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Preface

The *10th International Scientific-Business Conference LIMEN 2024 – Leadership, Innovation, Management and Economics: Integrated Politics of Research* gathered researchers and practitioners to discuss how organizations, economies, and public institutions were being reshaped by leadership dynamics, technological change, sustainability imperatives, and evolving policy environments. Held in hybrid format on **December 5, 2024,** at the **Vienna University of Technology (TU Wien), Austria**, LIMEN 2024 continued its mission of connecting scientific research with practical decision-making in business and public life.

The papers published in these *Conference Proceedings* reflected the conference's interdisciplinary scope and its focus on research that informed responsible management, innovation, and sustainable development. A strong thematic stream addressed **leadership and organizational sustainability**, including analyses of destructive leadership and its consequences in healthcare, leadership for social impact, generational change in SME leadership, and the role of managerial personality. These contributions highlighted how leadership behaviors and values influenced organizational effectiveness, employee outcomes, and long-term resilience.

Another prominent area of research examined **human resources, motivation, and contemporary workplace challenges**. Studies explored employer branding in the digital age, employee competence and motivation in hospitality, volunteering and early-career decisions, and emerging perspectives on social responsibility and corporate image. These papers emphasized that competitiveness increasingly depended on people-centered strategies, talent attraction, and sustainable work environments.

Artificial intelligence, digital transformation, and cybersecurity formed a central pillar of LIMEN 2024. Contributions addressed AI and intellectual capital, chatbots and service quality in the public sector, AI in anti–money laundering, software security "by design," data-driven campaign strategies, and IoT-based and cloud-oriented solutions in healthcare systems. The proceedings also included analyses of disruptive technologies, cybercrime, and the economic impact of cybersecurity risks, demonstrating how digital progress created new opportunities while raising new governance and protection requirements.

The volume also provided extensive insights into **innovation, entrepreneurship, and strategic management**. Papers investigated innovation performance and benchmarking frameworks, business model innovation and the metaverse, social innovation paradigms, greener supply chain adoption, consultancy for non-governmental organizations, logistics due diligence, and service recovery strategies in tourism and hospitality. Together, these studies offered practical frameworks for organizations seeking growth through innovation while maintaining accountability and sustainability.

Macroeconomic and public policy questions were well represented. Contributions examined globalization and inequality, poverty and social exclusion indicators, fiscal rules and political cycles, inflation dynamics, investment funds, public financing under crisis conditions, and the role of taxation principles in strengthening tax systems. Several papers focused on regional development, infrastructure performance, and investment attraction, underscoring the importance of evidence-based policy in supporting inclusive growth.

Energy transition and environmental sustainability appeared throughout the proceedings, including studies on renewable energy interest, hydrogen transition in refining, food system inde-

pendence, sustainable city development through building renovation, and sustainable mobility attitudes. These topics highlighted the increasing integration of sustainability goals into economic planning, corporate strategy, and public governance.

LIMEN 2024 was organized by the **Association of Economists and Managers of the Balkans – UdEkoM Balkan** and co-organized with the **Institute of Business Economics and Industrial Sociology, Faculty of Mechanical Engineering & Economics Sciences, Graz University of Technology**. The conference was supported by an international network of partners, including academic institutions and professional organizations, which strengthened the conference's international reach and ensured a broad exchange of perspectives.

Taken together, the contributions in this volume document current research debates and practical solutions at the intersection of leadership, innovation, management, and economics. The LIMEN 2024 proceedings, therefore, serve as a resource for academics, practitioners, and policymakers interested in translating research into practical strategies, balancing competitiveness with responsibility, and innovation with long-term societal value.

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Organisational Sustainability – The Effects of Destructive Leadership on Organisational Effectiveness in Healthcare Organisations

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Abstract: *This systematic literature review examines the latest findings on destructive leadership within the healthcare sector, focusing on its impact on employee well-being, organizational effectiveness and patient care outcomes. Using databases such as PubMed, PsycINFO and Scopus, peer-reviewed studies published in the past five years were analysed to ensure the inclusion of current research. The review prioritises studies with rigorous methodologies, including longitudinal designs and meta-analyses, to provide robust insights.*

The findings reveal that destructive leadership, including toxic leadership and abusive supervision, significantly contributes to burnout, emotional exhaustion and reduced job satisfaction among healthcare professionals. Additionally, such leadership behaviours negatively affect organizational performance and patient care quality. Contextual factors, such as the high-stress environment of healthcare settings, were identified as catalysts for destructive behaviours, underscoring the role of organizational culture and leadership training in mitigating these effects.

1. INTRODUCTION

Destructive leadership within the healthcare sector has emerged as a critical area of concern, particularly due to its profound implications for employee well-being, organizational effectiveness, and patient care outcomes. Recent literature highlights the multifaceted nature of destructive leadership, encompassing various detrimental behaviours that can significantly affect healthcare professionals and the overall healthcare environment. This literature review synthesizes the latest findings on destructive leadership in healthcare, focusing on its definitions, impacts, and potential interventions.

Destructive leadership is characterized by systematic and repeated behaviours that undermine the legitimate interests of the organization and harm subordinates (Aasland et al., 2010; Akstinaite et al., 2022). Aasland et al. (2010) highlight that destructive leadership behaviours, including passive forms like laissez-faire leadership, are prevalent in various organizational contexts, including healthcare. This prevalence is concerning, as it suggests that many healthcare professionals may be subjected to leadership styles that can lead to negative outcomes such as emotional exhaustion and decreased job satisfaction (Koç, Bozkurt, et al., 2022; Palvimo et al., 2023). Research by Koç, Şahin et al. (2022) emphasize that toxic leadership, which is a subset of destructive leadership, is particularly rampant in healthcare organizations. The authors argue that the unique stressors inherent in healthcare settings, such as high workloads and emotional demands, exacerbate the effects of toxic leadership, leading to increased emotional exhaustion among employees. This aligns with findings from Molino et al. (2019), who demonstrate

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that destructive leadership behaviours contribute to unsustainable working conditions, further aggravating the emotional toll on healthcare workers. In addition to that destructive leadership has an impact on patients' perceptions of care quality and therefore on patient care outcomes in the long run (Zaghini et al., 2020).

2. METHOD

In conducting a literature review on the latest findings in destructive leadership within the healthcare sector, a systematic approach was employed to gather, analyse, and synthesize relevant scholarly articles. The method involved several key steps, including defining the scope of the review, identifying relevant literature, evaluating the quality of the studies, and synthesizing the findings to draw comprehensive conclusions. The scope of the review was defined to focus specifically on destructive leadership behaviours in healthcare settings, particularly how these behaviours impact employee well-being, organizational effectiveness, and patient care outcomes. The literature search was conducted using academic databases such as PubMed, PsycINFO, and Scopus, targeting peer-reviewed articles published within the last five years to ensure the inclusion of the most current findings.

Once relevant articles were identified, they were evaluated for quality and relevance. This involved assessing the research design, sample size, and the robustness of the findings. For instance, studies that employed rigorous methodologies, such as longitudinal designs or meta-analyses, were prioritised. Articles by Mackey et al. (2021) and Li et al. (2024) provided comprehensive insights into the prevalence and impact of destructive leadership, making them valuable contributions to the review. Additionally, the review included studies that explored specific forms of destructive leadership, such as toxic leadership and abusive supervision, as these behaviours have been shown to have significant negative effects on healthcare professionals (Koç, Şahin, et al., 2022; Siyal et al., 2021).

The synthesis of findings involved categorizing the literature into themes that emerged from the data. Which were: 1. Impact und employees 2. Organisational challenges 3. Patient care outcomes 4. Intervention and Strategies. This led to defining key references and focus areas in which research highlighted the correlation between toxic leadership and emotional exhaustion among healthcare workers (Koç, Bozkurt, et al., 2022), indicating that such leadership styles contribute to burnout and decreased job satisfaction (Palvimo et al., 2023). Furthermore, studies by Zaghini et al. (2020) and Erschens et al. (2022) demonstrated that destructive leadership not only affects individual employees but also has broader implications for organizational performance and patient care quality.

3. RESULTS

Destructive leadership is characterized by behaviours that systematically undermine the well-being and performance of followers. It can manifest in various forms, including toxic leadership, abusive supervision, and laissez-faire leadership (Li et al., 2024). Toxic leadership, as defined by Koç, Bozkurt, et al. (2022) refers to a leadership style that fosters a hostile work environment, leading to emotional exhaustion among employees. This aligns with findings from Trépanier et al. (2019), who linked destructive leadership to adverse health outcomes for employees, including increased stress and burnout, which are particularly prevalent in nursing contexts due to staffing shortages and high turnover intentions. The implications of destructive leadership extend beyond individual health outcomes; they also affect organizational dynamics and patient care. Grill's research indicates that destructive leadership behaviours can diminish the meaning of work for employees, resulting in decreased productivity and engagement (Grill, 2023). Furthermore, Montano et al. (2023) conducted a meta-analysis revealing that destructive leadership styles correlate with increased levels

of affective symptoms and burnout among healthcare workers, ultimately leading to a decline in positive mental health outcomes. This suggests that the ramifications of destructive leadership are not only personal but also organizational, potentially compromising the quality of care provided to patients. The healthcare sector is particularly vulnerable to the effects of destructive leadership due to its high-stress environment and the emotional demands placed on healthcare professionals. Islam et al. argue that the dark side of leadership has been largely overlooked in healthcare settings, despite its potential to lead to catastrophic outcomes, including organizational failures (Islam et al., 2022). This observation is echoed by Zaghini et al. (2020), who found that nurse managers' leadership styles directly influence patients' perceptions of care quality, highlighting the critical link between leadership behaviour and patient outcomes. Moreover, the literature indicates that destructive leadership can exacerbate existing challenges within healthcare organizations. Fors Brandebo's study (2020) identifies various destructive leadership behaviours, both task-related and relationship-related, that can lead to increased conflict and reduced morale among staff. This is particularly concerning in crisis situations, where effective leadership is paramount. Keselman and Saxe-Braithwaite emphasize that unethical leadership can lead to disappointment and distrust among followers, further diminishing organizational effectiveness and negatively impacting patient care (Keselman & Saxe-Braithwaite, 2021). The mechanisms through which destructive leadership affects employee outcomes are complex and multifaceted. For instance, Erschens et al. (2022) found that perceived leadership styles significantly correlate with the subjective well-being of employees, suggesting that negative leadership perceptions can lead to increased cynicism and disengagement. Similarly, Palvimo et al. (2023) highlight the associations between destructive leadership, job demands, and burnout among nurses, indicating that the stressors introduced by poor leadership can lead to detrimental outcomes for both employees and patients. In addressing the issue of destructive leadership, it is essential to consider potential interventions and strategies for mitigating its effects. For instance, fostering a culture of ethical leadership and promoting authentic leadership practices can serve as protective factors against the negative impacts of destructive leadership. Mackey et al. (2021) suggest that organizations should focus on leadership development programs that emphasize constructive leadership behaviours to counteract the prevalence of destructive leadership. Additionally, the implementation of feedback mechanisms and support systems for employees can help identify and address destructive behaviours before they escalate. Furthermore, the literature underscores the importance of understanding the contextual factors that contribute to destructive leadership. For example, Tafvelin et al. (2023) highlight the role of leaders' working environments and stress levels in influencing their leadership behaviours, suggesting that addressing these underlying issues may help reduce the prevalence of destructive leadership. This perspective aligns with findings from Kousha et al. (2022), who emphasize the need for regular assessments of workplace incivility and leadership practices to enhance organizational performance.

These findings can be summarized as contextual and systemic factors which trigger destructive leadership. Meaning organisational culture, as well as leadership stressors and, as in the healthcare sector, high-stress environments lead to favour destructive leadership behaviour. Organisational culture can cause a significant impact on such behaviour if toxic behaviour can persist unchecked and the absence of feedback systems allows harmful leadership to go unnoticed (Kousha et al., 2022). Leadership stressors may lead to overworked managers who are prone to harmful behaviours (Erschens et al., 2022) and unaddressed emotional strain has a high effect on personal interactions both positively and negatively (Montano et al., 2023). As another factor, high-stress conditions in the healthcare environment result most likely from constant pressure, as well as staffing shortages and high emotional demands challenging leadership and staff alike (Mullen et al., 2018). In addition to that, poor leadership in crisis situations may even lead to an escalation of a dire situation and worsen problems (Fors Brandebo, 2020).

As a result, the recent scientific literature suggests several countermeasures in order to prevent destructive leadership from spreading in healthcare organisations. Though healthcare is most likely to stay a high-stress environment, the authors' suggestion mainly focuses on the organisational culture as well as on leadership development. First of the literature sees a high potential in ethical leadership and the implementation of training programs emphasizing on ethical and authentic leadership behaviours (Mackey et al., 2019). Another strategy would be to promote transformational leadership by encourage leaders to inspire and support employees through being a positive role model (Lundmark et al., 2021) Finally, a regular assessment of leadership practices and workplace incivility may help in establishing a positive leadership culture and to prevent leadership stressors (Kousha et al., 2022).

On the other hand, changes to the organisational culture may also have a high impact on combating destructive leadership. Celebi Cakiroglu and Tuncer Unver (2024) suggests fostering a supportive culture by developing an open communication environment to address destructive behaviours early. In addition to that, the introduction of an anonymous feedback system might be helpful to create an early warning system in regards of identification of leadership problems. Since high stress is one of the main reasons for destructive leadership behaviour (Tafvelin et al., 2023) suggested to provide resources for managers to reduce stress. This would lead to preventing burnout, as well as it would improve decision making and therefore reduce the probability of becoming prone to destructive leadership behaviour.

4. FUTURE RESEARCH DIRECTIONS

While significant strides have been made in understanding destructive leadership in healthcare, several gaps remain in the literature. Future research should focus on longitudinal studies that examine the long-term effects of destructive leadership on employee outcomes and organizational performance. Additionally, there is a need for more nuanced investigations into the different types of destructive leadership behaviors and their specific impacts on various healthcare roles (Mackey et al., 2019; Schmid et al., 2018).

Moreover, exploring the role of organizational culture in moderating the effects of destructive leadership could provide valuable insights into how healthcare organizations can create environments that mitigate the negative impacts of toxic leadership. Understanding the interplay between leadership styles and organizational culture will be crucial for developing effective interventions aimed at promoting healthier workplace dynamics (Lundmark et al., 2021; Silver et al., 2023).

5. CONCLUSION

Destructive leadership is still a pervasive issue in healthcare. It has a significant negative impact on employees, causing burnout and emotional exhaustion and undermining organisational productivity. In addition to that, there is a negative impact on patient outcomes by reducing the quality of care. The main reasons for this are high-stress environments, which exacerbate destructive behaviour and organisational culture, which can both enable and mitigate such behaviour. Another factor is so-called leadership stressors, meaning that overworked leaders are more likely to engage in harmful behaviours and that unaddressed emotional strain can negatively affect interpersonal interactions.

There has been made some progress in understanding destructive leadership, but there are many knowledge gaps still existing. There is still a need for a deeper insight into the long-term effects of destructive leadership in the healthcare sector and how specific behaviours have an effect on

the various healthcare roles. Additionally, it will be helpful to understand even more the mutual effects of leadership styles and organisational culture in terms of mitigating or promoting destructive leadership. In order to foster healthier workplaces, improve organisational effectiveness and enhance patient care outcomes, it will be crucial to combat destructive leadership.

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Modern Organizational Leadership for Social Impact: Transformative Organizational Challenges and Future Implications

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Transformative leadership

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Abstract: *This paper examines the critical role of modern organizational leadership in fostering sustainable social impact amid the challenges of contemporary management structures. Focusing on the "too much management" syndrome, which often limits organizational responsiveness to social needs, the paper advocates for a transformative shift toward ethical leadership models. Drawing from ethical leadership framework and Social Capital Theory, the analysis explores how ethical leadership prioritizes trust, transparency, and community engagement, enhancing social capital within organizations. Through case studies and theoretical insights, we demonstrate how these leadership practices contribute to resilience, accountability, and a purpose-driven workforce. Finally, the paper discusses future implications, emphasizing the need for leadership models that align business strategy with social responsibility to build sustainable organizations capable of adapting to socio-economic shifts and fostering long-term community impact.*

1. INTRODUCTION

In today's organizational landscape, an overwhelming focus on management routines often overshadows the potential of leadership to create meaningful social impact. Known as the "too much management syndrome" (Kotter, 1990), this phenomenon prioritizes operational efficiency, task completion, and control over the development of a purpose-driven culture and long-term value creation. While management is essential for organizational structure, an overemphasis can lead to rigid practices that undermine innovation, ethical responsibility, and social engagement (Mintzberg, 2004). This overreliance on management can inhibit an organization's adaptability to complex societal needs, thereby limiting its capacity to contribute to social progress (Senge, 1990).

This paper seeks to analyse the role of ethical leadership in fostering sustainable social impact through behaviour that embodies responsibility, integrity, and a focus on collective well-being. Rather than viewing leadership as merely a phase of management, the approach discussed here envisions leadership as a catalyst for sustainable, inclusive practices that promote long-term social value (Maak & Pless, 2006). By centering leadership on ethical decision-making and relationship-building, this perspective emphasizes the unique capacity of leaders to champion and drive positive social change within their organizations and communities (Greenleaf, 1977; Porter & Kramer, 2011).

To frame this discussion, we draw on Maak and Pless's (2006) model of ethical leadership and Social Capital Theory (Putnam, 2000) as two key frameworks for understanding how leadership can cultivate trust-based, sustainable organizational cultures. Maak & Pless's model provides a foundation

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for responsible leadership that is attuned to stakeholder needs and values, focusing on relational dynamics and moral responsibility. Social Capital Theory, which highlights the importance of trust, networks, and mutual obligations within a group (Coleman, 1988), further supports this approach by outlining the mechanisms through which ethical leadership can strengthen social bonds and cooperation within an organization. Together, these frameworks provide a foundation for examining how leadership, when aligned with ethical principles and social capital, can transform organizations into socially impactful entities capable of addressing broader societal challenges (Fukuyama, 1995).

2. THEORETICAL FOUNDATIONS: ETHICAL LEADERSHIP FOR SUSTAINABLE SOCIAL IMPACT

2.1. Ethical Leadership: Framework and Applications

Ethical leadership serves as a foundational element for organizations aiming to create sustainable social impact. Ethical leaders prioritize transparency, integrity, and the welfare of employees and stakeholders, positioning themselves as moral agents within the organization. By embedding ethical principles into their leadership approach, they foster a work culture that encourages responsible practices and moral integrity (Brown & Treviño, 2006). Ethical leadership is more than just compliance with rules; it involves leaders who genuinely care about the well-being of their teams, making decisions that benefit not only the organization but also society at large.

Maak and Pless (2006) offer a distinctive model of ethical leadership that emphasizes relational and responsible leadership. In their framework, relational leadership prioritizes building and maintaining strong relationships over simply achieving task completion. Ethical leaders, in this view, are community-centered and encourage an environment where social responsibility and community engagement are paramount (Maak & Pless, 2006). These leaders are deeply aware of the interconnectedness between their organization and the broader social landscape, positioning them as stewards of ethical responsibility and drivers of positive societal impact (Pless, 2007).

Ethical leadership has a significant impact on organizations by fostering trust, inclusion, and reciprocity, both within the organization and in its external interactions (Brown et al., 2005). By promoting a culture of transparency and accountability, ethical leaders enhance employee engagement, increase retention, and create a positive ripple effect that extends into the community (Caldwell et al., 2010). Ultimately, ethical leadership contributes to sustainable social impact by shaping organizations into entities that prioritize long-term social value over short-term gains.

2.2. Social Capital Theory: Building Blocks for Sustainable Impact

Social Capital Theory offers a valuable lens through which to understand the impact of ethical leadership on organizational resilience and sustainable social outcomes. Social capital refers to the value derived from networks, norms, and trust that facilitate coordination and cooperation within a group (Putnam, 2000). Within organizations, social capital encompasses the relationships and shared values that enable cohesive and collaborative work environments, ultimately supporting ethical organizational cultures (Nahapiet & Ghoshal, 1998).

Social capital comprises three key components: bonding, bridging, and linking capital. Bonding capital refers to the internal cohesion within groups, fostering strong, trust-based relationships that facilitate support and unity (Coleman, 1988). Bridging capital involves the connections between diverse groups, which enable organizations to gain fresh insights, exchange ideas, and adapt to

external changes. Linking capital, on the other hand, pertains to connections across status or hierarchical differences, which can facilitate access to resources and information that might otherwise be difficult to obtain (Woolcock, 1998). Together, these components create a foundation for organizational resilience, adaptability, and long-term success (Fukuyama, 1995).

For modern organizations, strong social capital is essential for fostering a sustainable and ethical organizational culture. High levels of bonding and bridging capital support knowledge sharing, enhance collective problem-solving, and encourage a spirit of inclusivity and collaboration (Adler & Kwon, 2002). Linking capital is particularly critical in hierarchical structures, where cross-status relationships help to break down silos and encourage upward and downward flows of information (Lin, 2001). Ultimately, social capital enables organizations to leverage ethical leadership effectively by providing a robust network of trust and cooperation, which supports sustainable social impact.

3. THE "TOO MUCH MANAGEMENT" SYNDROME: IMPLICATIONS FOR SOCIAL RESPONSIBILITY

In many modern organizations, an excessive focus on management has created a "too much management" syndrome, which can stifle social responsibility by prioritizing control and productivity over culture and ethical values. Management practices typically emphasize efficiency, task completion, and adherence to protocols, which, while essential for structure, often limit an organization's flexibility in addressing complex social needs (Mintzberg, 2004). Kotter (1990) distinguishes between management and leadership by highlighting that management is oriented towards maintaining order and stability, while leadership inspires change and adaptation. This overemphasis on management creates a gap where organizations may miss opportunities to integrate social responsibility into their core operations, as managerial approaches tend to focus narrowly on short-term gains rather than long-term societal impact.

To address this, a balanced approach that integrates ethical leadership is essential. Ethical leadership emphasizes a dual focus on operational efficiency and social responsibility, bridging the gap between strict management practices and socially impactful leadership. Ethical leaders encourage their teams to engage with community needs and foster a culture of accountability and social engagement that management alone may not achieve (Brown et al., 2005). This balanced approach allows organizations to maintain productivity while also being adaptable, responsive, and attuned to societal challenges, a critical factor for sustainable success in today's complex and interconnected world (Caldwell et al., 2010).

The concept of an "ethical leadership threshold" is essential for understanding how leaders can transcend traditional management roles to promote social good actively. Maak and Pless (2006) describe ethical leadership as a threshold where leaders move beyond simply managing resources and focus instead on creating value that benefits both the organization and society. Reaching this threshold requires leaders to adopt a relational and community-oriented approach, where they see themselves not just as managers but as stewards of societal well-being. By emphasizing relational and moral responsibilities, ethical leaders advocate for sustainable practices that contribute positively to society, thereby reinforcing a culture that goes beyond the organization's immediate interests (Pless, 2007).

In modern organizations, crossing this threshold means that leaders work across all organizational levels to encourage responsible decision-making, foster open dialogue, and build an inclusive and socially responsive culture (Maak & Pless, 2006). Ethical leaders not only model social responsibility themselves but also empower their teams to make ethical choices, engage in social

initiatives, and contribute meaningfully to the community (Brown & Treviño, 2006). This shift represents a transformative approach to organizational leadership, where ethical considerations and social impact become integral to business strategy rather than peripheral concerns, ultimately promoting a socially responsible organizational identity that aligns with the broader societal goals of sustainability and inclusivity (Porter & Kramer, 2011).

4. BUILDING SOCIAL CAPITAL THROUGH ETHICAL LEADERSHIP

A significant challenge for modern organizations is establishing trust across various levels, from employees to external stakeholders. Trust is crucial for fostering collaboration and ensuring commitment to shared values, which are essential for a sustainable social impact (Fukuyama, 1995). Ethical leaders play a pivotal role in building this trust by engaging transparently with employees and stakeholders, thereby reducing barriers to cooperation and promoting an environment conducive to open dialogue (Maak & Pless, 2006).

Social capital theory underscores trust as a foundational element that binds social networks and strengthens relationships within organizations, facilitating both organizational goals and alignment with social values (Putnam, 2000). Trust enables the development of reciprocity, as stakeholders feel assured that their contributions are respected and reciprocated within the organization, fostering a cooperative atmosphere that is more resilient to challenges (Coleman, 1988). When trust is cultivated by ethical leaders, it aligns with the core goals of social capital theory, helping to establish an organization where collaboration, ethical conduct, and social responsibility are deeply interwoven into the cultural fabric (Nahapiet & Ghoshal, 1998).

Another major challenge is promoting inclusion and engagement within diverse organizational structures, where hierarchical or departmental divides may limit opportunities for broad engagement and collaborative action (Adler & Kwon, 2002). Ethical leaders address this by advocating for inclusive practices that ensure all voices are considered in decision-making processes, enabling a broader range of perspectives and ideas to be heard (Maak & Pless, 2006).

Inclusive leadership not only reinforces trust but also contributes to "bridging" social capital by expanding networks and connecting different groups within the organization (Putnam, 2000). When employees feel included, they are more likely to participate actively and contribute diverse perspectives, which can strengthen the organization's capacity to address social challenges and create innovative solutions. This inclusivity not only aligns with the goals of social capital theory but also helps in meeting social impact objectives, as diverse contributions enhance the organization's reach and influence on social issues (Bourdieu, 1986).

In today's dynamic social and economic environments, resilience is essential for organizations aiming to maintain their social impact and adapt to changing conditions. Ethical leaders build resilience by fostering community relationships that can support the organization through crises, making it more adaptable and responsive (Fukuyama, 1995). This approach aligns with the concept of "linking" social capital, which involves connecting with external resources that can be instrumental during challenging times (Woolcock, 1998).

By establishing strong external networks and partnerships, ethical leaders enable the organization to access additional resources, knowledge, and support, which enhance its resilience in times of adversity (Lin, 2001). Linking social capital not only provides the organization with a buffer against uncertainties but also strengthens its ability to make a sustainable social impact by integrating

community needs and resources into its operations. Through community engagement, organizations become embedded in a broader social ecosystem, contributing to both their longevity and their capacity to address social issues effectively (Portes, 1998).

5. TRANSFORMATIVE APPLICATIONS OF SOCIAL CAPITAL FOR SUSTAINABLE SOCIAL IMPACT

Modern organizations face the critical challenge of shifting from profit-centric models to those that equally prioritize social impact as a key performance indicator. This shift reflects a more holistic approach to value creation, where financial goals are balanced with positive societal contributions (Carroll, 1991). Porter and Kramer's (2011) Creating Shared Value (CSV) framework provides a pathway for this transformation by aligning business success with social progress. CSV encourages leaders to view social issues as opportunities for competitive advantage, thus integrating social goals directly into the corporate strategy.

The implementation of shared value models has been observed in companies like Nestlé and Novo Nordisk. Nestlé's approach to sustainable agriculture and Novo Nordisk's efforts in diabetes care exemplify how organizations can drive both profit and social good. By prioritizing social impact alongside financial objectives, these companies create a more comprehensive value system that benefits society and strengthens organizational reputation and trust within communities (Porter & Kramer, 2011). Social capital theory supports this model, highlighting that organizations with strong external and internal trust networks can better adapt to social challenges and leverage those relationships for sustainable impact (Putnam, 2000).

Embedding ethical leadership across all organizational levels remains a significant challenge. Ethical practices must transcend top management to become a pervasive part of the corporate culture, ensuring that all employees internalize and act in accordance with the organization's social and ethical commitments. Senge's (1990) concept of the Learning Organization offers a foundation for achieving this, emphasizing continuous development where employees are empowered to learn ethical, socially responsible behaviors.

When social responsibility and ethical leadership become ingrained in corporate culture, social capital is strengthened through shared values, norms, and mutual trust. This alignment ensures that every member of the organization contributes to its social objectives, creating a resilient and ethically committed community. Furthermore, a culture embedded with ethical practices supports bonding social capital, reinforcing internal cohesion and accountability (Coleman, 1988). As Maak and Pless (2006) argue, ethical leaders are responsible for cultivating relationships that foster trust and engagement, key components for sustainable organizational impact.

Addressing complex social issues often requires organizations to work beyond their internal capacities, leveraging ecosystem partnerships to extend their reach and impact. This challenge is compounded by the need to foster collaborations across sectors, including nonprofit organizations, government agencies, and other corporate entities. Ecosystem thinking, which underscores the value of building inter-organizational partnerships to achieve large-scale social change, finds a practical application in structured approaches like the Dynamic Innovation framework, where co-operation with partners is a central strategic element (Planck et al., 2024).

By fostering these partnerships, organizations build bridging social capital, which connects them to diverse resources, expertise, and communities. Ecosystem partnerships are especially beneficial

for tackling large-scale social challenges like climate change, poverty, and healthcare access. Through collaborative networks, organizations can achieve broader and more sustainable social impact than they could in isolation (Adler & Kwon, 2002). These networks enable shared knowledge, pooled resources, and collective action, which amplify the organization's social impact while also creating shared value for all stakeholders involved (Fukuyama, 1995).

6. IMPLICATIONS FOR FUTURE ORGANIZATIONAL LEADERSHIP

Implication: The development of social capital significantly enhances organizational resilience, as it builds an adaptable and supportive culture. Social capital within organizations fosters networks of trust, knowledge-sharing, and cooperation, which are essential in navigating unpredictable challenges and change. In alignment with Putnam's (2000) foundational work, research has consistently shown that organizations with strong social capital can better withstand economic and social disruptions by leveraging mutual support and shared resources (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998).

Theory: Putnam (2000) identified social capital as a crucial component of societal and organizational resilience, asserting that it enables communities and institutions to flourish even in adverse conditions. Contemporary studies have expanded on this concept, emphasizing that social capital contributes to organizational innovation, adaptability, and a sustainable competitive edge (Lengnick-Hall et al., 2011; Baker & Dutton, 2017).

Future Vision: Leaders who prioritize social capital will cultivate organizations capable of enduring economic, environmental, and social shifts. These leaders will foster inclusive networks and resource-sharing, allowing for collective innovation and community-oriented support. Research by Lengnick-Hall et al. (2011) further emphasizes that resilience in organizations stems from an embedded culture of social capital, which strengthens their capacity to adapt to and recover from crises effectively.

Implication: Ethical leadership involves a high degree of transparency and accountability in reporting social impact. This transparency fosters trust and strengthens social capital both within the organization and in the external community. Tools such as ESG (Environmental, Social, and Governance) metrics and Social Return on Investment (SROI) enable organizations to track and communicate their social impact, ensuring that they are held accountable to both stakeholders and society (Eccles et al., 2014; Clark et al., 2015).

Frameworks: With the growth of ESG and SROI frameworks, organizations have clearer standards for reporting and improving social and environmental impacts, aligning business goals with social responsibility (Eccles et al., 2014). Studies show that adopting these frameworks can also enhance investor trust and employee engagement (Friede et al., 2015). The focus on accountability aligns with the idea that transparency strengthens social capital, as individuals are more likely to support organizations they view as responsible and socially committed (Maak & Pless, 2006).

Future Focus: Moving forward, organizations with strong accountability frameworks will be more likely to gain trust and legitimacy in their markets and communities, thus reinforcing their social capital and enhancing long-term sustainability. Research indicates that transparent impact reporting not only builds public trust but also aligns organizations with their purpose-driven goals, creating a virtuous cycle of trust and responsibility (Serafeim, 2020; Porter & Kramer, 2011).

Implication: A purpose-driven approach to work significantly influences employees' commitment to the organization's social values, fostering deeper engagement, motivation, and job satisfaction. Research by Maak and Pless (2006) on ethical leadership suggests that meaningful work aligned with social values can boost intrinsic motivation and enhance bonding social capital within an organization. Employees who feel aligned with the organization's mission are more resilient, engaged, and dedicated to the social mission (Kahn, 1990; Grant, 2008).

Theory: The concept of meaningful work is linked to social capital, as employees find intrinsic motivation through purposeful and value-aligned tasks. Theories on motivation and engagement propose that employees working within organizations that emphasize social impact experience higher job satisfaction, which can lead to stronger interpersonal connections and a greater sense of loyalty (Hackman & Oldham, 1976; Wrzesniewski, 2003). These connections, in turn, contribute to a culture of bonding social capital, which supports both individual and collective growth (Kanter, 1983).

Impact: A purpose-driven culture enhances social capital by creating an engaged and resilient workforce. This sense of purpose aligns employees' personal values with the organization's social mission, thus driving commitment and collaboration. Research indicates that purpose-driven organizations experience higher levels of employee retention and productivity, as well as stronger alignment with long-term goals (Ryan & Deci, 2000; Rosso et al., 2010).

7. CONCLUSION

Ethical leadership plays a pivotal role in establishing social capital, enabling organizations to foster trust, collaboration, and community responsibility, which in turn drives sustainable social impact. Ethical leaders, as Maak and Pless (2006) articulate, are not merely managers but champions of values such as transparency, fairness, and a commitment to stakeholders' welfare. By emphasizing relational and responsible leadership, they build bonding, bridging, and linking social capital (Putnam, 2000), allowing organizations to operate as cohesive, resilient entities. This relationship-based approach to leadership has been reinforced by recent studies, suggesting that socially responsible leaders can drive more sustainable outcomes by embedding social responsibility into the organizational culture (Cameron, 2008). Social capital theory, therefore, is essential for creating organizations that are not only economically viable but also socially impactful (Coleman, 1988; Adler & Kwon, 2002).

The shift from traditional, management-centric approaches toward ethical, transformative leadership is crucial for organizations that aim to thrive in today's socially conscious landscape. In management-driven models, the emphasis is often on productivity and control, which can stifle the adaptability required for long-term resilience. Ethical leaders go beyond these constraints, prioritizing stakeholder well-being and integrating social goals into business strategy (Porter & Kramer, 2011). This shift fosters cultures that balance operational efficiency with social purpose, a combination increasingly demanded by stakeholders and critical for addressing global challenges (Freeman & Auster, 2011; Christensen et al., 2016). Leaders who emphasize social impact and responsibility empower employees, strengthen organizational identity, and enhance trust within communities (Senge, 1990). Consequently, moving towards transformative, ethical leadership is more than a trend—it is a requisite for future-forward, resilient organizations.

Future research should explore the long-term effects of social capital within organizational leadership, particularly concerning resilience, adaptability, and community impact. The need for empirical studies on how social capital and ethical leadership intersect to promote resilience in organizations across diverse cultural and economic contexts is significant (Lengnick-Hall et al.,

2011; Nahapiet & Ghoshal, 1998). Additionally, examining the role of social capital in fostering collaboration and cross-sector partnerships will provide insights into how organizations can scale their impact while maintaining social integrity (Aguinis & Glavas, 2012; Lengnick-Hall et al., 2011). Finally, research that evaluates how organizations embed ethical leadership in corporate governance will offer guidance on establishing enduring frameworks for social responsibility. These studies will be vital in shaping future organizational models that prioritize ethical leadership and social capital as drivers of sustainable impact.

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Sustainability Aspects of Generational Change in the Leadership of Small and Medium Enterprises in Hungary

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Abstract: *Generational change in small and medium-sized enterprises (SMEs) is an influential moment that carries great implications for sustainability. This study explores the sustainability dimensions of generational transitions within Hungarian SMEs, focusing on the challenges and opportunities of this process. Drawing on qualitative interviews with family business owners and their successors, the research highlights the integration of sustainable business practices as a critical factor during ownership and leadership handovers. Findings reveal that while many SMEs face risks such as loss of institutional knowledge, generational change also presents opportunities to develop sustainable practices. The study emphasizes the importance of strategic succession planning and fostering intergenerational collaboration to meet environmental, social and governance (ESG) goals.*

1. INTRODUCTION

Small and medium-sized enterprises (SMEs) play a crucial role in national economies, particularly in Hungary, where they constitute a significant portion of the business sector. However, as many SME founders approach retirement, the need for effective generational change becomes increasingly pressing (Purczel, 2023). This transition presents both risks and opportunities, particularly in terms of sustainability. This paper examines how generational change influences sustainable business practices and what strategies can be implemented to ensure a smooth transition while maintaining environmental, social, and governance (ESG) goals.

2. RESEARCH AIM

This research aims to explore the impact of generational change on the sustainability and continuity of small and medium-sized enterprises (SMEs) in Hungary. By analyzing the challenges and opportunities arising during ownership and leadership transitions, the study seeks to identify key factors that influence successful generational succession. Furthermore, the research will investigate the role of sustainability attitudes across different generations and examine strategic approaches — such as knowledge transfer, intergenerational collaboration, and structured succession planning — that contribute to long-term business resilience. The ultimate goal is to provide insights and recommendations that facilitate smoother generational transitions while integrating environmental, social, and governance (ESG) principles into SME leadership practices.

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3. LITERATURE REVIEW

Generational change in SMEs: Generational transitions in SMEs have been widely studied, with research indicating that only one-third of enterprises successfully navigate their first transition (Virágh, 2018). The failure to properly manage succession can lead to business dissolution, economic instability, and job losses. Hungarian studies highlight that succession planning is often neglected, resulting in increased risks during ownership transfers (Kozák, 2019).

Sustainability in SMEs: Sustainability is increasingly recognized as a key factor in business continuity and success. SMEs that integrate sustainability into their operations are more likely to enhance their competitiveness and long-term viability. However, sustainability attitudes among SME leaders vary, with younger generations often placing greater emphasis on ESG factors. Studies by Kovács (2020) and Tóth (2021) suggest that Hungarian SMEs have started integrating sustainability initiatives, but gaps remain in strategic planning and implementation.

Theoretical frameworks on sustainability and succession planning: Several theoretical models provide insight into the intersection of sustainability and generational change. Stakeholder theory suggests that SMEs must consider the interests of employees, customers, and regulators when implementing sustainability measures. Additionally, resource-based theory emphasizes the importance of knowledge transfer and innovation in achieving competitive advantage during succession.

The reviewed literature presents varying perspectives on generational change and sustainability in Hungarian SMEs.

- Kozák (2019) emphasizes the importance of structured succession planning, noting that many SMEs fail due to a lack of preparedness. This contrasts with Virágh (2018), who attributes generational change failures primarily to resistance from older owners.
- Kovács (2020) and Tóth (2021) emphasize that younger entrepreneurs show a stronger commitment to sustainability but lack strategic implementation frameworks.
- László (2022) highlights knowledge transfer as the key element in successful transitions, proposing mentorship and structured training programs. This complements Purczel (2023), who focuses on statistical trends in SME transitions and identifies systemic economic factors affecting the sustainability of Hungarian SMEs.

Overall, the literature suggests that a holistic approach—incorporating structured succession planning, sustainability integration, and intergenerational collaboration—offers the best pathway for SMEs to navigate generational change successfully.

4. ACTORS OF GENERATIONAL CHANGE

Generational change in SMEs involves multiple key actors, each playing a crucial role in ensuring a smooth transition. The primary actors in this process are shown in Table 1.

Table 1. The primary actors of generational change

Actor	Roles	Generation
Old generation	Founder, owner, leader	**Baby Boomer**
New generation	Owner, leader	X, Y
Key corporate people	Managers, employees	X, Y, Z
Outsiders	Consultants, experts	X, Y

Source: Own research

- Founders and current owners: Typically, these individuals are the first-generation business leaders who have built and established the enterprise. Their role is to prepare the business for transition, transfer knowledge, and facilitate succession planning. However, resistance to change and reluctance to relinquish control are common challenges.
- Successors: Often family members or trusted long-term employees, successors take over the business leadership. Their ability to adapt to modern business practices, embrace sustainability, and effectively lead is crucial for the business's future.
- Employees and key stakeholders: Employees are directly impacted by generational change, as leadership transitions may result in organizational restructuring and shifts in business strategy. Engaging employees in the transition process can improve retention and knowledge continuity.
- External advisors and consultants: Experts in business succession, legal frameworks, and financial planning play an essential role in guiding SMEs through the complexities of generational change. Their expertise helps mitigate risks and ensure regulatory compliance.
- Government and policymakers: Legislative frameworks and government initiatives significantly influence generational transitions. Support programs, financial incentives, and regulatory policies can either facilitate or hinder the process.
- Customers and business partners: Business continuity depends on maintaining relationships with customers and partners. Successors must ensure that the transition does not disrupt operations, quality standards, or brand reputation.

A well-structured succession strategy that considers the roles and contributions of these actors can significantly improve the sustainability of SMEs undergoing generational change.

5. SUSTAINABILITY ATTITUDES OF DIFFERENT GENERATIONS

Sustainability perspectives and practices differ across generations, shaping how SMEs adapt to ESG principles. The key attitudes among different generations are summarized in Table 2.

Table 2. Sustainability attitudes of affected generations

Generation	Attitudes
Baby Boomer	Basic nature: saving.
Generation X	Sustainability is a sacrifice.
Generation Y	Our future is at stake.
Generation Z	(Not so) Green generation.

Source: Own research

- Older generation (founders and senior owners): Often prioritize business stability, profitability, and traditional practices over sustainability. Many are reluctant to implement ESG principles unless they see clear financial benefits. Their leadership style is typically hierarchical, with a focus on control and long-standing business relationships. Research suggests that older generations tend to be less engaged in corporate sustainability initiatives compared to younger cohorts (Williams & Schaefer, 2013).
- Middle generation (current leaders in transition)**:** Act as intermediaries between founders and successors. They are more open to integrating sustainable practices, but often struggle to implement them due to resistance from older leaders and financial constraints. They balance profitability with responsible business strategies, understanding the need for gradual change. Studies indicate that middle-generation business leaders play a crucial role in bridging traditional and innovative sustainability practices (Murphy, 2018).

- Younger generation (successors and future leaders)**:** Strongly committed to sustainability, digitalization, and innovative business models. They recognize the importance of ESG goals and actively seek to incorporate eco-friendly practices, fair labor policies, and corporate responsibility into their strategies. They also embrace digital tools for business efficiency and are more collaborative in decision-making. Research shows that younger generations, particularly Millennials and Generation Z, display a strong preference for sustainability-driven business models (Jones et al., 2017; Nielsen & Thøgersen, 2021).

6. FINDINGS AND DISCUSSION

The findings of this study indicate that generational change in SMEs presents both challenges and opportunities for sustainability. Key observations include:

- Loss of institutional knowledge: One of the primary risks associated with generational change is the potential loss of accumulated business expertise. Without proper succession planning, valuable institutional knowledge may not be transferred effectively, leading to operational inefficiencies and setbacks.
- Intergenerational conflicts: Differences in management styles, business priorities, and attitudes toward sustainability often create tension between outgoing and incoming generations. While older generations tend to focus on financial stability, younger successors may push for more sustainable and innovative business practices.
- Sustainability as a competitive advantage: Many younger successors recognize sustainability as a core component of long-term business success. SMEs that incorporate ESG strategies into their business models are more likely to achieve financial resilience and maintain strong stakeholder relationships.
- The role of digitalization: New generations bring technological advancements and digital tools into SME operations, helping to improve efficiency, reduce environmental impact, and enhance sustainability reporting practices.
- External support and policy incentives: Government programs, industry networks, and financial incentives play a crucial role in assisting SMEs through generational transitions. Access to sustainability funding and training programs can ease the adoption of ESG frameworks.

7. CONCLUSION AND RECOMMENDATIONS

Generational change in Hungarian SMEs is a critical process with profound sustainability implications. While the transition poses challenges, it also provides a unique opportunity to embed ESG principles into business operations. Based on the findings, the following recommendations can facilitate a successful and sustainable transition:

- Develop formal succession plans: SMEs should establish well-structured transition frameworks that integrate sustainability objectives. Training programs, mentorship initiatives, and early successor involvement can help preserve institutional knowledge.
- Foster an organizational culture that values sustainability**:** Intergenerational collaboration should be encouraged through knowledge-sharing platforms and leadership training, ensuring that sustainability remains a priority across generations.
- Leverage government and industry support programs: SMEs should utilize available financial incentives and sustainability grants to enhance their transition process and implement ESG-driven business models.
- Embrace digital solutions for sustainable operations: Digital transformation plays a crucial role in improving sustainability practices, reducing waste, and increasing operational efficiency.

- Engage stakeholders in the transition process: Maintaining strong relationships with employees, customers, and business partners during generational change ensures continuity and stability.

The findings of this study align with the research aim by demonstrating the critical impact of generational change on SME sustainability and continuity. The identified challenges and opportunities emphasize the importance of strategic succession planning, intergenerational collaboration, and sustainability integration. By implementing the recommended strategies, SMEs can effectively navigate leadership transitions while ensuring long-term resilience and adherence to ESG principles.

By implementing these strategies, Hungarian SMEs can not only survive generational change but also thrive in an increasingly sustainability-conscious business environment.

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The Manager`s Personality – Forged in the Heat of Determinism

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Abstract: *In the quicksand of our business world today, the figure of the manager appears like a fulcrum, a character expected to keep the business in balance no matter the circumstances, owing to some special skills and qualities. The ideal manager features a layered personality that brings together a wide variety of qualities and skills, just like in a colorful mosaic. The present paper tries to unveil one by one all the `layers` of the managers` inner structure and to understand how different forms of determinism generate particular features which altogether finally shape an efficient leader.*

1. INTRODUCTION

In a business environment permanently reshaped by the shockwave of the different political, social and economic upheavals of the 21st century, every company`s need for an `iron hand` that keeps everything under control is crucial. This `firm hand` comes in the form of an ideal manager with a strong and complex personality, able to respond quickly to the unexpected. The ideal manager features a layered personality that brings together a wide variety of qualities and skills, just like in a colorful mosaic.

Although the traits of the ideal manager have caused a lot of ink to flow, the question still stands as to what extent a manager`s qualities are the outcome of natural endowment, or that of education and hard work. Just like any other human, the figure of the manager features a layered personality, with innate and acquired characteristics, which crystallize the two main components of his personality - temperament and character. The intricate `construction` of the manager`s personality is the result of three major factors that model it and generate a triple determination: heredity, education, and social environment. While the temperament claims its interrelation with the genetic baggage, the character is modelled by the cultural, educational, and social environment. Therefore, what lies at the basis of the manager`s sophisticated `inner structure` is the ancient legacy he has inherited from his remote or direct ancestors. This `foundation` needs to be very strong as it holds the propensities and unleashed potential of any individual to accomplish certain things in life, including becoming a manager. Once the starting point is provided, other elements like culture, climate, gender, etc., come to exert their influence more or less significantly, to build up a unique identity.

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2. THE ECHOES OF THE ANCESTORS

In the attempt to get down to the foundation of any personality one can detect first of all *heredity*, an implacable element that helps us on the one hand, to acquire the `family heritage` straight from our direct predecessors, and on the other hand, allows us to bear a shred of the `genetic baggage` of the entire mankind. Therefore, the manager, just like any other human being, makes no exception to this rule.

Completely rejecting the empiricist `blank-state` theory according to which humans come to this world without any inborn knowledge, Jung (1991) believes that every human remains connected to the collective unconscious through some so-called `archetypes`. This `collective unconscious` contains a core of shared recollections and ideas that transcend the times and cultures and which all human beings identify with. Fundamental motifs of our evolutionary experience, these archetypes are inborn, instinctive and universal, expressed by various fundamental images and behavioural patterns which involuntarily manifest in us and are passed on to the next generations. Referred to as `the human genome`, this genetic legacy concentrates the entire evolutionary experience of the human race and transmits from generation to generation not only the physical characteristics but also an entire set of psychological factors, thus bringing about a double determination. The original combination of the physical and psychological elements generates a unique set of predispositions and abilities that mark our choices in life. Thus, the human being becomes both a recipient and a transmitter of a rich, millennium-old genetic legacy.

Overlapping different elements from theories like the `four humors' or the `four temperaments`, Jung proposes 4 main archetypes (The Persona, The Shadow, The Anima/Animus and The Self) and combines them into 12 archetypical figures (ruler, creator/artist, sage, innocent, explorer, rebel, hero, wizard/magician, jester, everyman, lover, caregiver) who represent the basic motivations of man and possess their values, significations and personality traits. Moreover, these 12 figures subsequently fall into 3 sub-categories based on the same motivation that fuels their existence: The Ego, The Soul, and The Self. According to Jung (1991), all these figures are reflected, even in small percentages, in every human, their combination giving rise to original and unique personalities. Over time, the quotas of these figures may fluctuate under the influence of our life events and personal development.

When it comes to managers, we believe that there are 4 figures that strive to cast the mould of their complex personality: first, the Ruler and the Creator, and in smaller percentages, the Wizard/Magician, and the Caregiver. In their endeavour to popularize Jung`s 12 archetypes, Mark and Pearson (2002) organized them into 4 individual groups who share the same inspirational or driving element: EGO (hero, magician, outlaw), ORDER (caregiver, creator, ruler), SOCIAL (jester, lover, member), and FREEDOM (explorer, innocent, sage). According to this classification, three of the four elements – *ruler, creator and caregiver* – are governed by the desire for order, while the *magician*`s touch springs straight from the manager`s ego.

Before anything else, any good manager needs to bear the spirit of a *Ruler*, whose main goals are order, control, and bringing structure to chaos. Secondly, a manager must be a *Creator*, as he usually finds comfort in working hard, dreams big, and feels the need to leave a mark on his field of activity by transposing his feelings, thoughts, and vision into a wide range of projects. This archetype yearns for authenticity and meaningful achievements, and his worst fears lie in mediocrity or complacency. Therefore, in leadership, the manager who bears this spirit can

stimulate innovation and creativity. At the same time, as a leader, he must also be a *Caregiver*, that is, a selfless, fair, generous, protective, and humane person who cares a lot about the problems and needs of the people who report to him. Last but not least, the manager also borrows from a *Magician* something that channels all the above qualities towards the aimed objectives – the intelligence, intuition and wit that help him to concoct strategies and tactics in the most unexpected situations, and the charisma to attract and influence the people around, or to stimulate their development.

Jung goes even further, considering that the ability to approach and experience the world depends on the dominance of the following 4 psychological functions in human beings - sensation, intuition, feeling, or thinking – which result in several dichotomies and can be expressed in an introverted or extroverted form (McLeod, 2024):

1) **Thinking (T) vs. Feeling (F):** `Thinking` individuals make decisions based on logic and objective considerations. `Feeling` individuals make decisions based on subjective and personal values.
2) **Sensing (S) vs. Intuition (N)**: `Sensing` individuals focus on present realities, tangible facts and details, being practical thinkers. `Intuitive` individuals focus on possibilities, interconnections, and future potential, often being abstract and theoretical thinkers.
3) **Extroversion (E) vs. Introversion (I):** `Extroverts` are oriented towards the outer world; they tend to be more outgoing and sociable, deriving energy from interaction with others and the external environment. `Introverts` are oriented towards the inner world, and they tend to be quiet and reserved, deriving energy from reflection, feelings, ideas, and experiences.

As generally there is only one prevailing function in everyone`s personality, we can conclude that managers are *`thinking extroverts`* because they rely basically on their judgment to approach the physical world. Therefore, they are analytical, strategic, logical, practical, realistic, hardworking, and aiming to be in control of everything; they are detail-oriented, and they have a knack for planning, implementing, and organizing others. Yet, we should not ignore or disregard the importance of a key ingredient in the managers` personality – intuition, which turns them into *`thinking intuitive extroverts`* and adds new qualities and skills to their personality. Consequently, they are also adventurous, outgoing, energetic, vivacious, enterprising, creative, innovative, seeking novelty and encouraging change; they make quick decisions, tend to see everything as a competition and are therefore good strategists and leaders. The other elements – sensing and feeling – are approached only to support and counterbalance the dominant feature.

In the same line of thought, Dias (2017) ruthlessly strikes at the very heart of the human nature, providing a mirror of the human personality exploded into 10 views, each revealing how the best and worst in human beings shape their beliefs and actions particularly in extreme situations: The Perceiver of Pain, The Ostraciser, The Tamer of Terror, The Beholder, The Aggressor, The Tribalist, The Nurturer, The Romancer, The Rescuer, and The Kinsman. These more or less powerful echoes of the same personality disguise a psychological mechanism that has evolved over great stretches of our evolutionary past to respond to certain repeating life problems. Its functioning interacts with our learned behaviour, our socialization. The nature and nurture connect and complicate Dias (2017); in other words, they are adaptive responses to all the challenges encountered in our evolutionary journey. From this perspective, a real manager, who is a superior, educated human being, seems to have managed to silence 9 of the above-mentioned echoes, giving full voice to the *Rescuer*, owing to his heartfelt altruism, which ennobles him in his double position of human being and professional.

3. THE IMPULSE OF EDUCATION AND SOCIAL ENVIRONMENT

Yet, heredity is not to be blamed for everything in life! Although it considerably influences the working of our brain, which is the control panel of our impulses, tendencies, temperaments, or thinking, the genes (genotype + phenotype) provide only the point of departure in a human`s life. Both the genotype (all the genes inherited from our parents) and the phenotype (the genotype`s interface or visible manifestation) push humans towards particular things or ways in the real world, or help them to tackle various situations more or less properly. Genes by themselves cannot decide anything; instead, they are enabled and disabled by the environment, which includes the physical body of an individual to all the factors and events that occur around him (Sapolsky, 2023). Along with heredity, other elements, like education, family, and social environment, claim their importance in forging our personalities. Although harsh over time, this dispute has already been settled by the specialists in the field, who valued almost equally the three influential elements.

The *education* and *family environment* go hand in hand because an individual`s relationship with his family members, friends, acquaintances, and peers may significantly influence the type of education to be followed as well as the school results. Particular family environments can determine how the same genes evolve differently and generate unique mutations (Sapolsky, 2023). Thought of as a microsystem that directly affects individual development (Bronfenbrenner, 1986), the family instills the basic values in children, providing a model of behavior, lifestyle, and action strategies. Furthermore, the parents` educational level and their perception of education and involvement in this vital aspect of life crucially influence the children`s academic achievement. Unfortunately, as nobody can choose their own family, neither can the manager. Behind any successful manager should be a harmonious, balanced family with strong beliefs and values, and, if possible, with a good socio-economic status meant to support him morally and financially to the highest educational level. Thus, under the impulse of a positive family environment, any future manager should be stimulated to obtain a university degree and should possess excellent specialized knowledge acquired on a strong base of general knowledge. General knowledge is vital for getting a broad perspective of the world and being able to approach issues from various points of view.

Just as importantly, a manager`s level of education is determined by his motivation and goals in life, along with his ability to go beyond his basic needs and outdo himself throughout his existence. One of the best-known evolutionists - Jean Baptiste Lamarck - emphasized the existence in every human being of a tendency which continuously pushes him to evolve and develop upwardly from simple to complex toward perfection (Burkhardt Jr., 2013). Furthermore, the American psychologist Abraham Maslow organized the human needs into 8 hierarchical levels, from basic to superior needs (physiological, safety, belonging and love, esteem, cognitive, aesthetic, self-actualization, and transcendence), represented in the shape of a pyramid (McLeod, 2024). If we were to analyze these needs in managers, the latter should attain at least the 7th level (self-actualization), which would help them reach their full potential and become the best version of themselves. The only constant objective of a manager should be to permanently improve knowledge and develop skills and abilities under the stimulus of a strong will.

Thrown into the whirlwind of a life full of diversity and endowed with an innate evolutionary impulse and some hereditary predispositions, human beings adopt a particular behavior and react in a particular way based on the environment and community wherein they live. Thus, the *social environment* is also of central importance as the relationships and influence of friends and peers, particularly in the most vulnerable stages of development, become crucial in shaping behaviours, attitudes and making important decisions. These relationships might also generate habits, practices and routines that could negatively affect a manager`s path in life.

4. THE CONSTRAINTS OF CLIMATE AND NATURAL ENVIRONMENT

Another interesting factor that determines disparities in the way humans evolve is the *climate*. The idea of an inherent connection between the human typologies and the geographic and climate diversity dates back to ancient times when Hippocrates had already outlined the first global climate interpretation system which pointed out the major differences between Europe and Asia. According to him, the resemblance between all Asian peoples was the result of the uniformity of a mild climate generated by Asia`s orientation to the South and East, and its location half-way between the cold and warm areas of the planet. This unique geographical position of the Asian continent shapes human beings devoid of force and energy, and seized by a permanent state of fatigue and need for relaxation. By contrast, Europe, oriented to the North and West and featuring huge seasonal differences, is populated by humans, communities, and peoples as different as the European climate. Accordingly, the people who live in the mountains are strong, brave, stress and labor-resistant, while those living in the lowland areas are short, chunky, and not very diligent and intrepid. Even more, the extremely cold regions incite savagery and harshness, whereas the hot regions stimulate leisure, fertility and even consanguineous relationships which produce genetic malformations. Hippocrates concluded that the Europeans had proved to be more intrepid and thirstier for freedom than the Asians, a fact which also explained the birth of democracy in Greece and the defeat of the Persian Empire by Alexander the Great. In the same line of thought, Aristotle holds that even if the Asian peoples are endowed with a lot of intelligence and originality, they lack stamina and boldness, being unable to overcome their condition as subject peoples. On the contrary, the North-European nations, although driven by reckless bravery and ideals of freedom, cannot brag about too much cleverness or ability to assert power and supremacy (Crăciun, 2013, pp. 71-72).

In the 16th century, the French political thinker Jean Bodin proposed a systematization into 4 main categories of all the geographical and climatic features that determined human diversity. Thus, the well-known North-South axis was approached in terms of latitude and featured two opposite peoples: the Southern peoples (between the equator and the 30th parallel), governed by Saturn and Venus, had a propensity for the intellectual and contemplative side of life, with proven creativity and originality; the Northern peoples (between the 60th parallel and the North Pole), governed by the Moon and Mars, were active, energetic, combatant, driven more by force than intelligence. The extreme characteristics of the Northerners and Southerners have softened in the temperate area located between the 30th and 60th parallels, governed by Jupiter and Mercure, which highlighted a complex human being who combined harmoniously the power, bravery and endurance of the Northerners with the shrewdness, ingenuity and knowledge of the Southerners, with remarkable results in fields like commerce, justice, politics, administration and interpersonal relations. Another interesting opposition was the East-South axis versus the West-North axis, and in this regard, Bodin attributed flabbiness, politeness, inaction, and cleverness to the peoples from the first axis, while rudeness, recklessness, and forced action were associated with the second axis. At the same time, the qualities of the highland people resembled those of the Northerners, whereas the characteristics of the lowland people resembled those of the Southerners (Crăciun, 2013, pp. 71-72). The diverse climate and natural environment (from rainforests to deserts) have also generated particular activities (agriculture, shepherding, hunting-gathering, etc) which throughout history have clearly outlined two distinctive cultures - individualistic and collectivistic, or societies - rigid or tolerant (Sapolsky, 2023). Other natural factors that have an impact on the human personality are the winds (which agitate the soul), the soil fertility (which instil seriousness and diligence), the sea and the islands (which stimulate hypocrisy and subtlety), and the frontier areas (which sharpen the warrior spirit) (Crăciun, 2013, p.72).

Charles Darwin completes the climatic determination by pointing out that the chilly weather in the cold areas stimulates the capillary and peripheral blood circulation as well as the intensive use of the muscles, and consequently the appetite, the search for nutritious and filling food, and the digestive system, which altogether eventually increase the body mass and develop a sanguine temperament in the people who live there. Conversely, the people living in the tropical areas are characterized by a choleric temperament, determined by the excess of yellow bile needed to completely burn the food that the body is unable to decompose due to the low quantity of oxygen generated with every breath by the warm and dilated air (Crăciun, 2013, p.69-70).

From this perspective, climate and its associated natural phenomena leave a particular kind of mark on the manager`s personality, generating a wide variety of management styles, which are not within the scope of our present paper.

5. THE ENCUMBRANCE OF THE GENDER

Speaking about influences, one should not overlook the *gender* issue, the eternal `battle of the sexes`, and the role of women and men in the evolution of society. The collective perception throughout history has retained the same image of the woman as being responsible for the perpetuation of the human species, while the man has been attributed the role of ensuring sustenance and protecting the woman and the offspring. Despite the 2,000 years of evolution, not much has changed and this stereotypical image of the woman has been perpetrated more or less openly by all societies, be they traditional or modern. In this context, no wonder that the position of manager is usually associated with men, considering that it takes special abilities and knowledge to carry out the job. With women having been denied for a long time the right to education and being considered inferior to men, it has been assumed that the position of manager was fit for a man and less for a woman. The fact that women are underrepresented in top management is undeniable, but the question is whether they are rightfully considered less good than men at leadership.

With most human societies patriarchal, women have been inevitably subjected to biased opinions to the extent that gender-stereotypical traits are important in becoming a successful manager. Generally, men are attributed behaviours that involve rationality, superiority, domination, competition, independence, self-control, responsiveness, narrow focus, assertiveness, or even aggressiveness, while women are associated with qualities like communication, conciliation, collaboration, empathy, warmth, balance, patience, and multiple focus. Yet, this "myth" was dismantled by the Harvard Business Review (Zenger & Folkman, 2019), which surprisingly revealed in a research study that women outperformed men on 17 of the 19 key competencies in leadership effectiveness. As such, women were rated as excelling in taking initiative, acting with resilience, practicing self-development, driving for results, displaying high integrity and honesty, developing others, inspiring and motivating others, adopting a bold leadership, building relationships, championing change, establishing stretch goals, encouraging collaboration and teamwork, connecting to the outside world, communicating powerfully and prolifically, solving problems and analyzing issues, innovating and proving leadership speed. On the other hand, men were rated as being better on two capabilities: developing a strategic perspective and having technical or professional expertise.

Other surveys focused on the qualities of men and women have revealed that women tend to have more balanced brains, whereas men tend to have more specialized brains; in other words, women tend to have less specialized brains, with talents distributed over larger areas. At the same time, men are narrow-focused, tend to pay attention to what they are good at, and miss other details around them; on the other hand, women are multiple-focused and able to notice and think about many things (Sundaresan, 2010).

6. SHAPING THE MANAGER`S PERSONALITY

All these influences and conditionalities forge a complex personality whose multitude of features intermingle to support fundamental managerial abilities. In his attempt to understand the position of a manager, Mintzberg (1990) identified 10 managerial roles, organized in 3 main categories, which crystallize a great number of related attributes.

The first category highlights the *interpersonal role* of a manager who is perceived as a *figurehead*, a *leader,* and a *liaison*. The fulcrum personality of the manager should induce employees to feel a feeling of stability, comfort, trustworthiness, and reassurance that every challenge will be tackled appropriately. Although the sense of hierarchy must be present in every employee, the manager`s sociability, friendliness, and approachability should make the workers feel more confident and freer to approach him for different kinds of problems. The communication and listening skills, along with emotional intelligence, particularly empathy, play a decisive role in connecting the employee to the manager and helping the latter to understand the way the employees` issues, be they personal or professional, can negatively affect professional performance. Moreover, the manager`s optimism, patience, tact, and emotional balance should reassure employees, boost their self-confidence and morale with the final aim of improving productivity. Thus, the manager turns into a guide, a motivator, a leader whose energy and coaching skills inspire employees and help them to grow professionally. Also, in the context of globalization, companies have become multicultural micro-work environments wherein managers need to be highly tolerant, open-minded, and receptive to all challenges arising from cultural differences. In this complex background, the manager must be able to choose the right people for the right roles and define efficient teams. Motivating teams and stimulating cooperation are essential as the manager needs to permanently keep the team spirit and cohesion alive. At the same time, delegating authority and empowering employees can stimulate responsibility and raise awareness that they are valuable parts in an intricate mechanism and that their performance influences the entire working of the system. Thus, horizontally, the manager becomes the `red thread` which connects everybody and everything within the company, and vertically, the `top point` that all the hope and trust of the employees converge on. Ultimately, the manager needs to continuously update their knowledge about the business environment, complete their external contact list, and maintain good communication with other companies.

Yet, Mintzberg goes beyond suggesting how managers should provide information according to their interpersonal management role and suggests ways in which they should process information owing to their *informational management role*. In his role of *monitor*, *disseminator,* and *spokesperson*, the manager is responsible for the way information is processed and disseminated both inside and outside the company. Relying on comprehensive knowledge about their company or industry, managers need to have an overview perspective of the business environment and to stay up to date with the evolution of the field. They must be permanently alert and attentive to every minute change in the business environment, and using their flexibility and adaptability skills, they must think and react promptly. The monitoring activity must be directed not only externally, towards the business environment, but also internally, towards the activity of various teams created within the company. As information is power, processing and disseminating it is as vital as acquiring it, so managers have to make sure the receiver gets the right information on time. Whether the information is sent inside or outside the company, managers need to make the most of their verbal, written and nonverbal communication skills, particularly since they become the interface between their company and other business partners.

According to Mintzberg, the last category of roles, named *decisional management roles*, brings together four more functions of the manager - *entrepreneur, disturbance handler, resource allocator* and *negotiator* - which altogether facilitate the skillful implementation of the complex knowledge gained by the manager. The successful exercise of these roles requires a combination of business expertise and general knowledge, backed by a sharp mind, able to grasp and find solutions to the most complex circumstances. A high level of perceptiveness expressed by means of analytical and synthetical thinking is also needed to define the company objectives and strategy. Responsibility and moderation come to give a helping hand in allocating and managing the company resources. In order to carry out the four functions of management - planning, organizing, leading and controlling, managers also need to be meticulous, disciplined, perseverant, but also creative and intuitive. Keeping an open mind and proving a keen sense of justice, they must be able to properly settle potential disagreements or conflicts. In addition, they have to be prepared for the unexpected and, in extreme situations, maintain calmness, balance and presence of spirit. As a growing business and connecting with other companies is of the utmost importance, and managers need excellent negotiation and decision-making skills. Just as importantly, because the business world is unpredictable, managers need to have a high tolerance to uncertainty and ambiguity, along with some proven stress, time, and risk management skills.

A more contemporary approach addresses the human personality characteristics and their relation with job responsibilities in a more synthetic way, reducing the large number of human traits to only 5 that are considered vital in fulfilling professional duties. Established in 1949 by D. W. Fiske and developed by researchers like Norman (1967), Smith (1967), Goldberg (1981), McCrae and Costa (1987), and (Yunus et al., 2018), this theory chrystallizes five broad personality traits - *openness, extraversion, agreeableness, conscientiousness* and *neuroticism*, hence the *Big Five Personality Traits*. *Openness* involves broad-mindedness generated by a permanent curiosity and thirst for learning new things, a receptiveness to the ever-changing reality, and adaptability to the unpredictable. *Extraversion* represents the willingness to embrace the world and to create relationships with the people around based on abilities like communication, enthusiasm, and sociability. Very much related to the previous two traits, *agreeableness* relies on qualities like altruism, kindness, patience, and empathy. *Conscientiousness* identifies task and goal-directed, planful and organized behavior, such as thinking before acting, following norms and rules, delaying gratification, prioritizing tasks, which all depend on traits like self-discipline, reliability, ambition, thoroughness and efficiency (Ülgen et al., 2016). Finally, *neuroticism* defines the manager`s level of emotional balance and resilience to stress and mood swings, along with his degree of irritability and anxiety. While the first four traits must be activated to the highest level in managers, neuroticism must keep a low profile as it may be regarded as a stain on the managers` character.

7. CONCLUSION

The role of manager appears to be a professional `armour` which covers an ordinary human being with their associated determinations and conditionalities. Thrown into this world with a complex genetic baggage that connects them with invisible ties to their ancestors, all human beings are subjected to a universal mechanism that assigns them the role of bearers of cultural values. By passing on these cultural values, they become and reassert the type of individual they originated from. Although the genetic endowment plays the role of a `thruster` in every human`s life, surprisingly, only 5% of the human DNA accounts for the genes, while 95% represents the intricate system of `on/off switches` intended to regulate the influence of various environmental factors on the unique genetic network. Therefore, the environment as a whole generates spectacularly

different genetic variations in people with identical genetic baggage, a fact which confirms the tight interactions between biology and environment (Sapolsky, 2023).

As a result, the interplay of additional elements like family and social environment, education, gender, climate, and natural environment forges the genetic legacy and shapes an exclusive personality. Although the great "puppeteer" of the manager`s personality remains the genetic inheritance, the KSAOs (knowledge, skills, abilities, and other characteristics) needed to efficiently fulfil a managerial position are at the same time strongly influenced by all the above-mentioned elements, particularly the education and social environment.

The concept of determinism does not rule out free will because human beings still have the freedom to make choices in life, but based on or within the limits of the qualities or flaws that they are endowed with. Managers, like all humans, have the right to decide among several courses of action, but owing to the special abilities that they were born with, they will most probably choose the course that will enable them to accomplish their mission in this world.

Anchored to the past by the strong bindings of the genetic legacy, the manager embraces and makes the most of this inherited potential, which acts like a `trampoline` in life. With this ace up his sleeve, the manager confidently looks toward the future, unwittingly allowing other factors to exert a more or less significant influence on his identity during his entire life. The outcome is a manager`s personality that reveals itself gradually as a layered, multilevel `structure` whose facets are defined and polished by a tangled fusion of predetermined elements.

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Captain Miša Anastasijević – The Great Socially Responsible Personality and Leader from the Past of Serbia and Romania

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Abstract: *The paper will explore the character and work of Captain Miša Anastasijević, his business and benefactions in Serbia and Romania. Prince Miloš Obrenović appointed him as Danube captain, and with that position, he entered the sphere of diplomacy and international justice. His benefactions are numerous. He donated his magnificent building in Belgrade, today known as the Captain-Miša building, to "his fatherland" for educational purposes. He financed the Belgrade Reading Room and gave many charitable contributions to the National Theatre in Belgrade, as well as to churches, schools, writers and the poor in Serbia and Romania. Today, more than ever, we need such leaders and socially responsible personalities, that is why Captain Miša Anastasijević should be promoted as an example to current and future generations and cultural heritage should be nurtured through institutional support and projects, which the authors will point out and give suggestions.*

1. INTRODUCTION

The ***socially responsible personality*** means living and working following ethical principles in business practices that have a direct impact on the social community. The ***leader*** is a personality who has leadership skills to effectively lead an organization and has an indirect impact on the social community.

Captain Miša Anastasijević sets an example of a great socially responsible personality and leader from the past of Serbia and Romania. He was a great merchant, a rich man, a patriot and a benefactor. He believed that through the development of education, the nation also rises. His ***benefactions in Serbia and Romania*** are numerous.

"To be born poor is the most ordinary thing in the world; to be born poor and then to become rich is as desirable as it is rare; but to be born poor and to become rich, and in the midst of this immeasurable treasure not to forget benefaction, this most beautiful human virtue, is the highest degree of happiness to which a mortal can exalt himself. This was achieved by the Poreč merchant Miša Anastasijević" (Stanisavljević, 2001, p. 5).

The paper will explore the character and his work, business, and benefactions, like a great socially responsible personality and leader.

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2. THE BIOGRAPHY OF CAPTAIN MIŠA ANASTASIJEVIĆ

Mihajlo Anastasijević was born on February 24, 1803, on the Danube island of Poreč, at almost the same distance between Serbia and Wallachia (today's Romania). The island of Poreč (which no longer exists) was flooded in 1971, during the construction of the Djerdap Hydroelectric Power Plant, whose population moved to the coast (today's Donji Milanovac in Serbia) (Nadoveza, 2022, p. 248).

Miša was named after his father Anastas, who was a farmer and a small merchant in Poreč. Mother Rose was a housewife, and she died shortly after giving birth. After his father Anastas died, when Miša was three years old, his stepmother, Milja continued to take care of him. His father left Miša from the estate on the island of Poreč: a small vineyard, 10 acres of ploughed land with a plot house in which there was a small shop. The widow (stepmother), Milja and the orphan Miša, stayed together to live, and she accepted him as her child. They were saved from misery by the merchant Stojan Matrošlija, who ran half of their shop and cultivated their land for several years (Wikipedia, 2024).

An elementary school was founded in Poreč in 1807, as part of the educational system designed and implemented by Dositej Obradović (Mirković, 2013, p. 336). His stepmother, Milja, as a wise woman ahead of her time, enrolled Miša in elementary school in Poreč in 1808, one of the first in Karadjordje's Serbia, and thus acquired his first "capital". Miša completed his entire education in two years, from 1808 to 1809, studying in Poreč the spelling book, the psalter and calculus - those subjects that were the only subjects that were taught. Thanks to the acquired knowledge, at the age of eleven, he was a teacher in Poreč (in the school he attended), replacing a priest who had been absent for several months (who was a teacher). He had 15 students at the school, from which he received a total of 8 groschen per month. For this reason, because he was literate, Barjaš-aga, Duke of Ada Kale, took Miša as his scribe. However, although he had a monthly salary of 10 groschen and food, he fled at the first opportunity, fearing the Turks. As a boy, in 1814, Miša started trading, first as a servant in the shop of Tenko Dinulović, where he cooked and sold soap, and then as a cellar keeper for Aga Vule Gligorijević, the head of Poreč. It was then served for 6 groschen a month. He received his first major salary of 100 groschen in 1816 for towing boats along the Danube through the Djerdap gorge. That is how it began, and in his mature age, Miša Anastasijević was extremely rich, allegedly even richer than Prince Miloš Obrenović.

In 1817, Miša became a customs officer on a scaffolding. After a few years of doing this profession and a certain amount of money that he saved, Miša decided to go into trade. As a twenty-year-old, he became one of the richest people, becoming a successful merchant. However, he soon left the "retail" trade and began trading livestock, and later salt, which proved to be profitable. Soon, he bought his first boat for 7,000 groschen and became one of the richest men in Serbia.

In 1825, he married Hristina Urošević, the younger daughter of the priest Ilija Urosević, from the village of Brzaska, on the Austro-Romanian side of the Danube. He then moved with his family from Poreč to Milanovac (today's Donji Milanovac in Serbia). In his marriage to Hristina, he had an only son, Miloš, and five daughters: Jelena (married to Garašanin), Ružica (married to Čarnojević), Persida (married to Marinović), Sara (married to Karadjordjević) and Anka (married to Damjanović).

Through his wife's brother, Sima Urošević, who was the scribe of Prince Miloš Obrenović, he came into personal contact with the ruler of Serbia, as well as with the largest merchants. Prince Miloš appointed him captain of the helmsman at Djerdap for Poreč. He made good use of the opportunity he was given, and brought order to the shipping business, gaining a great reputation, valuable acquaintances, and earnings along the way. Specifically, when the Hatišherif from 1833 resolved the territorial and economic position of Serbia, and received Djerdap and Krajina under its administration, Serbia

increased its population, as well as the turnover of goods. After the unification of the new districts, Prince Miloš Obrenović visited them and on that occasion appointed Miša Anastasijević as the Danube Captain (for Djerdap), giving him the title of major with a supervisory and arbitration function. With his new position, Captain Miša thus enters the sphere of diplomacy and international justice. With the accession of Aleksandar Karađorđević to the throne in 1842, Miša Anastasijević established friendly relations with him.

What is significant is that in 1842, Captain Miša moved to Belgrade with his family. In 1843, his only son, Miloš, died suddenly in Belgrade at the age of six. The death of his son affected him deeply; he was disappointed and stopped working, but his miraculous inertia, desire and perhaps spite to continue, tore him away from the tragic situation.

Miša first came to Wallachia (today's Romania) for salt in 1843, during the reign of Prince Jovan Bibescu. In 1847, he took a lease (monopoly) on the export of salt from the principality of Wallachia and Moldavia for seven years, and later on the import of salt from Austria-Hungary. When he paid off all his partners, he became one of the largest salt merchants in the Balkans. The business flourished for the next fifteen years, until 1865. Thus, Captain Miša's "empire" or "the first Serbian multinational company", as we would call it today, numbered about 10,000 people, 23 branches or warehouses in various places on the Sava and Danube and at least 74 ships for the transport of salt, as well as 9 large estates in Wallachia. The main office of the "empire" was in Bucharest, and the administration was in Belgrade (Univerzitet u Beogradu, 2024). At one point, he owned 1.5 million ducats of cash, which secured him the position of one of the richest men in the Balkan Peninsula.

Captain Miša got involved in politics by coincidence. He married all five of his daughters to people who, at the time, were either already important political figures or were on the verge of a successful political career. So, by marrying his daughters, he connected with political circles, that is, through his sons-in-law: Jovan Marinović, Prime Minister, Radovan Damjanović, the manager of the town of Belgrade and a minister, Arsen Čarnojević, an Austro-Hungarian nobleman, Djordje Karađorđević, a member of the Karađorđević dynasty, then with his uncle Ilija Garašanin, then the godfather of his daughter Anka, Toma Vučić Perišić, etc.

After the St. Andrew's Assembly, which began on St. Andrew's Day on November 30/ December 12, 1858, and ended on January 31/February 12, 1859, Miša, somewhat disappointed with politics, left Serbia and went to live in Wallachia (today's Romania). And the second part of his life, from 1859, Captain Miša Anastasijević (Figure 1), he spent in Wallachia, where he spent less time in Bucharest and more on his largest estate (spahiluk) in Clejani (in the district of Giurgiu), where he had a palace. There were great luxuries in the palace, such as the use of only silver furnishings and the finest furniture. To the Church of St. Archangels Michael and Gabriel in Clejani, next to the school, which he built himself, there was a special passage from the courtyard - a green alley, so that Captain Miša Anastasijević would not be disturbed. His security was taken care of in Wallachia by the Arnauts, and in Serbia by the Serbs, 12 armed bodyguards dressed in national attire. Although he had many palaces and houses in addition to those in Bucharest, Vienna, and Belgrade, he mostly stayed in Clejani, living in the countryside in a classy style.

Captain Miša Anastasijević died on St. Sava day on January 27, 1885 in his palace in Bucharest, of pneumonia, after three days of lying, and rests in the Church of St. Archangels Michael and Gabriel Church of St. Archangels Michael and Gabriel (Figure 2) on his estate in Clejani (in the district of Giurgiu) in Romania. According to his wishes, his body was embalmed and placed in a hermetically sealed space (Comoara mumiei din Clejani, 2007).

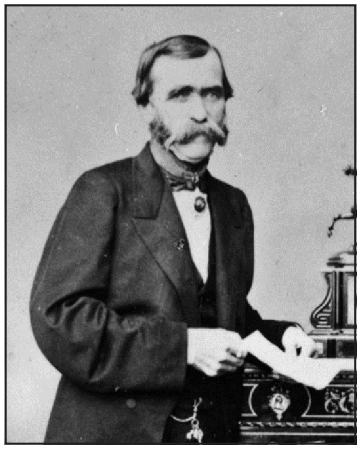

Figure 1.
Captain Miša Anastasijević
Source: Serbian Academy of Sciences and Arts (n.d.)

Figure 2. Church of St. Archangels Michael and Gabriel in Clejani, 2013
Source: Embassy of the Republic of Serbia in Bucharest (n.d.)

Starting from 1910, and even between the two world wars, there were initiatives in the public to transfer the remains of the educational benefactor Captain Miša to Serbia, but it did not come to fruition. His favourite daughter Sara, made a special effort and asked for something to be done for years. Also, a great interest in the transfer of the remains of the great benefactor at that time was shown by young academics, compatriots from Timok and Krajina, educated people who were educated in Captain Miša's building.

The biography of Miša Anastasijević is, in fact, the story of a man who, barely literate, more self-taught than educated, in a difficult struggle for survival in a time in which he lived, so to speak, out of nothing, through persistent work and guided by his own talent, managed not only to create a huge fortune, which included him among the richest people not only in Serbia, in Central Europe, but also to rise to the most important social spheres and play an important role in them. It attracts and intrigues that such a man, without any prior preparation, could have emerged from our midst at all, at the very time when such people were needed for the affirmation of the nation and the organization of the state (Milosavljević, 1988, pp. 7-8).

In this paper, the emphasis is placed on socially responsible business and the benefactions of Captain Miša Anastasijević.

3. THE BENEFACTIONS OF CAPTAIN MIŠA ANASTASIJEVIĆ

The benefactions of Captain Miša Anastasijević are numerous. Even as a young man, he did many good deeds and helped the poor, and was grateful to everyone who helped him at some point in his life. He gave clothes to the women of Donji Milanovac every time he got there, gave dowries to girls, saved merchants from ruin by forgiving their debts or giving loans and similar. In his old age, Miša became even more generous, so he gave his favourite boat "Simka" to a humanitarian society without thinking. There are many of his known benefactions, and it is considered that even more are unknown.

It should be noted that Captain Miša was a rich man with style, generosity, and a certain mission, who never forgot his poor origins. He believed that through the development of education, the people are also elevated, and since our people are poor, they should be helped by wealthy people.

And he did it. He financed the Belgrade Reading Room, of which he was one of the founders in 1846. He gave charitable contributions on several occasions for the National Theatre in Belgrade, as well as for churches, schools and the poor in Serbia and Romania. He also helped many writers by paying their printing costs for publishing books or giving them monetary gifts (Univerzitet u Beogradu, 2024).

What is important is that Captain Miša built his magnificent building in Belgrade, today known as the Captain-Miša building (Figure 3), donated to "his fatherland" for educational purposes (Univerzitet u Beogradu, 2024). Otherwise, the construction of the building began in 1857. Captain Miša Anastasijević donated the magnificent building to "his fatherland" exactly on February 12/24, 1863. The construction of the building itself lasted a relatively long time, until 1864, because they were waiting for the marble from Italy to arrive. Along with the building, all the furniture and equipment for educational and scientific work were donated. On behalf of the state, Prince Mihailo Obrenović thanked the donor, i.e., Captain Miša Anastasijević, in a letter dated February 13/25, 1863. The building houses the Great School, the Gymnasium, the Ministry of Education, the National Library, and the Museum. Today, it is located the Rectorate of the University of Belgrade.

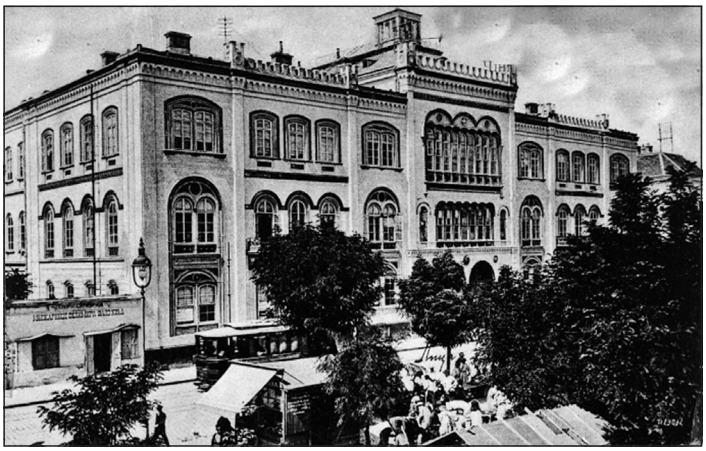

Figure 3. Captain Miša's building, 1867
Source: Diplomacy&Commerce (n.d.)

It is no coincidence that Wallachia (today's Romania) was the second homeland of Captain Miša Anastasijević. Miša's Serbian-Wallachian duality began with his birth on the Danube island of Poreč, at an almost equal distance between Serbia and Wallachia, almost in neither of them, but equally in both. This was, one might say, the first "buckle". Also, with his knowledge of the Wallachian language (today's Romanian), as well as Ottoman Turkish language, Captain Miša felt at home in Wallachia, so it is not surprising that as his wealth grew, he bought large estates in Wallachia (Milosavljević, 1988, p. 95).

On his main spahiluk (large estate) in Clejani (in the district of Giurgiu) in Wallachia (today's Romania), he founded a school for male and female children. The school was attended by about 152 pupils, who came from Wallachian (Romanian), Serbian, Bulgarian, Polish and Greek families. All students had free education, books and stationery, and 32 students also had housing, food and clothing. A predestined educator, from an early age, Miša not only helped the students materially, but also constantly took an interest in the progress of teaching and the success of the students. Miša also helped good students from his school in further education, and they became famous professors, engineers, agronomists, doctors, teachers, etc. (Vanku, 2003, p. 21). Both the students and teachers, as well as the higher education authorities, the ministers themselves, were paying

tribute and gratitude to Major Miša (as he was called in Wallachia, and still today in Romania) for his material assistance and wise management of the school (Brătulescu, 1925, p. 276).

Captain Miša Anastasijević used the Danube not only for commercial purposes, but as a link between the Romanian and Serbian people. He had a strong influence on the economic development of Serbia, but he also contributed a lot in the political field. Captain Miša played an important role in the development of diplomatic relations between Serbia and Romania in the second half of the 19th century. As a connoisseur of all political factors in Romania, he managed to secure the support of the Romanian state in the struggle of the Serbian people for independence from the Ottoman Empire, which resulted in the recognition of Serbia's independence at the Berlin Congress in 1878 (Nadoveza, 2022, p. 247).

He remained in the memories of his contemporaries that he was neither strict nor reactionary, and the trait of hardness did not exist in him at all. He was a gentle father to all members of his family, and just as good to those who lived on his property. He was a man of broad spirit and a noble heart. He knew how to live like a great gentleman and do good deeds. He subordinated his interests to the general ones, and loved Serbia and Romania equally, and did benefactions in both countries. He was a good teacher for everyone, and above all a great socially responsible personality and leader of the past and present era.

4. RESEARCH AND DISCUSSION

In order to improve and develop the cultural heritage of Serbia, as well as to promote the character and work of Captain Miša Anastasijević - a great socially responsible personality and leader from the past of Serbia and Romania, research was conducted in the period from December 9 to 29, 2024, in Belgrade, using the Survey methodology. The survey included 300 respondents. The survey was anonymous and contained 8 questions:

1. *Do you know who donated the magnificent building to "his fatherland" in which the Rectorate of the University of Belgrade is now located?* YES / NO

Regarding question number 1, by data processing was determined that 219 respondents (73%) gave a positive answer, while 81 respondents (27%) gave a negative answer.

Based on the total positive responses of 73%, it can be concluded that the majority of respondents know who donated the magnificent building to "his fatherland" in which the Rectorate of the University of Belgrade is now located.

Among the respondents, there were comments that the public and the media do not talk enough about our benefactors.

2. *Do you think that such a benefactor as Captain Miša Anastasijević should have a memorial room in the building that he donated to "his fatherland" for educational purposes?* YES / NO

Regarding question number 2, by data processing was determined that 261 respondents (87%) gave a positive answer, while 39 respondents (13%) gave a negative answer.

Based on the total positive responses of 87%, it can be concluded that the majority of respondents think that a benefactor such as Captain Miša Anastasijević should have a memorial room in the building that he donated to "his fatherland" for educational purposes.

Among the respondents, there were comments with amazement at why that has not been done so far.

3. *Do you know that Captain Miša Anastasijević was a great educational benefactor in both countries, Serbia and Romania?* YES / NO

Regarding question number 3, by data processing was determined that 168 respondents (56%) gave a positive answer, while 132 respondents (44%) gave a negative answer.

Based on the total positive responses of 56%, it can be concluded that a little more than half of the respondents know that Captain Miša Anastasijević was a great educational benefactor in both countries, Serbia and Romania.

Among the respondents, there were comments that little is said and written about the benefactor Captain Miša Anastasijević and what he did in Serbia and Romania, and that should be changed.

4. *Do you know that Captain Miša Anastasijević has done many other benefactions in Serbia and Romania?* YES / NO

Regarding question number 4, by data processing was determined that 96 respondents (32%) gave a positive answer, while 204 respondents (68%) gave a negative answer.

Based on the total negative responses of 68%, it can be concluded that the majority of respondents do not know that Captain Miša Anastasijević has done many other benefactions in Serbia and Romania.

Among the respondents, there were comments that the character and work of Captain Miša Anastasijević and his numerous benefactions that he has done in Serbia and Romania should be more seriously promoted.

5. *Do you know that he was born on the Danube island of Poreč, whose population later moved to the coast (today's Donji Milanovac in Serbia)?* YES / NO

Regarding question number 5, by data processing was determined that 87 respondents (29%) gave a positive answer, while 213 respondents (71%) gave a negative answer.

Based on the total negative responses of 71%, it can be concluded that most of the respondents do not know that Captain Miša Anastasijević was born on the Danube island of Poreč, whose population later moved to the coast (today's Donji Milanovac in Serbia).

6. *Do you know that he rests in Romania and that his body was embalmed and placed in a hermetically sealed space in the church he built in Clejani?* YES / NO

Regarding question number 6, by data processing was determined that 54 respondents (18%) gave a positive answer, while 246 respondents (82%) gave a negative answer.

Based on the total negative responses of 82%, it can be concluded that most of the respondents do not know that Captain Miša Anastasijević rests in Romania and that his body was embalmed and placed in a hermetically sealed space in the church he built in Clejani.

7. *Do you think that a tourist tour "On the Paths of Captain Miša Anastasijević" should be organized as a form of educational pilgrimage from Belgrade through Donji Milanovac to Clejani?* YES / NO

Regarding question number 7, by data processing was determined that 231 respondents (77%) gave a positive answer, while 69 respondents (23%) gave a negative answer.

Based on the total positive responses of 77%, it can be concluded that the majority of respondents think that a tourist tour "On the Paths of Captain Miša Anastasijević" should be organized as a form of educational pilgrimage from Belgrade through Donji Milanovac to Clejani.

Among the respondents, there were comments that such a tourist tour should contribute to the promotion of the character and work of Captain Miša Anastasijević.

8. *Do you think that Serbia and other countries in the world need such socially responsible personalities and leaders more than ever?* YES / NO

Regarding question number 8, by data processing was determined that 276 respondents (92%) gave a positive answer, while 24 respondents (8%) gave a negative answer.

Based on the total positive responses of 92%, it can be concluded that the majority of respondents think that Serbia and other countries in the world need such socially responsible personalities and leaders more than ever.

Among the respondents, there were comments that socially responsible personalities and leaders should contribute to the social community and do good deeds (benefactions), because kindness itself (as well as doing benefactions) is the highest level of life development.

5. CONCLUSION

Today, more than ever, we need such leaders and socially responsible personalities; that is why Captain Miša Anastasijević should be promoted as an example to current and future generations and cultural heritage should be nurtured through institutional support and projects.

In Serbia, the national award "Captain Miša Anastasijević" is awarded as an annual award for the most successful individuals, entrepreneurs and institutions. This award is given to encourage and affirm entrepreneurship in Serbia. The award is implemented by Media-invent doo Novi Sad, Radio Television of Vojvodina, Chamber of Commerce and Industry of Vojvodina, Chamber of Commerce and Industry of Serbia, Chamber of Commerce and Industry of Belgrade, University of Novi Sad and University of Belgrade, etc. (Wikipedia, 2024). In Romania, Captain Miša Anastasijević is present in the history of Romanian education, as well as in the folklore festivities in Clejani.

For everything he did, Mihajlo Anastasijević - Captain Miša was awarded with: the Serbian Order of the Cross of Takovo, 2nd Class; the Russian Order of St. Stanislaus; the Ottoman Turkish Order of Nichan-Iftikar; the Romanian Order of the Star; and the German Order of Waldeck.

"Miša outlived himself with his spirit" (Stanisavljević, 1995, p. 274). He lives his second life in his building on the Student Square, where the Rectorate of the University of Belgrade is located, and his bust in the courtyard of the building. Near the Student Square, there is also a street in Belgrade - Captain Miša's Street, which is located in the City Municipality of Stari Grad. Too, in

order to promote the character and work of Captain Miša Anastasijević, a memorial room should be opened in his building in Belgrade as an example for future leaders.

It is also necessary to organize a tourist tour "On the Paths of Captain Miša Anastasijević" as a form of educational pilgrimage, where it will start from his building in Belgrade, then continue along the Danube through the Djerdap Gorge to Donji Milanovac in Eastern Serbia, where Captain Miša was born, and further to Clejani in Romania, where he rests in his church, and return.

The authors also considered the idea of proposing to the Association of people from Timok and Krajina in Belgrade (UtikBGD, n.d.) the initiative to finally transfer the remains of the educational benefactor Captain Miša Anastasijević to Serbia, i.e., Belgrade. So perhaps the current Association should deal with and realize the initiative that was started in the past. Because such a socially responsible personality and leader as Captain Miša Anastasijević was, and what benefactions he left, deserve it.

Future leaders should be shown that in business, it is not only profit and market expansion that are important, but also being socially responsible in the community, as Captain Miša Anastasijević was.

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Study on Founding a Self-Knowledge and Personal Development Program

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Abstract: *As far as the labor market is concerned, the continuous evolution of society leads to an increase in competitiveness and a change in the standards for employment. Professional qualification and training, as a result of training and specialization courses, stand as advantages when finding and getting a job. Young people have to attain the standards required by this new social reality imposed by modern society. The proposed career guidance program is the result of own research and aims to stimulate the motivation of high school graduates or graduates of other forms of education to establish a change in their attitude and behavior as to maximize their chances of social acceptance within the Romanian labor market. The professional counseling and orientation program responds to the needs of young people's social-professional integration, contributing both to overturning their negative opinions towards labor, responsibility, society, and to facilitating their efforts to occupy a certain role in the community.*

1. INTRODUCTION

Organizations function through the joint action of people, yet each individual can undertake independent actions that might be in disaccord with the organization's policy or that are not properly reported to those in a position to be informed. The coordinated achievement of the desired results requires the existence of effective communication systems. Communication plays an essential role in social life because it represents one of the fundamental forms of human interaction. While defining the notion of communication, some authors broaden extensively the scope of the notion, encompassing any exchange that takes place between two or more people or groups of people, while other authors impermissibly narrow the scope by excluding forms of communication based on non-verbal means. Despite certain controversies, it is accepted that communication covers the transmission of a message from sender to receiver by use of a channel, being possible or real between two or more individuals exchanging substances, energy, or meanings (Daneci-Patrau, 2019, p.72).

For companies operating in a competitive environment, understanding the communication process is of particular interest and significance due to the increase in management complexity and the development of certain effective means of communication and decision-making.

The purpose of this program is to stimulate the motivation of young high school or professional school graduates, as well as those from other education centers or from the probation system, to initiate a foundational change in their attitudes and behaviors in order to maximize their chances of social integration upon graduation. Following this program, adolescents and young graduates will restructure their distorted image of themselves and those around them, in order to help them make realistic choices following their abilities, skills, and personal possibilities, thus supporting the process of stimulating the intrinsic motivation of adopting a prosocial behavior.

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2. LITERATURE REVIEW

Self-esteem is a measurable phenomenon and defines how one values oneself or evaluates oneself in relation with own and others' expectations. This leads to a sense of self-worth; therefore, only an individual with high self-esteem has a chance to gauge their potential and capitalize on it. Because it is related to the positive side of life, self-esteem helps people believe in themselves and the success of their endeavours. In agreement with Nathaniel Braden, psychotherapist and philosopher, deemed the father of self-esteem, we consider that "there are realities that we cannot escape; one of them being the importance of self-esteem" (Braden, 2024, p. 45). Moreover, specialists unanimously appreciate the importance of self-esteem in terms of success in life and career.

A society that tends to develop harmoniously must consider and support the career counseling activity, taking into account its necessity, offering everyone the opportunity to receive free services, strengthening the professional training foundation of those who work in this field, offering possibilities to create a material reference without which the activity cannot be carried out in optimal conditions. The career covers and identifies different roles of an individual: student, employee, community member, parent, etc., the way they act within family, school and society, and the life stages they can go through: marriage, retirement; all these considered as a unitary, indivisible whole. On this note, every person has a career and not only those who successfully exercise a certain profession (Jigău, 2005, p. 10).

Career development implies all aspects of human life in the making and with a specific dynamics in different areas (Gysbers, 1994, p. 67), namely:

1. self-knowledge and the honing of interpersonal relationship skills
2. initial professional education and training
3. assuming different roles in life
4. integration, experiencing and planing different life events.

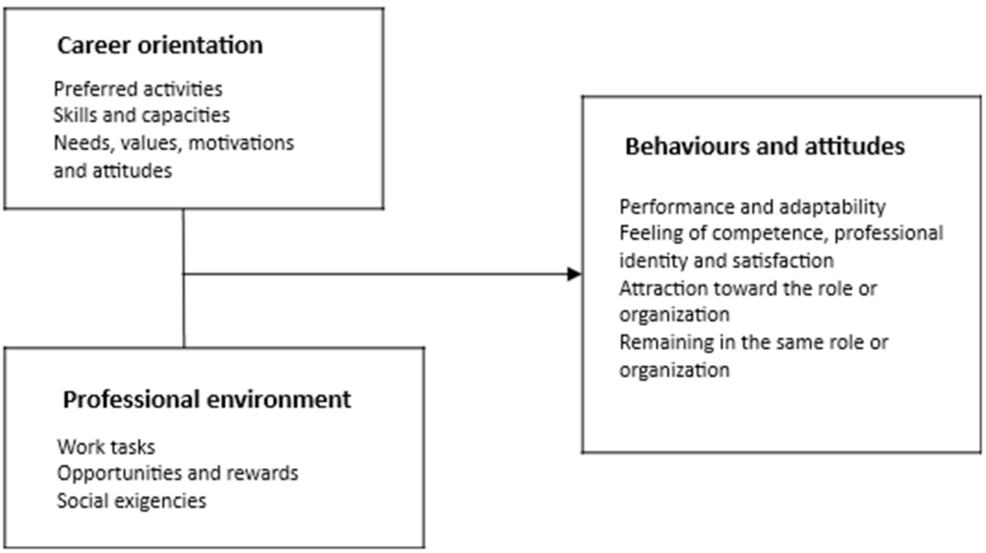

Figure 1. Career orientation and social consequences

Source: Howard (2010)

Through its more comprehensive character, the notion of career counseling and the implicit practice behind it fully respond to individuals and society's current demands and priorities. There are individual differences regarding career orientation. People are different; they vary in terms of

abilities, values, goals and preferred activities. Although different from each other, people still have many things in common. Based on this approach, specialists in the field have revealed ways to classify people according to the major patterns in terms of similarities and differences regarding career orientation. Thus, in this approach, the career orientation and its social consequences are presented in Figure 1.

As observed, career orientation is a fairly stable pattern comprising talents, values, attitudes and preferred occupational activities. The advantages for a company that implements an effective career management system are as recognizable as they are well-known, and namely refer to the increase in employee motivation with direct effects on work productivity and their degree of loyalty.

3. METHODOLOGY OF THE CAREER GUIDANCE PROGRAM

Even if a person possesses sufficient knowledge and intelligent ideas, if they are not aware and do not know how to manage their emotions and feelings, they may encounter difficulties in trying to build relationships or successful professional careers. People with a high degree of self-awareness realize how their feelings affect both themselves and those around them. The development of emotional intelligence allows us to value our intellectual skills and creativity. It ensures our success, both personally and professionally.

This program allows each person to get to know themselves and realistically self-evaluate. We will also be able to observe in each participant from the exposure of their qualities and flaws, the attitudes they have towards themselves and others, the realistic or unrealistic approach they have about themselves, depending on their level of emotional and psychological development. The proposed goal is to help the person know themselves and make realistic decisions according to the qualities, skills, and possibilities they have. Also, the aim is to stimulate the cognitive-behavioral restructuring process according to the intervention plan designed for each underage and young person. Moreover, these exercises aim to stimulate the person's self-determination and intrinsic motivation to start a process of reorganization based on other principles of existence, unlocking and forsaking inhibitions at certain levels where the need may be, learning and accumulating new information, the achievement, integration and use of discovered and rediscovered alternatives to propel them further in their evolution and development.

The objectives of vocational counseling and guidance through the proposed program are:

1. supporting teenagers in the process of understanding and self-appreciating who they are and who they can become,
2. gaining awareness about personal qualities and flaws,
3. self-image reframing and self-esteem increase,
4. perceiving one's own identity in relation to others,
5. adopting a positive attitude towards oneself and others.

Regarding the target group, the beneficiaries of the program are under-aged and young people, with no discrimination (sex, age, legal status, ethnicity, religious and sexual affiliation). During the program, the groups can be expanded, new members can be added (if transferred, moved from other departments, other situations).

The vocational orientation approach is based on the DOTS model (Law & Watts, 1977, pp. 8-10), which offers four general phases in the career counseling process. This model allows the client to be action-oriented.

Phase One: IDENTITY - The answer to the question *"Who am I?",* taking into account what it can offer and seeks and can establish a realistic correlation between these 2 aspects. It involves helping the individual know and understand himself career-wise: being able to talk about what he has done and can do, what he can offer in terms of performance, being aware of what he is looking for in a job in terms of motivation.

Phase Two: OPPORTUNITIES - Awareness of opportunities. The answer to the question *"Where am I?",* taking into account the individual's current state, accessible work possibilities imply the help offered for them to know and understand the job offers they might have by indicating directions: to have information about the types of possible activities - in terms of interests and satisfactions, rewards and incentives, to identify the requirements of the workplace in terms of obligation-commitment and motivation, skills and qualifications.

Phase tree: DECISION - The answer to the question *"What will I do?"*, identifying and solving personal impasses. It involves helping the individual make a decision and take responsibility for it: the individual will know what to do next and why and what the consequences of their decisions will be.

Phase Four: TRANSITION - Answering the question *"How will I handle it?"*, anticipating the consequences and finding solutions, involves helping the individual to be prepared to constructively solve the problems attached to the decision, to be able to anticipate what he needs to implement a decision and to deal with the consequences of other people's decisions, and to practice transferable skills: asking questions, self-introduction, communication, conflict solving, etc.

3.1. Duration of the Program and Frequency of Meetings

Under these organizational conditions, the group can be formed, and members can work individually, but also in groups of a minimum of 6 people and a maximum of 12. The group can be enlarged for shy, introverted people and reduced in the case of the outgoing. It is important to keep this number constant throughout the process carried out within the group. It is essential for the activity efficiency and development that some beneficiaries from the group be selected according to the criteria established by the work plan and the psychological development capacity. In this way, the slowness and stagnation of the group progress is avoided, and both a dynamic and constant, and accelerated psychological elaboration and growth are produced, resulting in a psychological impact on the whole group. As far as gender and age are concerned, there are counselors who choose to form homogeneous groups based on these two criteria.

The frequency of the meetings is configured as two meetings per week. It is enlightening because it shows how much the group means, how important and attractive it is for each member, the cohesion, and even the maturity of the group (over 90% presence indicates an efficient and cohesive group). It is preferable that the meeting be held on the same day of the week, at the same time, and in the same place.

The duration of the group sessions is variable, lasting between 60 to 120 minutes (occasionally an individual session is necessary to prevent premature withdrawal from the group, or to monitor the person who is going through a difficult time in their life). A meeting shorter than 60 minutes would not allow the development of emotional interactions, and one longer than 120 minutes would lead to stronger emotional tensions. The frequency of the sessions is twice a week. The module takes place over a period of 2 months, during which 12 themes are developed over several sessions. The duration

of a session should be constantly maintained and respected. The individual approach in the group structure according to the "here and now" relationship model implies: real self-evaluation in comparison with other people; self-knowledge and understanding of self-representation; direct expression of one's feelings; encouragement to talk to others constructively. This introspection endeavor leads to a thinking process that can trigger motivation and the commitment to search and discover one's vocation.

The pursued objectives and evaluation criteria are presented in Table 1.

Table 1. The objectives and evaluation criteria of the orientation program

Pursued objectives	Evaluation criteria
1. establishing personal identity 2. defining one's own motivational, attitudinal and aptitude system 3. expressing one's feelings 4. identification of the differences between ideal – real, possibilities, desires	1. analyzing the past, evaluating the present and imagining the personal future (to compare one's own image placed in the past, present and future) 2. illustration of self-knowledge schemes/ with examples from one's own motivational, attitudinal and aptitude system (interests, aspirations, strengths, weaknesses, qualities, defects) 3. identifying and expressing one's own feelings and experiences in various situations 4. preliminary orientation regarding prosocial behavior (to test the understanding of the relationship between personal qualities, abilities and possibilities and different choices or desires in life)

Source: Own processing

3.2. Development of the Career Guidance Program

The stages of vocational counseling and guidance are as follows:

1. The *first phase* has a limited duration; it starts with the first session and progresses until the tasks of the first stage have been completed. During this period, a common language is created together with the participants. Firstly, everyone expresses their expectations and how they adjust to them. Some may feel vulnerable in the presence of stronger peers. The state needs to be handled until the emotional availability of the people is possible, which will facilitate the exploration of their internal world. It is important not to feel threatened for revealing the truth for fear of being judged or manipulated. This phase ends around the third, fourth, fifth meeting, when an alliance is created between the animators of the meetings and the participants, while the aim is its consolidation.
2. There is a *middle phase* in which the participants begin to expose themselves as socially inadequate and know that they will be understood. In this phase, most of the work takes place within the group and can last until the 15th meeting. During this time, the person will change and develop along with their relationships towards the group and will become increasingly aware of the nature of the difficulties and transformations they must undertake. A process of growth and evolution will be conjointly developed, in which the hardships encountered in interpersonal relationships, as well as the ups and downs of the group work, will be overcome. In this stage, the difficulties will consist in maintaining the attitude of neutrality in the face of established relationships, shared experiences involving the containment of the anxieties arising in each participant, bearing the frustrations of the relationship, and facing the painful slowness at all levels of the human being's functioning when progress appears. Another fundamental task is observing and supervising the deficit or conflicts according to everyone's needs.
3. In the *final phase*, it is important to keep track of the end of the counseling sessions and not to stop them. It is essential to leave an open door so that the person to be able to return to counseling whenever they want. At the end of the process, which is transmitted from the

beginning of the sessions, it should be kept in account that there will be an end to the process, but not a stop. It can be noted that the person who has internalized a new way of existence is propelled towards exploration and psychological growth.

3.3. Motivational Interview

The motivational interview or the motivational meeting was initiated from a theoretical point of view, following an experiment by Miller and Rollnick. The main objective of the motivational interview is to bring to the surface the intrinsic motivation to change a problematic behavior. From this standpoint, this type of intervention is opposed to strategies that try to impose a change through external means and that strengthen extrinsic motivation. A behavior change can occur when the person attaches this change to their own values to something important to them (Miller & Rollnick, 2002, p. 35). Carre and Fenouillet (2009) believed that people are constantly motivated for something in particular.

The question that specialists must ask themselves is not - *Why is this person not motivated?, but What exactly could motivate this person?* It is important to explore the personal situation as well as the importance given by the different factors involved in the change, as each person has different values and expectations (Carre & Fenouillet, 2009, p. 293). Another important aspect within the motivational interview is represented by the ambivalence in which the person finds himself or herself. Thus, they are split between the desire to change due to the negative consequences of their behavior and the desire to maintain this behavior due to the advantages it offers. The ambivalence is explored during the interview by the interviewer who allows the clients to express themselves freely, without being judged. This can help people become aware of their condition and thus facilitate change (Carre & Fenouillet, 2009, p. 294).

These authors identified four general intervention principles consisting of:

1. Expressing empathy – taking into account the definition provided by Rogers, namely "empathy consists in perceiving the internal baseline of a person with the same precision, with its components and emotional meanings in such a way as if we were that person" (Rogers, 1980, p.116). This empathetic style of communication, characterized by respectfully listening to the person and desiring to understand them, is defining for the motivational interviewing process.
2. Developing disagreements – the motivational meeting is designed to assist the person in not being stuck and helping them adopt a new, positive behavior.
3. Avoiding resistance – during the motivational interview, it is recommended to avoid starting debates with the counselee. The counselor will seek to avoid points of resistance or try to reframe them to create a push towards change.
4. Strengthening the feeling of personal effectiveness – even if a person understands the importance of changing their behavior, if they do not consider themselves capable of making this change, they risk not being able to put it into practice. An important goal of the motivational interview is to increase the client's confidence in their ability to overcome obstacles and succeed in the process of change.

Five specific techniques are being used in building motivation: open-ended questions, valuation, speech on change, reflective listening and conclusions.

1. **Open-ended questions**: are used to create an air of trust and acceptance. In the beginning, the counselee is the one who is supposed to talk more, so the use of open-ended questions is recommended.
2. **Reflective listening:** the reflection answer (mirror response) is one of the most important skills of the counselor. The mirror response is a directive and selective process. Generally,

the discussion about changing an inappropriate behavior is preferentially chosen. The advisor ultimately decides what to reflect on, what to emphasize and what to ignore.

3. **Valuation**: It is important to value and notice the effort made as well as the resources used.
4. **Synthesis or conclusions**: is another form of intervention used right from the beginning of the motivational interview and used throughout the duration of the intervention. This frequent synthesis connects various parts of the counselee's speech and reinforces them, shows that the counselor has been actively listening up to this point and it helps the counselee prepare his arguments and comments.
5. **Summarizing the speech on change**: represents the beneficiary's comments that converge in the direction of the desired type of change and that reflect the intention to change.

The conclusiveness of the approach consists in approving the plan by the beneficiary and obtaining a verbal decision to follow the established plan and reaffirming this decision.

4. HIGHLIGHTING THE RESULTS OBTAINED THROUGH TWO PROPOSED EXERCISES

4.1. Exercise 1: "Who am I? How am I? How was I? How would I like to be?"

Allocated time: 20 min/exercise

Method: individual and in group

Material: oral/written

The aim proposed by this first exercise is to identify and explore the beneficiary's own feelings towards the group members and create inner transformations, reflect and reveal a new vision of one's own life.

Note: Analyze yourself along three guidelines on the way you were in the past, how you are now, and how you would like to be in the future, and tell a short story according to these three stages of your life. Write in three columns: "Me in the past/Me in the present/Me in the future". Inside the column for the past, please think about your life behavior in the past and write (what you did right and what you did wrong, how you acted in a certain situation and why, who influenced you and why you chose to follow their advice, how you were viewed by those close to you (parents, siblings, relatives, friends, neighbors), if you were satisfied with your life etc.). The information will be obtained by completing a table similar to Table 2.

Table 2. Personal analysis during 3 periods of time

Me in the past Yesterday)	**Me in the present (Today)**	**Me in the future (Tomorrow)**
How were you? ……. To be noted: How they are managing their feelings/emotions and how they are thinking (What are they saying? Can they express themselves? Are they able to rationalize?	*How are you now?……..* *To be noted*: The real relationship with the others (is it objective?)	*How would you like to be in the future?.....* To be noted: If they made plans and if they can think about decisions.

Source: Own processing

Also, next to the present column, please describe how you are currently (how you ended up using this program, what you think about your current situation, who you can rely on, how you think you should use your time, how you communicate with your family, etc.).

And inside the column for the future, please think and imagine how you would like your life to be in the future (would you like to wait and see what the future brings you? or do you want to actively fight to achieve a specific goal?, Will you have a family and children? or will you be alone? Will you have a job or not? Will you live an honest life? Will you have many friends or few? Will you have a normal financial situation? Will you be a wealthy person?).

Note: The debate will be led by the counselor based on the answers given by the participants. It is recommended to help the participants in order to identify the crucial moments and contexts that marked their lives, as well as the possibilities to bring changes in the present and in the near future. Depending on the context given by the beneficiaries of the program, the points of view are taken into account, and the debates begin. Furthermore, the participants can speak/write, and when the participant is speaking, the counselor will take notes about each person separately, and at the end of the exercise, he will read to the group "Who is" each participant, as they presented themselves.

After completing this exercise, the following aspects should be observed by the counselor: life ideals followed in accordance with the reality, on a personal and professional level; realistic approach on self-image; assessment of the involvement/assurance of the ongoing process and of the group participants (on a separate note, to be explained whether or not the person can work or not in the group and why?).

4.2. Exercise 2: "Self-evaluation"

At the end of the counseling session, an assessment of self-esteem is performed. Each participant is asked to self-analyze and to recreate a positive attitude towards themselves, to rebuild their self-esteem. A review of everything that was taught during the group session (problems identification and placing them in a context, self-control techniques, the relations between past events and current state, fighting negative thoughts, formulation of strategies for present and future, work on self-image).

Aim: Self-esteem strengthening; self-knowledge; resources; Ego integration and reinforcement, training the ideal self-image and emphasizing past successes and achievements.

Note: Each participant makes a self-analysis on their involvement in the group and a review of everything we taught here in the group will be carried out; They will state the problems they think they have; they will place the problems in a context (will express them in a story); They will identify the solutions they discovered for solving them; they will make connections between past events and current state; they will show how they fight negative thoughts; strategies/solutions for the present and future regarding the processing of their image.

Indications: The self-evaluation exercise can be the following activity related to Exercise 1: *"Who am I, how am I?, How was I?, How would I like to be?"*, or it can be applied at the end of the first 3, 4 group sessions.

Note: the evolution of the participants, the inner mirroring and ability to open up to the group.

The ultimate goal is to make efforts for positive changes in themselves. Sometimes a person's self-image is integrated and manifested in relation to the beliefs and values derived from the parent's image. The person acts, judges and evaluates events according to these interferences which are not their own, but are recognized as their own, without realizing that their true personal and social beliefs and values are different from those they experienced – these will be overshadowed.

The career guidance counselor's goal to comply with professional ethics is to provide a general framework of principles and decision rules that cover most of the situations that counselors and social workers encounter in their professional activity, to capitalize on a dynamic set of ethical standards, to draw their attention and inform them on the undesirable consequences that may appear in their practice. They must maintain high standards of competence in the activity they carry out, recognize the limits of their specific competence and the experience they have (Vîşcu & Cădariu, 2019, p. 45). Their services must be limited only to those techniques they are qualified for according to their profession, training, and experience.

5. FUTURE RESEARCH DIRECTIONS

The authors propose that in the future, to continue the analysis regarding the development of career guidance and counseling programs, focusing on new categories of beneficiaries, namely the unemployed, employees who want a career reorientation, or people registered with the County Employment Agencies.

By expanding to these new categories of beneficiaries, the authors believe that the initiative now initiated will achieve its purpose and fulfill its proposed objectives.

6. CONCLUSION

The motivational approach resembles a set of communication methods focused on the person and their relationship style. This is based on the exploration of ambivalence. Ambivalence, a human phenomenon consisting of opposing tendencies that block the prospects for change, for our mission: giving up and not "committing a crime". An individual's motivation to change is built starting with their contradictions. Motivation to change is not a character trait of the person, but a state that varies with the quality of an interaction. Ambivalence acts as a scale influenced by the counselor's position; if the counselor is pro-change, the person will become defensive and argue their status quo to preserve their decision-making autonomy.

The signs of a successful completion of the counseling process are the following:

1. The adopted objectives and action plan are very clear for the client who assumes responsibility of their implementation
2. The counselor-client relationship remains professional (it does not turn into friendship or hostility).
3. The client speaks freely and asks questions related to how the counselor-client relationship will continue after the counseling ends.

Counselors and social workers must take notice that there may be cases where the beneficiaries cannot complete the counseling sessions within the group, if they have not even started them. It is about those people who did not really get involved in the work of the counseling process. Some beneficiaries may stop the process before it has even really started. These situations can be revealed from the initial assessment sheets.

Research has shown that in the face of an argumentative counselor, the individual becomes resistant to the advice given and adopts an opposite point of view to regain the space for autonomy. At the opposite pole of the goal pursued, confrontation generates an argumentation of resistance. Persuasion is consequently not an effective method. The motivation for change comes from within; it cannot be enforced from the outside. All individuals are generally more persuaded by the arguments they discover than by those others come up with.

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Employer Branding in the Digital Age: Leveraging Social Media for Talent Attraction

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Abstract: *The role of employer branding in the 4th industrial revolution, characterized by rapid technological advancements and the rise of social media, is becoming increasingly vital. As the pace of information dissemination accelerates, employer branding is crucial for attracting talent, particularly amid workforce shortages and the "war for talent." A central question addressed in this paper is: how can employer branding be developed through social media, and where should companies begin? A case study from an FMCG company illustrates a strategic approach to building employer branding via social media platforms, highlighting its impact on talent attraction. The findings offer actionable insights for companies looking to implement effective employer branding initiatives, ultimately improving recruitment outcomes and enhancing organizational reputation in a competitive labor market.*

1. INTRODUCTION

The rapid technological disruption driven by the Fourth Industrial Revolution is profoundly reshaping how organizations approach talent acquisition (TA). With the rise of social media and a global talent shortage, companies face mounting pressure not only to attract top talent but also to position themselves as employers of choice in a fiercely competitive labor market. In this increasingly digital and interconnected landscape, effective employer branding has become paramount, as it reflects an organization's values, culture, and overall employee experience. Much like consumer brands differentiate products, employer branding helps organizations distinguish themselves in the labor market, shaping potential candidates' perceptions and enabling informed career decisions.

This emphasis on differentiation highlights the evolving nature of hiring strategies. While the terms "talent acquisition" and "recruitment" are often used interchangeably, they represent distinct approaches. Recruitment typically addresses immediate, reactive hiring needs, while talent acquisition involves a proactive, long-term strategy to identify, attract, and retain top talent. This broader perspective encompasses activities such as sourcing, screening, interviewing, and candidate selection, sometimes extending to early onboarding. By treating talent acquisition as a comprehensive and strategic function, organizations are better equipped to address both current and future workforce needs. Research underscores the importance of a strong employer brand in this process. As Štokić and Gardašević-Živanov (2023) highlight, "a strong employer brand has a significant positive impact on the organization, including an influence on talent attraction and retention" (p. 112).

The evolving expectations of the modern workforce add complexity to talent acquisition strategies. Millennials, born between 1981 and 1999, or Gen Y (Bolton et al., 2013, p. 8), and Generation Z, characterized as "the most diverse and career-oriented individuals" (Lopez et al., 2023, p. 770), increasingly dominate the labor market. These generations prioritize roles that "align with their

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values and provide opportunities for personal growth and contribution to a greater cause" (Rampen et al., 2023, p. 672). To meet these expectations, organizations must move beyond transactional recruitment and develop relationship-driven strategies focused on long-term engagement and development.

This shift requires adopting a cyclical model of talent acquisition, which emphasizes building lasting relationships with potential candidates and maintaining a sustainable talent pipeline. Organizations must anticipate future hiring needs and proactively prepare to meet evolving workforce requirements. Practically, this involves leveraging social media and digital platforms to continuously engage with talent and developing brand ambassadors among current employees to promote the organization's culture and values authentically. Social media, in particular, plays a pivotal role in shaping employer branding. As Tewary (2015) notes, "there is a significant increase of presence in the area of social media landscape" (p. 53). Platforms such as LinkedIn and Facebook have been shown to positively influence key employer brand dimensions, enhancing an organization's image and attractiveness to potential employees (Carpentier et al., 2019).

Despite these advancements, today's labor market remains challenging. Eurofound (2023) reports that "labour market slack was at the lowest level in a decade in late 2022" (p. 1), making the "war for talent" a pressing reality for organizations worldwide. In this competitive environment, companies that fail to invest in employer branding risk losing out on top candidates. Job seekers increasingly evaluate potential employers based on their alignment with personal values, organizational culture, and reputation.

The strength of an employer brand not only impacts talent acquisition but also plays a crucial role in employee retention. As Azura et al. (2023) observe, "employer branding shapes the overall perception of the organization as a desirable place to work, helping to attract and retain the right talent" (p. 106). A strong employer brand fosters employee satisfaction and loyalty, as Pavlović and Zdravković (2019) note, creating a sense of belonging and emotional connection between employees and the organization (Nizar et al., 2024). This alignment between employees' personal values and the company's mission reinforces internal branding, "which can improve employee retention, engagement, and overall job satisfaction, thereby fostering a more productive and committed workforce" (Nizar et al., 2024, p. 2), while at the same time sending consistent external signals to potential candidates about why the organization is an employer of choice.

Effective employer branding involves three interconnected components. The first is cultivating a strong internal culture, which centers on the organization's values and management style. It answers questions like: How does it feel to be part of a company like X? Does management walk the talk? Do their actions align with their words? The second component is communicating the employer's value proposition to potential employees, which represents the employer's promise to candidates. The third component is aligning internal and external perceptions of the brand, essentially creating a consistent employee and candidate experience. Inconsistent messaging between these elements can undermine an organization's credibility and attractiveness, ultimately harming talent acquisition efforts. Personal networks and word-of-mouth remain critical sources of information for prospective candidates, who often seek insights into company culture from current or former employees to reduce the perceived risk of joining a new organization (Wilden et al., 2010). Companies that "maintain transparent and authentic communication..via employee advocacy." (Mirović & Stanišic, 2023, p. 102) are better positioned to attract top talent. Clearly, misalignments between an organization's public image and employees' actual experiences can present significant challenges.

Organizations that prioritize employer branding can achieve tangible benefits, including reduced hiring costs, enhanced employee advocacy, and a stronger company culture. As Krušković et al. (2023) emphasize, "employer branding will contribute to hiring new employees, creating a strong company culture, and even reducing marketing costs" (p. 1203). Long-term strategies, such as the recruiting wheel, focus on retaining and engaging talent—"new hires as well as potential candidates—and focus on turning talent leads into applicants and making permanent employees advocates for the company" (Talentry, 2020, p. 7).

Given all this, the importance of employer branding in talent acquisition cannot be overstated. By integrating employer branding into long-term strategies and leveraging tools like social media, organizations can effectively attract and retain top talent. This alignment between organizational values and employee expectations ensures not only short-term success but also long-term sustainability in an increasingly competitive labor market. However, a key question remains: How can employer branding be developed through social media, and where should companies begin? The case study presented in this paper, focused on an FMCG company, illustrates a strategic approach to building employer branding via social media platforms, highlighting a step-by-step process.

2. THE CASE STUDY

The study focuses on the efforts of AB Company (a fictitious name known to the author) in Serbia, which is an affiliate of a global player in the FMCG sector, to establish an effective employer branding and talent acquisition process aimed at attracting talent from Generations Y and Z.

While the company had well-established recruitment and selection procedures, as well as a strong global employer branding strategy, it struggled to connect with and attract candidates from these younger generational cohorts.

In response to this challenge, AB initiated the development of a new employer branding strategy targeting Generations Y and Z. The goal was not only to attract highly qualified candidates from these generations but also to establish a robust talent pipeline that could meet the company's long-term business needs. Achieving this required a shift from traditional recruitment practices to a more strategic talent acquisition approach. This transformation involved broadening the scope of recruitment, moving from a linear process to a cyclical one that emphasizes relationship-building, anticipates future hiring demands, and focuses on creating a sustainable pool of candidates.

The strategy was structured in three key phases:

Step 1: Identifying Priorities – The first phase involved understanding the specific needs and preferences of Generation Y and Z in the context of employer branding.

In the first phase of building the strategy, AB started analyzing the key factors that could enhance its appeal to Generations Z and Y. As these cohorts are composed of younger individuals who are highly engaged with digital platforms, it made sense to gather insights directly from them. This phase focused on employer branding, specifically on how AB could improve its attractiveness to this demographic.

To achieve this, AB organized a hackathon for university students in collaboration with faculty members from selected institutions. Hackathons are defined as "time-bounded events where participants gather in teams to develop projects that interest them" (Medina Angarita & Nolte, 2020, p. 50). The students were divided into groups and tasked with understanding what the key

professional drives and motives are for this group, where AB stands vis-à-vis the competition, and what areas for improvement or gaps AB has, as well as proposing strategies to make AB more appealing to Generations Y and Z. This event, hosted at AB's headquarters, functioned as both a strategic initiative and an opportunity to engage with potential future employees. Research suggests that such direct, experiential interactions are particularly effective in shaping perceptions of an employer's brand. For example, Sirojuddin and Sopiah (2022) found that "potential applicants seem to be drawn to businesses based on their past interactions with them" (p. 247).

The students presented their findings to a panel of judges, which included several senior managers from AB. Their analysis indicated that while AB was perceived as a company with a strong reputation for ethical values and business success, its social media presence was notably less visible compared to other global companies.

The Hackathon results also showed that Generation Y and Z are particularly interested in companies that emphasize innovation, career growth opportunities, and international mobility. However, it was apparent that while AB offered these features, it was not as active in showcasing them online, especially compared to its competitors. For AB, the opportunity was clear: to strengthen its online presence and better communicate its employer brand to younger generations.

Step 2: Developing and Implementing an Action Plan – The second phase of the strategy focused on creating targeted initiatives to enhance AB's appeal to Generations Y and Z, with a special emphasis on social media engagement. Given the importance of digital platforms in reaching this cohort, AB recognized the need to improve its online visibility to connect with this demographic.

AB's response involved launching a dedicated Facebook page focused on engaging young, less-experienced job seekers. The decision to use Facebook was based on recent research suggesting that it provides the best balance between a large, young user base and remains the primary source of information for young adults. For instance, Russmann and Hess (2020) found that "social media was a main source of news for the interviewed young adults, with many expressing that they felt well-informed via Facebook in particular" (p. 3193). Despite some legal limitations on promoting specific products on this platform, AB used the page to highlight its commitment to corporate social responsibility, employee training/development, and flexible work arrangements—features that align with the values of younger generations.

Step 3: Monitoring Progress and Making Improvements – The final phase involved tracking the effectiveness of the implemented strategies, gathering feedback, and making adjustments as needed to ensure continuous improvement.

HR professionals from AB quickly realized that simply having a presence on social media does not automatically guarantee visibility. Shortly after launching their Facebook page, the company faced the challenge of not achieving the desired traction. AB's limited presence on Facebook and lack of presence on other social platforms failed to capture the attention they had hoped for. As a result, the company was confronted with a new question: How could AB increase traffic and engagement on its chosen social media platform?

The solution came through the identification of two themes that resonated strongly with Generation Y and Z: innovation and international travel. With this insight, AB launched the on line campaign titled "Your Index (University Pass) is Your Passport (Travel Document)." The campaign invited students to submit personal stories, photos, or videos that aligned with AB's core values. Those

whose submissions were selected would win an international trip—a highly attractive incentive for the target demographic. These young individuals value experiences that expand their horizons, making the promise of travel compelling, as supported by previous research.

A key element of the campaign involved empowering students to engage their own communities (e.g., friends and followers) to vote online, directly on Facebook, for their submissions. This feature gave participants a sense of control and transparency in the voting process, as one participant explained: "The possibility of inviting my crowd to vote for my video was great because I could transparently see where my votes stood compared to others and actively act upon it. It's empowerment with transparency."

The 50 participants with the most votes were awarded an all-expenses-paid trip to AB's newly built, state-of-the-art global factory. Once there, the winners shared their experiences online, amplifying AB's visibility and helping the company appear more appealing to the target demographic. Some of the participants, driven by an interest in internships or job opportunities, were also given the chance to start in these roles within AB, provided there was a good fit.

For many of the participants from Generation Y and Z, this was their first international trip. AB covered all costs, including passport fees, which was particularly important given the financial limitations many face. The competition's viral nature, combined with the students' ability to invite their followers to vote, led to rapid engagement across social media platforms. In less than six months, AB's Facebook page gained over 20,000 new followers, predominantly from Generation Y and Z. This surge in visibility not only boosted AB's online presence but also created a quantum leap in the attractiveness of AB and positioned it as an employer of choice among Generations Y and Z.

The results were also evident in the year following the campaign. AB was ranked among the top five employers in Serbia, and the strength of the company's external talent pipeline significantly improved. The company no longer struggled to find qualified candidates for entry-level positions, which was a direct result of the campaign's success in building awareness and engagement with younger talent.

Three years later, the global impact of this initiative became clear. Over 30 young professionals from AB in Serbia were selected for international developmental assignments, compared to just 5-10 in previous years. This increase in global opportunities not only enhanced AB's talent pool but also further bolstered its employer brand. The success stories of employees on international assignments became a powerful TA tool, making the company even more appealing to candidates from Generation Y and Z.

3. FUTURE RESEARCH DIRECTIONS

While this case highlights the success of AB's efforts in connecting with Generation Z, it opens several avenues for future research to further enrich the understanding of employer branding strategies.

First, future studies could explore the long-term effects of social media engagement on employer branding and talent acquisition. Research could investigate how sustained social media interaction impacts an organization's reputation, talent pool, and overall success in attracting candidates over time.

Second, it would be valuable to examine how different generational cohorts respond to employer branding efforts. Comparing the responses of Generation Y and Z with those of older generations, such as Generation X and Baby Boomers, could provide insights into varying preferences

for communication, brand perceptions, and the effectiveness of different engagement strategies across age groups. This would help tailor employer branding strategies to specific demographics more effectively.

Third, the case study illustrated how empowering candidates to influence the outcome through voting and social sharing created a viral effect. Future research could investigate the impact of personal empowerment on the success of recruitment campaigns. Studies could explore whether this form of engagement leads to higher-quality candidates or better cultural fit within organizations.

Another promising direction for future research is to compare global employer branding strategies with local ones. Investigating the differences in strategies and outcomes between global and localized campaigns could provide valuable insights into the challenges and benefits of tailoring employer branding for different regions or cultural contexts.

Lastly, the case highlights the incorporation of gamification—such as voting and social sharing—into employer branding efforts. Future studies could expand on this by examining the broader application of gamification in employer branding and recruitment. Research could explore whether these strategies are effective across different industries or if certain job types require tailored approaches to engage candidates.

By exploring these areas, future research can provide a deeper understanding of how employer branding strategies can evolve and adapt to the changing needs of companies and job seekers, particularly in the digital era.

4. CONCLUSION

This case demonstrates the power of a well-executed, iterative approach to employer branding. Through consistent monitoring, feedback, and adaptation, AB was able to turn a social media challenge into an opportunity to connect with its target audience. By aligning its campaign with the values and aspirations of Generation Y and Z—innovation, career development, and international exposure—the company was able to significantly improve its talent acquisition efforts and strengthen its reputation as an employer of choice.

The case of AB's employer branding campaign illustrates the critical role that targeted, innovative strategies play in connecting with younger generations—particularly Generation Z. By leveraging social media and aligning the campaign with core values, AB was able to significantly increase its visibility and attractiveness to this key demographic. The campaign's success, amplified by the student's ability to invite their followers to vote for their submissions, turned what could have been a simple contest into a viral event that not only engaged participants but also extended the company's reach well beyond its immediate audience.

As a result, AB not only improved its external talent pipeline but also strengthened its employer brand, leading to an increase in the number of qualified applicants for entry-level positions. The long-term impact of the initiative was further reflected in the company's ability to attract top talent for international assignments, enhancing its global talent pool and fostering a more dynamic organizational culture.

This case demonstrates the value of continuous feedback, iteration, and adaptation in employer branding efforts. AB's commitment to addressing the needs and preferences of its target demographic,

coupled with a strategic and transparent approach to engagement, was key to its success. For AB, and similar companies, this approach shows that building a strong employer brand requires not just visibility but also meaningful engagement with the right audience, leveraging digital tools that resonate with their values and lifestyle.

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Innovative Approach to Employee Motivation through Incentive Tourism: Analysis of Hilton Costabella Beach Resort & Spa

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Abstract: *Motivation is the fundamental driver of human behavior and a key management tool for achieving goals within organizations. This paper investigates the management of human resources through motivation, with special emphasis on incentive travel as a specific form of reward. Incentive travel is a powerful motivational tool that, through unforgettable experiences and customized rewards, significantly increases employee motivation, team bonding and productivity. Based on secondary data, previous scientific research on tourism incentives and motivational theories is presented. The empirical part of the work includes the analysis of in-depth interviews of the management of different departments of the Hilton Costabella hotel with employees who had the opportunity to participate in incentive trips as a reward for their business results. Research shows a significant positive impact of incentive trips on employee motivation as well as the overall success of organizations, especially in the tourism sector. The results indicate that the alignment of motivational strategies with the needs of employees contributes to the creation of a positive working atmosphere, increases loyalty and ensures the long-term success of the organization.*

1. INTRODUCTION

In the modern business environment, characterized by high dynamics and increasing competition, organizations are faced with the need to continuously adopt innovative approaches in order to maintain high levels of performance and satisfaction of their employees.

Employee satisfaction has become a key factor that directly affects productivity, loyalty, and overall organizational success. For this reason, employers are increasingly recognizing the importance of investing in strategies that aim to ensure a high level of satisfaction among employees, while the need for a holistic approach to human resource management is increasingly being recognized. In this context, incentive travel appears as one of the most effective tools for employee motivation, offering them unique and unforgettable experiences that go beyond traditional forms of reward.

The aim of the paper is to show how incentive travel, as an innovative approach to employee motivation, can contribute to the creation of a positive and engaged work environment, and how it affects employee motivation, efficiency, and work performance. Accordingly, the main hypothesis is set, which refers to the assumption that participation in incentive tourism programs significantly increases motivation, job satisfaction, and work efficiency of employees, in this paper on the specific example of the Rijeka hotel, Hilton Costabella Beach Resort Spa.

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2. INCENTIVE TRAVEL

Incentive trips are designed as a reward for a specific achievement, such as reaching certain sales goals, improving productivity, or building strong professional relationships. This type of travel is not only about recreation, but about creating unforgettable experiences that will influence motivation and work performance. According to research, travel incentives are more motivating than monetary rewards because they create a positive feeling towards the company and strengthen the relationship between employees and the organization (Robson et al., 2017; Jeffrey, 2015).

The key objectives of the travel incentive include: employee motivation (1), strenghting relationships (2) increasing loyalty (4), brand promotion (5).

(1) Travel is used as a means to motivate employees to achieve better results in their work (Fenich et al., 2015; Mair, 2015).
(2) Travel allows employees to get to know each other better and build stronger professional and private ties (Severt, 2013; Kazandzhieva, 2019).
(3) Incentive travel can increase employee loyalty to the company and reduce turnover (Sheldon, 1995; Jeffrey, 2015).
(4) Travel can be part of a brand promotion strategy, especially if it includes activities that promote corporate culture or social responsibility (Muszyńska & Ostrowska Tryzno, 2020).

Incentive trips are characterized by a number of unique characteristics that distinguish them from other types of trips: program design (1), choice of destinations (2), activities and experiences (3), service quality (4).

(1) Programs are usually planned in detail to ensure maximum participation and participant satisfaction. This includes the choice of destinations, accommodation, activities and special events (Davidson & Cope, 2003; Lee & Chiang, 2017).
(2) Choice of destinations: Popular destinations for travel incentives include exotic places, cities with a rich history, or places with unique natural beauty. For example, Iceland, Scotland and southern Europe are often chosen for their attractiveness and opportunities to create memorable experiences (Robson et al., 2017; Davidson & Cope, 2003).
(3) Activities and experiences: Travel includes a wide range of activities, such as team building, networking, culture and entertainment. These activities are designed to ensure interaction between participants and to create long-lasting records of the trip (Gračan et al., 2019; Davidson et al., 2011).
(4) Service quality: Incentive travel requires a high level of professionalism and service quality to ensure that all aspects of the trip run smoothly (Yoon & Shim, 2011; Huang et al., 2015).

The success of the travel incentive depends on numerous factors, which include: destination (1), program and activities (2), participation and activities (3), Corporate Social Responsibility (CSR) (4).

(1) The choice of destination is crucial for the success of the trip. The destination must offer unique experiences, easy accessibility, and a high level of security (Potgieter et al., 2016).
(2) The travel program should be diverse and adapted to the needs of the participants. This includes activities that consider motivation, team building, and networking (Lee & Chiang, 2017; Gračan et al., 2019).
(3) Participant satisfaction is a key indicator of success. According to research, participants who are satisfied with the trip are more motivated to achieve better results in their work (Severt, 2013; Jeffrey, 2015).
(4) Modern travel incentives often include activities that promote CSR, such as volunteering or supporting local communities. These activities help build a positive image of the company and strengthen relations with employees (Muszyńska & Ostrowska Tryzno, 2020).

As in other forms of tourism, trends are changing, so when the previously mentioned factors are met, today's trends in this form of tourism can be divided as follows: executive design (1), technology (2), sustainability (3), generation Y requirements (4).

(1) Travel is increasingly personalized, with a focus on creating unique experiences for participants (Gračan et al., 2019).
(2) The use of technology, such as social networks and mobile applications, is becoming increasingly important for the organization and promotion of travel (Gračan et al., 2019).
(3) Companies are paying more and more attention to sustainability and CSR activities, to ensure that travel has a positive impact on local communities and the environment (Muszyńska & Ostrowska Tryzno, 2020).
(4) Young employees are looking for different types of experiences, which affects the design and organization of travel (Davidson et al., 2011).

Trying to respect the trends, the organizers of this type of trip naturally face a number of challenges. By reviewing the literature, they can be divided into the following: budget (1), safety (2), logistics (3), (4) regulatory obstacles.

(1) Cost control is a key challenge. Companies often look for cheaper destinations and accommodation, but at the same time, they want to provide innovative and interesting experiences (Robson et al., 2017).
(2) The safety of the participants is a priority. Destinations must be safe and stable, especially in the context of global challenges such as terrorism and political instability (Robson et al., 2017).
(3) The coordination of travel, including transportation, accommodation and activities, requires a high level of organization and communication (Yoon & Shim, 2011; Huang et al., 2015).
(4) Changes in regulatory frameworks can affect the organization of travel, especially in the case of international destinations (Robson et al., 2017).

The following schematic diagram illustrates the above.

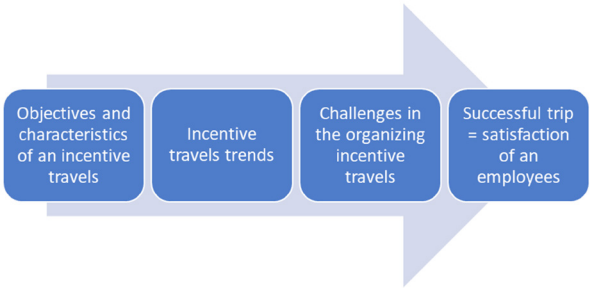

Figure 1. From the theory of the importance of motivating trips to satisfied employees

Source: Own research

3. HILTON COSTABELLA BEACH RESORT & SPA CORPORATION

Hilton Hotels & Resorts is the flagship brand of Hilton Worldwide. Hilton Worldwide is an international hotel group, one of the largest and fastest-growing, and is at the top of the global hotel industry. This includes hotels that Hilton Worldwide directly owns, as well as those that it franchises and manages. The mission of the Hilton Group is to be the world's most hospitable company by creating exceptional guest experiences, meaningful opportunities for employees, value for owners and a positive impact in its communities. Hilton's vision is to fill the earth with the light and warmth of hospitality, providing exceptional experiences in every hotel, every guest, every time. It is interesting that behind the name "Hilton" are hidden the core values of this hotel chain, which

are: hospitality – Passion for providing exceptional guest experiences, integrity – Always doing the right thing all the time, leadership – Being a leader in your own industry and communities, teamwork – Being a team player in everything you do, ownership – Being the owner of your own actions and decisions, and now – Acting with a sense of urgency and discipline.

The Hilton Costabella Rijeka project is the work of the company JTH Holding d.o.o., which launched the business of a luxury hotel resort in Rijeka. This project, built in 2021, is one of the largest Czech investments in Croatia, which built a 5* hotel resort and as such became a sign of prestige and luxury, but also the only high-class hotel in Rijeka.

The investor is the Czech company JTH Costabella, and Hilton did not lease or buy the Rijeka resort, but only took over the management, i.e., the intellectual capital of this resort. What makes this hotel special, apart from the location itself, is that it is a family-friendly resort that can accommodate up to 560 guests.

Given the prestigious name it bears, that of the famous global hotel chain Hilton, this move has provided the Rijeka area with a new tourist attraction.

3.1. Human Resource Management Strategy at Hilton

Hilton Costabella, as part of the global Hilton family, is recognized as one of the best places to work, as confirmed by prestigious awards from Fortune magazine and the Great Place to Work organization. These recognitions place Hilton Costabella among the best employers globally, emphasizing excellence in human resource management and commitment to employee development. Hilton offers outstanding benefits to its employees, rewarding them for their efforts and contributions. This was confirmed by the results of the research conducted for this work. Hilton Costabella particularly excels in creating a positive work environment through various initiatives, including team-building activities, birthday parties, parties for team members, and education and training programs. Employees have the opportunity not only for professional growth but also for personal development, which significantly contributes to their satisfaction and engagement. This approach motivates employees, strengthens their loyalty, and is reflected in the performance of the entire hotel chain.

Hilton stands out as a committed employer that invests significant resources in the career development of its employees, providing them with a wide range of opportunities for professional and personal growth. Central to Hilton's career development strategy is Hilton University, a platform that offers a comprehensive education and training program. This program includes a variety of training essential for success in the hospitality industry.

As part of the initial hiring phase, Hilton provides onboarding training based on Standard Operating Procedures (SOP). This training ensures that new employees quickly and efficiently master the basic processes and work standards, which allows them to be successful in integrating into the team and organization. After initial training, Hilton continues with ongoing training, providing continuing education opportunities that allow employees to advance their skills and knowledge throughout their careers. This approach encourages constant professional development and adaptation to the changing needs of the industry. Hilton also places special emphasis on improving the skills and knowledge of managers. Specialized training programs for managers are focused on the development of leadership skills, strategic thinking, and team management, ensuring that leaders within Hilton can effectively lead their teams and contribute to the overall success of the organization. In addition, Hilton offers innovative training, such as coffee training and wine

tastings. These specialized trainings not only enrich employees' knowledge about the products they offer, but also enable employees to better understand and communicate with guests about the latest trends in the food and beverage industry.

This approach to career development at Hilton not only encourages professional growth but also contributes to the creation of a positive work environment and a high level of engagement among employees. Hilton's commitment to the education and development of its employees is clearly reflected in their success as a global leader in hospitality.

3.2. Evaluation and Awarding

Within the Hilton hotel chain, the employee progress monitoring system is carried out through a semi-annual evaluation process called the Personal Development Report (PDR). This evaluation system is key to identifying and developing talent within the company. Employees are evaluated according to categories that include exceed expectations, meet expectations, and below expectations. Employees who are rated in the highest category of exceed expectations are recognized as the hotel's top talents. These talented employees undergo further development, which includes programs such as Cross Exposure. Every 6 months, 2-3 individuals are selected to be rewarded for their work under this program.

The Cross Exposure program provides employees with the opportunity to expand and share knowledge within different Hilton hotels globally. For example, one form of reward and professional development may include a two-week stay at the Hilton Hotel in Paris, where employees have the opportunity to gain new experiences and skills, while at the same time being rewarded for their contributions. Such programs not only provide development opportunities but also encourage international cooperation within the group. Each Hilton hotel implements this program as part of its strategic approach to human resources development.

On a global level, Hilton also monitors employee results through precisely defined criteria and standards set for specific positions. Circle of Excellence, as one of the most prestigious reward programs, is awarded to the best employees within specific regions. Those who achieve exceptional results win a prize trip for themselves and another person, where all expenses for a stay in luxury destinations are covered. This prize package includes not only accommodation and transportation, but also additional benefits such as gifts and exclusive content at the destination.

It is important to emphasize that only top talents recognized by Hilton through the PDR system are recognized for participation in such programs. In addition to individual recognition, Hilton also fosters a culture of teamwork. Prize gatherings and team activities, such as evening outings and socializing in other hotels within the group, are regularly organized. These gatherings encourage collaboration, strengthen team cohesion, and contribute to creating a positive work environment. All of these initiatives have long-term goals not only in motivating employees, but also in their continuous professional development, which contributes to the success of the organization on a global level.

4. EMPIRICAL ANALYSIS – HILTON COSTABELLA

As part of the empirical analysis, research, more precisely an in-depth interview, is being conducted, which, using the example of the Hilton hotel chain, seeks to explore the connection between incentive travel and employee motivation, as well as their impact on productivity. The goal of the research is to better understand how incentive travel contributes to employee motivation and engagement in the hotel industry.

For this paper, research was conducted using the in-depth interview method with hotel management, provided that the participants had participated in some form of incentive travel. The analysis of the responses led to the conclusion that three employees — the sales director, the human resources director, and the sales executive — participated in incentive programs.

Every six months, an employee evaluation is conducted within each Hilton hotel, within which individuals who particularly stand out with their work and professional achievements are selected. These employees, recognized as key talents, are rewarded with various forms of recognition and development opportunities, including incentive travel. The interview results were summarized in five groups: general information about the employees and their job satisfaction before participating in the incentive trip, the experience of the trip itself, motivation before and after the trip, the impact on work performance after returning, and finally, the advantages and disadvantages of incentive trips, with suggestions for possible improvements.

The respondents are employees of the Hilton Costabella Beach Resort & Spa, who started their work at the hotel right from the opening, or pre-opening. The first respondent took on the role of Director of Sales, while the second respondent began her career in the Finance department and later joined the Sales department. The third respondent took on the position of Director of Human Resources from the very beginning at Hilton. All three respondents emphasize that working in this environment has been extremely satisfying from day one. The Hilton brand culture, which places special emphasis on employee care and offers a variety of rewards, has played a key role in creating an extraordinary atmosphere in the office. This makes Hilton a place where every team member feels valued and motivated to achieve excellence. The experience of the second respondent, who worked in two different departments, is particularly noteworthy. She emphasizes that this time, through different departments, has enabled her to acquire a wide range of skills. Each step in her career within Hilton has further confirmed her satisfaction and enthusiasm for working in this dynamic and stimulating environment.

All three respondents highlighted their incentive trips and described the experiences, emphasizing how they significantly contributed to their professional development and personal satisfaction. The first respondent won the “Circle of Excellence” award as the best sales director for the Europe, Africa and Middle East regions, which for her represented not only a great professional success, but also an unforgettable experience. The award included a trip to Mexico, where every aspect was carefully designed, which further strengthened her satisfaction and pride in working at Hilton. The second respondent participated in the Flavors and Flair event in Qatar, which exceeded all her expectations. The trip was not only an opportunity to relax but also a source of inspiration and knowledge, which enriched her professional skills and personal growth and left a lasting impact on her career. This trip was a competition in which the second respondent, together with her colleagues from the HIP department and the Michelin restaurant Nebo, won the award for presenting the flavors of Kvarner. The third respondent, on the other hand, felt extremely proud of the award she received, which provided her not only with a vacation but also with the opportunity to further enrich her business experience. Traveling to Hilton Prague as the best sales director, she had the opportunity to learn about examples of good practice, which was particularly useful and enriching for her. All three trips left a strong positive impression on the respondents, confirming the value of incentive programs in encouraging employee satisfaction and professional development. After returning from the incentive trips, the respondents shared their observations on motivation and work performance. The first respondent emphasized that seeing her efforts recognized and rewarded further strengthened her motivation, encouraging her to make even greater efforts and achieve greater success. Although she did not notice a significant change in her work performance,

she noticed a positive impact on her team, who were inspired by her achievement and encouraged to strive for similar goals. The second respondent emphasized that her motivation after returning from the trip not only remained high but also increased. She learned how to apply the acquired knowledge in her daily work and upcoming challenges. She also highlighted the positive impact of travel on her work performance, as meetings with numerous colleagues broadened her horizons, providing her with new insights and opportunities within the profession, which further strengthened her ambition to achieve greater achievements. The third respondent noted that her motivation did not change after returning from the trip, as it is always at a high level, thanks to her constant dedication and enthusiasm for work. However, the trip had a positive impact on her work performance, especially with regard to her work in the human resources department. The third respondent uses each trip as an opportunity to broaden her horizons, observing people and the organization of work, and noticing new practices that she can apply upon her return, bringing fresh ideas and improvements to her work.

When it comes to suggestions for improving incentive travel and its long-term impact on careers, the interviewees provided the following insights: All three interviewees agree that Hilton already successfully manages the organization of incentive travel, emphasizing that the current standards are very high and that they do not see the need for significant improvements. They believe that the reward system at Hilton Costabella already works excellently and that all employees will be rewarded for their efforts.

In terms of long-term impact, incentive travel has a significant positive impact on the career of the respondents. The first respondent believes that further opportunities for development and reward should be provided to her colleagues, while the second respondent relies on the fact that incentive travel will enrich her professional reputation, enable networking, acquire new knowledge, and encourage innovation. The third respondent emphasizes that such trips significantly contribute to her professional development in the field of human resources, providing an opportunity to acquire new ideas and best practices that she can apply in her work, improving talent management strategies, and creating a positive work environment.

The research data showed that incentive travel had a positive impact on all of the above aspects: participation in incentive tourism programs significantly contributes to improving team dynamics and cooperation among employees, as well as to the personal and professional development of employees, and results in increased work efficiency. Incentive travel contributes to professional and personal development, as well as greater work efficiency.

However, to reach more general and comprehensive conclusions, it is necessary to expand the research to a larger number of respondents who have had the opportunity to participate in incentive trips. It would also be useful to compare the effects of incentive trips with other traditional methods of motivating employees, to gain a deeper insight into the similarities and differences between different approaches to motivation, and their specific effects on the work dynamics within the Hilton Costabella Beach Resort & Spa.

5. CONCLUSION

This paper highlights the importance of business tourism, with a special focus on incentive travel, as an innovative approach to employee motivation. Incentive travel, as a specific segment of business tourism, represents a significant tool in stimulating work motivation and employee engagement. The relationship between motivation and incentive travel is based on the assumption

that these forms of reward act as a strong motivator for work. Incentive travel provides employees with the opportunity to feel recognized for their efforts and contributions through unforgettable experiences, which results in increased motivation, productivity and loyalty to the employer. The example of the Hilton Costabella company shows how a successfully implemented employee reward strategy can become a key factor in creating a positive work environment. Hilton Costabella recognizes the importance of incentive travel and other forms of reward as essential items in business, paying great attention to its employees, their working conditions, and the work environment. This business decision contributes to creating a work atmosphere in which employees enjoy coming to work, do what they love, and in the process, earn a well-deserved income. The research carried out within this work confirmed the effectiveness of incentive travel as a powerful tool in human resources management. This paper emphasizes that, with proper management and application of motivational strategies such as incentive travel, they can achieve not only better work results, but also long-term satisfaction and loyalty of their employees, which is crucial for success in a competitive business environment.

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Employee Competence as a Key Factor of Motivation and Satisfaction in the Hotel Sector

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Abstract: *As a key component of the tourism industry, the Republic of Croatia's hotel sector requires highly competent employees to meet guests' expectations and ensure a competitive advantage. This paper investigates the influence of employees' competence on their motivation and job satisfaction. Competence was analysed through professional skills, interpersonal skills and adaptability, taking into account the specifics of the hotel industry. The research was conducted among hotel employees in the Republic of Croatia, using a questionnaire. The results show that employee competence significantly contributes to their motivation, work engagement, expectation and satisfaction. Key motivational factors include opportunities for education and advancement, while employee satisfaction stems from a positive work environment, management support, and recognition of their contributions and its seasonality. Employees with a higher level of professional competence express a greater sense of self-confidence, loyalty to the employer and job satisfaction. In addition, a clear connection was observed between direct investments in employee development and the overall quality of services provided by the hotel, which affects guest satisfaction and the hotel's financial performance. The conclusions point to the need for continuous investment in the development of employee competencies to ensure the sustainability and quality of business in the Croatian hotel sector. Concrete strategies are proposed for improving professional development and creating a stimulating work environment, which encourages employee motivation and satisfaction, which is directly reflected in the experience.*

1. INTRODUCTION

The hotel industry is vital for tourism, so its sustainable development is very important for the success of tourism as a whole. The hotel industry's primary goal is to meet the expectations of guests and provide a well-trained workforce to ensure success and achieve growth.

An interesting destination that has adequate quality will forever remain in the memory of tourists and tourists will be happy to return to this place or recommend it to others.

The human factor is crucial in the hotel industry because the quality of hotel services and products depends on the knowledge, skills, experience, behaviour and other characteristics of employees. And they are dependent on competence. Research shows that job satisfaction enhances employee's loyalty, yet Croatian tourism faces a shortage of skilled labour, an aging workforce, and reliance on seasonal or foreign workers. Only 6% of industry employees are highly educated, and declining enrollment in tourism-related education is a growing concern.

Organizational support improves job satisfaction, motivation, and retention. Employees who enjoy guest interactions tend to perform better, making service orientation and job satisfaction

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key research areas. Insufficient training harms service quality, while competence encompasses technical skills, interpersonal abilities, problem-solving, and professional development. This paper emphasizes the need for continuous investment in employee training to ensure high service quality. The aim of this paper is to investigate the influence of employees' competence on their motivation and job satisfaction.

The study is done on a sample of 166 participants who are employees in small and medium-sized hotels in the Republic of Croatia. The instrument used for data collection was a Questionnaire. This research employs a quantitative methodology. Research on tourism employees provides insight into a wide range of topics that can help improve working conditions, training, professional development, and the implementation of new technologies. Such research can be useful for tourism as an industry to improve working conditions, employee satisfaction, and ultimately the quality of service provided to tourists.

The paper is structured as follows: Section 2 presents a literature review. Section 3 explains the methodology used to analyze the results of the research. Section 4 presents the results and discusses the implications of these results, and Section 5 provides a concluding summary of the findings.

2 LITERATURE REVIEW

Job satisfaction is the most important job attitude and one of the main research topics in the organizational literature (Akgunduz et al., 2018). This construct relies on an assessment that an individual performs regarding the tasks accomplished, work conditions, and work environment (Judge & Kammeyer-Mueller, 2012). If the individual evaluates these aspects positively, then he/she will be satisfied with his/her job. However, if the result of this evaluation is negative, the worker will be dissatisfied. Therefore, we can affirm that this concept has two components, cognitive and affective (Judge & Kammeyer-Mueller, 2012). The cognitive component is related to the assessment of work-related aspects (e.g. tasks, conditions, and environment) and the affective component refers to the affects that emerge from this assessment, positive (i.e. employees are satisfied with their job) or negative (i.e. employees are dissatisfied with their job; (Judge & Kammeyer-Mueller, 2012). As the hotel industry continues to evolve, the necessity for a holistic, competency-based approach to talent development will only become more critical. By embracing the cultivation of psychosocial competencies, the hotel sector can make sure that it remains at the forefront of guest satisfaction, employee engagement, and organizational success (Sharma & Singh, 2024). The quality of service is one of the key assumptions of a sustainable and profitable business in the hotel industry. On the other hand, employees as direct providers of hotel services have a direct impact on the perceived quality of service. Establishing a relationship between job satisfaction and perceived intangible service quality is of great importance for customer relationship management and sustainable competitive advantage (Perić et al., 2023). Research by Garcia and Martinez (2018) highlights the role of empathy in creating memorable guest interactions and fostering loyalty towards hospitality brands. This empathetic mindset manifests in various ways, from the genuine greeting at check-in, to the thoughtful recognition of a guest's preferred amenities, to the sensitivity shown in addressing a complaint or concern. By cultivating empathy, prospective hotel employees can transform a routine hotel stay into an exceptional, emotionally resonant experience that leaves an impact on the guest. Developing empathy allows hotel staff to anticipate guests' need, offer personalized recommendations, and create memorable experiences (Zeithaml et al., 2018). There is a need for revising hospitality curriculum at both undergraduate and post graduate levels. Management and operations orientation needs to be segregated. Hospitality managers without management education exposure would have a limited vision and most of the

learning would happen on the job or through trial and error. (Jauhari, 2006). Employees who are willing to continuously learn and apply their knowledge in practice will take a dominant position. Only with such human resources can hotel companies achieve good business results and secure a strong market position (Šekarić et al., 2015). The main international trends in the hotel services market include: robotization of hotel enterprises, introduction of "smart" hotel rooms, the use of environmental innovations (garbage sorting, plastic rejection, non-daily change of bed linen, etc.), the development of mobile online resources, blockchain technology, etc. The possibility of introducing innovative solutions into the activities of hotel enterprises is impossible without an appropriate personnel policy, which involves improving the skills of personnel and, accordingly, their innovativeness for the implementation of innovative solutions in the activities of hotel enterprises (Ivanova & Nikolskaya, 2022)

3. METHODOLOGY

3.1. Sample description

The survey included 166 respondents, whose answers were analyzed in several key demographic categories.

3.2. Variables

The research will focus on the following key variables: employee competencies, motivation and job satisfaction.

3.3. Methods of data analysis

In order to determne the key factor of motivation and satisfaction in the hotel sector of Republic of Croatia, the research that has been conducted seeks answers to the following questions:

1. What motivational factors have the greatest impact on employee satisfaction in the hotel sector of the Republic of Croatia?
2. How does the level of employee competencies affect their motivation and job satisfaction in the hotel sector of the Republic of Croatia?

The set goals define the following hypotheses:

Hypothesis H1: Opportunities for education and advancement are the main motivating factors for employees in the hotel sector.

Hypothesis H2: A higher level of professional competencies of employees has a positive effect on their motivation and job satisfaction.

The data collected from secondary sources were analysed using SPSS (Statistical Package for the Social Sciences) version 29.0.

Descriptive statistics: This analysis provided key statistical values, including the average and standard deviation for individual elements in achieving workplace motivation. Inferential statistics: Cronbach's Alpha coefficient and Bayes Factor and Test of Sphericity.

4. RESULTS AND DISCUSSION

The demographic profile of the sample provides an important insight into the structure of the respondents.

Table 1. Description of the research sample

	NUMBER OF RESPONDENTS	%
GENDER	**166**	**100**
Male	57	34,34%
Female	109	65,66%
AGE GROUP	**166**	**100**
18-25	35	35,00%
26-35	35	35,00%
36-45	38	38,00%
46-55	36	36,00%
55+	22	22,00%
LEVEL OF EDUCATION	**166**	**100**
Elementary school	5	3,01%
High school	127	76,51%
College education	24	14,46%
Higher vocational education	10	6,02%
Postgraduate study, doctorate	0	0,00%
WORKING POSITION	**166**	**100**
Auxiliary worker	9	5,42%
Housekeeper, cleaner	49	29,52%
Maintenance worker	8	4,82%
Receptionist	35	21,08%
Concierge	0	0,00%
Chef	12	7,23%
Waiter/ Waitress	40	24,10%
Manager or director	13	7,83%
TOTAL WORKING SENIORITY	**166**	**100**
less than 5 years	57	34,34%
5 - 10 years	39	23,49%
11- 20 years	38	22,89%
20 more	32	19,28%

Source: Own research

Table 2. Cronbach´s Alpha coefficient

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.773	.785	6

Source: Own research

Cronbach's Alpha value of 0.773 suggests that the scale has good reliability. According to general guidelines for the interpretation of Cronbach's alpha coefficient, values between 0.7 and 0.8 are considered good (while values above 0.8 are considered very good and below 0.7 are considered poor). This value indicates that there is adequate internal consistency among the items, which means that the items probably measure the same dimension or latent trait. This coefficient takes standardized items into account, which can provide insight into how items perform when they are

all placed on the same scale. The value of 0.785, which is slightly higher than the baseline value, confirms that the scale remains stable and reliable even after standardization, which once again indicates good internal consistency.

Table 3. Item-Total Statistics

	Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Job compatibility in relation to expectations and previous experiences.	23,76	4,172	,440	,218	,765
Motivation in the workplace	23,51	4,276	,622	,434	,716
Intersectoral cooperation and its impact on motivation	23,54	3,935	,553	,418	,731
Positive working atmosphere and its impact on motivation in the workplace	23,39	4,978	,467	,340	,757
Acknowledging and accepting suggestions for improving job efficiency and influencing motivation	23,57	3,919	,597	,399	,717
Guest satisfaction vs. motivation in the workplace	23,43	4,550	,506	,374	,743

Source: Own research

Table 3's key parameter is the Corrected Item-Total Correlation, which shows how each item is related to the overall scale score. High correlations indicate that the item contributes to measuring the scale's latent trait. "Motivation at the workplace" shows the highest correlation (0.622), highlighting its relevance. In comparison, "Job compatibility with expectations and previous experiences" has a lower correlation (0.440), but it is still acceptable as correlations above 0.30 are considered good. The Squared Multiple Correlation explains each item's contribution to the total scale variance. "Motivation at the workplace" explains 43.4% of the variance, indicating its importance in the scale. Similarly, items like "Acceptance of improvement proposals" explain 39.9% of the variance. The most important measure in this table is Cronbach's Alpha if Item Deleted. If an item has a significant impact on scale reliability, its removal causes a decrease in Cronbach's alpha. Omitting any item here has only a small effect, showing that the scale has good internal consistency. "Motivation at the workplace" causes the greatest drop (0.716), signaling its crucial role. Conversely, "Job compatibility with expectations" causes a smaller drop (0.765), but still contributes positively. All in all, the results indicate that the scale is well designed and that the items largely share the same latent trait, which enables a valid measurement of motivation in the workplace.

Table 4 presents descriptive statistics for factors influencing workplace motivation among hotel industry employees (N = 166). Overall, high mean scores (e.g., good working conditions: M = 4.87, SD = 0.39; positive working atmosphere: M = 4.86, SD = 0.39) indicate strong employee satisfaction. In contrast, factors such as the reward system (M = 4.63, SD = 0.75), guest compliments (M = 4.77, SD = 0.60) and continous education and improvement show greater variability (M = 4,60, SD = 0,738 suggesting differing perceptions among respondents. The results do not confirm Hypothesis H1: Opportunities for education and advancement are the main motivating factors for employees in the hotel sector. The results from Table 4 clearly show that, on average, employees

are satisfied with various aspects of their workplace, with special emphasis on the high rating of working conditions and working atmosphere. Although the mean values for most variables are quite high, the existence of variation in responses, especially about rewards and continuing education, indicates areas that may be subject to further improvements. Based on this data, management can identify key aspects that contribute to general employee satisfaction and focus their efforts on improving factors such as the reward system and opportunities for professional development, which are not rated as positively as some other factors.

Table 4. The role and importance of individual elements in achieving workplace motivation

	Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Salary	166	3	5	4,73	,533	,284
Permanent workplace	166	1	5	4,70	,692	,478
Good working conditions	166	3	5	4,87	,390	,152
Positive working atmosphere	166	3	5	4,86	,386	,149
Compliments from guests	166	1	5	4,77	,602	,363
Guest satisfaction	166	1	5	4,81	,515	,266
Management's attitude towards staff	166	2	5	4,86	,416	,173
Recognition by superiors	166	3	5	4,78	,485	,235
Reward system for achieving excellent results	166	1	5	4,63	,750	,563
Acknowledging and accepting proposals for improving job efficiency	166	2	5	4,67	,664	,441
Continuous education and improvement	166	2	5	4,60	,738	,544
Valid N (listwise)	166					

Source: Own research

Table 5. Impact of employee competence on their motivation and job satisfaction

	Bayes Factor and Test of Sphericity				
	Bayes Factor[a]	Mauchly's Test of Sphericity			
		Mauchly's W[b]	Approx. ChiSquare	df	Sig.
Within-Subject Effect	1,013E+265	,000	1778,301	135	,000
a. Method: Rouder's method. Number of Samples: 166. Seed: 1248774681. Testing model versus null model.					
b. The Mauchly's Test uses an equally-spaced polynomial contrast to test the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.					

Source: Own research

In the context of research on the hotel sector in the Republic of Croatia, analyzing the results used to assess the impact of employee competence on their motivation and job satisfaction can be particularly important for understanding how to develop a competitive advantage and improve service quality in this industry. The study employed statistical tests such as the Bayes Factor and Mauchly's Test of Sphericity to evaluate the significance of various variables and correlations among them. The use of the Bayes Factor in the analysis indicates strong support for the research model linking employee competence with their motivation and satisfaction. Given the exceptionally high Bayes Factor (1.013E+265), we can conclude that employee competence, which includes professional skills, interpersonal abilities, and adaptability, has an extremely positive impact on their motivation and job engagement. This result suggests that well-developed employees with a

higher level of competence are more motivated, which directly contributes to their job satisfaction and, consequently, the quality of services they provide in hotels. Another key element of the analysis was Mauchly's Test of Sphericity, which revealed a significant violation of sphericity in the data, with a p-value of 0.000. This violation suggests that error variances across different conditions in the data are unbalanced. As a result, corrections must be applied in further analysis to obtain more accurate results. In the context of the hotel sector, this indicates that employee motivation, engagement, and satisfaction are not homogeneous across all employees, and that employee development strategies need to be adjusted to meet the specific needs and expectations of different groups of hotel employees. Based on these analyses, the research results clearly show that employee competence significantly contributes to their motivation and satisfaction. Employees with higher levels of professional competence, interpersonal skills, and adaptability perform better and often demonstrate greater engagement at work. This includes higher loyalty to the employer, greater motivation for career advancement, and, as a result, increased job satisfaction. This factor becomes crucial in the hospitality industry, as satisfied employees often lead to better guest experiences, which are directly linked to a hotel's financial success. The results confirm Hypothesis H2: A higher level of professional competencies of employees has a positive effect on their motivation and job satisfaction.

The study also established a connection between investments in employee competency development and the overall quality of services provided by hotels. Employees who have opportunities for continuous training and career advancement not only feel more motivated and satisfied, but also deliver higher-quality services to guests. This ripple effect has long-term positive impacts on a hotel's success, as guest satisfaction increases customer loyalty and encourages repeat visits. The research clearly demonstrates that continuous investment in employee competence development plays a crucial role in the sustainability and quality of business operations in the hotel sector. Given the increasing competition and changing market conditions, hotel establishments must recognize the importance of developing their employees to ensure not only service quality but also a competitive advantage. Proposed strategies for improving professional development—such as training programs, mentorship, career advancement opportunities, and the creation of a supportive work environment—should be a priority in human resource management strategies. By doing so, employee motivation and satisfaction will remain high, which will directly reflect on service quality and the overall success of hotels in the tourism sector.

5. CONCLUSION

The research indicates that employees are, on average, very satisfied with the work environment, but there are certain factors, such as the reward system and opportunities for professional development, that can be improved. Management could focus its efforts on strengthening these aspects to further improve employee engagement and motivation. These results can serve as a basis for further development of strategies that will contribute to greater employee satisfaction and productivity, thereby achieving long-term benefits for both employees and the organization. The key message of the paper is that employee competence is a crucial factor influencing motivation and job satisfaction in the hotel sector. The research highlights that higher levels of professional competencies positively impact employee motivation and satisfaction, which in turn enhances service quality and the overall success of hotels in the tourism industry. The study emphasizes the importance of continuous investment in employee development, including training, mentorship, and opportunities for advancement, to maintain a competitive edge and ensure high-quality service delivery. Additionally, a positive work environment, management support, and recognition of employee contributions are identified as key motivational factors that contribute to employee satisfaction.

The focus on psychosocial competencies highlights the importance of interpersonal skills in the hospitality industry, which can be applied to other service-oriented sectors to improve customer experiences. The research provides insight into the factors that influence employee satisfaction in the hospitality industry, highlighting the need for a holistic approach to talent development that includes both technical and psychosocial competencies. Future research could explore the impact of cultural, economic, and legal differences on employee satisfaction and motivation in the hospitality industry in different regions. Exploring the effectiveness of different reward systems and professional development programs in increasing employee satisfaction and retention could provide valuable insights for industry professionals. Hotel management should focus on improving reward systems and providing more opportunities for professional development to increase employee satisfaction and motivation personnel. Continuous investment in employee training is needed to ensure high quality services and maintain competitiveness in the hotel industry.

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Exploring the Nexus of Artificial Intelligence and Intellectual Capital: A Bibliometric Analysis

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Intellectual capital;
Artificial intelligence;
Factorial analysis;
Bibliometric analysis

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Abstract: *This study presents a thorough bibliometric and factorial analysis of the intersection between Artificial Intelligence (AI) and Intellectual Capital (IC). As AI increasingly reshapes the management and application of IC, research in this domain has expanded significantly. Utilizing a comprehensive dataset from a prominent academic database, this paper maps the intellectual framework, identifies key authors, journals, and institutions, and uncovers essential trends and thematic clusters in AI and IC research. The study visualises the intricate relationships and factors that define the AI and IC knowledge landscape by employing advanced bibliometric techniques such as co-citation analysis, keyword co-occurrence, and conceptual mapping alongside factorial analysis. Factorial analysis facilitates the identification of latent variables and deeper thematic groupings, thereby enriching the interpretation of bibliometric results. Key themes are prominently highlighted. The findings clarify the current state of AI and IC research and propose future research directions and potential applications in this evolving field.*

1. INTRODUCTION

The connection between artificial intelligence (AI) and intellectual capital (IC) is becoming increasingly significant in today's knowledge-driven economy (Popescu & Šebestová, 2024). Intellectual capital refers to an organization's intangible assets, which include human capital (the skills and knowledge of employees), structural capital (the processes, systems, and databases), and relational capital (the relationships with stakeholders). This capital is essential for promoting innovation and gaining a competitive advantage (Andriessen, 2003; Bontis, 2002; Edvinsson & Malone, 1997; Martínez-Torres, 2006).

Artificial Intelligence (AI) is a sophisticated technology that allows machines to perform tasks intelligently. AI can enhance each component of intellectual capital by improving efficiency, decision-making, and knowledge utilization. AI tools can support employees by offering advanced data analysis, personalized learning experiences, and automation of routine tasks. This enables employees to concentrate on higher-level thinking and creative problem-solving, ultimately enriching the organization's human capital (Bedi et al., 2024; Chowdhury et al., 2023). AI can improve a firm's structural capital by optimizing processes, enhancing knowledge management, and enabling more effective organisational communication and collaboration. AI systems can analyze vast amounts of data to identify patterns and insights to inform strategic decision-making (Mikalef & Gupta, 2021). AI can facilitate better relationships with customers and partners by enabling more personalized communication, improving customer service through chatbots, and using predictive analytics to anticipate customer needs (Maolidah et al., 2023; Vodenko & Lyausheva, 2020).

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2. METHODOLOGY

This study conducts bibliographic research to uncover trends and gaps related to the nexus of artificial intelligence and intellectual capital. The study conducts a bibliometric analysis of the research area by examining empirical data from published literature, highlighting significant themes (Leung et al., 2017). The application of mathematical and statistical methods to books and other forms of communication (Pritchard, 1969). Our study utilises the standard science mapping workflow developed by Börner et al. (2003) and further developed by Aria and Cuccurullo (2017), Cobo et al. (2011), and Zupic and Čater (2015). The standard workflow consists of five stages, as illustrated in Figure 1.

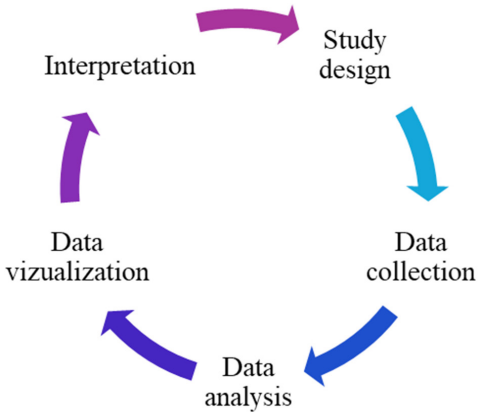

Figure 1. The workflow of bibliometric research
Source: Own processing

For our study design, we formulated the following research questions:

RQ1: What are the trend and citation patterns?

RQ2: Which counties are leading in research?

RQ3: Which sources are the most relevant in publishing?

RQ4: Which authors are the most relevant in publishing?

RQ5: What are key topics according to the keywords in publication patterns?

Data were collected on October 15, 2024, from the Web of Science database. The database was selected because the Web of Science is highly valued in the academic community for conducting robust, reliable, and meaningful bibliometric analyses. Table 1 describes the criteria for data filtering.

Table 1. Filtering criteria for data collection

Keywords:	„Intellectual capital“(All fields) AND „Artificial Intelligence“ (All fields“ OR „Human capital“ (All fields) OR “Relation capital” (All fields) OR „Structural capital“ (All fields)
Subject category:	„Economics“, „Management“, „Business“, „Business Finance“, „Multidisciplinary Sciences“
Research area:	Business Economics
Language:	English
Document type:	Article

Source: Own processing

The first articles researching the selected topic date back to 1918. Still, we only consider the period from 2000 to 2023, as the meaning of artificial intelligence and using intellectual capital in companies and countries became most attractive during these years. Data are analysed using standard bibliometric techniques, such as bibliographic coupling, co-author, co-citation, co-word analyses, and factorial analysis. Table 2 describes these techniques.

Table 2. Standard bibliometric techniques

Bibliometric technique		The unit of analysis used	Kind of relation
Bibliographic coupling	Author Document Sources	Author's oeuvres Document Journal's oeuvres	Common references among author's oeuvres Common references among documents Common references among the journal's oeuvres
Co-author	Author Country Institution	Author's name Country from affiliation Institution from affiliation	Authors' co-occurrence Countries' co-occurrence Institutions' co-occurrence
Co-citation	Author Document Journal	Author's reference Reference Journal's reference	Co-cited author Co-cited documents Co-cited journal
Co-word		Keyword or term extracted from	Terms' co-occurrence title, abstract or document's body

Source: Own processing, according to Cobo et al. (2011)

Factorial analysis, commonly called factor analysis, is a statistical technique used to explore and identify underlying relationships among variables. This method reduces data by grouping related items into distinct factors, simplifying complex datasets for more effective analysis. Numerous sources emphasize that factor analysis proves particularly beneficial in diverse fields such as psychology, marketing, and finance. It aids in uncovering latent constructs that influence observed behaviours and trends. Researchers can identify common factors that drive various outcomes by examining the correlations among variables, enhancing insights and decision-making processes (Radanliev & De Roure, 2021; Valderrama et al., 2022; Vasquez-Torres, 2018).

3. RESULTS

From 2000 to 2023, we will follow the increasing trend of researching relations between intellectual capital and artificial intelligence. A faster increase can follow from 2019 when pandemics bring forward the importance of intangible assets and new technologies.

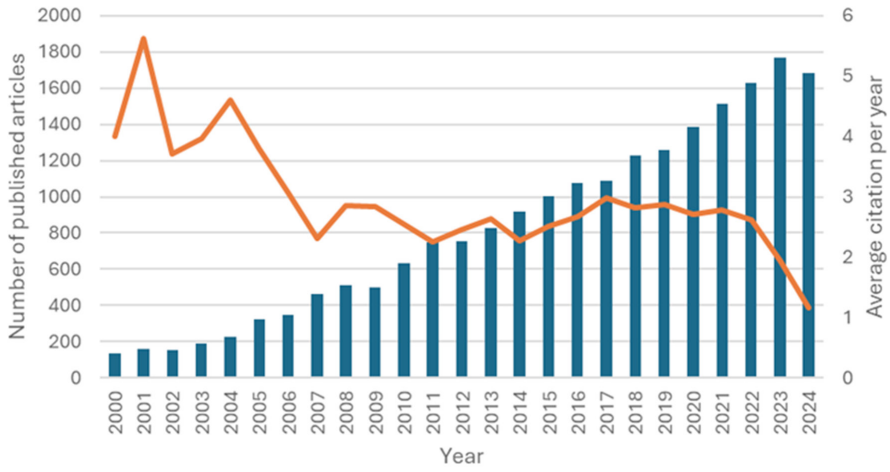

Figure 2. Annual scientific production and average yearly citation over the last 24 years

Source: Own processing

Our dataset comprises 141 countries. Unsurprisingly, the USA leads in this area, having produced 14,101 articles. China follows the USA, with 7,139 publications, while the UK holds the third position with 4,768 articles.

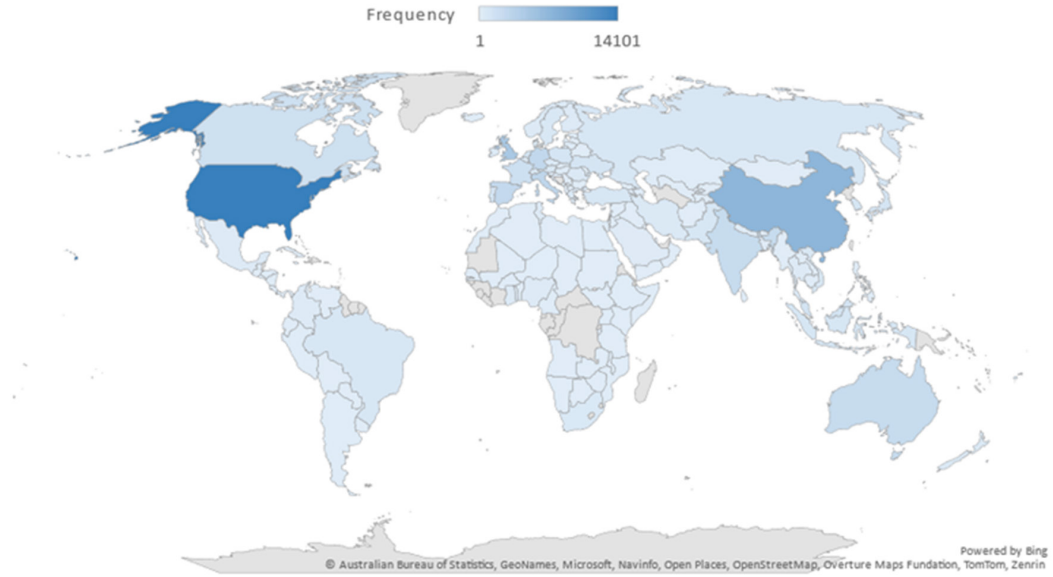

Figure 3. Country scientific production
Source: Own processing

Figure 4 shows the ten most relevant sources. Our sample consists of 1,378 sources. The leading source is the Journal of Intellectual Capital, with 412 documents. The second-ranked source is Applied Economics, with 367 documents, followed by the International Journal of Human Capital and Information, with 261 documents.

Also, these publications were analysed by 36,083 authors. The most relevant are Cuaresma Jusus Crespo and Wright Mike, with 22 publications each. Next is Bontis Nick, with 19 publications, and Docquier Frederic and Kong Dongmin, with 17 articles each.

We also provide the co-citation map for authors in Figure 6. The authors are divided into four clusters.

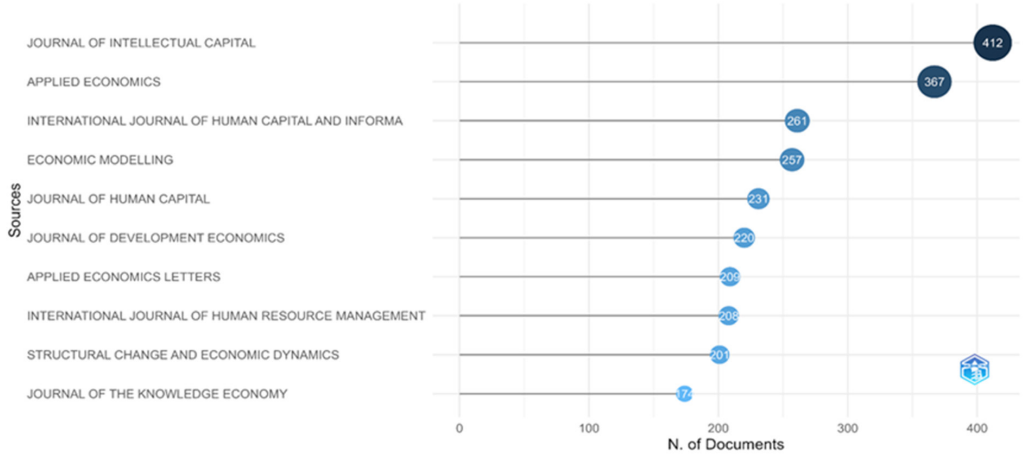

Figure 4. The most relevant sources
Source: Own processing

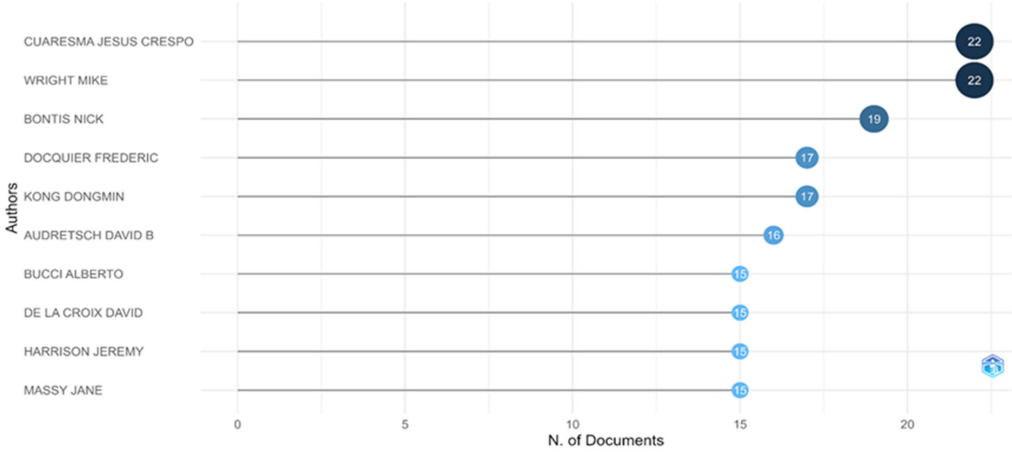

Figure 5. The most relevant authors

Source: Own processing

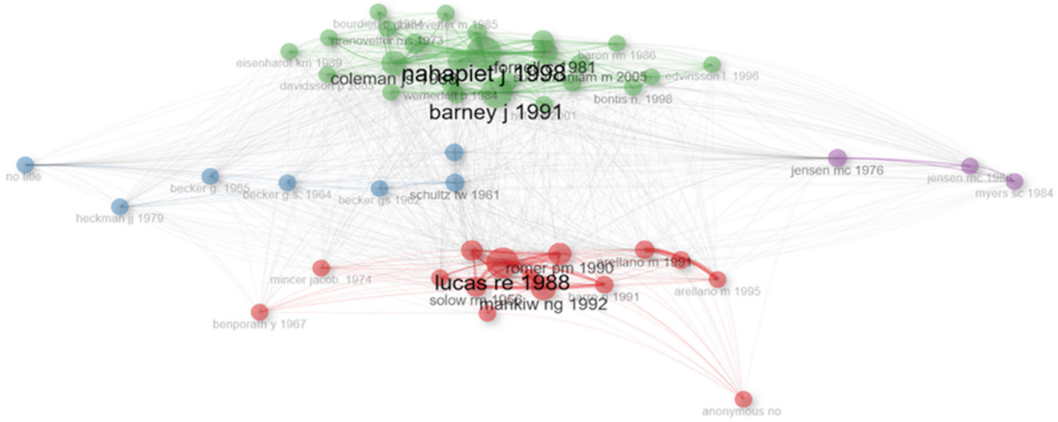

Figure 6. Co-citation map

Source: Own processing

We provide co-word networks and factorial analysis to comprehend the relationship between topics and the main research methods. Keywords were divided into two clusters. The first cluster, red, included keywords related to intellectual capital, innovations, and firm efficiency. The second cluster, blue, is related to human capital and its efficiency.

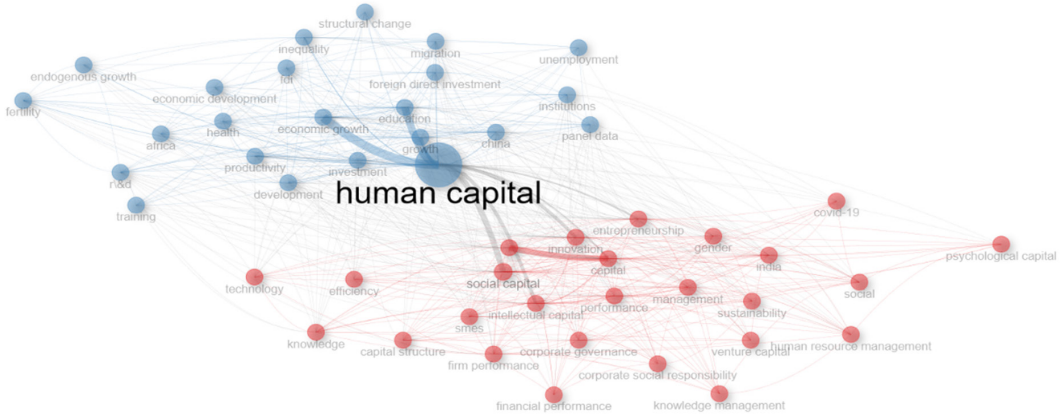

Figure 7. Co-word network

Source: Own processing

For our factorial analysis, we utilized a multidimensional scaling (MDS) map. This map provides a visual representation of the relationships among various concepts. By examining the distances and groupings of the terms, we can identify patterns and themes that reveal the underlying dimensions of the dataset.

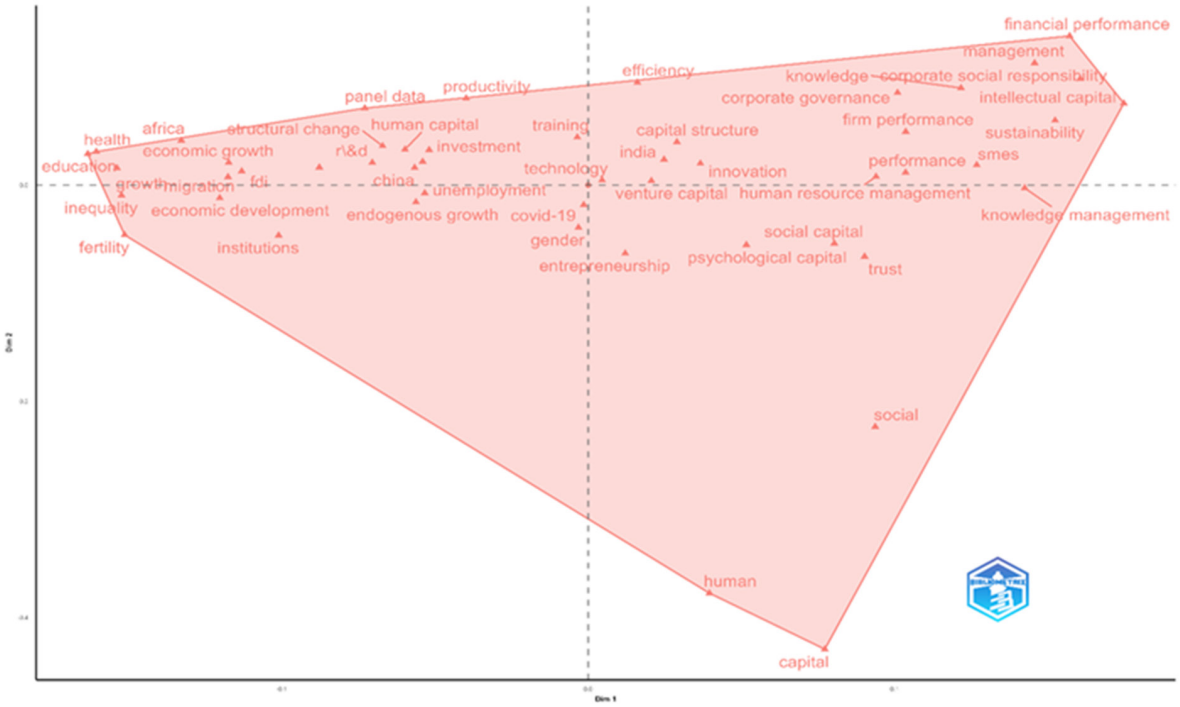

Figure 8. Multidimensional scaling map
Source: Own processing

Our MSC map is divided into four clusters. The first cluster, located in the top right, encompasses topics related to management, performance, and corporate governance. Key terms such as financial performance, corporate governance, management, corporate social responsibility (CSR), and sustainability are closely linked, indicating a strong thematic relationship. This suggests that firm performance and corporate practices, including CSR and governance, are highly interconnected. These concepts may reflect discussions or research on how effective governance, sustainability initiatives, and management strategies directly impact a company's financial results. Additionally, terms like intellectual capital and knowledge management are included in this grouping, highlighting that a firm's knowledge and intellectual resources — such as human capital and social capital — are crucial to its performance metrics. This cluster presents a business-driven framework that connects corporate practices with performance outcomes. The close relationship between management, corporate governance, and corporate social responsibility (CSR) strongly emphasises sustainability and responsible business practices. This focus highlights these factors' impact on internal management efficiency and financial success.

The second cluster, located in the bottom left, brings together economic and social development topics. Keywords such as economic growth, education, health, inequality, and fertility form a well-defined subcluster. These concepts are closely linked to development economics. The proximity of economic development, growth, inequality, and education suggests a discussion about how fundamental societal structures influence economic trajectories. Including inequality, education, and health as key terms highlights a focus on human development and the distributional effects of growth. The placement of the term "economic growth" alongside fertility, inequality, and education

indicates a typical policy-driven discussion that emphasizes how economic development can be affected by these factors, especially in the context of low- and middle-income countries. Additionally, terms such as migration and institutions are also clustered in this area, suggesting a focus on how global and national policies regarding social issues impact the broader economic landscape.

The next cluster focuses on Social Capital and Psychological Capital. Social capital, psychological capital, trust, and entrepreneurship are grouped in the middle-right section. Social and psychological capital in this cluster highlights the significant role of trust, social structures, and human resource management in influencing organizational and economic performance. Entrepreneurship can be seen as a result of these forms of capital, indicating that building social networks and fostering psychological resilience could be crucial for entrepreneurial success. Additionally, the connection to human capital emphasizes the importance of individuals in driving both business performance and social change.

The Central Cluster: Knowledge, Efficiency, and Innovation. The central focus on knowledge, efficiency, innovation, and capital structure highlights the importance of these concepts in the discussions within the dataset. This centrality emphasizes that innovation and knowledge drive economic growth and corporate performance. In today's economy, these elements are essential for improving efficiency, fostering organizational development, and driving economic expansion. Furthermore, capital structure plays a vital role, indicating the need to balance a firm's financial systems and its ability to innovate and enhance productivity. This relationship connects to both the management and development-oriented aspects of the dataset.

4. CONCLUSION

This research briefly introduces the relationships between artificial intelligence and intellectual capital. Bibliographic analysis provides empirical confirmation about the development of these relations and research trends. Using bibliographic analyses, we answered five research questions. We confirmed the rising trend of researching the selected topics during 2000 – 2023. According to our results, the USA is the leading country in research, which is expected given its research and technological potential. Also, we provide information about most relative authors and sources. Using factorial analysis, we research the trend topics and topic patterns.

This research also has limitations, as we use only one database – Web of Science. The Web of Science database is comprehensive but does not cover all existing intellectual capital articles. Therefore, our results are accurate for Web of Science articles but may differ for other databases. We should also note that readers should be careful when summarizing our results. This method does not analyse entire articles because reference analysis analyses the titles, keywords, and abstracts of published studies. However, the bibliographic analysis also has positive aspects. It provides readers with a comprehensive overview of areas of interest.

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Chatbots at Work - A Qualitative Case Study to Analyse the Service Quality of Chatbots in the Public Sector in Austria

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Service quality;
System quality;
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Case study

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Abstract: *Recent developments in the field of information technology and the rapid rise in artificial intelligence-based applications are increasingly leading to the implementation of chatbots. In addition to the private sector, chatbots are also being more and more used in the public sector. If public administrations ensure the characteristics of service, system, and information quality with their chatbots, the interaction between citizens and government can be improved, and thus the customer experience can be turned for the better.*

The study at hand provides insights into the status-quo of implemented chatbots in selected Austrian public administration websites. Methodologically Yin's embedded multiple case study approach is used, and is carried out on four cases from public administration and five cases from the energy sector. Based on the classic SERVQAL approach a 10-layer structure has been designed to make the performed tests with the chatbots transparent and comparable.

The results show for the analysed cases that the application of chatbot technology is still in its infancy, and is not yet being used: neither across the whole public sector nor at its potential functional capacity. Furthermore, the analysis revealed that there are major qualitative differences between the analysed chatbots. It was found that the currently implemented administration chatbots have potential for improvement in terms of their problem-solving ability, reliability, adaptability, user-friendliness, and information quality.

The results of the study are in line with previous findings in the literature that cast doubt on the ability of chatbots to replace traditional administrative services. In addition, the results are of interest to public authorities and administrations because they can help to improve their digital services through measures that were proposed as concluding recommendations.

1. INTRODUCTION

The rapid advancement of information technology and the increasing use of artificial intelligence (AI) have led to the widespread implementation of chatbots across various sectors, including public administration. In Europe, the adoption of digital government services has been accelerating, with countries like Estonia and Denmark leading the way in e-government initiatives. According to the European Commission's Digital Economy and Society Index (DESI) 2022, Austria ranks above the EU average in digital public services, with 79% of Austrians using e-government services compared to the EU average of 65%.

Globally, countries such as Singapore, South Korea, and the United States have also made significant progress in integrating AI and chatbots into public services. These technologies aim to

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improve service delivery, enhance citizen engagement, and increase operational efficiency. Despite these advancements, the implementation of chatbots in the public sector faces challenges related to service quality, user trust, and technological limitations.

This study aims to fill the knowledge gap regarding the use of chatbots in the Austrian public sector by evaluating their service quality using a composite approach based on classic approaches. A 10-layer structure has been designed to make the performed tests with the chatbots transparent and comparable. By examining chatbots from providers in crucial sectors of broad interest, various government and energy provider chatbots were analyzed using a mixed-method approach. This research seeks to provide a snapshot of the status quo and to identify strengths and areas for improvement, contributing to the broader understanding of chatbots in public administration.

The remainder of this paper is organized as follows: Section 2 provides theoretical background and related work. In section 3, methodology and research procedure are described in detail, emphasis is laid on the design of an a priori structure that adapts characteristics from various sources, and forms the basis for a systematic evaluation. In section 4, the results are presented for each sector and each chatbot, whereas in sections 5 and 6 results are discussed, limitations are mentioned, and further work is sketched out.

2. THEORETICAL BACKGROUND AND RELATED WORK

Chatbots are AI-driven programs designed with the intention to simulate human conversation. They are categorized based on their structure, purpose, and target audience. Haristiani (2019) classifies chatbots into three types: flow-based, AI-based, and hybrid models. In contrast, Adamopoulou and Moussiades (2020) offer a more detailed classification based on knowledge domain, service type, and interaction method.

Digital government refers to the use of information and communication technologies (ICT) to enhance government services. The European Commission's eGovernment Action Plan aims to modernize public administrations and facilitate the digital transformation of government services. In Austria, initiatives such as the Digital Austria Action Plan (Federal Ministry for Digital and Economic Affairs, 2025) and the widespread adoption of e-government services underscore the country's commitment to digital innovation.

While extensive literature can be found on the use of chatbots in private sectors such as customer service and e-commerce (Misischia et al, 2022; Fu et al., 2023), research on their application in the public sector remains limited (Følstad & Bjerkreim-Hanssen, 2023). Existing studies often emphasize the technological aspects of chatbots rather than their impact on quality of service, user perception, or user satisfaction. However, those few existing studies suggest that there is considerable interest in the potential benefits of deploying recent technologies, such as chatbots, in public administration. This is particularly relevant for improving the quality of public services and public offerings (Van Noordt & Misuraca, 2019). This study addresses this gap by a systematic approach which incorporates established attributes from classic models like the technology acceptance model (TAM) (Davis, 1989) and the SERVQAL framework (Parasuraman et al., 1988) was conducted to assess the effectiveness of chatbots of Austrian's public administration in enhancing service quality in terms of their service, system, and information quality.

3. METHODOLOGY AND PROCEDURE

The study employs a multiple case study approach (Yin, 2002) to analyze systematically chatbots from various Austrian government websites and energy providers. This qualitative method allows for an in-depth understanding of the context and the specific characteristics of each chatbot.

Table 1. A priori structure containing dimensions, characteristics, and related sources

Quality Dimension	Chathot Characteristics	Source/ Adapted From
Service quality	- interaction - entertainment - problem solving/certainty - trendiness - customization	Chang et al. (2020) Misischia et al. (2022)
	- empathy - responsiveness	Jenneboer et al. (2022) Parasuraman et al. (1988) Trivedi (2019)
	- reliability - security	Parasuraman et al. (1988)
System quality	- response time - reliability - usability - availability	Jenneboer et al. (2022)
	- flexibility	Trivedi (2019)
Information quality	- accuracy - availability - efficiency	Jenneboer et al. (2022) Trivedi (2019)

Source: Own research

The evaluation procedure began with the selection of chatbots, which involved identifying chatbots from the Austrian government and energy provider websites. The selection of instances was performed systematically: in the public administration sector out of 14 federal ministries and 9 municipalities only six portals or websites had implemented a chatbot at the time of data collection, which equals about 25%, whereas in the energy sector out of 29 providers only five had implemented a chatbot, which equals roughly 17%. As two government portals used the same chatbot, which in turn was almost identical to another one, the final sample contained four chatbots from public administration, i.e. Fred (Federal Ministry of Finance), WienBot (City of Vienna), ELLI (City of Linz), and Lou (City of Sankt Pölten) and five chatbots from energy providers, i.e. BotTina (Wien Energie), Linda (Stadtwerke Klagenfurt), LEA (Salzburg AG), IKB (Innsbrucker Kommunlabetriebe) and a nameless chatbot of Burgenland Energie.

The process of data collection as a result of systematic testing and the documentation of performed chatbot interactions needs to be formalized and operationalized. For this reason, it is necessary to design a priori a construct or a scheme, which forms the basis for a case study protocol (Yin, 2002). The structure of the case study protocol followed the Information Systems Success Model of Delone and McLean, and uses the three dimensions *service quality*, *system quality*, and *information quality* as primary categories (DeLone & McLean, 1992, 2003; Jenneboer et al., 2022). For each dimension, a set of characteristics was predefined, which again has been derived from various scientific sources and – if necessary – has been adapted to evaluate chatbots (cf. Table 1).

Following this, interaction testing was conducted by engaging with each chatbot through predefined queries and navigating through suggested keywords. Each interaction step was meticulously documented in the scheme described above, which was implemented as an Excel file, noting the chatbot's responses and any issues encountered. The interaction focused on the chatbots' ability to handle user

queries, provide accurate information, and facilitate service processes. Each chatbot was tested up to ten interaction levels deep. The performed interaction steps, the chatbots' reaction and the analysts' observations were recorded in a structured Excel file (e.g., invalid or wrong links; Error 404 links; misleading or incorrect answers; chatbot suggests keywords, it then cannot explain; live-chat cannot be established; disruption, etc.).

Finally, the SERVQUAL model was applied to evaluate the service quality of each chatbot based on the recorded interactions with the selected chatbots based on four dimensions (the fifth dimension *Tangibles,* has been omitted since the object of research is intangible):

- Reliability: Consistency and dependability in providing accurate information.
- Assurance: The ability to convey trust and confidence.
- Empathy: The ability to provide caring and personalized service.
- Responsiveness: The promptness and helpfulness of the chatbot's responses.

4. RESULTS

This section presents the findings of the study, categorized into two main areas: government chatbots and energy provider chatbots. The analysis provides a detailed evaluation of each chatbot's performance based on the SERVQUAL model dimensions and the application of pattern matching allowed for interpreting heterogenous data (Campbell, 1975). The data generated from the interaction with four government chatbots and five energy provider chatbots consisted of 6313 entries in the 10-layer structural file that contained three quality dimensions (DeLone & McLean, 1992; Jenneboer et al., 2022) with all in 17 different chatbot characteristics. Chatbot differences in their complexity and their phase of development become visible in the number of observations: whereas WienBot had 2317 entries the chatbot of Energie Burgenland had only 55 entries. The results highlight both the strengths and the areas for improvement for each chatbot, offering insights into their effectiveness in delivering public services.

4.1. Government Chatbots

The study conducted an in-depth analysis of chatbots deployed by the Federal Ministry of Finance, the City of Vienna, the City of Linz, and the City of Sankt Pölten. The systematic assessment of the four dimensions of the SERVQUAL model – reliability, assurance, empathy, and responsiveness – led to the findings summarized below.

Fred, the chatbot of the Federal Ministry of Finance, demonstrated high problem-solving capabilities, effectively addressing a wide range of user queries. However, Fred exhibited limitations in handling more complex queries. While Fred's performance in terms of reliability and assurance was strong, indicating a consistent and trustworthy service, there were notable deficiencies in empathy and responsiveness. This suggests that while Fred can provide accurate information, it cannot engage users in a personalized and timely manner.

WienBot, the chatbot for the City of Vienna, excels in providing real-time information and supports multiple languages, enhancing its accessibility and user-friendliness. Despite these strengths, WienBot falls short in executing in-depth services. The chatbot performs exceptionally well in responsiveness, offering a visually appealing interface and prompt replies. However, similar to Fred, WienBot struggles with reliability and empathy, indicating a need for improvements in delivering consistent service and personalized interactions.

ELLI, the chatbot for the City of Linz, was found to have limited problem-solving abilities and often provided outdated information. This significantly impacts its reliability and assurance, as users cannot

consistently depend on ELLI for accurate and current information. Additionally, ELLI lacks responsiveness and empathy, further diminishing its effectiveness as a service tool.

Lou, the chatbot for the City of Sankt Pölten, is effective in providing general information but lacks depth in specific areas. Lou demonstrates moderate reliability and responsiveness, suggesting that while it can handle basic queries, it struggles with more detailed or complex requests. Improvements are needed in assurance and empathy to enhance user trust and engagement.

Across the chatbots study findings show that despite strengths in responsiveness and moderate assurance, indicating a trustworthy service (which suggests a need for improvements in conveying trust and confidence to users), there exist particular challenges in reliability and empathy as well as a need for enhanced problem-solving capabilities.

4.2. Energy Provider Chatbots

Furthermore, the study included chatbots from energy providers such as Wien Energie, Energie Burgenland, Salzburg AG, Stadtwerke Klagenfurt and Innsbrucker Kommunlabetriebe to provide a comprehensive evaluation of chatbot implementation across different sectors within Austria. By examining both government and energy provider chatbots, the study aimed to compare and contrast the service quality and effectiveness of chatbots in various public service contexts. This broader scope allows for a more nuanced understanding of how chatbots perform in different settings and identifies sector-specific strengths and areas for improvement. Additionally, the inclusion of energy providers helps to highlight best practices and potential areas for cross-sector learning and improvement in chatbot deployment.

BotTina, the chatbot for Wien Energie, is effective for general inquiries but struggles with more complex queries. BotTina's performance in terms of reliability and responsiveness is moderate, indicating that while it can handle basic tasks, it may not always provide timely or accurate responses. The chatbot also lacks assurance and empathy, suggesting a need for improvements in building user trust and providing personalized service.

LEA, the chatbot for Salzburg AG, stands out with its advanced problem-solving capabilities and ability to execute processes. LEA excels in reliability, assurance, and responsiveness, making it a highly effective tool for user interaction. However, there is room for improvement in empathy, as the chatbot could benefit from more personalized and engaging interactions with users.

Linda, the chatbot for Stadtwerke Klagenfurt, provides personalized information and supports process execution, demonstrating strong reliability and responsiveness. Despite these strengths, Linda shows moderate performance in assurance and empathy, indicating that while it is effective in handling tasks, it could improve in building user trust and providing a more personalized service experience.

The chatbot for Energie Burgenland, on the other hand, has limited functionality and primarily serves as a FAQ bot. This chatbot exhibits low reliability, assurance, and responsiveness, suggesting significant room for improvement in all areas of service quality.

The last analyzed chatbot, the Innsbrucker Kommunalbetriebe chatbot, is currently one of the best-developed chatbots among energy providers. The chatbot is able to respond to individual customer requirements and create customer-specific files, such as PDF and CSV. With the option of making appointments online and uploading and downloading documents, the chatbot shows good results in terms of reliability, problem-solving ability, and security. The chatbot has potential for improvement in terms of empathy, which would enable it to have an even better understanding of its users and thus respond even more precisely to the different customer requirements.

5. DISCUSSION

The findings indicate that while chatbots improve accessibility and efficiency in public services, there are significant areas for improvement. The application of the SERVQUAL model reveals that most chatbots perform well in responsiveness but struggle with reliability, assurance, and empathy. The results align with previous studies that highlight the potential of chatbots to enhance service delivery (Adam et al., 2021; Androutsopoulou et al., 2019). However, the gaps identified in reliability and empathy are consistent with the challenges noted by Aoki (2020) and Følstad and Bjerkreim-Hanssen (2023), who emphasize the need for better AI integration and user-centric design.

Evaluating Austrian government chatbots in terms of their service, system, and information quality using the SERVQUAL model through the detailed analysis of each chatbot, the results highlight the need for continuous improvement and better integration of AI capabilities. The study finds that while chatbots like Fred and WienBot perform well in certain dimensions, they fall short in others, particularly in providing personalized and empathetic service. This study adds to the current state of knowledge by providing a comprehensive evaluation of chatbot service quality in the public sector using the SERVQUAL model. It identifies specific areas where chatbots excel and where they need improvement, offering practical recommendations for enhancing service quality and user satisfaction.

6. CONCLUSION

This research offers significant insights into the deployment and efficacy of chatbots within the Austrian public sector. Utilizing the SERVQUAL model, it identifies critical areas for enhancement to improve service quality and user satisfaction. The study underscores the necessity for ongoing advancements in chatbot technology, particularly in terms of reliability, assurance, and empathy. These findings align with existing literature, which highlights the need for improved AI integration and user-centric design in public sector chatbots.

The study proposes practical measures for enhancing chatbot services, including improved data integration, continuous training, and expanded language support. These enhancements can lead to more efficient and user-friendly public services. Public sector organizations should prioritize enhancing the AI capabilities of their chatbots to improve problem-solving abilities and provide more personalized and empathetic service.

Several limitations of the study need to be acknowledged. The analysis period was relatively short, and the focus was on a limited number of chatbots, due to a lack of implementations in the chosen sectors. Additionally, the study relied on qualitative data, which may be subject to researcher bias. Future research should explore a broader range of chatbots, include quantitative analysis to validate findings, and consider longitudinal studies on two issues: (i) to assess the long-term impact of chatbots on service quality, and (ii) to measure the chatbots' learning ability, i.e. self-improvement over time. Furthermore, expanding the research to include user feedback and satisfaction surveys could provide a more comprehensive understanding of chatbot effectiveness and perceived quality of service.

The study's findings contribute to the current body of knowledge by providing a detailed evaluation of chatbot service quality in the public sector. They highlight the potential of chatbots to enhance service delivery while also identifying significant areas for improvement. By addressing these areas, public sector organizations can better meet the needs of their citizens and improve overall service quality.

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Analysis of the Workforce in Romania Using Data from the 2021 Census

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Abstract: *This paper examines the relationship between higher education and employment in Romania, using data from the 2021 Population Census in Romania. The methodology of the study includes creating regression models, hypothesis testing and examining the correlation between the variables, to assess how the proportion of university graduates influences employment rates among the active population. The results of the study reveal a significant correlation, indicating that an increase in the proportion of individuals with higher education corresponds with higher employment rates. Individuals with higher education represent a significant share of the employed population, highlighting that education is an important factor in determining employment outcomes. These findings suggest that education reforms are necessary to better align with labor market changes, ensuring the workforce is prepared for future challenges.*

1. INTRODUCTION

In the process of societal development, an important part is played by education and, inherently, by the workforce. Education represents the main source of knowledge, facilitating technological changes and providing innovative solutions to societal problems. The workforce directly contributes to economic and social development through social integration.

Higher education represents an asset for obtaining and maintaining a job. The skills acquired through higher education are considered essential in the labor market and the proportion of people who hold such degrees within the total population is a relevant indicator in evaluating the entire educational process. The technical skills acquired offer an advantage, along with critical thinking, communication skills, problem-solving abilities and teamwork. The importance of education levels and their impact on employment and economic development has been highlighted in various studies. Individuals with higher education are considered better prepared for the demands and challenges of the labor market, thus obtaining better-paid jobs and various competitive advantages.

For Romania, the educational offer has become varied and facilitating access to education has become a priority for the entire society. In some cases, there are discrepancies between the requirements of the labor market and the skills acquired during university years, making it a difficult process to find a suitable job. According to Ionescu et al. (2020), the fast transition to online learning during the COVID-19 pandemic led to significant changes in Romania's educational system, requiring close collaboration among teachers and students to ensure effective learning. Edelhauser and Lupu-Dima (2021) highlight in a study that the COVID-19 crisis revealed that Romanian education managers struggled to respond effectively, indicating the need to integrate the online teaching methods, as education is likely to shift towards a hybrid model. As a result of these statements, education plays an essential role in helping individuals to obtain the skills

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needed to adapt to demands of the labor market (such as remote work or new digital tools). These modifications have demonstrated the value of higher education in preparing individuals to handle changes in the labor market. Those who are better educated tend to be more flexibility and they have the skills required to succeed in remote or hybrid work.

In the context of the COVID pandemic, the labor market has changed, impacting the behavior of the population and employment trends. Chivu and Georgescu (2021) stated that the COVID-19 pandemic has impacted the Romanian labor market, highlighting the need for adequate policies to stimulate employment and support vulnerable groups affected by the crisis. Remote work has become the norm, especially for highly educated workers, who adapted much more easily to the restrictions of the pandemic.

According to Dimian et al. (2012), employers face difficulties in the recruitment process and current employees lack motivation, loyalty and responsibility. For Romania, the labor market has gone through numerous changes to better adapt to the demands of the European Union, as well as due to globalization, technological progress and changes in consumer preferences. Dimian (2014) states that the education system must be adapted to prevent overqualification or underqualification and to anticipate changes in the labor market regarding the required skills. These challenges demonstrate the need to better understand the role of higher education in employment. In this respect, this paper aims to analyse the impact of the proportion of people with higher education within the total population on the proportion of employed individuals within the active population.

2. METHODOLOGY

This paper focuses on the relationship between two relevant proportions in this context: the proportion of people with higher education within the total population and the proportion of employed individuals within the total active population. The proposed objective is to investigate the connection between these two variables and analyze how the level of education influences employment.

The data used was county-level data from the preliminary results from the Population and Housing Census in Romania, 2021 round, available at the website of the National Institute of Statistics (2021). The analysis was conducted using R, with the following packages: ggplot2, ggpubr, car, carData, crayon, lmtest, tseries and vcd. The regression model was created using the lm() function and it was displayed using the summary() function. The analysis of variance was conducted using the anova() function. The representative graph was created with the ggplot() function. Covariance and the Spearman correlation coefficient were calculated and the Jarque-Bera test was used for testing normality.

The standard regression model has three main characteristics that can help us explore relationships between variables, estimate values for unrecorded observations and understand influences.

The regression models were created between:

1. Independent variable: the proportion of people with higher education within the total population and the dependent variable: the proportion of employed individuals within the active population.
2. Independent variables: the proportion of people with higher education within the total population, the proportion of the population that changed residence within the total population, and the dependent variable: the proportion of employed individuals within the active population.

In the hypothesis testing phase, the significance of the regression coefficients will be evaluated to determine whether there is a significant relationship between the proportion of people with

higher education within the resident population and the proportion of employed individuals within the active population. The results of the analysis of variance (ANOVA) will indicate whether the regression model is significant in explaining the variation of proportions. Significance testing highlights the utility of the independent variable in predicting the dependent variable. The coefficient of determination shows to what extent the total variation in the dependent variable is explained by the independent variable. The Spearman correlation coefficient indicates how strong the relationship between variables is and its direction, for variables that are not normally distributed. The significance level is set to 0.05.

Error autocorrelation occurs when the errors in the model show a systematic correlation between them. This can affect the validity of estimates and the interpretation of the results. To detect it, specific tests will be used, such as the Breusch-Godfrey test. These tests will help us evaluate the presence and severity of autocorrelation and consider necessary adjustments in our analysis. The Shapiro-Wilk test is used to check data normality and the Breusch-Pagan test is used for heteroscedasticity.

3. RESULTS

The first regression model has the employment rate of the active population as the dependent variable and the proportion of the population with higher education as the independent variable. Through this regression model, we can observe the impact of individuals who have graduated from university on the labor market. Thus, the results of the regression model obtained are shown in Figure 1.

```
Call:
lm(formula = y ~ x, data = data)

Residuals:
      Min        1Q    Median        3Q       Max
-0.049251 -0.014814  0.005179  0.014699  0.026152

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.88164    0.00826 106.740  < 2e-16 ***
x            0.36317    0.05583   6.505 9.22e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01966 on 40 degrees of freedom
Multiple R-squared:  0.5141,    Adjusted R-squared:  0.5019
F-statistic: 42.32 on 1 and 40 DF,  p-value: 9.216e-08
```

Figure 1. Results of the Regression Model

Source: Own processing

As shown in Figure 1, the coefficient of determination (Multiple R-squared) indicates that 51.41% of the variation in the proportion of the employed population within the active population is explained by the proportion of the population with higher education within the total population.

The validity of the model is tested:

Null Hypothesis: The model is not valid

Alternative Hypothesis: The model is valid

The p-value is 9.216e-08, which is less than 0.05; therefore, the null hypothesis is rejected and the model is valid. The model is statistically valid and the independent variable has a significant effect on the dependent variable.

The intercept has a value of 0.88. Thus, if the proportion of the population with higher education within the total population is 0, then the proportion of the employed population within the active population is 0.88.

The significance of the intercept is tested:

Null Hypothesis: The intercept is not statistically significant

Alternative Hypothesis: The intercept is statistically significant

The p-value is 2e-16 is less than 0.05, so the null hypothesis is rejected and the intercept is statistically significant.

The coefficient of the independent variable has an estimated value of 0.36. Thus, if the proportion of the population with higher education within the total population increases by one percentage point, then the proportion of the employed population within the total population increases by 0.36 percentage points.

The significance of the coefficient of the independent variable is tested:

Null Hypothesis: The coefficient of the independent variable is not statistically significant

Alternative Hypothesis: The coefficient of the independent variable is statistically significant

The p-value is 9.22e-08, which is less than 0.05; therefore, the null hypothesis is rejected and the coefficient of the independent variable is statistically significant.

The dependent variable has a normal distribution, while the independent variable does not have a normal distribution, as determined by using the Jarque-Bera test. The obtained results for the dependent variable are as follows: χ^2 (chi-squared) is 1.5621, degrees of freedom (df) is 2 and p-value is 0.4579.

Null Hypothesis: The dependent variable follows a normal distribution

Alternative Hypothesis: The dependent variable does not follow a normal distribution

The p-value is 0.4579, which is greater than 0.05; therefore, the null hypothesis is accepted and the dependent variable is normally distributed.

The obtained results for the independent variable are as follows: χ^2 (chi-squared) is 50.62, degrees of freedom (df) is 2 and p-value is 1.019e-11.

Null Hypothesis: The dependent variable follows a normal distribution

Alternative Hypothesis: The dependent variable does not follow a normal distribution

The p-value is 1.019e-11, which is greater than 0.05; therefore the null hypothesis is accepted and the dependent variable is normally distributed.

Figure 2 shows the results of the ANOVA test, which examines whether there are statistically significant differences between the groups analyzed.

```
Analysis of Variance Table

Response: y
           Df   Sum Sq   Mean Sq F value    Pr(>F)
x           1 0.016362 0.0163625  42.319 9.216e-08 ***
Residuals 40 0.015466 0.0003866
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Figure 2. ANOVA results
Source: Own processing

Null Hypothesis: There is no significant relationship between the model variables

Alternative Hypothesis: There is a significant relationship between the model variables

The p-value is 2e-16, which is less than 0.05; therefore the null hypothesis is rejected and the intercept is statistically significant.

Thus, there is a significant association between the proportion of people with higher education within the population and the proportion of employed people within the active population. The graphical representation of the univariate regression model is shown in Figure 3.

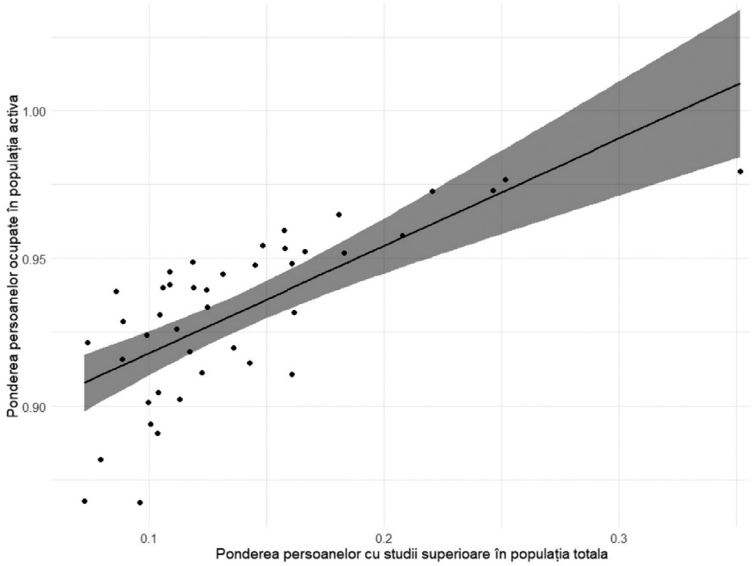

Figure 3. Univariate Regression Model - Graphical Representation
Source: Own processing

The covariance is 0.001, which indicates the existence of a direct link and a small association between the proportion of people with higher education within the total population and the proportion of employed people within the active population. The Pearson correlation coefficient cannot be used because the independent variable is not normally distributed. Thus, the Spearman correlation coefficient is used, which has a value of 0.75. Therefore, there is a strong tendency that when the proportion of people with higher education within the total population increases, the proportion of employed people within the active population also increases.

The normality of the errors is evaluated by the Shapiro-Wilk test. The obtained results are W is 0.92105 and p-value is 0.006542.

Null Hypothesis: The errors follow a normal distribution

Alternative Hypothesis: The errors do not follow a normal distribution

The p-value is 0.006542, which is less than 0.05; therefore, the null hypothesis is rejected and the errors are not normally distributed.

The Breusch-Pagan test shows that the variance of the errors is constant. The obtained results are BP is 1.134, df is 1 and p-value is 0.2869.

Null Hypothesis: The variance of the errors is constant (homoscedasticity is present)

Alternative Hypothesis: The variance of the errors is not constant (heteroscedasticity is present)

The p-value is 0.2869 which is greater than 0.05; therefore, the null hypothesis is accepted and the variance of errors is constant (homoscedasticity is present).

The Breusch-Godfrey test (also known as the Serial Correlation LM test) is used to validate the absence of autocorrelation. The obtained results are LM test is 8.4072, df is 1 and p-value is 0.003737.

Null Hypothesis: The first-order errors are not autocorrelated

Alternative Hypothesis: The first-order errors are autocorrelated

The p-value is 0.03737, which is less than 0.05; therefore, the null hypothesis is rejected and the first-order errors are autocorrelated.

The second regression model has as the dependent variable the proportion of the employed population within the active population, and as independent variables, the proportion of the population that has changed residence within the total population and the proportion of the population with higher education within the total population. Through this regression model, we can observe the impact of individuals changing their residence on the labor market and the impact of individuals with higher education on the labor market. The results of the multivariate regression model are shown in Figure 4.

```
Call:
lm(formula = y ~ x1 + x2, data = data)

Residuals:
      Min        1Q    Median        3Q       Max
-0.043158 -0.009314  0.000237  0.009751  0.030375

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.84015    0.01393  60.331  < 2e-16 ***
x1           0.20607    0.06671   3.089  0.00369 **
x2           0.19692    0.05629   3.498  0.00119 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.01737 on 39 degrees of freedom
Multiple R-squared:  0.6301,    Adjusted R-squared:  0.6112
F-statistic: 33.22 on 2 and 39 DF,  p-value: 3.774e-09
```

Figure 4. Results of the Multivariate Regression Model

Source: Own processing

As shown in Figure 4, the coefficient of determination (Multiple R-squared) indicates that 63.01% of the variation in the proportion of the employed population within the active population is explained by the proportion of the population with higher education within the total population and the variation within the proportion of the population that has changed residence within the total population.

The validity of the model is tested:

Null Hypothesis: The model is not valid

Alternative Hypothesis: The model is valid

The p-value is 3.774e-09, which is less than 0.05; therefore the null hypothesis is rejected and the model is valid.

The model is statistically valid and the independent variables have a significant effect on the dependent variable. The representation of the multivariate regression model is shown in Figure 5.

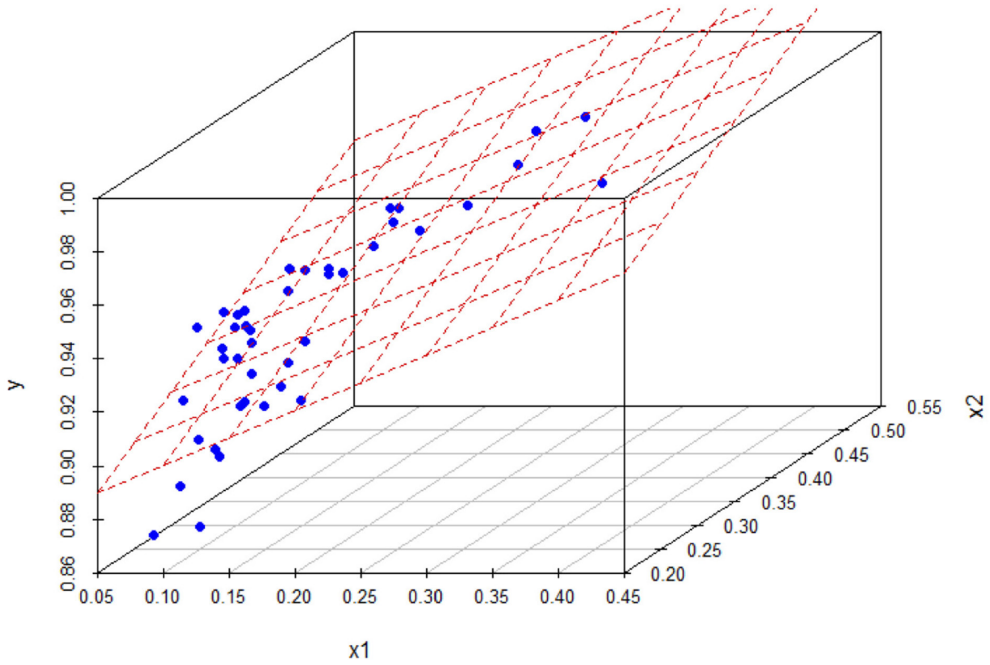

Figure 5. Representation of the Multivariate Regression Model

Source: Own processing

The significance of the intercept is tested:

Null Hypothesis: The intercept is not statistically significant

Alternative Hypothesis: The intercept is statistically significant

The p-value is 0.00244, which is less than 0.05; therefore, the null hypothesis is rejected and the intercept is statistically significant.

The significance of the coefficients of the independent variables is tested:

Null Hypothesis: The coefficient of the independent variable is not statistically significant

Alternative Hypothesis: The coefficient of the independent variable is statistically significant

The p-value is 0.00369, which is less than 0.05; therefore, the null hypothesis is rejected and the coefficient of the independent variable is statistically significant.

Null Hypothesis: The coefficient of the independent variable is not statistically significant

Alternative Hypothesis: The coefficient of the independent variable is statistically significant

The p-value is 0.04872, which is less than 0.05; therefore, the null hypothesis is rejected and the coefficient of the independent variable is statistically significant.

The significance of the coefficient of the dependent variable is also tested:

Null Hypothesis: The coefficient of the dependent variable is not statistically significant

Alternative Hypothesis: The coefficient of the dependent variable is statistically significant

The p-value is 4.589e-08, which is less than 0.05; therefore, the null hypothesis is rejected and the coefficient of the dependent variable is statistically significant.

Figure 6 shows the results of the ANOVA test, which examines whether there are statistically significant differences between the groups analyzed.

```
Analysis of Variance Table

Response: y
          Df   Sum Sq  Mean Sq F value    Pr(>F)
x          1 0.064509 0.064509 48.2241 1.975e-08 ***
x2         1 0.005701 0.005701  4.2621   0.04534 *
Residuals 41 0.054845 0.001338
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure 6. ANOVA for the multivariate model

Source: Own processing

Null Hypothesis: There is no significant relationship between the dependent variable (x) and the independent variable

Alternative Hypothesis: There is a significant relationship between the dependent variable (x) and the independent variable

The p-value is 0.04534, which is less than 0.05; therefore, the null hypothesis is rejected and there is a significant relationship between the two variables.

Null Hypothesis: There is no significant relationship between the dependent variable (x_2) and the independent variable

Alternative Hypothesis: There is a significant relationship between the dependent variable (x_2) and the independent variable

The p-value is 1.0975e-08, which is less than 0.05; therefore, the null hypothesis is rejected and there is a significant relationship between the two variables.

Thus, there is a significant association between the proportion of people with higher education within the population and the proportion of employed people within the active population and between the proportion of people who have changed residence within the total population and the proportion of employed people within the total population.

By conducting the Variance Inflation Factor (VIF) test and obtaining a value of 2.171161, we can conclude that the variables do not exhibit significant multicollinearity.

Null Hypothesis: There is no multicollinearity among the model variables

Alternative Hypothesis: There is multicollinearity among the model variables

The VIF value is 2.171161, which is less than 5; therefore, the null hypothesis is rejected, indicating that there is no multicollinearity among the model variables.

The normality of the errors is evaluated by the Shapiro-Wilk test. The obtained results are W = 0.98355 and p-value 0.7963.

Null Hypothesis: The errors follow a normal distribution

Alternative Hypothesis: The errors do not follow a normal distribution

The p-value is 0.7963, which is greater than 0.05; therefore, the null hypothesis is accepted, indicating that the errors are normally distributed.

The Breusch-Pagan test shows us that the variance of the errors is not constant and its result is different than the one obtained in the previous model: BP is 7.6761, df is 2 and p-value is 0.02154.

Null Hypothesis: The variance of the errors is constant (there is homoscedasticity)

Alternative Hypothesis: The variance of the errors is not constant (there is heteroscedasticity)

The p-value is 0.02154, which is less than 0.05; therefore, the null hypothesis is rejected, indicating that the error variance is not constant (heteroscedasticity is present).

The Breusch-Godfrey test (also known as the Serial Correlation LM test) is used to validate the absence of autocorrelation and its result is different from the one obtained in the previous model: LM test is 4.3994, df is 1 and p-value is 0.03595.

Null Hypothesis: The first-order errors are not autocorrelated

Alternative Hypothesis: The first-order errors are autocorrelated

The p-value is 0.03595, which is less than 0.05; therefore, the null hypothesis is rejected, indicating that the first-order errors are autocorrelated.

The most suitable model is the multivariate model, as it has the highest Adjusted R-squared (61.12%).

4. FUTURE RESEARCH DIRECTIONS

Future research should investigate the impact of technological advancements and digitalization on the evolving skill requirements within the labor market. Future studies could examine how different types of education, such as vocational training versus higher education, affect employment outcomes in various domains. Comparative studies between geographical regions could provide further insights into best practices in aligning education with labor market needs. Research on how government policies influence the link between educational achievements and labor market demands could provide valuable insights for improving workforce development strategies.

5. CONCLUSION

The analysis presents two linear regression models: a univariate model for the variable "proportion of the employed population within the active population" based on the "proportion of the population with higher education within the total population" and a multivariate model that includes both independent variables. Therefore, the relationship between higher education attainment and employment rates in Romania is examined using two linear regression models based on recent census data.

By analyzing data from the 2021 Census, the research demonstrates that higher education levels are associated with better employment outcomes across the active population, while mobility also plays a complementary role in labor market integration.

The results of this case study support the importance of the education level in employment in Romania. People with higher education have a significant proportion within the employed population and the level of education significantly influences this aspect. These findings can be useful for the development of educational and employment policies in the country. Moreover, mobility is also an aspect that can be considered in the analysis of the labor force employment.

The differences between labor market demands vary by country. In Romania, the labor market has adapted to the requirements of the European Union, globalization, and technological progress. As Romania continues to face challenges linked to technological change and globalization, understanding the evolving role of education in employment will be essential for elaborating effective policies.

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Is Volunteering a Potential Push Factor for Early Career? A Study on the Perceptions of Bulgarian Students

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Abstract: *Multiple studies on the transition phase from higher education to the labour market suggest that the availability of volunteer experience is beneficial for students. This paper presents results from a survey on 525 students at the largest economic university in Bulgaria. Using descriptive and inductive statistical methods, it explores the relationship between volunteering during undergraduate and graduate studies and its influence on students' perceptions that involvement in volunteering will aid their entry into the job market and support their future career development. The findings show that over 60% of the respondents believe that volunteering will help them in finding a job and is positively valued by potential employers. The development of soft skills stands out as one of the greatest advantages of volunteering for Bulgarian students.*

1. INTRODUCTION

Volunteering, youth engagement and encouraging civic behavior in higher education are not a mainstream topic in Bulgarian social science. Even though for more than thirty years now Bulgaria has been building a new democratic regime, volunteering is still sporadic, infrequent and poorly recognized by the official statistics. The latest Bulgarian Annual Youth Report does not cite specific numbers, but using a sociological survey, it finds that 68% of the young respondents consider that volunteering is "worth it". That positive attitude translates mostly to charity (47% of the respondents) and in-kind donations (25%). Just 15% of the young people who have participated in the survey have given their time, skills and efforts (Ministry of Youth and Sports, 2023, pp. 93-95).

Driven by the understanding that the reintroduction of the culture of volunteering, giving and civic engagement is a must for every contemporary higher education institution, a team of researchers from the University of National and World Economy (UNWE) in Sofia, Bulgaria is currently working on the research project "Volunteering as an Approach to Building Sustainable University Communities" (No. KP-06-H65/3, funded by the Bulgarian National Science Fund). In four years, it will study the attitudes of different internal university communities towards volunteering, it will build profiles of different types of volunteers and their attitudes and will prepare recommendations for normative and institutional changes.

For the purposes of the project, the research team has adopted a definition of volunteering as an *unpaid free-will support for people or causes through activities organized by government/public institutions, business structures, or civil society organizations.* This approach is in line with the general understanding that volunteering isn't compulsory, is aimed at strangers, not connected to any type of remuneration (Fényes et al., 2021, p. 4), it differs from charity and donations, should be mostly internally motivated, and happen in a somewhat controlled environment. Within the research

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project, the authors take into account the approach of the International Labour Organization and the United Nations that young people are those aged between 15 and 24, which covers most of the UNWE students in the bachelor's programmes and does not exclude the majority of the master's students.

2. LITERATURE REVIEW

The general benefits of engaging in *volunteering* are studied in depth in various cultural contexts, economic backgrounds and for different types of participants. Regarding the positive societal outcomes for young volunteers, political activism, voting turnover, and better civic engagement are commonly cited (Kim & Morgül, 2017). Some authors have included volunteering in the "quality of life" concept for 200 students in Lithuania (Navickas et al., 2016). They have confirmed emotional benefits (including better motivation, self-confidence, independence, stress control), development of soft skills (communication, teamwork, etc.), having a better social situation (new acquaintances and friends), and gaining awareness of more cultures. Improved physical and mental states are also reported, leading to a generally positive impact on students' life quality. The role of volunteering for health status and personal well-being are also a common feature (Turk et al., 2022; Balashov et al., 2018). The psychological influence of volunteering on South African students is summarized as mostly positive – self-awareness (self-confidence, personal growth, knowledge of self, management of emotions, finding a purpose, etc.), increased open-mindedness (to people with different socio-economic backgrounds and cultures), career awareness, sense of achievement, the opportunity to put theory into practice (Cronjé, 2015). Baert and Vujić (2018) point out that volunteering can also have a negative effect – volunteer engagements can take off from the time for developing and refining hard skills, and can also mean that the newly hired employee will expect to have enough time off to carry on with their volunteering activities.

In terms of *volunteering within a university context and linked to the start of a career*, various sources have examined the period of transition to full employment. Students in all types of higher education programmes presumably have some initial idea of a career path, meaning that they should have started considering engaging in activities that will help their successful entrance into the labour market. The available research on that topic is quite diverse. Typically, volunteering is better recognized as a career advantage factor in *economically advanced Western-world countries* with traditions rooted in Catholicism. Garver et al. (2009) in their analysis of the positive outcomes of volunteering on college students, summarize them as an improvement of soft skills (problem-solving, critical thinking, leadership, teamwork, time management, communication), cognitive development, social skills (responsibility, cultural understanding), citizenship and career marketability. Around the same time, large-scale research on student volunteering in Australia, Canada, New Zealand, the UK and the USA (Smith et al., 2010) discusses the so-called instrumental (career-related / resume-building) motivational factors for volunteering. More than 55% of the respondents view volunteering as a plus when applying for a job, to get in contact with business persons, but also as a factor for admission to higher education. Students who are not current volunteers perceive that connection even strongly, compared to those who volunteer occasionally or regularly. More recent research with students in six Australian universities (Haski-Leventhal et.al., 2020) lists among the benefits to student volunteers higher level of employability, increased human capital, contributing to their resumes, and aiding future career prospects; gaining valuable life skills and experiencing personal development; learning outcomes; development of positive citizenship values – understanding, reciprocity, higher level of empathy. The research confirmed the benefits "satisfaction of helping others", "gain work experience, skills", "enhanced self-esteem, confidence, cultural understanding", "new social networks, friendships". As unexpected outcomes, the students point out new perspectives, learning about self, psychological well-being, recognition, and promotion. As disappointments, they mention "ungrateful service recipients", "work is unsubstantial or meaningless", and "stereotyping of students as lazy".

Two papers from the same year in the United Kingdom report opposing results. One author using results from the UK Household Longitudinal study finds a statistically significant relation, showing that young people who have been part of organization-based volunteering activities experience an increased probability of employment (6 percentage points for young women and 8 percentage points for young men) (O'Higgins, 2020, p. 34) and volunteering being more "effective as a bridge to employment for the least educated" (ibid, p. 36). On the other hand, a mixed methods study in the United Kingdom on the relationship between youth volunteering and employment finds "no evidence that … volunteering had effectively led to securing a job" (Hoskins et al., 2020, p. 773). According to that paper, volunteering is useful if it offers career-related experience and is self-initiated (as opposed to imposed). Being a part of a middle-class family also turns out to be a factor. Data from Canada, the UK, the USA, Austria, and France at the beginning of the century shows that prior volunteer experience can lead to a higher level of entry wages, with different studies reporting variances between 5,5% and 45,5% (Baert & Vujić, 2018, p. 822).

The potential of volunteering as a push factor for early career has also been studied in *various European countries*. Results show a 7.3 percentage point better chance of a positive reaction to their job application and a 2,8 percentage point higher probability of being invited to a job interview for Belgian students (Baert & Vujić, 2018). A qualitative study on Italian students – volunteers aged up to 28 years and engaged in social activities useful for the community – outlines acquiring soft skills, communication skills, and interpersonal skills as positive outcomes of volunteering (Giancaspro & Manuti, 2021). Students from Lithuania with volunteering experience have felt more confident during job interviews, have had better social contacts, and know better potential employers (Navickas et al., 2016, p. 108).

There is also evidence of the potential of volunteering for better future employment coming from Central and Eastern European countries. In one study young Romanians, Turks and Italians describe volunteering as a very good (56%) or good (40%) opportunity to learn; a very good way (52%) to develop social entrepreneurial skills. According to its author, volunteering "may improve people's employability and career prospects" (Epure, 2013, pp. 61-63). A more recent study among student volunteers in Hungary, Slovakia, Romania, Ukraine and Serbia discusses the so-called "career-focused volunteering" – one that is aimed at acquiring work experience, professional knowledge, and networking (Fényes et al., 2021, p. 3). Its results show that career-building is more visible among women and people with close friend relationships outside academia. The authors coined the term "revolving-door volunteering" trying to depict the process where young people try short-term but diverse volunteering experiences and thus experiment, test themselves, and as a result can even change their career plans. The same study underlines that the motivation to do volunteering as a CV-building step is not as strong among students in ***Central and Eastern European countries*** as it is in the US and Canada. A sociological study on the attitudes towards volunteering of the students of one large Ukrainian university presents an interesting parallel to Bulgaria due to the common ex-communist history of both countries. Volunteering is perceived as "approbation of professional knowledge acquired … during training" and as a part of "personal career scenarios" (Ovcharova et al., 2022, pp. 298-299). Along with being a stage of the individual career path, the students have reported considering the option to start their employment at the nonprofit organization where they have been volunteering. A study on the impact of volunteering workshops, conducted in three waves in 2019-2020 with students of UNWE confirms positive feedback on developing and/or strengthening transversal skills as personal efficiency (planning, keeping up with deadlines, coping with stress), personal traits (individual and group work, adaptability), self-reflection (character building, knowing of self), problem-solving and creativity, leadership and taking initiative, better communication skills, raised motivation and positive mindset (Gorchilova & Toncheva-Zlatkova, 2020).

3. RESEARCH METHODS AND DATA

As already discussed, data on the role of volunteering in universities and as a tool to improve employability in Bulgaria is quite scarce. One of the tasks of the research project "Volunteering as an Approach to Building Sustainable University Communities" is to shed light on the students' perceptions of volunteering as a push factor of early carrier opportunities. This understanding will contribute to promoting volunteering as powerful tool for personal, professional and social development and a base for building leadership skills, social responsibility and empathy.

The *primary research hypothesis* suggests that volunteering is not yet fully recognized as a valuable tool for gaining a career advantage, particularly in the early stages. Students with prior volunteering experience are more likely to recognize its benefits, both generally and specifically in the context of being evaluated by potential employers. These benefits include improved job prospects, professional growth, and the development of essential soft skills.

One of the research instruments was questionnaires, distributed to students, faculty and staff of the UNWE, delving into their perceptions of volunteering, previous experiences and family backgrounds, the willingness to support different causes, the motives for engaging or not engaging in volunteering activities focused within the university, or aimed towards the UNWE ecosystem and society at large. The students' survey covered 525 participants with a representative sample of the different university programmes, course levels, and forms of study. It was conducted via an online form between April and May 2024.

The participants in the survey were divided into two groups according to their volunteering experience: those with volunteer experience (either current or past) and those without any volunteer experience. The volunteer experience was identified based on individuals who indicated participating at least once a month or more frequently during their secondary or higher education in one or more of the following activities: environmental care, animal care, assistance and support for elderly people, assistance and support for children, organizing charitable causes and events, supporting the organization of sports events, supporting the organization of cultural events, disaster and emergency response, and assistance and support for migrants or refugees. Based on this definition, 57% of the surveyed students are considered volunteers.

To evaluate participants' perceptions of volunteering as a driving factor for career development, responses to the question "*Now imagine that you are involved in a volunteer activity. To what extent would the following statements relate to your career development?*" were analyzed based on the following statements:

1. Statements with a positive attitude towards the impact of volunteering:
   a. It will help me find a job,
   b. It will be highly appreciated by a potential employer,
   c. I will become better in my profession,
   d. It will help me connect with socially responsible organizations,
   e. I will meet people from different professions,
   f. I will meet people in leadership positions.
2. Statements with a negative attitude toward the impact of volunteering:
   a. My volunteering will not be appreciated by potential employers,
   b. I won't have time to get additional qualifications,
   c. I won't have time to study.

Students' views on the role of volunteering in enhancing soft skills were assessed through their responses to the question: "Now imagine that you are involved in a volunteer activity. To what extent would the following statements apply to you personally?" The analysis focused on the following statements (all with a positive attitude toward the impact of volunteering):

a. It'll boost my self-confidence,
b. I will improve my time management skills,
c. I will improve my leadership skills,
d. I will improve my communication skills,
e. I will cope better with stress and crisis situations,
f. I will acquire conflict response skills.

A five-point scale was used to assess the degree of agreement regarding how these statements apply to the respondent. "Certainly wouldn't apply to me", "Rather wouldn't apply to me", "It would somewhat apply to me", "Rather would apply to me" and "Certainly would apply to me."

Descriptive statistical methods were used to examine students' perceptions of volunteering as a driving factor for early career opportunities. Additionally, a non-parametric hypothesis testing method (Chi-Square Test) was applied to explore the presence of statistically significant relationships between volunteering status and the degree of agreement or disagreement with the aforementioned statements.

4. RESULTS

The distribution of students by key characteristics for the total sample and the sub-group with volunteering experience is presented in Table 1. The results reveal that students with volunteer experience did not differ significantly from the overall study participants in key characteristics. It can be concluded that volunteers at UNWE are present across all courses and fields of study, regardless of their employment status and gender.

Table 1. Distribution of the Respondents in the Sample by Variables of Interest

Characteristics	Share % Total Sample	Share % Volunteers
Gender		
Female	65.3	66.0
Male	34.7	34.0
Level and Year of Study		
Bachelor's Degree First Year	18.6	20.2
Bachelor's Degree Second Year	21.7	23.9
Bachelor's Degree Third Year	29.2	25.3
Bachelor's Degree Fourth Year	14.8	15.8
Master Degree	15.7	14.8
Form of Study		
Full-time	83.7	85.5
Distant	16.3	14.5
Working Status		
Not Working	32.1	28.6
Part-time	29.2	31.6
Full-time	38.8	39.7

Source: Own research

Generally, respondents expressed positive attitudes towards volunteering as a push factor for their career development (Table 2). They were most convinced that participating in volunteer activities would help them connect with people in different professions, leadership positions, and those engaged in socially responsible activities. More than 40% believe that volunteering will help them become better professionals, indicating that the statement "volunteering will improve my professional skills" certainly applies to them. Regarding its potential to help them find a job, the results are ambiguous, with almost equal proportions of participants who believe it applies to them and those who believe it does not. As far as the assessment by a potential employer regarding volunteering, a small proportion of respondents gave answers "Rather would apply to me" and "Certainly would apply to me" to the negative statement "My volunteering will not be appreciated by potential employers". On the positive statement, that volunteering will be highly appreciated by potential employers, the proportion of positive answers rather or certainly exceeds the proportion of negative answers by 5 percentage points. As far as the statements, that volunteering would interfere with learning or gaining additional qualifications are concerned, students are largely convinced that it does not apply to them.

Table 2. Involvement in Volunteering as a Driving Factor for Career Development – Students' Perceptions

Statements	Now imagine that you are involved in a volunteer activity. To what extent would the following statements relate to your career development?				
	Certainly wouldn't apply to me	Rather wouldn't apply to me	It would somewhat apply to me	Rather would apply to me	Certainly would apply to me
With a positive attitude towards the impact of volunteering:					
It will help me find a job	19.0%	21.1%	26.9%	14.9%	18.1%
It will be highly appreciated by a potential employer	15.2%	17.6%	29.2%	18.2%	19.7%
I will become better in my profession	13.5%	16.5%	27.0%	19.6%	23.4%
It will help me connect with socially responsible organizations	5.50%	8.60%	32.20%	25.10%	28.60%
I will meet people from different professions	2.90%	7.20%	25.30%	25.10%	39.40%
I will meet people in leadership positions	6.30%	11.00%	27.00%	24.80%	30.90%
With a negative attitude towards the impact of volunteering:					
My volunteering will not be appreciated by potential employers	25.1%	28.9%	24.3%	10.6%	11.0%
I won't have time to get additional qualifications	29.1%	31.6%	25.5%	7.4%	6.3%
I won't have time to study	24.7%	28.5%	27.4%	9.9%	9.5%

Source: Own research

The Chi-square test was used to examine the significance of relationships between having or not having volunteer experience and the extent to which the above-listed statements apply to respondents. The results indicate that students with volunteering experience are statistically significantly more likely to agree with the following statements: "I will become better in my profession" ($p=0.091$), "It will help me connect with socially responsible organizations" ($p<0.01$) and "I will meet people with different professions" ($p<0.01$). Conversely, they are significantly less likely to agree with the statement: "I won't have time to get additional qualifications" ($p=0.05$).

The results reveal that students view volunteering as a valuable tool for developing soft skills. Over 50% of respondents selected "Rather would apply to me" or "Certainly would apply to me" for all six statements related to soft skills (Table 3). Participants were particularly confident that volunteering would enhance their communication skills and help them acquire conflict response skills.

Table 3. Involvement in Volunteering as a Driving Factor for Soft Skills Development – Students' Perceptions

Statements	Now imagine that you are involved in a volunteer activity. To what extent would the following statements apply to you personally?				
	Certainly wouldn't apply to me	Rather wouldn't apply to me	It would somewhat apply to me	Rather would apply to me	Certainly would apply to me
I'll boost my self-confidence	5.9%	8.2%	28.2%	27.2%	30.5%
I will improve my time management skills	7.6%	10.7%	25.6%	25.8%	30.3%
I will improve my leadership skills	6.1%	9.5%	26.9%	25.3%	32.2%
I will improve my communication skills	5.7%	6.9%	24.2%	29.0%	34.3%
I will cope better with stress and crisis situations	5.7%	10.7%	29.6%	24.2%	29.8%
I will acquire conflict response skills	5.9%	7.6%	25.0%	28.8%	32.6%

Source: Own research

Using the Chi-square method, it was revealed that having or not having volunteer experience has a statistically significant impact on the following statements related to soft skills – "I'll boost my self-confidence", "I will improve my communication skills", "I will acquire conflict response skills" ($p<0.05$) and "I will improve my time management skills" ($p<0.10$). Volunteers are more likely to believe that participating in such activities will boost their self-confidence and improve their time management and communication skills. Additionally, they are more likely to consider that volunteering will help them acquire conflict resolution skills.

5. CONCLUSION

Volunteering in Bulgaria is still not widely recognized as a tool for enhancing career prospects, especially for graduates or for finding better job opportunities. As mentioned earlier, in Central and Eastern European countries, the motivation to engage in volunteering as a CV-building step is not as strong among students compared to their peers in the United States and Western Europe. However, the findings from the study conducted among UNWE students align with previously cited research: over 60% of respondents believe that volunteering will help them find a job and be positively valued by potential employers. Those with volunteering experience are also more confident that it will help them excel in their chosen profession.

The development of soft skills is undoubtedly one of the greatest advantages of volunteering. The results of the current survey confirmed this, showing that students with volunteering experience are more convinced of its benefits for developing specific soft skills.

Recognizing the benefits of volunteering as a push factor for career development raises the question of the university's role in building volunteer communities. Such initiatives benefit not only the students but also the university itself. By fostering volunteering opportunities, the university can ensure

better career prospects for its graduates while establishing itself as a socially responsible institution working for the benefit of society as a whole. Moreover, creating and developing volunteer centers within the university can contribute to building a genuine community of like-minded individuals. This community can work toward a just society, provide opportunities for the inclusion of vulnerable groups, and position the university as a sustainable leader in a rapidly changing world.

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Artificial Intelligence in Anti-money Laundering: A New Era of Business Integrity and Ethical Entrepreneurship

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Abstract: *This paper examines the transformative role of Artificial Intelligence (AI) in enhancing business integrity and fostering ethical entrepreneurship through improved anti-money laundering (AML) compliance. Traditional AML methods, hindered by manual inefficiencies and limited scalability, struggle to detect complex laundering schemes. AI addresses these challenges by leveraging advanced algorithms and machine learning to process large datasets, identify patterns of financial crime, and predict high-risk activities with greater accuracy. By automating routine tasks, AI optimizes resource use, allowing compliance professionals to focus on strategic decision-making and ethical evaluation.*

The study also highlights AI's ability to support entrepreneurs in building a culture of compliance and integrity, aligning operations with legal and ethical standards. As AI evolves, its capacity to reduce biases, enhance transparency, and increase accountability significantly bolsters ethical business practices. However, the research emphasizes the need for ethical considerations in AI deployment to avoid over-reliance on automation and ensure fairness and accuracy in AML protocols.

1. INTRODUCTION: A WIDER THEORETICAL-SCIENTIFIC APPROACH BETWEEN AI, AML AND POLICE COOPERATION

The integration of Artificial Intelligence (AI) in anti-money laundering (AML) practices marks a pivotal shift in the fight against financial crime, transforming compliance mechanisms and enhancing cross-border cooperation. Money laundering, a significant challenge in modern economies, distorts markets, undermines trust, and has long been a focus for international regulatory bodies such as the United Nations, Europol, and Interpol. These organizations highlight the role of technology, particularly AI, in enabling sophisticated detection of money laundering activities across jurisdictions, making cooperative international responses feasible (United Nations Office on Drugs and Crime [UNODC], 2020; Europol, 2021; Interpol, 2022). Political science and economic theories of regulatory governance illustrate how cooperation between states to combat financial crime involves a complex interplay of national interests, legal frameworks, and global norms (Held & McGrew, 2003; Fukuyama, 2004). This cross-national engagement is crucial for maintaining public security and financial stability in a globalized economy.

From a sociological perspective, money laundering is viewed as a threat to societal integrity, eroding public trust and perpetuating criminal economies that often fund more severe crimes like terrorism and human trafficking (Passas, 1999; Sassen, 2014). AI in AML frameworks addresses these issues by enhancing the capabilities of regulatory bodies and financial institutions to manage the vast and intricate data streams involved in financial monitoring. This capability is not only a technical advancement but also a sociopolitical tool, reshaping the approach to public security through

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collaborative, data-driven efforts (UNODC, 2020). The adoption of AI in this context brings challenges around data privacy, transparency, and ethical considerations. These concerns echo through political science and economics literature, where scholars discuss the balance between efficiency and ethical responsibility in regulatory technologies (Floridi, 2018; Brynjolfsson & McAfee, 2014).

Economic theories also emphasize AI's transformative impact on resource allocation and productivity. In AML, AI-driven automation reallocates human resources from repetitive tasks to strategic decision-making, optimizing costs and enhancing the efficacy of compliance efforts (Varian, 2010; Brynjolfsson & McAfee, 2014). At the policy level, the United Nations and Europol stress that responsible AI use is key to maintaining fairness, accuracy, and ethical standards, suggesting a balanced, transparent approach to deploying AI tools in AML (UNODC, 2020; Europol, 2021).

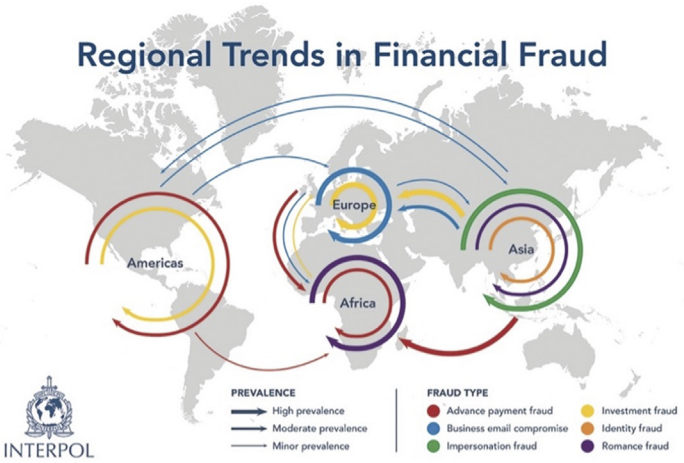

Figure 1. Regional Trends in Financial Fraud
Source: Interpol (2024)

2. BEYOND THE BOUNDARIES: A SYSTEMIC COOPERATION AMONG STATES, FINANCIAL INSTITUTIONS AND COMPANIES

The cooperation between states, financial institutions, and companies is essential in combating financial crimes across borders. Financial crimes such as money laundering, terrorist financing, and tax evasion are transnational issues that impact economies, destabilize financial systems, and often fuel organized crime. Reports from the United Nations (UN), Europol, the Financial Action Task Force (FATF), and Interpol consistently emphasize that the complexity and scale of these crimes require a cooperative, multifaceted approach. This approach hinges on proactive public policies, collaboration among states, private sector involvement, and leveraging technological advancements. For now, let's understand each of them by being a part of a complete puzzle.

2.1. International Frameworks for Financial Crime Prevention

The UN and FATF provide foundational frameworks[2] for countries to establish AML (Anti-Money Laundering) and CFT (Counter Financing of Terrorism) measures. The UN's conventions and

[2] Key foundational frameworks for Anti-Money Laundering (AML) and Counter Financing of Terrorism (CFT) have been developed by the United Nations (UN) and the Financial Action Task Force (FATF), establishing critical guidelines and standards for international cooperation and effective enforcement. The UN frameworks include the International Convention for the Suppression of the Financing of Terrorism (United Nations, 1999), the UN Convention Against Transnational Organized Crime (United Nations, 2000), UN Security Council Resolutions 1267 and 1373, which address terrorist asset freezing and broader

resolutions, such as the UN Convention Against Transnational Organized Crime (2000) and the International Convention for the Suppression of the Financing of Terrorism (United Nations, 1999), encourage member states to harmonize their laws with international standards, facilitating cooperation and establishing a baseline for enforcement (UNODC, 2020). The FATF further supplements these by providing actionable recommendations on combating money laundering and terrorist financing, helping countries align regulatory frameworks and implement preventative measures within financial systems (FATF, 2019).

2.2. Proactive Public Policies and State Cooperation

Proactive public policies are essential for ensuring financial institutions, companies, and other stakeholders operate within a cohesive regulatory environment[3]. Reports by Europol and the UN stress the need for governments to go beyond reactive enforcement by establishing preventative frameworks that enable better intelligence sharing, coordinated action, and data interoperability between countries (Europol, 2021; UNODC, 2020). For example, Europol's European Financial and Economic Crime Centre (EFECC) enhances European Union (EU) states' ability to jointly investigate and disrupt complex financial crimes. Public policies that support cross-border data-sharing agreements, secure platforms, and joint task forces are fundamental to dismantling sophisticated criminal networks.

2.3. The Role of Financial Institutions in Cross-Border Cooperation

Financial institutions are on the front lines of detecting suspicious activities due to their role in processing vast amounts of transactional data. They play a critical role by implementing Know Your Customer (KYC) processes, monitoring transactions, and reporting suspicious activities to Financial Intelligence Units (FIUs). FIUs, in turn, function as centralized authorities, gathering, analyzing, and sharing information with both national and international law enforcement agencies (FATF, 2019). Institutions' vigilance and adherence to AML and CFT obligations are essential in uncovering trends indicative of transnational financial crime, especially when states support these efforts with robust compliance requirements.

2.4. Corporate Responsibility and Private Sector Involvement

Beyond financial institutions, other companies also bear responsibility for preventing financial crime. Reports from Interpol highlight how corporate governance policies and ethical practices within companies can prevent exploitation by criminal organizations seeking to launder money or facilitate illegal financing (Interpol, 2022). Many large corporations and multinational firms are incorporating enhanced due diligence (EDD) procedures to monitor risky transactions across their global supply chains. The UN Global Compact further advocates for ethical business practices, encouraging companies to combat corruption, support transparency, and contribute to economic stability.

anti-terrorism measures (UN Security Council, 1999, 2001), and the UNODC Model Legislation on Money Laundering and Financing of Terrorism (UNODC, 2020). FATF's foundational contributions encompass the FATF 40 Recommendations, which provide a comprehensive standard for AML and CFT practices (FATF, 2019); the FATF Recommendations on Virtual Assets (FATF, 2021); and the Risk-Based Approach guidance, which emphasizes resource allocation based on identified risk levels (FATF, 2014; 2021). FATF's mutual evaluation processes further ensure compliance and enhance consistency across member countries' AML/CFT frameworks (FATF, 2019).

[3] We also should refer to a previous research made (Filho, 2024a) in regards the need in enhancing both rule of law and democratic values within State level, environment in which becomes possible to implement all the suggested improvements.

2.5. Leveraging Technology in Combating Financial Crime

Technological innovations, especially AI, machine learning, and data analytics, are central to modern AML and CFT efforts. AI can sift through vast datasets, identify complex transaction patterns, and enhance detection accuracy, thus optimizing the compliance processes for institutions and law enforcement. The UNODC and FATF acknowledge AI's potential in proactive risk assessment, though they also caution against over-reliance on automation due to the risk of excluding human oversight (UNODC, 2020; FATF, 2021). Europol's reports underscore the benefits of a collaborative approach where states and the private sector leverage technology to secure data channels and share actionable intelligence quickly and efficiently.

3. AI-DRIVEN AML SOLUTIONS FOR CORPORATE INTEGRITY AND TRANSPARENCY

The deployment of Artificial Intelligence (AI) in anti-money laundering (AML) systems has increasingly become a cornerstone in corporate governance, bolstering integrity, transparency, and accountability within business environments. Through AI's ability to analyze extensive datasets, recognize complex transaction patterns, and predict high-risk behaviors, companies can enhance AML compliance and reduce instances of financial misconduct. Reports from the International Monetary Fund (IMF) and Transparency International suggest that corporations using AI-driven AML technologies see significant improvements in detection capabilities, operational efficiency, and legal compliance (IMF, 2021; Transparency International, 2020). Integrating AI in corporate AML protocols not only meets regulatory demands but also strengthens public security by preventing funds from flowing to organized crime and terrorism, creating safer financial ecosystems through cross-border cooperation.

3.1. Enhanced Detection and Efficiency through AI-Driven Solutions

Traditional AML methods often rely on manual processes that are time-consuming, error-prone, and insufficiently scalable (Fukuyama, 2004). By contrast, AI-driven AML solutions utilize machine learning, pattern recognition, and data analytics to automate and streamline compliance efforts. This automation enables corporations to identify illicit financial patterns across millions of transactions, thus preventing financial misconduct at scale. The IMF's 2021 report on AML technology adoption highlights that companies using AI for AML detect suspicious activity up to 70% faster than those using conventional methods (IMF, 2021). This increase in detection speed significantly contributes to operational efficiency, as compliance teams can allocate resources to more complex and nuanced evaluations instead of routine tasks, effectively reducing costs and increasing accuracy (Brynjolfsson & McAfee, 2014).

3.2. Transparency and Accountability in Corporate Practices

Transparency is a central tenet of effective AML practices, as it fosters accountability and reduces the risk of internal misconduct. Transparency International (2020) reports that companies using AI-based solutions in their compliance processes exhibit a 45% decrease in instances of non-compliance and misconduct within their organizations, primarily due to increased surveillance and accountability mechanisms embedded in AI models. Such transparency can deter employees from engaging in unethical practices and facilitates the early identification of high-risk transactions or entities. Moreover, this data-driven approach ensures that financial transactions are closely monitored, leaving an auditable trail that strengthens a company's integrity.

3.3. Reduction of Human Bias and Increased Fairness

AI-driven AML systems contribute to fairness in compliance processes by reducing human bias in decision-making. Theoretical research in public security and policing has underscored the role of technology in promoting fairer, more objective assessments by relying on data rather than subjective interpretations (Floridi, 2018). In cross-border cooperation contexts, where diverse cultural and legal perspectives converge, AI can ensure consistent standards of compliance[4]. For example, the FATF (2021) underscores that AI reduces variability in AML investigations and enables cooperation between financial institutions and law enforcement agencies across different jurisdictions, standardizing practices and building trust in regulatory frameworks. This fairness not only enhances corporate credibility but also aligns business practices with global standards on anti-corruption and transparency.

3.4. The Role of Statistical Data in Demonstrating AI's Impact on AML

Statistical data from the IMF, FATF, and Transparency International show a marked improvement in AML effectiveness when AI tools are applied. According to the FATF (2021), financial institutions that adopted AI solutions for AML experienced a 55% reduction in the number of false positives, freeing compliance teams to concentrate on actual high-risk cases rather than misidentified low-risk transactions. These reductions are particularly valuable at the corporate level, where false positives can consume valuable resources, impede operational efficiency, and increase compliance costs. Additionally, Transparency International's 2020 report highlights that in corporations utilizing AI-driven AML, employee adherence to ethical practices improved by over 40%, indicating that transparency facilitated by AI may positively influence corporate culture.

Overall there is valid proof that AI is a must resource to be applicable within the AML context, as the below graphic demonstrates:

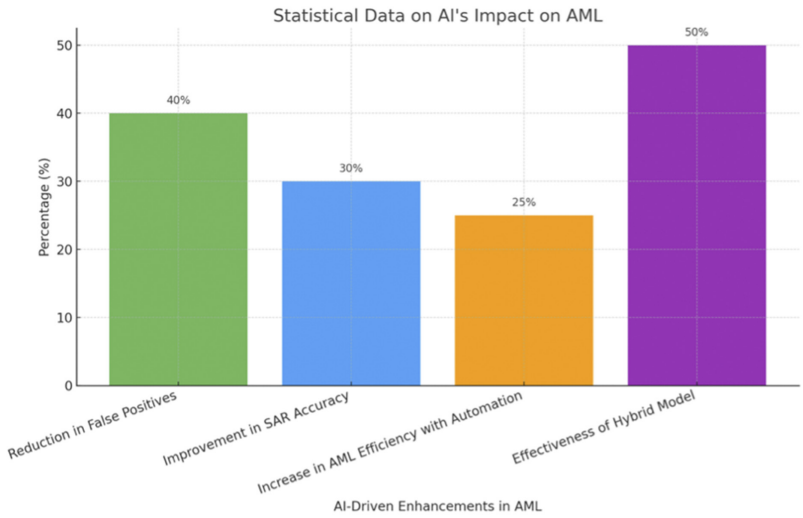

Figure 2. The tailored data in this infographic is based on aggregated findings from recent industry reports and studies, primarily covering AI-driven Anti-Money Laundering (AML) improvements

Sources: LexisNexis & Refinitiv (2022), International Monetary Fund [IMF] & Financial Conduct Authority [FCA] (2023), Financial Action Task Force [FATF] (2023), Europol & Interpol (2023)

[4] A similar approach allows us to navigate within the police context, a concept of organizational compliance based on the same values we commonly see in business sector, also widely applied when it comes to governance and integrity (Filho, 2023, 2024b).

AI-driven resources in AML are critical for enhancing public security and fostering cross-border cooperation. By automating detection of complex financial crimes and improving reporting accuracy, AI helps financial institutions and enforcement agencies share insights more effectively, enabling faster, coordinated responses to illicit activities that span borders. This synergy strengthens the global financial system's defenses and bolsters public trust, creating a safer, more transparent environment for international commerce.

3.5. Strengthening Public Security and Cross-Border Cooperation

Beyond corporate compliance, AI-driven AML systems contribute significantly to public security by improving cross-border information-sharing and cooperation. Transnational financial crimes often fund activities such as organized crime, human trafficking, and terrorism, which demand collective preventive measures across jurisdictions. AI technologies allow corporations to integrate with international AML protocols, creating networks that share critical data across state boundaries (UNODC, 2020). With AI's standardized and automated data processing, countries and corporations can detect transnational financial crime faster and more reliably, facilitating timely intervention. This capability aligns with theoretical frameworks in public security that promote cooperative policing, asserting that collaboration between the private sector and public authorities is crucial for achieving holistic crime prevention (Fukuyama, 2004; Europol, 2021).

A preliminary conclusion leads to that AI-driven AML solutions are pivotal in enhancing corporate integrity and transparency, fostering ethical corporate practices, and supporting global public security. Reports from international organizations like the IMF, FATF, and Transparency International demonstrate how AI's accuracy and efficiency improve AML compliance, reduce human bias, and facilitate cooperation between financial institutions and law enforcement. As AI technologies continue to evolve, they will play an even greater role in building transparent and fair financial systems, advancing both corporate responsibility and public security on a global scale.

4. FUTURE RESEARCH DIRECTION UNDER THE ETHICAL IMPERATIVE IN AI-DRIVEN AML: AVOIDING OVER-RELIANCE ON AUTOMATION

As Artificial Intelligence (AI) becomes increasingly integrated into Anti-Money Laundering (AML) protocols, ethical considerations emerge as a crucial component in ensuring fair, accurate, and responsible compliance. While AI offers transformative potential for detecting and deterring financial crimes, the risks associated with over-reliance on automated systems must be carefully managed. Ethical frameworks in AI deployment emphasize human oversight, transparency, and bias mitigation, which are essential for creating balanced and effective AML systems (Floridi, 2018; Bryson & Winfield, 2017).

4.1. Ensuring Fairness in AI-Powered Compliance Systems

One primary concern in AI-driven AML is the potential for algorithmic bias, which can lead to unfair treatment of individuals or businesses. Research suggests that, without rigorous oversight, AI models may inherit or amplify biases from training data, leading to disproportionate scrutiny of certain demographic groups or transaction types (Mehrabi et al., 2021). For example, statistical data from the World Economic Forum (WEF) indicates that biased algorithms can increase the likelihood of false positives for minority-owned businesses by as much as 25% in certain financial settings, underscoring the need for regular human intervention to validate AI-generated findings (WEF, 2020).

Ethical AI frameworks recommend continuous monitoring and testing of AML algorithms to detect and mitigate bias. The Financial Action Task Force (FATF) also emphasizes the importance of a balanced risk-based approach, encouraging institutions to use AI responsibly by involving compliance officers in decision-making processes, particularly for high-stakes transactions (FATF, 2021).

4.2. Transparency and Accountability in AI Decisions

Transparency is a cornerstone of ethical AI implementation in AML, as it allows stakeholders to understand the rationale behind automated decisions. According to Transparency International (2020), the opacity of some AI algorithms can hinder accountability, making it difficult for companies to audit or challenge erroneous findings. This lack of transparency can lead to trust issues, as customers and stakeholders may question the fairness of compliance decisions, particularly when errors arise.

Practical examples reinforce the need for transparency in AI-driven AML protocols. The International Monetary Fund (IMF) reports that institutions with transparent AI models exhibit a 30% reduction in disputes over compliance decisions compared to institutions using more opaque algorithms (IMF, 2021). To address transparency challenges, experts recommend employing explainable AI (XAI) techniques, which make algorithmic processes and outcomes interpretable for human auditors (Doshi-Velez & Kim, 2017). Explainable models support compliance officers in reviewing and validating AI outputs, helping build stakeholder trust and ensuring that AML efforts are justifiable and clear.

4.3. Avoiding Over-Reliance on Automated Systems

Although AI can significantly enhance AML effectiveness, an over-reliance on automation can undermine compliance goals. Automated systems, while efficient, may fail to recognize nuanced behaviors or adapt to rapidly evolving money laundering techniques, which require human expertise. Studies indicate that over-reliance on AI in AML protocols can lead to under-detection of complex, atypical laundering schemes. For instance, the Financial Crimes Enforcement Network (FinCEN) observed that fully automated AML models were less effective in identifying sophisticated layering techniques within high-net-worth accounts, missing up to 15% of potential high-risk cases that human analysts later flagged in manual reviews (FinCEN, 2019).

To mitigate these limitations, ethical frameworks advocate for a "human-in-the-loop" approach, where AI aids, rather than replaces, human decision-makers. By maintaining an optimal balance between automated processes and human judgment, institutions can leverage AI's speed and scalability while preserving the nuanced insights and adaptability that human analysts bring to complex cases (Mittelstadt et al., 2016). FATF's guidance also highlights the importance of this hybrid model, recommending that institutions design AML protocols that empower human reviewers to override AI decisions when necessary (FATF, 2019).

4.4. Statistical Support for Ethical AML Implementation

Recent data from FATF and the United Nations Office on Drugs and Crime (UNODC) suggest that ethical AI-driven AML models lead to improved outcomes in terms of accuracy and fairness. Institutions with human-augmented AI systems report a 20% higher accuracy in suspicious activity reports (SARs) than fully automated systems, with a reduction in false positives by up to 40% (UNODC, 2021). Additionally, a report from Transparency International (2020) notes that

AI models developed with ethical guidelines, such as accountability and transparency, contribute to a 35% increase in stakeholder confidence in AML protocols.

With that said, we shall acknowledge that the integration of ethical considerations within AI-driven AML frameworks is essential to creating fair, accurate, and effective compliance systems. By balancing automation with human oversight, enhancing transparency, and prioritizing fairness, institutions can deploy AI responsibly, reinforcing corporate integrity and promoting a robust compliance culture that aligns with public trust and international regulatory expectations.

5. CONCLUSION

Despite these advancements, numerous challenges remain. The differing regulatory landscapes and privacy laws between states can complicate cross-border data sharing while varying levels of resources and expertise among countries create inconsistencies in enforcement (UNODC, 2020). Additionally, AI-driven tools in AML can sometimes yield false positives, creating compliance burdens for businesses without effectively mitigating risks. A balanced, cooperative framework—where public policies encourage international collaboration, financial institutions uphold AML standards, and companies reinforce ethical practices—is crucial for sustained progress.

In summary, the fight against cross-border financial crime necessitates a comprehensive and coordinated effort among states, financial institutions, and private companies. Proactive policies and technological integration play a central role in this collaboration, reinforcing global resilience against financial crime and contributing to the stability and integrity of international financial systems.

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Navigating Governance with AI: Opportunities and Challenges in Portugal and Brazil

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Abstract: *This paper explores the intersection of corporate governance and AI-driven mechanisms, with a focus on how artificial intelligence can enhance the effectiveness of governance practices. By analyzing the integration of AI in corporate decision-making, risk management, and transparency, we argue that AI tools have the potential to revolutionize governance structures by improving efficiency, accuracy, and responsiveness. Through a comparative analysis, we examine the regulatory frameworks governing corporate governance and AI in two distinct jurisdictions: Portugal and Brazil. Both countries have developed unique approaches to regulation, with Portugal emphasizing robust data protection and corporate transparency, while Brazil has focused on regulatory reforms aimed at promoting innovation in AI while ensuring accountability. This paper highlights the opportunities and challenges posed by these regulatory environments and offers recommendations on how both nations can align AI-driven governance with ethical, legal, and economic considerations to foster a more effective, transparent, and sustainable corporate landscape.*

1. INTRODUCTION

The rapid evolution of artificial intelligence (AI) is transforming industries and reshaping conventional paradigms in governance and management. In the realm of corporate governance, AI tools offer a powerful means to address inefficiencies, improve decision-making accuracy, and enhance organizational transparency. As businesses operate in increasingly complex environments, the integration of AI into governance structures promises not only operational advantages but also the potential to reinforce ethical and legal standards.

This paper investigates the intersection of corporate governance and AI, analyzing how AI-driven mechanisms are being employed to optimize governance practices. It focuses on the role of AI in three critical areas: corporate decision-making, risk management, and transparency. By leveraging AI capabilities, companies can better anticipate risks, streamline compliance efforts, and foster trust among stakeholders. However, the deployment of AI in governance also raises pressing questions about regulatory oversight, accountability, and the balance between innovation and ethical responsibility.

The regulatory frameworks of Portugal and Brazil provide a compelling backdrop for this study. Portugal's approach, grounded in strong data protection laws and an emphasis on corporate transparency, offers a model of how regulations can foster trust while embracing technological advances.

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Conversely, Brazil's focus on regulatory reforms to encourage innovation in AI, coupled with accountability measures, demonstrates an alternative path toward harmonizing technological growth with governance standards.

Through a comparative analysis of these two jurisdictions, this study seeks to elucidate the opportunities and challenges posed by AI-driven governance. It also examines how regulatory environments in both nations can evolve to address the complexities of AI integration. By exploring these dynamics, the paper aims to offer practical recommendations for aligning AI applications in corporate governance with ethical, legal, and economic considerations. Such alignment is essential for building a governance landscape that is not only effective and transparent but also sustainable in the face of technological advancement.

2. REGULATIONS AND FRAMEWORKS IN AI-RELATED TO CORPORATE GOVERNANCE IN BRAZIL

In Brazil, the relationship between corporate governance (Coelho & Santos Junior, 2018) and artificial intelligence (AI) is considered fundamental to the development of fairer and more efficient societies. When governance is applied to artificial intelligence, it becomes crucial to ensure that this technology is used ethically, transparently and responsibly. Furthermore, responsibility has been much debated in the country in the face of fake news resulting from the use of AI, because while it can be a tool for detecting and mitigating the spread of fake news, on the other hand, it can be used to create and spread disinformation.

Artificial intelligence connects with various areas and in the social field it can offer innovative solutions to social problems, such as optimizing public services, analyzing data for public policies and improving administrative efficiency. However, without proper governance, the risks associated with the use of artificial intelligence can materialize, such as algorithmic discrimination and the violation of citizens' privacy. In this sense, it is essential that institutions establish clear guidelines on the use of AI, promoting inclusion and equity. In addition, effective governance must involve the participation of civil society in the formulation of AI-related policies. This ensures that citizens' voices are heard and that their concerns are considered in the decisions that affect their lives. Transparency in government actions regarding the use of AI is also vital to building trust between citizens and institutions.

Artificial intelligence has the potential to transform sectors such as health, education, security and finance, but it also raises concerns about privacy, ethics and security. Without clear regulation, there are risks associated with the misuse of personal data, algorithmic discrimination and a lack of transparency in automated decisions. Given this context, the regulation of artificial intelligence in Brazil is becoming increasingly necessary as this technology advances and integrates into various areas of society.

A regulatory framework, an expression that has gained prominence in Brazil, can establish guidelines that guarantee the protection of citizens' rights, promoting the ethical and responsible use of AI. This includes defining responsibilities for companies that develop and implement these technologies, as well as rules on how data should be collected, stored and used. Regulation can also encourage research and the sustainable development of artificial intelligence, ensuring that innovations are beneficial to society.

In addition, regulation can help create an environment of trust between consumers and companies, promoting the acceptance of AI in different sectors. It is essential that Brazil seeks to align

its policies with international best practices, ensuring that the country does not fall behind in the global race for technological innovation. Therefore, it is essential that the government, together with experts and civil society, work on drafting comprehensive legislation that addresses the challenges and opportunities brought about by artificial intelligence.

Despite the urgent need to regulate artificial intelligence in Brazil, Law Project 2.338/2023, which deals with the issue, has been under discussion in the National Congress since 2023 and is therefore pending approval (Chamber of Deputies, 2023). The bill is the result of the work of a committee of jurists and is being analyzed alongside other regulatory proposals, including Law Project 21/2020 (Chamber of Deputies, 2021), which lists guidelines for the promotion and action of the Brazilian government concerning the use of AI.

In Brazil, laws that intend to address new technologies must follow a principled basis, similar to those contained in Law 12.965 of 2014 (National Congress of Brazil, 2014), known as the Civil Rights Framework for the Internet, which aims to establish rights, duties, guarantees and principles for the use of the internet in Brazil, ensuring privacy and protection of personal data, freedom of expression and net neutrality. In addition, it is important to make it clear that companies providing AI applications need to be subject to the application of the Brazilian Consumer Protection and Defense Code under Law 8.078 of 1990 (National Congress of Brazil, 1990). Finally, legislation on AI must be in harmony with the Constitution of the Federative Republic of Brazil, especially its first article, which places human dignity as one of the foundations of the Democratic State of Law.

Pending the approval of Law Project 2.338 (Chamber of Deputies, 2023), the latest law considered to be a regulatory milestone impacting the use of AI in Brazil is the General Data Protection Law (GDPL) (National Congress of Brazil, 2018). Inspired by the General Data Protection Regulation, which is European Union (2016) legislation that establishes data protection and privacy standards, the GDPL establishes guidelines for the handling of personal records, such as the collection, storage and processing of information. It is therefore possible to say that Brazil is following in Portugal's footsteps when it comes to the digital environment and data protection.

Regulation of the issue is highly controversial in Brazil. So much so that Bill 2.338 of 2023 (Chamber of Deputies, 2023) has already undergone one hundred and fifty parliamentary amendments. In its first article, the bill defines the scope of the legislation, which is to establish general national rules for the development, implementation and responsible use of artificial intelligence (AI) systems in Brazil, with the aim of protecting fundamental rights and guaranteeing the implementation of safe and reliable systems, for the benefit of the human person, the democratic regime and scientific and technological development.

Just like the GDPL (National Congress of Brazil, 2018), the law brought in some definitions with the aim of standardizing the normative language of a very dynamic and changing subject. In this sense, it defined an artificial intelligence system as a computer system, with varying degrees of autonomy, designed to infer how to achieve a given set of objectives, using approaches based on machine learning and/or logic and knowledge representation, using input data from machines or humans, with the aim of producing predictions, recommendations or decisions that can influence the virtual or real environment.

For those who claim that artificial intelligence will replace human action, Law Project 2.338 of 2023 (Chamber of Deputies, 2023) provides that human intervention is crucial in reviewing automated decisions to ensure that they are fair and free from bias. This is because it is human

action that develops AI. In addition to human review, the adoption of control mechanisms such as double-checking by experts, the use of AI to audit AI, and the implementation of continuous feedback systems to adjust algorithms according to the results are measures that can make review fairer and more efficient. After all, transparency and access to explanations about decisions are fundamental to enabling an effective review and the correction of possible errors or injustices.

In view of the content presented, the relationship between governance and artificial intelligence in Brazil not only enhances the responsible use of this technology but also promotes a more cohesive and participatory social environment. For AI to benefit society as a whole, a commitment to governance practices that prioritize ethics, transparency and respect for human rights is essential. In this context, regulation becomes necessary and urgent, as technological advances have strongly affected legal relations in Brazil.

3. REGULATIONS AND FRAMEWORKS IN AI-RELATED TO CORPORATE GOVERNANCE IN PORTUGAL

As we've seen so far, all developments regarding AI-driven mechanisms under both corporate governance and compliance processes as regulated frameworks in Brazil, we acknowledge that, in parallel, Portugal has embraced Artificial Intelligence (AI) as a critical component in modernizing corporate governance while aligning with European Union (EU) directives and strategies[3]. The country's regulatory landscape combines national-level initiatives with European decisions to ensure a robust yet flexible framework for integrating AI into corporate governance, even though still in its implementation phases[4].

Portugal's integration of AI into corporate governance operates within the broader framework of its obligations as a member state of the European Union (EU). As stipulated in Article 2 of the Treaty on the European Union, the EU is founded on values that include respect for human dignity, freedom, democracy, equality, the rule of law, and human rights, with special consideration for the rights of minorities. These values guide member states toward fostering a society characterized by pluralism, non-discrimination, tolerance, justice, solidarity, and gender equality (Almeida, 2021).

Given these foundational principles, Portugal must ensure that its AI regulations and corporate governance frameworks align with these shared EU values. The integration of AI-driven mechanisms in corporate decision-making, risk management, and transparency must uphold human dignity and avoid exacerbating inequalities or discrimination. For example, the deployment of AI in corporate governance must not only comply with the technical and legal standards set forth by EU instruments, such as the General Data Protection Regulation (GDPR) and the proposed Artificial Intelligence Act but also actively contribute to promoting justice and solidarity in economic and corporate practices.

[3] Möllers discusses the "comply-or-explain" mechanism within European legislative frameworks, emphasizing its role in corporate governance. He highlights Section 161 of the German Stock Corporation Act (*Aktiengesetz - AktG*) as an example, where the German Corporate Governance Code operates as a form of 'soft law' with limited binding effect. Similarly, in Portugal, the adoption of analogous mechanisms aligns with the European trend, particularly in the integration of AI-driven compliance tools. These technologies enhance the implementation of "comply-or-explain" rules by automating transparency processes and providing advanced analytics for governance reporting, thereby adapting the principles of soft law to contemporary digital governance structures (Möllers, 2019, pp. 95–96).

[4] The artificial intelligence in European Union will be regulated by the AI act, as being recognized as the first world's comprehensive AI law (European Parliament, 2023). The Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13th June 2024 laying down harmonized rules on Artificial Intelligence will apply from 2nd August 2026 with some exceptions.

By aligning its national AI strategy (AI Portugal 2030) with EU directives, Portugal underscores its commitment to embedding these shared principles into its regulatory frameworks. This approach ensures that AI applications enhance corporate governance while fostering ethical and sustainable business practices that respect the rule of law and support a pluralistic society. The emphasis on transparency and accountability in AI systems is not merely a technical requirement but a reflection of the broader EU mandate to create inclusive and fair systems that benefit all citizens.

Thus, Portugal's compliance with EU standards goes beyond legal obligations; it is a reaffirmation of its role in a union committed to values that prioritize human rights, equality, and the collective good in the age of AI-driven innovation. Among the various legal instruments and frameworks applied within the national context, we recall the Portuguese Charter for Digital Rights (Portugal Government, 2021), therefore adopted in 2021, which reflects Portugal's commitment to regulating digital transformation and AI. It outlines principles related to transparency, accountability, and ethical use of digital technologies, essential for corporate governance. Moreover, it also brings all relevant provisions that address the protection of digital rights in corporate environments, emphasizing the importance of ethical AI deployment.

Within the same logical line, the Portuguese AI Strategy (Ministério da Ciência, Tecnologia e Ensino Superior, 2019) is applicable as a strategy that aligns with the European Commission's AI White Paper (European Commission, 2020) and the EU Artificial Intelligence Act (European Commission, 2021), emphasizing responsible AI use (e.g., key focus areas include promoting innovation, regulating AI for ethical governance, and fostering transparency in corporate decision-making).

We shall not forget the GDPR, drafted from the EU-level regulatory framework and settled within the Portuguese national legal system, becoming not only simply a transposition of the EU framework but foremost a foundational legal instrument in Portugal, as well as the alignments that are based on the AI Act, where Portugal is actively working to harmonize its national policies.

As above said, the General Data Protection Regulation (GDPR), although an EU-level regulation, is considered foundational in Portugal, influencing how corporations use AI in compliance with data protection and privacy laws but also ensures that AI systems in corporate governance do not compromise personal data, fostering trust and accountability.

On the other hand, the European Artificial Intelligence Act (AI Act) is under constant review and implementation by the Portuguese authorities, which allows the classification of AI systems by risk and imposes obligations on corporations deploying AI, particularly in governance contexts like decision-making and risk management.

It is quite important to highlight that as the main AI-driven mechanisms in corporate governance, we can cite a *first*, therefore acting as a preventive measure, mechanism that works as a decision-making and predictive analytics, and that means that AI systems would enable data-driven decisions by analyzing large datasets, forecasting trends, and identifying risks, ensuring efficient and accurate corporate governance practices.

In addition to that, *a second AI-driven mechanism* can use the AI-powered algorithms to assess risk in real-time including financial, operational, and compliance risks, thus optimizing governance responses (Risk Management Tools). As we developed so far, we acknowledged that the goal of AI-driven mechanisms within the corporate governance scenario is to enhance the efficiency, transparency, and accountability of decision-making processes while aligning with ethical, legal,

and regulatory standards. These mechanisms aim to create a more resilient and responsive governance structure capable of addressing the complexities of modern business operations in a globalized and digitalized environment.

For that reason, our *third mechanism* allows the AI tools in order to enhance corporate transparency by automating the auditing process and ensuring traceability in decision-making chains, which aligns with GDPR and EU AI Act mandates (Transparency Mechanisms).

Lastly, we can cite a *fourth mechanism* to deal with fraud detection and compliance, remembering that this works closely associated with transparency, as it has a coercive function in case the first layer of tools fails or contains any sort of bias. At this level, AI systems monitor transactions and corporate operations to detect fraud, ensuring adherence to legal and ethical standards (Fraud Detection and Compliance Mechanisms).

Portugal's integration of Artificial Intelligence (AI) into corporate governance reflects its commitment to aligning national practices with the European Union's (EU) principles and standards. This alignment is not only a regulatory necessity but also a strategic opportunity for Portugal to strengthen its position as a leader in ethical and innovative AI governance[5]. By adopting EU standards, fostering innovation, and promoting ethical AI deployment, Portugal ensures that its approach to corporate governance is both compliant and forward-thinking.

Portugal's legal instruments are designed to harmonize with EU frameworks, particularly those addressing data protection, transparency, and accountability. For instance, the General Data Protection Regulation (GDPR) sets a clear standard for ensuring that AI systems respect privacy rights, thereby fostering trust in their deployment within corporate governance. Similarly, the proposed EU Artificial Intelligence Act provides a risk-based classification system for AI applications, emphasizing the need for safeguards in high-risk scenarios. By adhering to these EU standards, Portugal not only fulfills its obligations as a member state but also creates a robust foundation for integrating AI into governance practices.

As Innovation plays a critical role in this process, the Portuguese AI Strategy, articulated in AI Portugal 2030, encourages the development and application of AI technologies through initiatives like regulatory sandboxes. These controlled environments allow corporations to experiment with AI-driven governance solutions under real-world conditions while remaining within the boundaries of legal norms. This approach enables the safe testing of innovative technologies, reduces regulatory uncertainty, and accelerates the adoption of AI solutions that can enhance decision-making, risk management, and transparency within corporate structures.

Ethical considerations are central to Portugal's approach, reflecting the values enshrined in Article 2 of the Treaty on the European Union[6]. Ethical AI deployment ensures that innovation is

[5] Also important to mention that Portugal has taken significant steps to integrate EU directives on sustainability and governance into its regulatory framework. For example, the country has adopted the European Climate Law and implemented the Non-Financial Reporting Directive, which promotes transparency in corporate governance and the protection of human rights. Moreover, Portugal's alignment with the European Ecological Pact showcases its dedication to achieving climate neutrality by 2050 while fostering innovation within a sustainable framework (Silveira & Duarte, 2021; Portugal Government, 2022).

[6] In the realm of AI and digital transformation, Portugal has actively positioned itself as a "digital nation," promoting initiatives that emphasize ethical AI practices, robust data protection, and inclusivity. The creation of Free Technology Zones and Digital Innovation Hubs demonstrates Portugal's effort to foster innovation while adhering to EU standards on cybersecurity, privacy, and the responsible use of technology (Portugal Government, 2022).

balanced with accountability, preventing misuse or bias in corporate governance systems. By prioritizing transparency, fairness, and human oversight, Portugal aligns its national policies with EU-level efforts to promote an inclusive and just digital transformation. This focus on ethical AI also enhances public trust and corporate accountability, fostering a governance environment that supports pluralism, equality, and justice.

To become more effective in the short term, Portugal can adopt several measures to strengthen its regulatory framework and maximize the potential of AI in corporate governance. First, the country should expedite the implementation of the EU Artificial Intelligence Act by aligning national laws and regulations with its provisions. This would provide clarity and consistency for corporations, ensuring seamless compliance with both national and EU requirements. Second, Portugal can expand the scope and accessibility of regulatory sandboxes to include more sectors and encourage broader participation by corporations and startups. By doing so, it would foster a culture of innovation while ensuring that new AI applications meet ethical and legal standards. Third, the government should enhance public-private collaboration, leveraging the expertise of academic institutions, private companies, and civil society organizations to co-develop policies and frameworks that address emerging challenges in AI governance.

In conclusion, Portugal's integration of AI into corporate governance demonstrates its commitment to EU principles of transparency, accountability, and ethical innovation. By adopting EU standards, fostering controlled experimentation through regulatory sandboxes, and promoting ethical AI deployment, Portugal is well-positioned to lead in this transformative area (Gonçalves, 2022). However, by accelerating the alignment with EU regulations, expanding innovation initiatives, and fostering collaborative policymaking, the country can further strengthen its regulatory framework. These steps will not only enhance the effectiveness of AI in corporate governance but also ensure that Portugal continues to evolve as a model for ethical and innovative AI practices in Europe.

4. FUTURE RESEARCH DIRECTION

Future research in the intersection of AI-driven mechanisms, GDPR compliance, and corporate governance could address several pressing and innovative directions. For instance, a comparative analysis could focus on the interoperability challenges when companies operate across regions with divergent AI and data protection regulations (e.g. Brazil v. Portugal), but go deeper by studying how corporations are embedding ethical AI principles into governance practices while ensuring GDPR compliance.

In parallel with the formal regulatory context in which we are seeking the application of existing laws and the approval of others that regulate the development and use of artificial intelligence in Brazil, Brazilian companies, regardless of size, sector, or geographical location, can make use of the ISO/IEC 42001 standard (International Standard Organization, 2023), which is the first international standard to establish requirements for the management of artificial intelligence systems.

Published by the International Organization for Standardization (ISO) (Coelho, 2022, pp. 177-92) and the International Electrotechnical Commission (IEC) in 2023, it is aimed at any organization that uses, develops or provides products or services that integrate AI systems. The standard aims to help organizations develop or use AI systems responsibly and in a transparent, reliable and secure manner.

5. CONCLUSION

We believe that there is a Fundamental Right to Good Governance that deserves to be analyzed from the procedural, economic and final aspects. That is why it is possible to frame it as a true path towards the realization of fundamental rights, especially social rights.

In Brazil, the relationship between good governance and artificial intelligence not only enhances the responsible use of this technology but also promotes a more cohesive and participatory social environment. The main challenge of regulating Artificial Intelligence (AI) in Brazil is to precisely define the scope of the legislation, keep up with technological developments and, above all, balance the new legislation from a practical point of view with protecting citizens' fundamental rights.

By crossing the Atlantic Ocean, Portugal's alignment with European Union (EU) standards in the age of artificial intelligence (AI)-driven innovation reflects not just legal compliance but a broader commitment to the shared values of the EU, including human rights, equality, and the collective good. This commitment is grounded in several national initiatives and EU-aligned policies emphasizing sustainability, governance, and technological advancement.

Moreover, the integration of AI in governance processes intersects with data protection laws like the General Data Protection Regulation (GDPR). The EU's regulatory landscape encourages corporate strategies that prioritize ethical AI use, balancing innovation with safeguards for human rights and corporate transparency. The framework also addresses the global impact of European regulations, influencing corporate AI policies beyond the EU's borders.

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Evaluating the Effectiveness of Secure by Design in Reducing Software Vulnerabilities

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Abstract: *As cyber threats get more advanced and complex, including security measures directly into software design, known as "secure by design", becomes increasingly important. This study looks into whether using secure-by-design principles leads to fewer software vulnerabilities than traditional security practices applied later in development. The study assesses the practical usefulness of secure-by-design solutions in reducing vulnerability rates and improving software resilience by analysing case studies from various sectors. The research focuses on how security considerations introduced early in the software lifecycle affect long-term risk reduction, as well as the possible benefits and drawbacks of these proactive strategies. The findings seek to give insights for organizations wanting to enhance their cybersecurity posture by incorporating security at core design levels, eventually contributing to the larger discussion about best practices in secure software development.*

1. INTRODUCTION

As cyber attacks become more common and sophisticated, organizations, governments, and individuals face substantial difficulties that necessitate novel methods to protecting sensitive data and critical infrastructure. Traditionally, security vulnerabilities are addressed after a threat has occurred, resulting in severe financial losses, reputational harm, and operational interruption. This reactive strategy emphasizes the critical need for a paradigm change to more proactive security measures.

Secure by design (SbD) is a transformational approach to software development that emphasizes the incorporation of security measures from the beginning of the program lifecycle. SbD aims to prevent vulnerabilities before they occur by embedding security into the basic design of systems, lowering long-term risks and increasing software resilience. While the theoretical benefits of SbD have been widely debated, actual proof of its practical efficiency across many industries is limited.

The purpose of this research is to explore and analyse the use of SbD approach in various sectors by assessing the effectiveness of its principles as outlined by the Cybersecurity and Infrastructure Security Agency (CISA), in reducing software vulnerabilities. We investigate the applicability of these principles in a variety of organizational situations by analyzing real-world case studies. The case studies include systems from a variety of sectors where SbD principles were either successfully implemented or neglected, allowing for a comparative analysis of security outcomes. By evaluating these situations, this study aims to shed light on how successful SbD is at minimizing vulnerabilities as compared to standard, reactive security techniques.

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2. BACKGROUND AND LITERATURE REVIEW

2.1. Secure by Design Overview

SbD is a proactive software engineering philosophy that emphasizes integrating security into the core architecture and development processes from the very beginning of the software lifecycle. The concept of SbD aims to minimize vulnerabilities and risks by ensuring that security is embedded throughout every phase of system development, from initial design through deployment and maintenance. According to Del-Real et al. (2024), SbD can be defined as "*an engineering approach that aims to protect software systems, privacy, and identity from vulnerabilities, attacks, breaches, and threats. It involves considering security in the early stages of the lifecycle and embedding it into software, architecture design, systems, and products by developers.*"

SbD contrasts sharply with traditional, reactive approaches to security, where vulnerabilities are addressed only after they are discovered or exploited. As cybersecurity threats evolve in complexity, traditional methods of post-deployment patching and vulnerability scanning are often insufficient to protect systems from emerging risks. The Cybersecurity and Infrastructure Security Agency (CISA) advocates for SbD as a cornerstone of secure software development practices, emphasizing the importance of integrating security into the system's design, architecture, and software development process to reduce potential attack surfaces before they can be exploited.

2.2. Integration of Secure by Design in Industry Practices

SbD ideas have been embraced and promoted by prominent industry frameworks and organizations. The Security Development Lifecycle (SDL), a framework created by Microsoft to incorporate security milestones across the whole development process, incorporates SbD (Microsoft, 2022). The SDL includes phases like threat modeling, security testing, and code review, all aimed at ensuring vulnerabilities are identified and mitigated as part of the development process rather than as an afterthought. The SDL's approach highlights the necessity of considering security at every stage of software development to reduce risks and prevent security flaws from making their way into production.

Similarly, the Open Worldwide Application Security Project (OWASP) promotes and encourages SbD and has provided a set of practices, including threat modeling, secure coding standards, automated security testing, and the Software Assurance Maturity Model (SAMM). These practices support the notion that secure software development is inherently a preventive process, where security should be incorporated into the software development lifecycle and not be tacked on afterward. The OWASP SAMM model offers a maturity model for assessing an organization's software assurance practices and improving them over time to align with SbD principles (OWASP, 2019).

2.3. Evolution of Secure by Design

Early security practices relegated security concerns to secondary roles, often prioritizing functionality over protection. The major breaches of the late 1990s and early 2000s underscored the inadequacy of reactive security measures and motivated a shift toward more proactive approaches, such as Microsoft's SDL and OWASP's SAMM (Howard & Lipner, 2006). The advent of DevSecOps in the 2010s further revolutionized SbD by integrating security tools into continuous integration and continuous delivery (CI/CD) pipelines. As of this change, developers, security experts, and operations teams started to share the responsibility among them and integrate security during the

coding and testing phases. This is also known as the "shift left" movement promoted by DevSecOps, which highlights the importance of addressing security from the early stages of the software development process. The aim of the "shift left" movement is to reduce vulnerabilities and improve overall system resilience. DevSecOps has demonstrated how automation and collaboration can make SbD principles a seamless part of modern development workflows, therefore reducing the risk of security vulnerabilities.

2.4. Comparing Secure by Design and Traditional Approaches

Security issues, in traditional software development, are frequently addressed only after systems are developed and deployed. This has resulted in being very expensive and disruptive. For instance, post-deployment vulnerability scanning, penetration testing, and patching are commonly used to find and address issues that were missed during development. The "Cost of a Data Breach Report 2024" (IBM, 2024) states that companies that do not incorporate security into the design and development stages of a project will have to pay much more to cope with breaches. According to the research, the average cost of a data breach for businesses that do not follow secure-by-design guidelines is $4.45 million, but for those that do, the costs are lower.

In contrast, SbD offers several distinct advantages over traditional methods:

Cost efficiency: Integrating security measures in the software development lifecycle minimizes the costs of detecting and correcting problems after the software has been deployed and is operational. According to studies, the cost of repairing a fault increases as the program develops. In their report, Functionize (2023) notes that the cost of finding and resolving problems increases considerably as time progresses through the software development life cycle. Correcting issues identified after the product has been deployed may be exceedingly expensive and risky, costing substantially more than correcting them early on. These findings highlight the financial benefits of following Secure by Design principles, which advocate for including security measures from the start of the software development process.

Risk reduction: SbD minimizes the attack surface by integrating security controls such as encryption, access control, and secure coding practices into the system's design. The 2024 Data Breach Investigations Report of Verizon (2024) presents reliable evidence that shows that systems designed with security as a main consideration are less likely to suffer from data breaches, given that security is built throughout the whole development lifecycle. This proactive strategy contrasts with reactive approaches, which frequently leave vulnerabilities neglected until they are exploited.

Operational stability: SbD ensures that security is built into the system, which reduces the need for emergency fixes and hot patches. Sommerville (2016) argues in his book that actions such as patch deployments can cause system instability and downtime. SbD mitigates this risk by detecting and correcting security concerns early on, resulting in a more stable and robust system.

3. CASE STUDIES AND ANALYSIS

The case studies chosen for this study attempt to give a deep comparative examination of SbD concepts used in the software development lifecycle, with an emphasis on real-world examples where these principles were and were not used in reality. The selection of these case studies is based on CISA's framework "Shifting the Balance of Cybersecurity Risk: Principles and Approaches for Security-by-Design and -Default" (Cybersecurity and Infrastructure Security Agency, 2023),

which identifies key SbD principles and tactics. This study does not include all principles, but focuses mainly on those principles that are directly linked to the development, design, and deployment stages of the software lifecycle. Each selected principle is illustrated through a pair of case studies, one where the principle was effectively implemented and another where it was neglected.

3.1. Criteria for Case Study Selection

Relevance to SbD principles: Each case study is closely related to one of the principles listed in the CISA framework, with one exhibiting effective implementation and the other stressing its lack.

Industry representation: The case studies cover a range of industries to guarantee that the findings are applicable across settings, providing insights into how SbD concepts may be applied to a variety of operating scenarios.

Real-world relevance: The case studies selected are based on real-world cases; from breaches to successful implementations of SbD concepts.

3.2. Case Studies Analysis

Principle 1: Memory-Safe Programming Languages

Dropbox file sync engine: Dropbox's has managed to guarantee strong security and system dependability by using the Rust programming language for its file sync engine. Rust's compile-time memory safety, which prevents vulnerabilities like buffer overflows and null pointer dereferences, are well aligned with Dropbox's multi-layered security policy. This includes secure data transport via SSL/TLS and data at rest encryption with AES-256 (Dropbox, 2024). Dropbox is using memory safety concepts effectively and has decreased vulnerabilities and improved the dependability of its sync engine by moving crucial components to Rust. Rust is a systems programming language created by the Mozilla Foundation, that provides low-level control with tight safety checks. This makes it particularly suitable for high-security, performance-critical applications like Dropbox's infrastructure (Saykol & Uzlu, 2017).

Windows Server Message Block (SMB) Protocol – WannaCry Attack: WannaCry Attack: The WannaCry ransomware attack, which occurred in May 2017, exploited a weakness in the Windows Server Message Block (SMB) protocol, specifically SMBv1. This vulnerability, known as CVE-2017-0144, enabled remote execution of arbitrary code on computers. The hacker known as EternalBlue published the weakness, known as EternalBlue. This allowed WannaCry to spread quickly over worldwide networks. It impacted approximately 200,000 systems in more than 150 countries, causing substantial disruption in industries such as healthcare, telecommunications, and manufacturing, with estimated damages totaling billions of dollars (Cybersecurity and Infrastructure Security Agency, 2017). The underlying cause of this attack was a flaw in the SMBv1 protocol's handling of specially crafted packets. The vulnerability could have been mitigated if the protocol had been written in a memory-safe language, such as Rust, which enforces strict compile-time memory safety checks to prevent issues like buffer overflows—one of the primary causes of such security breaches. CISA's report on the WannaCry attack stresses the importance of timely patching and security measures to protect against similar vulnerabilities, underscoring the risks associated with non-memory-safe languages like C, which is prone to such errors (Cybersecurity and Infrastructure Security Agency, 2017).

Comparison: The use of memory-safe programming with Rust by Dropbox has dramatically improved memory safety and vulnerability reduction by preventing buffer overflows and null pointer dereferences at compilation time. As a result, there is a more secure and dependable system, as the possibility of exploitation is reduced. In contrast, the WannaCry attack on Windows, that exploited a flaw in the SMBv1 protocol built in C, shows the impact on system security when memory safety is not addressed. The attack, which spread quickly, illustrated how weaknesses in memory management in non-memory-safe languages may result in catastrophic breaches.

Principle 2: Secure Hardware Foundation:

Apple's Secure Enclave in iPhones: Apple's use of the Secure Enclave in its iPhones demonstrates the need of including secure hardware to safeguard sensitive data. The Secure Enclave is a specialized subsystem included in the iPhone's A-series CPUs. It is designed to protect sensitive data such as fingerprints, facial scans, and encrypted keys. This hardware guarantees that such data is kept separate from the main processor and safeguarded from both software-based assaults and flaws in the operating system or third-party programs. The Secure Enclave uses fine-grained memory protection and secure processing capabilities, making it far more difficult for attackers to access this critical data, even if the device is hacked. Apple's Secure Enclave provides a strong layer of defense against unwanted access by using hardware-based security mechanisms, which aligns with a Secure by Design (SbD) strategy to improve user privacy and system integrity (Apple, 2023).

Meltdown and Spectre Vulnerabilities in Intel Processors: The Meltdown and Spectre vulnerabilities, discovered in 2018, exposed fundamental flaws in the design of modern processors, particularly those manufactured by Intel. These vulnerabilities exploited speculative execution, a performance optimization feature in processors, to bypass traditional memory protections and gain access to sensitive kernel memory (Lipp et al., 2018; Intel, 2018). Attackers were able to access critical data from other processes, resulting in serious security breaches. The Meltdown issue may have been avoided if hardware-based secure memory segregation were used for processors. To fix this issue, extensive patching were implemented, accompanied by performance degradation of the impacted computers, highlighting the implications of failing to incorporate secure hardware features from the start. These vulnerabilities were discovered by many researchers who analyzed the case. Their findings have been documented in the Meltdown research paper (Lipp et al., 2018). Intel issued a statement, highlighting the severity of the vulnerabilities and stressing for immediate remediation (Intel, 2018).

Comparison: When SbD principles are applied, like in the case of Apple's Secure Enclave, security is incorporated directly into the hardware. This ensures that sensitive data is segregated and shielded from software flaws. This proactive design lowers the danger of unwanted access while increasing system resilience. In contrast, the lack of such safe hardware features, as illustrated by Meltdown and Spectre, exposes systems to serious security vulnerabilities. Without built-in protections, attackers were able to overcome memory safeguards and get access to critical data, resulting in broad exploitation and costly mitigations. These differing approaches highlight the vital need to incorporate security into hardware throughout the design phase.

Principle 3: Web Template Frameworks

Django: Django is a popular Python online framework and it is known for its safe coding practices, particularly in its template system. It lowers the danger of XSS by automatically escaping user input in templates. This guarantees that harmful scripts cannot run in the user's browser since any data rendered in the template is automatically escaped. Django's template engine escapes special

characters such as <, >, and &, thus preventing them from being read as HTML or JavaScript. Automatic escaping is a key feature of Django's template system, which considerably improves the security of web applications produced with it (Baker, 2022).

The British Airways data breach: In 2018, British Airways was subject to a significant data breach from a cyber attack linked to the Magecart group. The attackers used a vulnerability within the web template framework used by the airline's website. As highlighted by Aljaidi (2023), the attackers injected malicious code into the website's JavaScript library. The breach occurred because the web template framework did not properly implement automatic escaping of user input, which is a key mechanism to protect against XSS attacks. Rather, attackers were able to introduce malicious scripts that collected users' financial and personal information since user data was placed directly into the web pages.

Comparison: The application of input sanitization is the main way that Django and the British Airways scenario differ from one another. Django's template system offers a strong protection against XSS attacks through automatically escaping user input. The British Airways hack happened because its online template architecture lacked enough input sanitization. This allowed hackers to take advantage of the system. As demonstrated in the British Airways case, this draws attention to the vulnerability of online applications that do not automatically escape user input.

Principle 4: Parameterized Queries

Adobe: The leading software provider Adobe, stresses the use of parameterized queries to avoid SQL injection attacks, which is a common technique used for data thefts. Adobe uses parameterized queries to make sure that user inputs are handled solely as data and not executable code, according to the Experience Platform documentation (Adobe, 2024). This method prevents hackers from inserting malicious SQL code into input areas. The implementation of parameterized queries in the case of the Adobe Experience Platform is done by binding input values from users to predefined SQL query structures. For instance, Adobe's platform employs placeholders and ties user input to them at runtime rather than concatenating user input straight into a SQL expression. This way, data is treated as a literal value, not as part of the SQL command, so malicious input cannot alter the query's logic or structure. So, even if an attacker attempts to inject malicious SQL code, it will be treated as part of the data, preventing unauthorized database access.

Heartland Payment Systems data breach: There were a series of security weaknesses in Heartland Payment Systems' systems that led to the 2009 data breach. In this attack, hackers stole over 130 million credit card credentials. The main cause of the incident were the SQL injection flaws that enabled attackers to get around security protections and obtain sensitive data from the database. These vulnerabilities were mainly because of the outdated software used, inadequate security measures, and incorrect input validation. Hackers used these vulnerabilities for several months taking credit card information. Heartland's systems were not adequately secured, even though there were security best practices to stop SQL injection attacks, such using parameterized queries and sanitizing input (Cingolani & Zamparini, 2019). The breach's total financial impact is projected to be over $300 million. The incident emphasizes the importance of more stringent security standards and the use of safe coding approaches in payment processing systems to avoid such vulnerabilities in the future (Philadelphia Federal Reserve, 2010).

Comparison: The fundamental distinction between Adobe's and Heartland's techniques is the use of parameterized queries. Adobe successfully inhibits SQL injection attacks by constraining

user inputs to preset SQL query structures using placeholders, which ensures that user input is regarded as data rather than executable code. In contrast, Heartland's system suffered from SQL injection vulnerabilities due to the failure to use parameterized queries, which allowed attackers to manipulate SQL queries by directly concatenating user input into the SQL statement. This highlights the vulnerability of systems that do not implement parameterized queries, as seen in the Heartland breach.

4. DISCUSSION

Effectiveness of secure by design: The study shows that SbD practices are effective in reducing software vulnerabilities and enhancing system resilience. By integrating security measures early in the development process, as suggested by McGraw (2006) and Howard and LeBlanc (2022), risks are detected and handled before deployment. This proactive approach not only strengthens systems but also aligns security initiatives with business objectives. By doing so, it enhances stakeholder confidence and significantly lowers the likelihood of expensive security breaches, as highlighted by Howard and Lipner (2006). Furthermore, SbD practice leads to reduced overall costs of system lifetime. Addressing security concerns early in the development process reduces the need for expensive repairs later on, claim Venson et al. (2019). Beyond the monetary rewards, this strategy encourages the growth of an organization's security-focused culture, guaranteeing long-term gains and improving security management techniques.

Advantages: SbD offers a variety of benefits, including a notable reduction in software flaws, improved system resilience, and cost efficiency throughout the software lifecycle. Addressing security concerns during the initial development phases results in fewer incidents, thereby reducing the costs associated with patching, system downtime, and breach recovery (Howard & Lipner, 2006). According to McGraw (2006), integrating security from the start will improve system's overall security posture and reduce the efforts for maintenance afterwards. According to Venson et al. (2019), companies who use SbD techniques see lower long-term security costs and increased operational efficiency. In addition to guaranteeing cost savings, this alignment of security with overarching business objectives also reaffirms the organization's dedication to upholding dependable and strong systems.

Challenges: Although SbD has several benefits, there are drawbacks as well. The significant upfront cost of putting these processes into place is one of the main issues. It takes a lot of effort to integrate security from the beginning. For businesses with tight funds or outdated technology, this might be especially difficult (Howard & Lipner, 2006). Furthermore, the development team's proficiency is essential to the successful use of Secure by Design. It can take a lot of time and effort to teach developers on safe coding standards (Shostack, 2014). According to Venson et al. (2019), small and medium-sized businesses may find the initial outlay necessary for Secure by Design procedures to be a major obstacle.

5. FUTURE RESEARCH DIRECTIONS

Looking ahead, there is an urgent need for more research to improve the application of Secure by Design approaches. Future work should focus on creating more user-friendly tools and frameworks that make it easier to integrate security early in the development process, especially for smaller enterprises with low resources. Additional empirical research is crucial to objectively assess the long-term success of SbD. Technology and threats advance rapidly, hence it is critical to investigate how security needs also change and ensure that SbD stays flexible and responsive to new challenges.

6. CONCLUSION

Adopting SbD techniques is a very effective strategy for minimizing software vulnerabilities, increasing system resilience, and assuring overall cost effectiveness. Organizations that integrate security measures from the start of the software development lifecycle may manage risks in a proactive way, connect security with business objectives, and increase stakeholder confidence. Despite the initial investment and skill necessary, the long-term benefits, such as lower security expenditures, fewer incidents, and a better security culture, far outweigh the hurdles. Finally, SbD leads to more secure, efficient, and cost-effective systems, with major benefits for both enterprises and customers.

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Innovative Data-Driven Email Campaign Strategies with Salesforce Marketing Cloud

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Abstract: *This study investigates the impact of data-driven email marketing strategies using Salesforce Marketing Cloud, emphasizing innovative techniques for optimizing digital marketing performance. Recognized for its robust analytics and personalization capabilities, Salesforce Marketing Cloud provides advanced tools for improving engagement, conversion rates, and campaign efficacy. By examining practices for data collection, analysis, and actionable insights, this research offers a framework for enhancing customer segmentation and optimizing decision-making processes. Focusing on a case study in the cosmetics industry, findings demonstrate how strategic, data-centered approaches drive higher return on investment and elevate campaign effectiveness. This study provides valuable insights for leveraging Salesforce Marketing Cloud, offering a model for developing dynamic, personalized email marketing strategies that maximize platform potential and lead to effective, high-yield campaigns.*

1. INTRODUCTION

Email marketing is an essential digital strategy due to its personal, cost-effective, and customizable approach. It enables businesses to connect directly with audiences, fostering relationships and driving sales with a high return on investment (ROI), sometimes reaching $42 for every $1 spent (Smith, 2020). Email marketing's direct communication channel allows tailored messages, making engagement more meaningful (Ozcan & Guler, 2024). Additionally, its measurability—through metrics like click-through rate (CTR), and conversion rate (CVR)—provides precise tracking for performance enhancement.

Customer Relationship Management (CRM) systems, such as Salesforce, play a vital role in optimizing email campaigns. Salesforce consolidates data from various sources to offer a unified view of customer behavior, enabling detailed segmentation and personalization (Salesforce, 2024). Its automation tools simplify processes like sending, tracking, and analyzing responses.

This research examines how data from email campaigns can optimize future initiatives by analyzing engagement metrics and demographics. The study focuses on how segmentation, personalization, and timing improve campaign effectiveness and provides recommendations for marketers to leverage CRM insights for impactful, data-driven email marketing.

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2. LITERATURE REVIEW

2.1. Email Marketing

Personalization, which uses customer data to tailor messages, boosts open and CTR, helping campaigns achieve greater relevance and impact. Mitra and Singh (2023) underscore the effectiveness of segmentation, which groups customers based on demographics, psychographics, behavior history as well as geographic location (p. 24). By crafting targeted messages and creating segmented email lists, improved engagement rates and extensive relationships with customers are built (Cybellium, 2024, p. 48).

Parise and College (2008) discuss how advances in web technologies enable more sophisticated data collection and analysis, supporting better segmentation strategies.

Additionally, Vibha and Saloni (2020) reveal that timing and consistency are crucial in email marketing (p. 147). Emails sent at optimal times, when recipients are most active, are more likely to succeed. Furthermore, well-planned online and offline strategies lead to long-term relationships with customers.

2.2. CRM

CRM systems, such as Salesforce, are pivotal in managing customer relationships and marketing strategies, offering a unified view of customer interactions across channels. As specified by Yadav et al. (2023) CRM serves as both a management function and a technology that integrates all business processes involving customer interactions across sales, marketing, and services (p. 106). The goal of CRM technology is to manage the entire customer journey comprehensively, from beginning to end.

Based on Cybellium (2024) behavioral targeting leverages insights from a user's previous actions to shape future interactions (p. 12). By tracking behaviors such as website visits, content downloads, and email engagement, marketers can design campaigns that align with the user's interests and preferences. This strategy enhances the relevance of marketing efforts, increasing the likelihood of conversions.

According to Soudatti (2024), marketers need to develop strategies that utilize CRM data and insights to provide personalized experiences and targeted communication (p. 65). This includes approaches for lead nurturing, customer segmentation, cross-selling, upselling, and loyalty programs, all aimed at enhancing customer engagement.

CRM workflow automation can replace manual processes, speeding up operations to boost productivity. This increase in efficiency enhances employee effectiveness while reducing campaign costs. Modern CRMs offer fully integrated workflow tools that support automation and foster a customer-centric approach to business (Agnihotri & Rapp, 2010, p. 24).

2.3. Data-Driven Marketing Strategies

The rise of big data has revolutionized marketing, enabling data-driven strategies that offer in-depth insights into customer behavior and preferences. Cybellium (2024) highlights behavioral segmentation that examines consumer actions, such as purchasing habits, brand loyalty, usage frequency,

and reactions to marketing initiatives (p. 31). It is pointed out that in the analysis of this data, companies can identify valuable customers, frequent purchasers, and loyal supporters, enabling them to develop strategies to retain and reward these segments.

Kumar et al. (2024) also emphasize that big data transforms marketing by enabling customer segmentation, personalization, real-time insights, and targeted advertising. It analyzes vast datasets to improve customer engagement, optimize campaigns, track trends, and deliver relevant ads, enhancing marketing strategies and outcomes.

Additionally, advanced technologies like machine learning and predictive analytics are highlighted by Vinasco (2019) through real-world marketing use cases, including cross-sell opportunities, experiment analysis, and attrition prevention, based on the author's experience at Facebook and Uber. Aimed at demystifying AI, it serves as a guide to its potential in marketing strategies.

2.4. Campaign Optimization

Existing research on campaign optimization utilizes methodologies such as A/B testing, customer segmentation, and predictive modelling to enhance email marketing. A/B testing (Cybellium, 2024, p. 25) allows marketers to experiment with email elements like subject lines, layouts, and call-to-action buttons to identify what drives recipient engagement. Even minor adjustments in content can yield significant results, emphasizing the value of iterative refinement.

Predictive analytics (Mitra & Singh, 2023, p. 28) is an iterative process requiring continuous updates, monitoring, and validation to adapt to evolving data and market dynamics. It leverages historical data and predictive models to enhance customer targeting, optimize campaigns, and improve marketing outcomes. By anticipating customer behavior, businesses gain a competitive edge and maximize marketing efficiency in a data-driven environment.

3. RESEARCH METHODOLOGY

This research employs a quantitative approach to evaluate the effectiveness of data-driven email campaigns implemented via Salesforce Marketing Cloud (SMC). Primary data, including CTR, revenue and CVR, will be gathered using SMC analytics tools to assess performance across campaign elements and audience segments. Secondary data, such as industry benchmarks and academic insights, will contextualize findings.

A purposive sampling strategy will target specific email campaigns and audience segments, considering criteria like demographics (age and gender).

The research considered a real client coming from the cosmetic industry, where campaigns were executed via Salesforce Marketing Cloud in six months.

Ethical practices, including data confidentiality and regulatory compliance, will be prioritized. Potential limitations, such as data constraints and external variables, will be acknowledged.

3.1. Segment Creation with Audience Builder

Audience segmentation is key to effective email marketing, enabling personalized content delivery. SMC's Audience Builder facilitates segmentation based on demographics, behavioral, psychographic,

and transactional data. Data Extensions store customer data, and the drag-and-drop interface simplifies segment creation. The specific client segments included demographic categories such as: young female customers under the age of 30, middle-aged female customers between the ages of 30 and 49. Older female customers over the age of 50 and the segment for female customers with unspecified ages. Finally, the only one segment for male customers of all ages.

3.2. Design email templates using Content Builder

Using SMC Content Builder, emails can be customized for responsiveness and visual appeal. The platform's drag-and-drop functionality helps efficiently organize content, while responsive design tools ensure the layout works on mobile, tablet, and desktop devices.

For personalized content, dynamic elements such as customer names and demographic details (age, gender) can be incorporated using AMPscript or personalization strings, increasing relevance. The email's sections were carefully organized, with content tailored to customer preferences. For example, the monthly newsletters included sections like "Discover Products," "Shop Products," "News," and "Pool - Skin Concerns," while also featuring the "NLP - Loyalty Program" in every issue.

Significant changes occurred in April with the addition of the "Skin Guide" section and the "Announcement of Ambassador Campaign," which provided more specialized content. In subsequent months, like May and June, additional focused sections like "Towel Promo" and "SUN Promo" were introduced. These sections, along with personalized content based on age and gender, ensured targeted product recommendations and promotions.

3.3. Testing Content with Journey Builder

The A/B testing process considers setting clear objectives and selecting test variables, such as subject lines, layouts, or content variations. Audience segments, like: "Young Female Shoppers", "Middle-age Female Shoppers", "Old Female Shoppers", "Remainder Female Shoppers" and "Male Shoppers" are created to evaluate the performance of these variables. The goal is to determine which variations drive higher CTR, CVR, or overall engagement. Tests are conducted by creating different versions of the chosen variables and sending them to segmented groups.

The Random Split activity in Journey Builder plays a key role in streamlining A/B testing. It allows marketers to test multiple variations by randomly assigning contacts to different paths, ensuring unbiased test groups. Each path can feature different elements like email content or subject lines (Goyal, 2023).

3.4. Automation Studio

The SMC automation workflows are configured within Automation Studio, where routine tasks like email sends, data imports, and marketing operations are automated to ensure consistent execution (Devadiga, 2024).

An important part of email automation is scheduling emails at optimal times. By analyzing customer engagement data, emails are sent when recipients are most likely to engage. For example, promotions tied to holidays or seasons for the cosmetic client were scheduled for Fridays or Mondays, avoiding weekends and late-night hours to reduce unsubscribes.

Segmentation and personalization are key to automation workflows. Audience groups, such as "Young Female Shoppers" and "Male Shoppers," receive tailored messages based on their preferences and behaviors.

3.5. Data Analysis

Once data is collected, advanced tools like Einstein Analytics are used for in-depth analysis. This allows marketers to uncover trends and patterns that provide valuable insights into customer preferences and behaviors.

The iterative process of data collection, analysis, and optimization helps marketers remain agile and responsive to changing behaviors. By refining strategies using data-driven insights, CTR and CVR improve, contributing to long-term business growth (Gadekar, 2023). This cycle of analysis and optimization is central to successful email marketing in SMCs.

4. RESULTS

The research analyzed data in a period of six months derived from email campaigns executed in SMC, comparing three months of general newsletters to three months of personalized content based on age and gender segments. The study focused on evaluating the impact and effectiveness of these strategies by examining key performance metrics, including CTR, CVR, and revenue generated across various audience segments.

4.1. Campaign Segment Analysis

A critical aspect of the study involved segmenting the audience into distinct groups. By analyzing performance metrics specific to each segment, the study aimed to assess the tailored effectiveness of the campaign's messaging and offers.

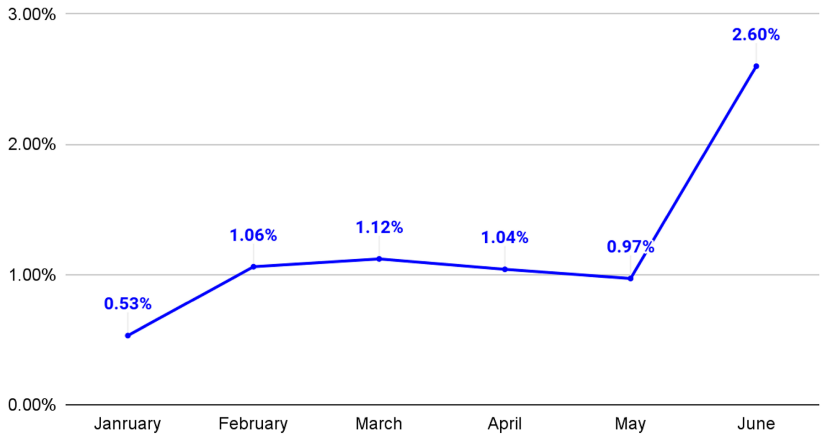

Figure 1. CTR evaluation over the past six campaigns

Source: Own research

CTR given in Figure 1 and CVR given in Figure 2 drastically increased and went into a positive tendency in the last 3 campaigns that considered personalization strategies.

CTR given in Figure 3, differently behaved in each month so none of the target clusters had continuous values, however for CVR given in Figure 4, it can be established that the men cluster has

the highest values overall, indicating that age-defined segments are necessary for men. From the female segments, the highest values for CVR are detected in the old women segment signal right targeting with the content and personalization.

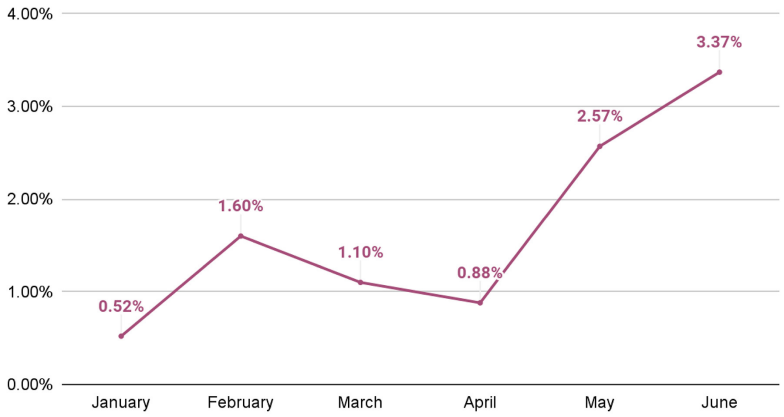

Figure 2. CVR evaluation over the past six campaigns

Source: Own research

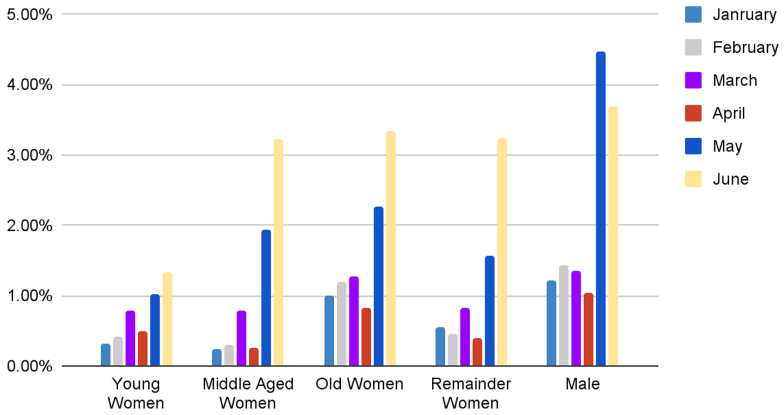

Figure 3. CVR per audience group over the past six campaigns

Source: Own research

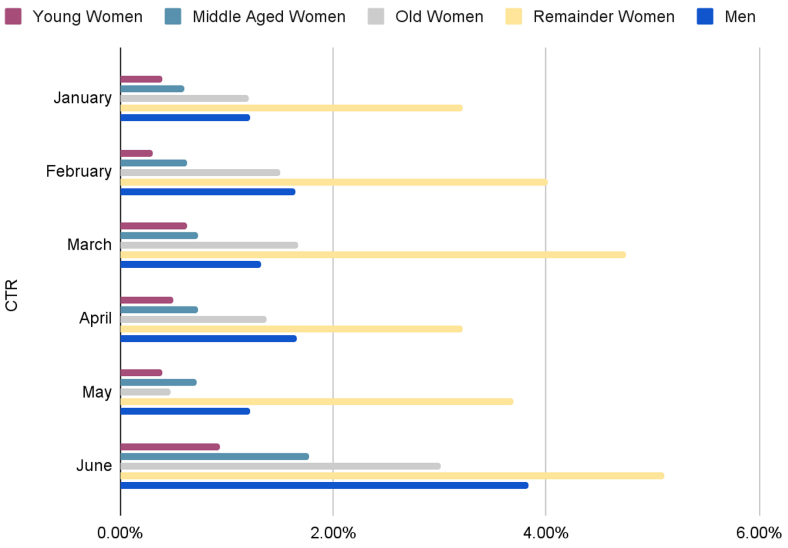

Figure 4. CTR per audience group over the past six campaigns

Source: Own research

4.2. Effectiveness of Personalization Strategies

For the past three campaign sections: Discover Products, Shop Products, and Skin Guide contained specific content for relevant audience groups. Results from the comparison demonstrated in Figure 5 demonstrate that section Discover Products - increased the number of interactions by 10%, Shop Products increased the number of interactions by 8%, and Skin Guide increased the number of interactions by 1%.

A large amount of interactions going to the promotions sections is expected as most of the promotions are bonus gifts for bought products.

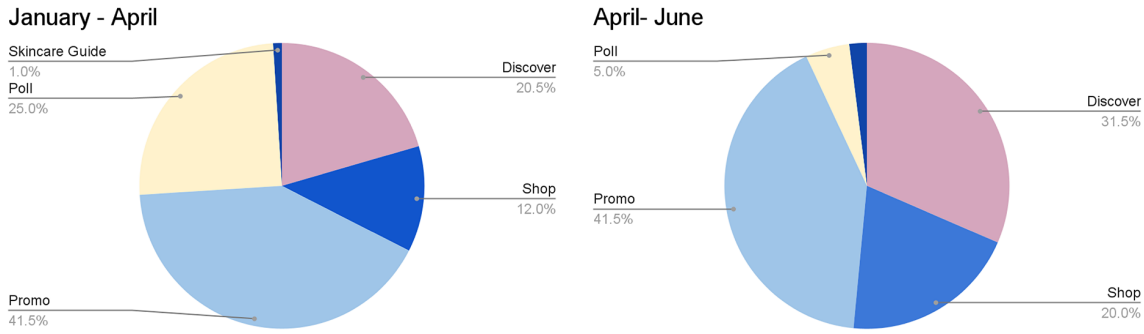

Figure 5. Section engagement per specific audience January - April and April-June comparison

Source: Own research

Considering that the most clicks increased in the sections Discover and Shop Products, we did expect an increase in the revenue too. Results given in Table 1 reveal an increase of 17.07 € in revenue for the email campaign over the past three campaigns per 1.000 mails delivered, or total revenue for the 910.000 mails delivered is 20,356.7 €. The total increase throughout the past three campaigns compared to the previous three campaigns is 4 times higher.

Table 1. Revenue comparison between the period January-April and April-June

Period	Revenue per 1K mails	Total Revenue
January - April	5.3 €	4,770 €
April - June	22.37 € ↑(17.07 €)	20,356.7 € ↑(15,586.7 €)

Source: Own research

4.3. Comparative Analysis and Benchmarks

Benchmarking email marketing metrics such as CTR, CVR, and revenue helps evaluate campaign performance across industries.

CTR: In the cosmetic industry, the average CTR is 1.3% for 2024 (Mailchimp, 2024). Over the last three campaigns, the CTR reached 1.54%, with a notable increase to 2.60% in June's campaign. This growth surpasses the previous rate of 0.90%, indicating that personalization has positively impacted CTR.

CVR: CVRs measure the percentage of recipients who completed a purchase. For the cosmetic industry, the average CVR is 2.7% according to Mediatool (2024). The recent campaign achieved a conversion rate of 2.27%, with June reaching a peak of 3.37%, significantly exceeding industry benchmarks.

Revenue per Email: This metric calculates the average revenue generated per email sent. The benchmark value for revenue per email is 0.09€ according to Pearce (2024), compared to the campaign's average of 0.022€ over the past three campaigns. Significant improvement can be seen compared to the previous period, where revenue per email was 0.0053€.

Overall, the campaign's performance, particularly in CTR and revenue, demonstrates the effectiveness of personalized email marketing, with continued growth in key metrics.

5. FUTURE RESEARCH DIRECTIONS

There are several areas for future exploration and enhancement to refine email marketing strategies further.

One key opportunity is to explore advanced personalization techniques using artificial intelligence (AI) and machine learning (ML). By leveraging real-time data and predictive analytics, marketers can create hyper-personalized content that anticipates customer needs and behaviors more accurately, improving engagement.

Additionally, future research could extend beyond email marketing by integrating campaigns with other channels like social media, SMS, and in-app messaging, creating a more cohesive customer experience. Studying the effectiveness of multi-channel campaigns and how data from various sources can be synthesized for better personalization could provide valuable insights.

While this study focused on six months, longer-term, longitudinal studies could track email performance over one year or more. This would allow for deeper insights into long-term trends, the impact of seasonality, and the effects of continuous optimization. It could also help marketers understand customer lifecycle stages and how email strategies should evolve.

Another area for exploration is customer journey mapping. Future studies could create dynamic journey maps that reflect the complex paths customers take from awareness to conversion. This would allow for more targeted and effective interventions at key moments in the customer journey.

Lastly, future work should address concerns around data privacy, compliance with regulations like GDPR and CCPA, and the ethical implications of advanced personalization. Emerging technologies like augmented reality (AR), virtual reality (VR), and blockchain also offer exciting opportunities for innovation in email marketing.

6. CONCLUSION

This research provides a comprehensive analysis of data-driven email campaign strategies using SMC, focusing on a client coming from the cosmetic industry. Over six months, the study demonstrated significant improvements in key performance metrics— CTR, CVR, and revenue where three campaigns involved non-personalized content, followed by three campaigns utilizing personalized targeting based on audience segmentation. Audience segmentation using SMC Audience Builder played a crucial role in campaign success. By categorizing customers into distinct segments, the study showed how personalized content tailored to each segment's behaviors and interests resulted in higher engagement and conversions. Content design, facilitated by SMC Content Builder, ensured visually appealing, responsive, and personalized emails. Dynamic elements, such as customer names and personalized product recommendations, strengthened recipient engagement.

Automation Studio and Journey Builder, streamlined the campaign process. Emails were sent at optimal times, and automated customer journeys ensured personalized communication, improving operational efficiency and timely engagement.

The findings underscore the value of a data-driven approach to email marketing. SMC's capabilities enable businesses to enhance engagement, build stronger customer relationships, and increase revenue. Future research should explore advanced machine learning for deeper personalization and predictive capabilities, as well as comparative studies with other CRM platforms.

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Advancing Dynamic Method Labeling for Optimal Selection in Multicriteria Intelligent Software Systems for Higher Education Business Processes

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LANA Adaptive Labeling Framework;
Multidimensional labels;
Business process optimization;
Higher Education Institutions (HEIs)

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Abstract: *This paper presents the LANA Adaptive Labeling Framework (ALF) as an advanced framework for dynamic method labeling and selecting optimal data processing methods in multiple multicriteria intelligent software systems, focusing on business processes in higher education institutions (HEIs). Earlier approaches to method labeling relied on static hierarchical structures. In contrast, LANA ALF introduces adaptability through continuous learning from user feedback, automatic balancing of criteria based on historical data and current task requirements, and multidimensional labels for comprehensive method evaluation. Each query is represented with a set of labels, while neural networks evaluate the optimal method by balancing criteria such as performance, cost, reliability, and accuracy. User feedback is stored in dynamic tables (e.g., user satisfaction), automatically adapting their structure to new tasks and data types. The results demonstrate that LANA ALF enables intelligent agents to autonomously make decisions without the need for direct involvement of data science experts, thereby increasing accuracy, reliability, and user satisfaction. This framework provides a foundation for further application of ALF in various domains.*

1. INTRODUCTION

Continuous progress in technology and the move to digital platforms are changing how people live, work, and communicate. That causes significant changes in how higher education institutions (HEIs) work. One of the most important jobs of HEIs is to create knowledge that helps develop new technologies and social innovations. Because of this, HEIs are increasingly using advanced technology to improve their main activities, such as teaching and learning, research, and working with businesses and society.

Every day, HEI information systems create and collect large amounts of data. However, this data is not used well enough to create knowledge and insights that could improve the quality of HEI processes. Machine learning (ML) is a part of artificial intelligence (AI) that helps process data from HEI information systems faster and more accurately. Machine learning enables computers to autonomously acquire knowledge and adjust their behavior. Key areas of using machine learning in higher education so far include mining student performance and enrollment data (Romero & Ventura, 2010; Goyal & Vohra, 2012). According to Alzubi et al. (2018), the main focus is on instructing computers to adapt their behaviors to maximize the probability of achieving the intended goal, as measured by the frequency of success. The increasing popularity of ML can be due to its exceptional precision, rapid processing time, and extensive selection of accessible approaches and algorithms that can be utilized for classification or regression problems (Nieto et al., 2019). The fundamental advantage of machine learning (ML) is its capacity to create models that may be incorporated into decision-making processes (Al-Kmali et al., 2020).

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Over time, many ML methods and algorithms (Joldić et al., 2023) and software solutions that use them have been developed. However, choosing the right method and algorithm is often difficult for both statisticians and data scientists. For regular users, this can be a barrier to using ML. Creating an intelligent agent that is part of the HEI information system and helps users select the right ML method and algorithm could significantly improve the use of machine learning in daily analysis. The intelligent agent, called LANA (short for Learning ANalytical Agent) and with Adaptive Labeling Framework (ALF), is introduced in this paper. It focuses on higher education processes and can be integrated with HEI information systems. In the paper, two phases of the LANA agent development are presented.

2. FIRST PHASE

2.1. Methodology in the Prototype Phase

This section describes the construction of the prototype LANA and how methods were selected (Bijedić et al., 2024). Selection process criteria: Choosing a method for factors that matter:

- Aligning the method with the nature of the data,
- Verifying if the results were statistically valid,
- Quantify the time and space the method required,
- Considering user feedback regarding the relevance and importance of the results.

These ensured that the methods chosen, which worked and demonstrated correctly – were limited to different questions and user needs.

Labeling System: To make the selection process easier, both queries and algorithms were labeled. This system helped match specific questions with the best methods.

Example of Query: One example of a possible query was predicting how well a student would perform in second-semester subjects. This prediction was based on their first-semester results.

Implementation Details: Microsoft ML.NET was used to build models for the prototype. These models used binary classification and regression algorithms.

Table 1. Metrics of Binary Classification and Regression algorithms with user ratings scores

Method type Binary Classification	Accuracy	F1 score	Area Under the Precision Recall Curve	Time (ms)	Memory (bytes)	User 1	User 2
1. LbfgsLogistic	85%	83%	85%	386	290616	79%	69%
2. AveragedPerceptron	83%	78%	84%	77	187544	77%	88%
3. Prior	61%	0%	57%	43	2024	34%	98%
4. SdcaLogisticRegression	84%	82%	84%	277	302488	78%	74%
5. SdcaNonCalibrated	84%	82%	84%	190	209184	78%	82%
6. SgdCalibrated	84%	82%	84%	61	37440	78%	96%
7. SgdNonCalibrated	84%	82%	84%	47	89672	78%	94%
Method type Regression	**R-Squared**	**Mean Squared Error**		**Time (ms)**	**Memory (bytes)**	**User 1**	**User 2**
1. FastForest	0.55	5.265		990	442880	65%	60%
2. FastTree	0.45	6.480		501	363096	51%	50%
3. Gam	0.53	5.557		58	1285152	62%	70%
4. LbfgsPoissonRegression	0.46	6.344		98	159048	51%	80%
5. LightGbm	0.48	6.174		181	962208	53%	85%
6. OnlineGradientDescent	0.49	6.035		39	4016	54%	99%
7. Sdca	0.52	5.678		112	255392	62%	67%

Source: Bijedić et al. (2024)

The system worked within the limits set by system users. It focused on using less time and memory while still giving accurate answers to educational questions.

Table 1. presents Binary Classification and Regression algorithm metrics with user rating scores. "Time" denotes the execution time of the algorithm in milliseconds for a training set of 1000 students. "User 1" and "User 2" represent user ratings of the usefulness of the results based on their personal preferences. *User 1* is rated based on result accuracy, while *User 2* is rated based on accuracy and resource consumption (execution speed and memory usage).

The results in Table 1 illustrate the compromises among accuracy, computational efficiency, and user satisfaction. Although certain algorithms achieved better accuracy, they necessitated increased processing time and memory, thereby affecting user preferences.

2.2. Limitations of the Prototype Approach

The prototype had some problems that made it less flexible and efficient. The system could only use binary classification and regression methods. It did not support other types of analysis, such as clustering or ranking. Also, the number of available queries was fixed, so users could not use different types of questions. The method selection process was static and required manual testing. Because of this, it was hard to make the system bigger and more efficient. The system did not have automatic selection, so every method had to be chosen manually. The prototype did not adapt to different users. Users could not make it change based on their wants. You could give feedback, but the system didn't use it well and didn't get better based on what happened in the past.

Advanced features could not be used with this setup. It didn't evaluate methods in multiple ways, so it couldn't compare them differently. The system made it hard to change the results for different jobs, and the way they were shown wasn't perfect.

3. SECOND PHASE OF LANA AGENT DEVELOPMENT

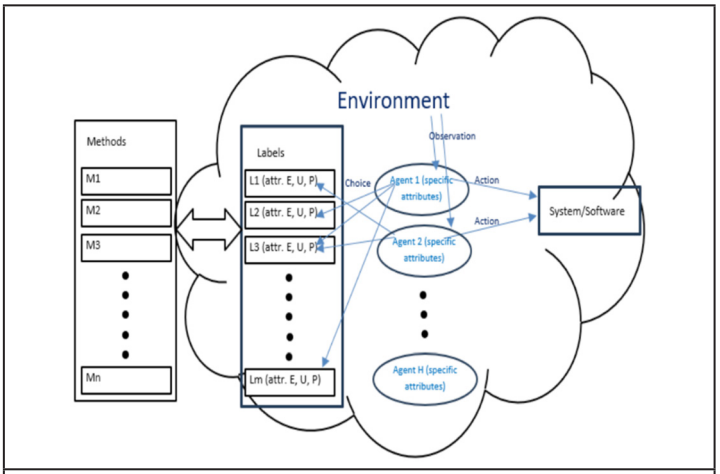
3.1. LANA Adaptive Labeling Framework (ALF)

The LANA Adaptive Labeling Framework (ALF) was created to fix the issues mentioned in the previous section of this paper - which represents the first phase - the prototype phase. The prototype was suitable for basic tasks, but it was limited. It couldn't handle many types of analysis and wasn't flexible for different user needs. ALF is smarter and can adapt to what users want. This section explains the theoretical ideas behind ALF, how it works, and why it's better than the prototype.

3.2. Theoretical Foundations and Introduction of ALF

The main idea of ALF is *dynamic labeling*. Every query and method in the system gets labels, like tags, as shown in Figure 1. Usually, when extracting information from the existing data, one has to deploy database admins, statisticians, analysts, etc. ML methods for data analysis on the higher level of hierarchy are placed in the middle of the LANA agent, while algorithms that exist for those methods are on the lower. Then, the purpose of data queries is considered, so a top-level hierarchy of the methods is added; in this case, it is the general division of ML methods into descriptive, prescriptive, and predictive methods.

For example, a query might have labels like "fast result" or "uses numbers." Methods also have labels, like "accurate but slow." These labels help ALF match the best method to the query.



- Agent as a layer between the **environment** and the **user**
- Hierarchy of **methods and algorithms**
- **Personalization** and adaptation based on the **user type**
- Labeling queries according to purpose **and data type**
- **Multi-agent system**:
  - Possibility to assign multiple agents for different processes
  - Supervisory agent (LANA) for studying interactions – useful for academic research

Figure 1. Multi-Agent System Architecture: Interaction Between Environment, Agents, and Methods in the LANA Framework

Source: Author's preparations

ALF uses *neural networks* to make decisions. ALF also learns from user feedback. If a user likes a method, ALF remembers and improves. If a method doesn't work well, ALF learns not to use it again for similar tasks. One big idea in ALF is *adaptation*. The system can change based on the task or user. For example, if a user needs fast results, ALF will focus on speed. If accuracy is more important, ALF will choose slower but better methods.

The environment's influence on the agent should be reflected in the hierarchy of label attributes, with environment-related attributes at the top. These attributes could be purely qualitative (accepted/rejected) or include weights to better mimic real-world complexity, accounting for unforeseen factors and interactions. When attributes are weighted, the intelligent agent (IA) should learn thresholds to determine which methods work best in different situations.

As you go down the hierarchy, attributes should describe internal software product features, like the IA's available methods. These ways of doing things can be called categorical, weighted categorical, or numerical. Method accuracy is one of the most important qualities, but other qualities, like adaptability or efficiency, also play a part.

Important things to consider when choosing a method are:

- Methods can be used for more than one thing, and algorithms made for one task can also work well for other tasks.
- Correctness: The method should match the task and the more general characteristics.
- Relevance: You should consider adding more classifications specific to the task.

For this to work, methods must have complete metadata organized in a hierarchy. That information should be kept in a database to be used as the list of methods grows. Use-case diagrams should show intelligent agents as actors and show how they interact with each other. Because agents have to add or remove links based on their usefulness, this process may change the architecture of the software.

3.3. Architecture of ALF

As shown in Figure 2, ALF has the following units which are connected as parts that work together: The diagram shows the cardinality between a university department, users, queries, algorithms, and methods interacting with user requirements.

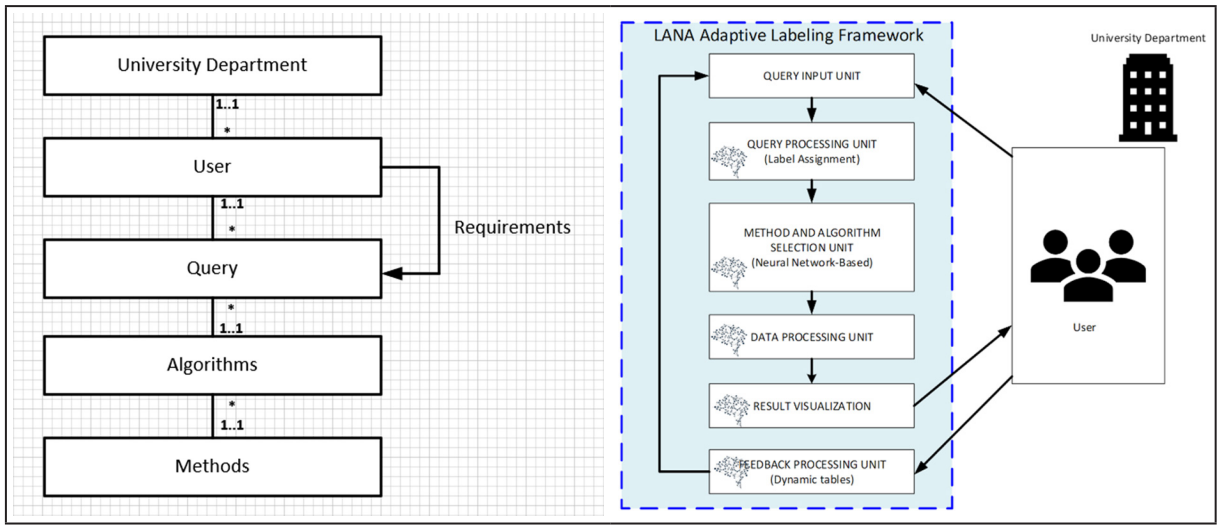


Figure 2. Architecture of the LANA Adaptive Labeling Framework and its interaction with University Departments and Users

Source: Author's processing

The following sections describe each unit of the ALF architecture in detail, explaining their roles and interactions within the system.

- THE QUERY INPUT UNIT - This is where the user type or uploads questions. A teacher might ask, *"Which students do you think will fail next semester?"* It then moves the query on to the next step by itself.
- UNIT FOR QUERY PROCESSING (Assigning Labels) - In this part, "labels" are used to describe the question. Some labels that might come up for a query like "*Group students for projects*" are "*clustering task*" and "*needs quick results*." It can figure out what the user wants with the help of these labels.
- METHOD AND ALGORITHM SELECTION UNIT - A neural network selects the method and the best three algorithms for the method chosen using previous user feedback.
- UNIT FOR PROCESSING DATA - This is where the system processes the data. For instance, if the task is to guess how well a student will do in school, it looks at grades or attendance records using the chosen method.
- VISUALIZING THE RESULTS - Results are shown in charts and graphs that are easy to understand. For instance, the user (teacher) might see a bar chart that shows which students are likely to fail.
- UNIT FOR PROCESSING FEEDBACK - Users can give feedback once they have the results. For instance, if a user (teacher) provides feedback, "*these results are accurate, but useless for me*" or "*not organized result*". The data are serialized using Dynamic Table Method, where the database store is self-organized for storing feedback.

3.4. Personalization Features for Different Users and Tasks

The second phase includes a set of personalizing key features as new ALF enhancing methods. It is focused on the following user feedback inputs:

Table 2. Personalization types with user feedback inputs

Personalization by User Type: • **Teaching Staff**: The agent uses methods optimized for accurate predictions, helping teachers identify students who need extra support. • **Students**: Focus is on visualizing results for example students or other non-expert staff - making it easier to understand their progress and areas for improvement.	USER FEEDBACK
Personalization by Task Type: • The type of query affects some of the following features – *Predicting Student Success*: Some methods that analyze past performance to forecast future outcomes. – *Study Completion or Dropout Rate*: More focus on KPIs like attendance, grades, and engagement to estimate the likelihood of a student completing their studies.	
Personalization by Goals and Preferences: • The IA user can choose what is most important for their task: – *Speed vs. Precision*: Faster methods for quick results (very often useful or more accurate methods for detailed analysis. – *Cost Efficiency*: Methods that use fewer resources while still delivering reliable results.	
Personalization by Analysis Complexity: • The agent system checks the complexity of the task: – *Quick, Simple Results*: Uses methods like regression or decision trees for straightforward tasks. – *Complex, Hidden Rules*: Employs advanced techniques like deep learning for tasks requiring very high GPU calculation.	
Personalization for displaying Method Result: • The output results are visualized in a way that fits the user's needs: – *Different Levels of Detail*: From high-level summaries reports to in-depth reports – with additional attachments. – *Customized Visualizations results*: Charts, graphs, or other heat maps are used according to user preferences.	

Source: Author's processing

This degree of customization guarantees that the system satisfies the particular requirements of every task and user. The system adjusts to provide the best outcomes, whether a teacher is searching for precise forecasts or a student is investigating trends.

4. CONCLUSION

The development of ALF is a big step toward creating smarter, more advanced, adaptive systems for higher education. Early results from the prototype and new ALF model extension have shown how intelligent agents can improve decision-making by better method selection and personalization.

The following steps of further long-term research include:

1. **Enhancing ALF's implementation**: Continue the second phase implementation with testing models (Functional Testing, Validation of Recommendation Accuracy, Accuracy and Adaptation Based on Feedback, Adaptability to Different User Needs)
2. **Comparing ALF with the prototype**: We'll test both systems side by side to see how much ALF improves performance.
3. **Exploring new dimensions for labeling**: Adding more label methods and adapting to complex queries and user needs.
4. **Expanding personalization features**: It is planned to extend ALF for different user groups, like students, teachers, and administrators.
5. **The ability to add new algorithms and datasets**: ALF will be capable of adding new tools and types of data dynamically in pursuit of long-term objectives.

6. **Automation of new queries**: The new implementation will support the automatic attachment of new questions to the system – a new potential for expansion and assimilation without additional effort.

Ultimately, ALF is a tool built to address current method selection bottlenecks that will lead to more intelligent, user-centered solutions for higher education in the future.

The further plan is to enhance the LANA agent by incorporating advanced feature engineering techniques and natural language processing methods to analyze query characteristics outlined in this paper, enabling it to select the most reliable algorithms based on accuracy, user preferences, and resource costs for the new queries based on experience of query similarity and user feedback.

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AWS-Based Chatbot and IoT Framework in Healthcare

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Abstract: *Cloud computing is revolutionizing patient care and health data management, particularly with AWS services like Lambda, Lex, and its proprietary databases. This study examines how these technologies enhance chatbot functionalities to improve doctor engagement and real-time communication with medical records. AWS Lambda handles backend processing, while AWS Lex manages natural language processing, enabling chatbots to respond promptly and personally to doctor inquiries. This integration ensures seamless data analysis and monitoring. Furthermore, the research the generation and application of synthetic health data, focusing on key metrics like blood pressure, blood sugar, pulse and few other that we will see in this paper. Additionally, it outlines a framework for incorporating Internet of Things (IoT) devices to further enhance these capabilities. The combination of cloud computing, chatbots, and IoT enables more proactive and personalized patient care, improves real-time data collection and analysis, and streamlines healthcare processes, ultimately leading to better patient outcomes.*

1. INTRODUCTION

The healthcare industry is undergoing a profound transformation driven by advancements in cloud computing, chatbot technologies, serverless architectures, and IoT. These technologies are reshaping patient care, data management, and service delivery, creating new opportunities for personalized care, real-time decision-making, and operational efficiency.

Cloud computing provides a scalable architecture that enables big data analysis and storage, essential for personalized patient care and real-time decision-making (Islam et al., 2023). Deploying chatbots such as AWS Lex or ChatGPT on a cloud platform provides scalability and cost-efficiency by allowing resources to dynamically scale according to demand, ensuring 24/7 availability even during high traffic periods (Mechkaroska et al., 2024). Within the cloud computing ecosystem, AWS Lambda (Amazon Web Services, n.d.-j) and AWS Lex (Amazon Web Services, n.d.-k) in conjunction with databases, create a robust framework for developing intelligent health data management systems. AWS Lex, a chatbot service that utilizes natural language processing, facilitates seamless natural language communication while gathering critical health data. This information is processed by AWS Lambda, a serverless compute service that triggers automated workflows and responses based on specified health metrics. Integrating IoT devices, such as wearable health monitors, further enhances healthcare systems by enabling continuous data collection and real-time health monitoring (Li et al., 2024).

AWS serverless architectures, particularly AWS Lambda, allow developers to focus solely on application logic without the burden of infrastructure management, making it ideal for healthcare

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systems. Key benefits include no upfront provisioning, automatic scalability, and reduced operational costs, as users pay only for resources consumed. Despite offering high availability and a simplified development process, challenges such as limitations on long-running tasks and architectural complexity must be considered, making it a robust yet evolving solution (Kumari & Sahoo, 2022).

This paper explores the transformative potential of these integrated technologies in healthcare. We discuss how to effectively manage health data using AWS Lex and Lambda, focusing on generating and utilizing test data for key health parameters. We also address the challenges and considerations in implementing these technologies, such as interoperability, security, and data privacy. As the healthcare sector continues to embrace digital transformation, the synergy between cloud computing and IoT technology promises to usher in a new era of innovative solutions. By leveraging these advancements, healthcare professionals can improve resource management and administrative efficiency while providing more proactive and personalized patient care.

2. TRANSFORMING HEALTHCARE WITH CLOUD AND IOT INTEGRATION

2.1. Cloud Computing in Healthcare

In the healthcare context, cloud computing refers to the storage, management, and processing of medical data and applications via remote servers located globally. Healthcare organizations utilize cloud-based services to access computing resources—such as processing power and storage—without reliance on physical infrastructure or local servers. These resources are available on demand through the Internet (Aceto et al., 2020).

Cloud computing has transformed healthcare by making it more patient-centered and data-driven, offering cost-efficient and accessible solutions. It enhances system agility and reduces the need for maintenance resources, driven by the importance of secure and private patient data management (Aceto et al., 2020). Additionally, cloud computing acts as a platform and infrastructure for integrating solutions across healthcare networks, enabling the effective sharing of electronic health records (EHRs) and thereby reducing costs while improving access to large-scale medical data, including genetic and radiological information (Banimfreg, 2023).

2.2. AWS Lex for Health Data Interaction

In today's healthcare environment, there is a greater need than ever for quick and constant access to services and data. Patients expect accurate information about their health and insurance coverage, prompt answers to their questions, and effective appointment scheduling. Despite being crucial, traditional contact centers frequently fall short of these standards due to their lengthy hours and high call volumes.

AWS Lex, a state-of-the-art natural language understanding service, allows developers to create sophisticated voice and text conversational interfaces. Its transformative capabilities can significantly enhance overall care management, expedite data collection, and improve patient interactions. By integrating AWS Lex, healthcare organizations can develop advanced chatbots and virtual assistants that handle all aspects of patient care and administrative tasks, revolutionizing the delivery and management of healthcare services (Amazon Web Services, n.d.-h).

Illustrative Scenario: Consider a scenario where a patient calls a hospital to schedule a routine checkup. Instead of navigating a complex phone menu or waiting on hold for a human representative,

the patient interacts with a virtual assistant powered by Amazon Lex. This intelligent assistant can efficiently provide available appointment times, schedule the checkup, and manage other inquiries (Mierzwa et al., 2019).

Application: Hospitals and healthcare facilities can leverage AWS Lex to create a 24/7 virtual assistant capable of managing various administrative tasks, including:

- Appointment Scheduling: Patients can book, reschedule, or cancel appointments at any time, streamlining the scheduling process and improving convenience.
- Insurance Inquiries: The virtual assistant can provide information about insurance coverage, copayments, and billing procedures.
- Frequently Asked Questions: Common queries about hospital services, operational hours, and preparation instructions can be answered promptly, reducing the need for human intervention.

Benefits:

- Enhanced Patient Experience: Patients enjoy a seamless and efficient experience with self-service options available around the clock, reducing frustration associated with long wait times and complex navigation.
- Cost Reduction: Automating routine tasks can significantly cut call center costs and allocate resources more effectively.
- Increased Efficiency: Healthcare staff can focus on more complex tasks and patient care, while the virtual assistant handles routine administrative functions, leading to improved operational efficiency.
- Security and Privacy: When integrating AWS Lex into healthcare applications, security and privacy are paramount. Encryption, access control, compliance with healthcare regulations, and continuous monitoring make AWS Lex a reliable tool for developing secure and privacy-conscious healthcare solutions (Amazon Web Services, n.d.-e). All these security features can be easily leveraged since we are using AWS, which has incorporated the security to the highest standards (Amazon Web Services, n.d.-g).

2.3. AWS Lambda for Serverless Computing in Healthcare

In the healthcare sector, the ability to instantly process and analyze vast amounts of data is essential. AWS Lambda enables healthcare providers to quickly launch new applications or services, automate complex operations, and respond to critical events. For instance, Lambda can handle data from IoT sensors or wearable devices that continuously monitor patients' vital signs. Lambda can immediately notify healthcare providers when a patient's data exceeds a certain threshold, enabling prompt interventions that may save lives (JetBase, 2023).

Moreover, the serverless architecture of AWS Lambda is highly beneficial in healthcare environments where scalability is crucial. Lambda automatically scales to meet as requests increase, ensuring that healthcare applications remain responsive and effective even during peak hours. This scalability is particularly valuable in scenarios requiring quick and accurate data processing, such as overseeing extensive immunization programs or managing public health emergencies (Amazon Web Services, n.d.-d). This capability is exemplified in scenarios where healthcare professionals monitor patients with chronic conditions using wearable devices integrated with IoT sensors (Amazon Web Services, n.d.-f).

Illustrative Scenario: A healthcare professional monitors a large patient base with chronic conditions like diabetes or heart disease. These patients wear wearable devices that continuously track

their blood pressure, heart rate, and glucose levels. The devices are configured to transmit data in real time to the healthcare provider's cloud-based system.

Application: AWS Lambda can automatically process this incoming data. For example, Lambda can trigger an alert via SMS or email to the patient's care team if a patient's glucose level suddenly spikes or drops to a dangerous level. The system can also automatically arrange a follow-up session or suggest adjustments to the patient's treatment plan.

Benefits:

- Real-time Response: Immediate notifications to the care team enable prompt action, such as advising the patient to take their medication or schedule an urgent appointment.
- Scalability: AWS Lambda can automatically scale to handle increased data volume as the number of patients grows without needing additional servers or infrastructure.
- Efficiency: Automated monitoring reduces the need for manual data assessment, allowing healthcare personnel to focus on direct patient care.
- Proactive Care: Early identification of health issues helps avoid hospitalizations and complications, improving patient outcomes and reducing healthcare costs.

By integrating AWS Lex and Lambda, healthcare providers can create intelligent, scalable, and cost-effective solutions that enhance patient care, streamline operations, and ensure data security. This integration facilitates the development of advanced applications that can revolutionize healthcare delivery, paving the way for more personalized and proactive patient care.

2.4. Integration of Cloud Computing and IoT in Healthcare

The combination of cloud computing and IoT in healthcare is transforming the industry, making it more efficient, data-driven, and patient-centric. By connecting various physical entities, equipment types, and sensors over the Internet, IoT technologies provide new opportunities for personalized treatment plans, remote monitoring, and effective healthcare delivery.

IoT technologies streamline healthcare operations by automating administrative tasks, minimizing the need for extensive staffing, and reducing labor costs through processes such as vital sign monitoring. This automation not only prevents errors and costly interventions by enabling early diagnosis and continuous monitoring but also enhances patient engagement by empowering individuals to take control of their treatment, allowing them to track their health and communicate more effectively with healthcare professionals (Li et al., 2024).

However, as IoT devices grow rapidly in healthcare settings, ensuring patient data security and privacy becomes paramount. Robust cybersecurity measures are essential to prevent data breaches and unauthorized access, especially given the volume of sensitive data transmitted and stored (Obaid & Salman, 2022). Moreover, the integration of IoT devices with electronic health records (EHRs) provides a comprehensive view of a patient's health. This integration not only improves communication among healthcare providers but also ensures that all parties involved in a patient's care have access to the most current information (Vos et al., 2020). IoT devices generate vast amounts of data that can be leveraged for predictive analytics. This analysis can forecast potential health issues before they escalate, enabling preemptive interventions and personalized treatment plans, thus reinforcing the overall efficacy of IoT in enhancing healthcare delivery (MoldStud, n.d.).

Beyond simple monitoring, IoT facilitates remote patient management, allowing medical professionals to address chronic conditions and provide timely treatment without requiring frequent hospital visits (Li et al., 2024).

Wearable sensors are increasingly used for continuous, real-time health monitoring, with devices such as smartwatches and fitness trackers tracking activities and physiological metrics. More advanced wearables now measure vital signs like temperature, oxygen saturation, and blood pressure. These sensors, combined with machine learning, provide users and healthcare professionals with crucial feedback for early intervention in high-risk patients (George et al., 2023). However, challenges remain in ensuring the accuracy and reliability of these devices.

3. AWS-BASED CHATBOT FRAMEWORK

The integration of AWS Lambda and AWS Lex within cloud computing for healthcare presents transformative advancements in patient interactions and health data management. This framework aims to enhance interactivity, patient monitoring, data analysis, and chatbot customization. Additionally, it outlines how IoT devices can expand these functionalities and discusses the generation and utilization of synthetic test data for monitoring key health metrics.

The proposed solution leverages AWS services to create a flexible chatbot system deployed on web platforms, mobile apps, or messaging services like Slack and Facebook Messenger. AWS Lex processes user inputs, identifying intents and extracting key details, while AWS Lambda handles backend logic, retrieving patient data from databases like Amazon DynamoDB. IoT integration is managed through AWS IoT Core, supporting real-time health monitoring. Synthetic data generation and monitoring are facilitated by AWS Lambda and CloudWatch, ensuring efficient operation and adaptability in managing healthcare data (Hnatushenko et al., 2024; Amazon Web Services, n.d.-c).

3.1. Architectural Workflow for a Chatbot

The architectural workflow of a healthcare chatbot, illustrated in **Figure 1**, consists of several key components that play vital roles in processing user inputs, executing business logic, interfacing with IoT devices, and providing personalized responses. These components include:

1. User Interaction: Users can engage with the chatbot through various platforms, such as web interfaces, mobile applications, or messaging services like Facebook Messenger. This flexibility allows for seamless command entry, prompting the chatbot to process and respond based on established workflows and natural language understanding (Vos et al., 2020).
2. AWS Lex for Natural Language Processing: AWS Lex employs advanced Natural Language Understanding (NLU) to interpret user input, determining intent and extracting relevant data (Dev Community, n.d.). For example, if a user queries, "Give me results for patient with ID xx," AWS Lex identifies the intent and extracts "blood sugar" as the requested health metric. The system can then retrieve necessary data from backend systems like Electronic Health Records or AWS DynamoDB (Amazon Web Services, n.d.-a; Amazon Web Services, n.d.-l).
3. Using AWS Lambda for Backend Processing: Upon interpreting a user's request for blood sugar data, AWS Lex triggers an AWS Lambda function to manage backend tasks. Lambda retrieves the necessary health data from a database like Amazon DynamoDB or Amazon Aurora (Amazon Web Services, n.d.-b). The data may be reorganized for clarity, and fluctuations in blood sugar readings can be analyzed. After processing, Lambda sends the refined data back to Lex, delivering relevant, personalized health information to the user.

4. Using AWS IoT Core to Integrate with IoT Devices: AWS Lambda interacts with AWS IoT Core to facilitate real-time monitoring of health data from IoT devices, such as glucose monitors (Amazon Web Services, n.d.-i). These devices securely transmit blood sugar readings, which Lambda processes. Any significant trends or abnormalities detected during analysis are flagged, and the processed data is relayed back to AWS Lex, providing users with real-time updates and insights. This system ensures that patients receive timely and accurate health information, promoting effective condition management.
5. Using AWS CloudWatch for Monitoring and Logging: AWS CloudWatch offers monitoring and tracking of key metrics, such as function invocations, execution durations, and error rates. This capability is essential for optimizing system performance and ensuring that healthcare chatbot systems can efficiently handle demand spikes (Amazon Web Services, n.d.-c).

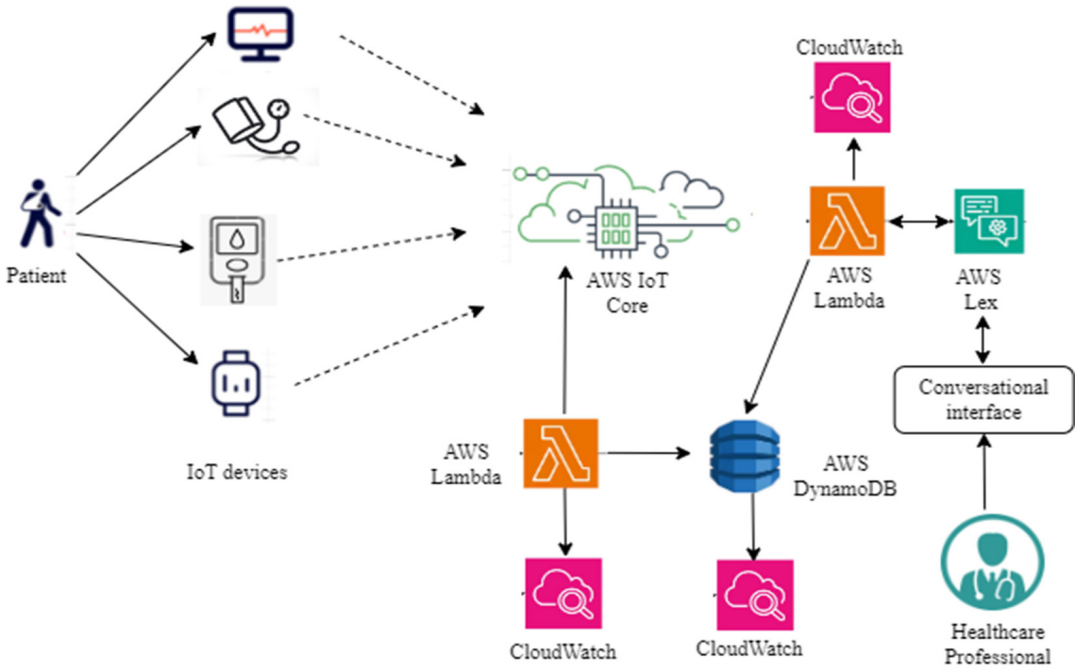

Figure 1. AWS-based chatbot framework
Source: Author's illustration

4. EXPERIMENT AND RESULTS

The objective of this experiment is to evaluate the effectiveness and functionality of the AWS-based chatbot within a healthcare setting. The primary goals are to test the chatbot's ability to process user inputs and deliver accurate responses, and verify that the integration between all AWS services runs fast, cost-effective, efficient and secure. By achieving these objectives, we aim to validate the system's reliability and efficiency in a real-world healthcare environment.

4.1. Setup

- Objective: The focus of the testing is to determine how quickly the chatbot relays information requested by medical staff, as timely access to patient data is critical for effective decision-making and care delivery.
- Data Preparation**:** The synthetic data used for testing the chatbot has been loaded using a script that randomly generates values for blood glucose, heart rate, respiratory rate, and body temperature in DynamoDB. The database contains records for 100 patients, with values set

within specified boundaries defined by the script. Currently, we have chosen to generate patient data synthetically. In the future, we plan to implement a complete system that integrates IoT devices to send real-time data to the cloud.

4.2. Conducting the Experiment

- User Interaction Simulation: Medical professionals interact directly with the AWS Lex chat interface via a web browser. They initiate requests for patient data using prompts like "Give me data" or "Give me patient data." This interaction is designed to be intuitive, allowing users to access crucial information swiftly.
- Patient Identification Request: The chatbot prompts for the patient's Social Security Number (SSN) to verify identity against the database records.
- Data Request Handling: If the SSN matches a record, the chatbot asks which specific data the user needs, such as blood pressure, temperature, heart rate, or cholesterol levels. The user must select from these available data types.
- Error Handling and Fallbacks: If an incorrect data type is requested or if the SSN does not match any record, the chatbot consistently prompts for correct information. This loop continues until valid data is provided, ensuring accuracy and preventing progression on invalid inputs.
- IoT Integration Testing: While current integration of IoT devices is theoretical with scripted data generation, future implementations aim to use Arduino or Raspberry Pi, connecting to AWS IoT Core for real-world testing. A Lambda function would manage data retrieval from AWS IoT Core to DynamoDB.
- Data Processing and Response Accuracy: The AWS Lambda function triggers immediately upon user interaction, processing user input and retrieving data from DynamoDB. The chatbot, synchronized with Lambda, handles queries accurately. Correct SSN entries receive precise data responses; incorrect entries trigger fallback intents to re-prompt the user, maintaining a 100% accuracy rate in delivering valid data.
- Performance Monitoring: AWS Lambda's performance is closely monitored, focusing on the function's execution logic. DynamoDB's scalability settings—5 read and write capacity units—support the experiment's needs without direct correlation to data throughput in MB/s. Latency in AWS Lex is minimal, showing negligible impact on system performance.
- AWS CloudWatch Integration: During the test period, AWS Lambda, DynamoDB, and Lex performance was monitored using CloudWatch. To evaluate the performance of the system, metrics like the number of invocations and the duration. To ensure ongoing performance monitoring and debugging, CloudWatch, for instance, assisted in visualizing the impact of cold starts on Lambda function execution.

4.3. Results

- Response Time**:** Notably, the chatbot's first request typically experiences the longest delay due to the initial cold start of AWS Lambda functions. This delay averages around 100 milliseconds, which is critical for healthcare scenarios where time-sensitive data access is essential. Subsequent requests are processed significantly faster, improving overall efficiency. This initial delay occurs because AWS Lambda functions must load into memory for the first time during their cold start. As a result, response time is inevitably increased during this process, which also loads the function code and initializes the runtime environment. However, once the Lambda functions remain warm, subsequent requests are handled much faster, significantly reducing initialization overhead.

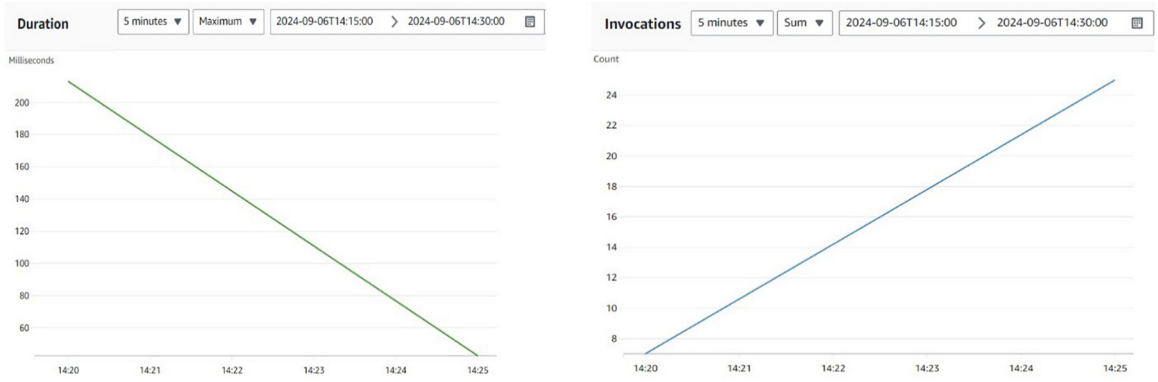

Figure 2. Graphical representation of Lambda invocation and duration
Source: Author's illustration

- Function Loading Metrics: The presented graphics in Figure 2 show key AWS Lambda performance data, including invocations and execution durations. These indicators are crucial for assessing the reliability and efficiency of backend processing. The data demonstrates that Lambda functions operated effectively after the initial cold start phase. This suggests a strong operational configuration that can reliably handle assigned responsibilities once initial loading is complete.
- Handling of Simulated Data**:** Throughout the experiment, access was made to the synthetic data stored in DynamoDB, but no changes were made to it. During the testing phase, no data insertions were performed; instead, Lambda functions were primarily utilized for data retrieval. Interestingly, significant lags were only observed when the chatbot was first activated. In subsequent exchanges, the system continued to respond quickly and without noticeable delays, even when users submitted unrecognized input.

5. FUTURE RESEARCH DIRECTIONS

Future work includes connecting the system to AWS IoT Core for real-world data and expanding the current system to incorporate real-time IoT devices for health monitoring. By integrating IoT devices, the system's capabilities will be significantly enhanced, enabling dynamic interactions and continuous patient monitoring. These improvements will allow healthcare professionals to offer more personalized and timely care, directly impacting patient outcomes. As IoT technology continues to evolve, further exploration into its integration with cloud computing and AI-based chatbot systems will open new possibilities for real-time health interventions and operational efficiency.

6. CONCLUSION

The experiment's outcomes confirm the capacity of the AWS-based healthcare chatbot system to provide prompt responses with minimal latency, accurate data retrieval, and seamless integration with AWS services, maintaining a 100% accuracy rate. These capabilities are critical in real-time healthcare environments, where timely and precise data access can significantly impact patient outcomes. Technologies like cloud computing, artificial intelligence, and IoT are poised to revolutionize healthcare by enhancing its responsiveness, personalization, and efficiency. Embracing these advancements will redefine healthcare standards, leading to a more connected and healthier society, while improving operational effectiveness for providers and better outcomes for patients.

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The Impact of mHealth and NLP on Big Data Analytics in Healthcare

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Abstract: *The widespread adoption of mobile health (mHealth) has recently led to a significant expansion in the volume of medical data generated daily from diverse sources, including laboratory information systems, electronic health records (EHR), wearable devices, and social media. This trend is one reason why mHealth is increasingly associated with the concept of big data. Big data in healthcare encompasses a wide range of data types, differing in both source and level of structuring.*

Text mining and semantic analysis techniques within big data analytics have shown promising potential in addressing challenges in this field. Unstructured textual data, often referred to as big text data, contains invaluable insights that can help healthcare practitioners in clinical decision-making, enhance healthcare outcomes, and benefit scientific discoveries. Consequently, text mining has been widely employed to convert unstructured textual data gathered from different sources into a structured format.

This paper provides a comprehensive overview of the tools and methods offered by Natural Language Processing (NLP) for extracting and analyzing meaningful information and patterns from large volumes of natural language text data. It focuses on various text preprocessing techniques used to prepare raw text files to obtain relevant linguistic units interpretable by computers.

Given that human language remains central for documenting diseases and treatments, the integration of rich terminology systems and NLP in healthcare and biomedical research is of tremendous importance for statistical analytics and knowledge discovery. Moreover, healthcare professionals require access to scalable and expandable big data infrastructure to facilitate decision-making and diagnosis, improve healthcare outcomes, and, importantly, reduce costs in this sector.

1. INTRODUCTION

Due to the rapid development of technology and the enormous amounts of available data, analytics has become an immanent practice in many different fields of study, referring to the analysis which involves the detailed and careful examination of data to identify causes, crucial components, and potential outcomes. As a logical process of analyzing data, analytics is often supported by disciplines like statistics and computer science. Healthcare organizations are investing in the development of advanced tools and techniques to analyze, process, accumulate, and manage large amounts of healthcare data, both structured and unstructured (Nambiar et al., 2013; Rehman et al., 2021). Efficient management, analysis, and interpretation of big data can unlock new opportunities for modern healthcare, enabling healthcare providers to revolutionize medical therapies and personalized medicine (Dash et al., 2019). In many fields and industries, data analytics can be categorized into four types based on its outcomes: descriptive, diagnostic, predictive, and prescriptive analytics.

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According to Alghamdi et al. (2021), among healthcare analytics methods, descriptive analytics plays a foundational role by analyzing raw data to discover patterns and provide insights for better patient care and more sophisticated decision-making. Healthcare companies can more effectively detect problems and their effects by using diagnostic analytics, which provides a deeper understanding of the reasons and motives behind their goal to generalize findings appropriate for wider populations. By predicting future trends and disease courses, predictive analytics expands these capabilities through the use of sophisticated data mining and machine learning techniques. This method has become increasingly integral in healthcare since it enables the development of frameworks and support systems that improve disease prevention and diagnostic precision. Descriptive, diagnostic, and predictive analytics work together to provide healthcare practitioners with a powerful set of resources that supports data-driven decision-making and operational effectiveness.

The digitization of healthcare data has led to the accumulation of massive heterogeneous datasets generated from various sources such as electronic health records, clinical notes, and social media (Asri et al., 2015). To best describe big data, Laney (2001) singled out three key dimensions of big data, known as the 3Vs: volume, velocity, and variety. Several researchers introduced other Vs to this model, such as veracity (Schroeck et al., 2012) and value (Dijcks, 2013).

In the paper about the potential and challenges of big data analytics in healthcare, the authors (Raghupathi & Raghupathi, 2014) describe four Vs of analytics. The volume of healthcare data is immense and continues to grow rapidly due to the continuous creation of data. Velocity is the term used to describe the real-time accumulation of data at unprecedented speeds, which makes timely processing and analysis challenging. Healthcare data has also evolved, becoming more complex due to the shift from structured formats like electronic health records to semi-structured and unstructured formats like multimedia files. This variety makes healthcare data both valuable and difficult to evaluate, requiring the application of advanced and scalable techniques to extract meaningful insights. Veracity, the fourth component, emphasizes how important data accuracy and dependability are in the medical industry.

Hammad et al. (2020) discuss the challenges and potential solutions for managing the increasing volume, velocity, and variety of healthcare data. Traditional data processing methods struggle to handle this influx of information, so the authors argue that semantic web technologies can complement big data approaches to address these challenges. Moreover, existing semantic ontologies used in healthcare can improve data acquisition and integration. However, there is a constant necessity for improving methods and techniques for the semantic storage of healthcare data.

Exploring how big data and semantic web technologies can revolutionize personalized medicine, Panahiazar et al. (2014) argue that the massive amounts of health-related data offer remarkable opportunities to improve clinical decision-making and patient outcomes. Semantic web technologies have a significant role in transforming "big data" into "smart data," which further provides useful information for personalized treatment. The paper proposes a framework for empowering personalized medicine through a robust, scalable, and flexible semantic-driven big data infrastructure.

2. THE POWER OF NLP - TEXT PREPROCESSING TECHNIQUES

Text mining and semantic analysis techniques within big data analytics have emerged as promising solutions to extract valuable insights from this wealth of information (Raghupathi & Raghupathi, 2014). The potential of these techniques lies in their ability to convert unstructured textual data into a structured format, which can then be utilized by healthcare practitioners to drive scientific

discoveries. Leveraging the power of big data analytics in healthcare can lead to many benefits, including early detection, prediction, and prevention of health-related issues (Rehman et al., 2021).

Natural language processing (NLP) has emerged as a powerful tool for extracting and analyzing meaningful information from vast volumes of textual data (Torfi et al., 2020; Akerkar, 2018; Bahja, 2020). This paper provides a comprehensive overview of the various text preprocessing techniques employed in NLP to prepare raw text for further analysis and interpretation.

One of the fundamental steps in NLP is text preprocessing, which involves cleaning and transforming the raw text data into a format that computational algorithms can effectively process (Rajput, 2019). This typically includes steps such as tokenization, stop-word removal, stemming, and lemmatization, among others. (Kumar & Babu, 2018; Singh, 2018; Nhlabano & Lutu, 2018).

Tokenization is the process of breaking down the text into its fundamental units, known as tokens, which are typically words, numbers, or punctuation marks. This step is crucial as it allows the NLP system to identify and analyze individual linguistic elements within the text.

Following tokenization, stop-word removal is often performed to eliminate common words that hold little semantic value, such as articles, conjunctions, possessive adjectives, etc. (Akerkar, 2018). This helps to focus the analysis on more meaningful and informative words (Khurana et al., 2022). Stemming and lemmatization are two techniques used to further simplify the text by reducing words to their base or root form. Stemming involves the removal of suffixes from words to obtain their stem, while lemmatization utilizes more sophisticated linguistic knowledge to identify the base or dictionary form of a word, known as the lemma (Singh, 2018; Alaparthi & Mishra, 2020).

The effectiveness of these text-preprocessing techniques has been well documented in the literature. Studies have shown that proper text preprocessing can significantly improve the performance of various NLP tasks, such as sentiment analysis, information extraction, and text classification. For example, a study on sentiment analysis of Twitter data found that text preprocessing methods, such as handling hashtags, emojis, and URL links, can increase the predictive accuracy of sentiment classification models (Bao et al., 2014; Kumar & Babu, 2018; Nhlabano & Lutu, 2018). Another study on the impact of text preprocessing on sentiment analysis models for social media data demonstrated that applying various preprocessing techniques, including negation handling, stemming, and lemmatization, can significantly enhance the performance of the resulting models. Furthermore, the importance of text preprocessing is not limited to specific NLP tasks. Review on Sentiment Lexicons" (Jagdale et al., 2018) highlights the critical role of lexicons in text preprocessing for a wide range of text mining applications.

3. CASE STUDY

As a multidisciplinary field, text mining integrates tools from information retrieval, data mining, machine learning, statistics, and computational linguistics to process natural language text. It converts large volumes of unstructured or semi-structured text data into a structured format, enabling further analysis or visualization through tables, charts, or mind maps (Tyagi, May 3, 2021). Using diverse methodologies, text mining explores facts, associations, and affirmations and applies text preprocessing to transform raw text into linguistically meaningful units.

This paper aims to investigate to what extent text mining relies on NLP by applying NLP text preprocessing techniques to five posts downloaded from PatientsLikeMe (2024), an open platform

where patients with chronic illnesses or conditions share their health journeys, experiences, and treatments. All posts are part of the discussion within the Diabetes online community and are used for healthcare research purposes as publicly available anonymized data.

Post 1: *I had type 2 diabetes and underwent a mini gastric bypass surgery. Amazingly, my diabetes was gone just one day after the surgery and it has stayed that way ever since!*

Post 2: *I am looking for shoes that are good for amputated toes. I have no toes left. I need a pair of shoes that are easy to put on and take off, but have a back because I have neuropathy and can't feel it when a shoe falls off. I also need a sandal. I have my Medicare shoes, but they are boots and sneakers. I'm looking for slippers and sandals.*

Post 3: *I'm new here and just curious. Are there people here not taking insulin shots? I have been diagnosed with type 2 diabetes and was prescribed with Insulin. I have been holding off and haven't gone back to the doctor but I plan to do it when I am able to. I have tried doing the low card no sugar diet and my blood sugar is still always at 290 to 350.*

Post 4: *I have been diagnosed with diabetes for 2 years now. I have undergone several treatments which include daily insulin injections and medication. But i did like to know if there are alternative remedies that i can use to treat my neuropathy.*

Post 5: *They diagnosed me with type 2 diabetes a few years ago. Due to MS Osteoarthritis and Lupus it's hard to move around. I eat my green smoothies, veggies and minimum (ROM) range of motion when my body permits me to do so. The problem is nothing is still really helping drop my A1C. Tried metformin, januvia, majourna etc.*

All posts have undergone five NLP text preprocessing techniques, such as tokenization, stop-word removal, lemmatization, POS tagging, and parsing, but due to the scope of this paper, only the analysis of Post 1 will be presented.

POST 1 text preprocessing steps:

- Tokenization refers to breaking the text into individual words: *['type', '2', 'diabetes', 'undergo', 'mini', 'gastric', 'bypass', 'surgery', 'amaze', 'diabetes', 'go', 'day', 'surgery', 'stay']*
- Stop-word removal involves removing common but uninformative words like *'and', 'a', 'my', 'was',* etc.
- Lemmatization reduces a word to its base or dictionary form (lemma) and, unlike stemming, produces a linguistically correct base form: *['type', '2', 'diabetes', 'undergo', 'mini', 'gastric', 'bypass', 'surgery', 'amazing', 'diabetes', 'go', 'day', 'surgery', 'stay']*
- Part-of-speech tagging assigns grammatical tags to each token, indicating its part of speech (e.g. noun, verb, adjective, etc.): *type (noun), 2 (number), diabetes (noun), undergo (verb), mini (adjective), gastric (adjective), bypass (noun), surgery (noun), amaze (adjective), diabetes (noun), go (verb), day (noun), surgery (noun), stay (verb)*
- Parsing involves analyzing the grammatical structure of a sentence to understand how different words and phrases relate to each other: Subject: *"I" → Verb: "undergo" → Object: "mini gastric bypass surgery" → Outcome: "diabetes gone"*

This processed text demonstrates how raw healthcare text is transformed into a form suitable for machine learning algorithms or other analytical purposes. After having applied NLP preprocessing techniques to all selected posts, a comparison has been conducted to enable text classification and information extraction. The input data has been entered into the ChatGPT AI (OpenAI, 2023) and the detailed outputs have been structured and presented in Table 1.

The preprocessed data is structured in the Table according to different criteria. Category classifies the purpose of the post: sharing success - Post 1 highlights a resolved condition through surgery;

product recommendations - Post 2 focuses on specialized footwear for neuropathy and amputated toes; medical advice seeking - Posts 3, 4, and 5 explore challenges with diabetes management, alternative treatments, and multi-condition impacts. Themes and medical conditions identify key issues discussed, including health conditions, treatments, or lifestyle aspects: diabetes is present in all posts, either as a resolved issue (Post 1) or a current challenge (Posts 2-5). Treatment options are explored in Posts 3-5, including medications, dietary changes, and alternative remedies. Product recommendation is sought in Post 1. Challenges/Queries highlight the specific challenges faced or questions asked in Posts 2-5. Posts 3, 4, and 5 explore challenges with diabetes management, alternative treatments, and multi-condition impacts. Posts 2, 3, and 5 emphasize mobility, diet, and physical challenges due to underlying conditions. Outcomes state the results or unresolved issues, where applicable.

Table 1. Structured data table summarizing the five Posts

Post	Category	Themes	Medical Conditions	Treatments/ Products	Challenges/ Queries	Outcomes
1	Treatment Success Stories	Diabetes management, surgical intervention	Type 2 diabetes	Mini gastric bypass surgery	None	Diabetes resolved post-surgery
2	Product Recommendations	Neuropathy, footwear for mobility issues	Amputated toes, neuropathy	Shoes, slippers, sandals, Medicare footwear	Difficulty finding suitable shoes and sandals	None
3	Medical Advice Seeking	Diabetes management, dietary challenges	Type 2 diabetes	Insulin (prescribed but not used), low-carb diet	High blood sugar (290–350), looking for non-insulin treatment options	Blood sugar remains uncontrolled
4	Medical Advice Seeking	Neuropathy treatment, long-term diabetes	Diabetes, neuropathy	Insulin injections, medication	Seeking alternative remedies for neuropathy	None
5	Medical Advice Seeking	Chronic conditions, ineffective treatments	Diabetes, MS, osteoarthritis, lupus	Metformin, Januvia, Majourna, diet (green smoothies, veggies)	Difficulty lowering A1C despite medications and lifestyle adjustments	A1C levels remain high

Source: Own research

As can be seen from this small-scale analysis, NLP text preprocessing is crucial for transforming raw text into structured data that can be analyzed and summarized effectively. Tokenization allows the identification of individual entities (e.g., *diabetes*, *neuropathy*) and actions (e.g., *underwent surgery*) and facilitates the mapping of key themes and concepts to specific table fields like Medical Conditions and Treatments/Products. Stop-word removal reduces noise in the text, ensuring only meaningful words (e.g., *insulin*, *neuropathy*) are considered for analysis. Lemmatization normalizes variations of the same word, ensuring consistency (e.g., *treated*, *treatments* → *treatment*) and helps group related concepts under unified terms, improving the accuracy of fields like Treatments/Products and Challenges/Queries. Part-of-speech (POS) tagging enables the identification of key entities (nouns) like *diabetes* and *surgery,* and helps extract actions (verbs) like *underwent*, *prescribed*, and descriptors (adjectives) like *chronic*. Parsing identifies relationships between entities and actions (e.g., *diabetes* is treated with *insulin*).

In order to extract structured data in a variety of ways, NLP preprocessing is essential. More precise identification of key themes can be achieved by segmenting texts into smaller parts and concentrating on meaningful words. The correct categorization of data into table fields is enabled by methods such as entity extraction. Furthermore, by identifying cause-and-effect links, parsing maps connections between data points. Eliminating irrelevant words guarantees that only significant content is examined. Consequently, it reduces the possibility of incorrect classification or overcrowding tables with unnecessary details. In conclusion, NLP preprocessing aids in the extraction of insightful information from text, producing an output that is organized, structured, and simple to understand.

4. CONCLUSION

The choice of appropriate preprocessing techniques can be highly context-dependent and may vary depending on the specific application and the characteristics of the text data. For instance, in the domain of sentiment analysis, studies have found that the inclusion of emoticons, emojis, and abbreviations can provide valuable insights into the writer's sentiment. They thus may require specialized handling during the preprocessing stage (Resyanto et al., 2019). An in-depth analysis of the language of electronic discourse, in SMS communication media in particular (Jelić & Polovina, 2024), highlights the intensive usage of different graphostylistic innovations, such as emoticons, multiplication of graphemes, code-switching, verbalization of laughter, etc. that the writers of the messages use to add special nuance to the meaning of their utterances. Additionally, when gathering information from social media, special attention should be paid to the shortening and clipping of words and phrases - linguistic processes that need to be understood to analyse the text.

The field of NLP is continuously evolving, and new techniques and approaches are constantly being developed to enhance the effectiveness of text preprocessing. As the volume and complexity of textual data continue to grow, the importance of efficient and robust text preprocessing methods will only become more pronounced.

High data quality is critical, as inaccurate or unreliable information can directly impact life-saving decisions. Despite advancements in analytics, maintaining veracity, the fourth key feature of data analytics, remains a challenge, particularly with unstructured data, where errors, such as misinterpreted handwritten prescriptions, are common. Thus, the ultimate goal of healthcare analytics should be to ensure error-free and credible data.

The combination of NLP-driven big data analytics and mHealth solutions has the potential to drastically change healthcare services. More individualized and proactive medical care is made possible by mobile health applications, which enable continuous collection and analysis of patient-generated data. But there are still a lot of important issues that must be resolved in the future. Significant issues include interoperability, data imbalance, missing data, data noise, sophisticated integration of varied data kinds, and combining data from multiple sources, in addition to the previously mentioned heterogeneity and large data volumes. To overcome these and other challenges, a multidisciplinary team effort combining technological know-how with a solid ethical basis is needed. Finding this balance will allow the healthcare industry to fully utilize mHealth and NLP to improve patient care, reduce costs, and advance medical research.

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Project Management of Web Application Development

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Abstract: *Purpose/reason(s) for writing this research paper was to conduct one more pilot research on this specific topic: "Project Management of Web Application Development", in the series of previous pilot research we conducted about different programming experiences and knowledge in the IT field. Findings/main results of the conducted research in the following study we are expected are results of our investigation and documentation of these research aspects: (1st aspect) project management processes that will be broken down in detail and explained individually using the method of modelling and content analysis, (2nd aspect) participants in the web application development project and their tasks and the stages through which the web application development project goes will be elaborated in detail, (3rd aspect) the results of the survey procedure which will show: (3.1st sub- aspect) information about the importance of each individual participant in the implementation of the web application development project, (3.2nd sub- aspect) information about the necessity of monitoring changes in the environment in order for the project manager to successfully fulfil his roles and responsibilities and adapt his activities and processes accordingly (i.e. re-engineer business processes as necessary) on the web application development project and (3.3rd sub-aspect) information on the importance of preparing for changes in the environment and positive impact on the outcome of the project managed by the IT project manager. Also, regarding research methodology, the paper will apply (a) modelling and content analysis; and (b) the Chi-square test for the statistical procedure to examine the dependence of different qualitative characteristics.*

1. INTRODUCTION

In the paper, the following were investigated and documented: (1) project management processes that are broken down in detail and individually explained using the method of modelling and content analysis, (2) participants in the web application development project and their tasks, and the stages through which the web application development project goes are elaborated in detail, (3) the results of the survey procedure that are presented, namely: (3.1) information about the importance of each individual participant in the implementation of the web application development project, (3.2) information about the necessity of monitoring changes in the environment in order for the project manager to successfully fullfill his roles and responsibilities and adapt his activities and processes accordingly (i.e. perform as necessary business process the reenginering) on the web application development project and (3.3) information on the importance of preparing for environmental changes and the positive impact on the outcome of the project managed by the IT project manager. Also, the Chi-square test for statistical procedure was applied in the paper in order to examine the dependence of two qualitative characteristics.

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2. WEB APPLICATION DEVELOPMENT PROJECT MANAGEMENT PROCESSES

The project's web application development processes are managed by the IT manager. From the financial aspect, the processes and/or sub-processes of cost management of project implementation are important, and account is taken of cost estimation, budget determination and cost control. At the end of each project, the funds spent must be justified (in a certain way). A lot is usually expected from IT projects. Executive managers in companies believe that the introduction of IT will contribute to the improvement of business processes and more efficient work of the entire organization.

Web application development projects represent a kind of challenge for project IT managers because they involve coordination with many stakeholders and the integration of different technologies. In every phase of the life cycle of an IT project, the role of the project sponsor, project manager and project team is very important. Successful software development teams must strike a balance between delivering quality software systems quickly, meeting stakeholder requirements, addressing risk, driving traffic, and improving the way they do their jobs (Kilibarda et al., 2016).

3. PARTICIPANTS IN THE WEB APPLICATION DEVELOPMENT PROJECT

Each project has its own manager. Every project manager must know what is happening with their project and must know how to calculate certain metrics that will help them (all participants in the project) in making a decision (finally) (Zabierowski et al., 2009). Typically, a project team is defined for a project, but it may be necessary to adjust the team due to the nature of the work, which can occur during the project's development. Participants in the development of web applications are: a researcher of needs for web applications and individual modules, web architect, web designer, web programmer (web developer), web developer of database for web applications, web developer of web applications intended for end users (Webmaster), end user for web application testing, web application administrator.

A web designer is a person whose task is to create an attractive visual solution for a web application for future users, define use cases, consult with web developers about the possibility of implementing ideas and testing. There is sometimes a small misunderstanding in communication based on experience, because in some cases it is more difficult to realize the construction of a web application based on the set requirements of a web design solution.

A web developer is an employee who deals with the implementation of a project, i.e. a web application created in a specific programming language in an application tool. Web developers are divided into front-end and back-end web developers. A front-end web developer deals with the part visible to the user using the web application. The user uses the web browser application tool to view the web application. A front-end web developer writes and edits CSS3.2 and HTML5.3 code in various work environments that are defined. The back-end web developer deals with the logic of the functioning of the web application and everything that is not visible to the end user. A web database developer for web applications works with the database, then deploys the database to the server, sometimes deploys domains, serves content to the user, etc. In some cases (depending on the size of the company), the dividing line between front and back web developers is small and also depends on the technologies.

4. DEVELOPMENT STAGES OF A WEB APPLICATION PROJECT

It is generally known that the development phases of a web application development project are: application needs analysis, web application design and projecting, web application implementation, end user education, web application implementation and support and maintenance. When it comes to the analysis of the needs for the application, a case study and cost-effectiveness assessment should be made, i.e. an assessment of whether it is worthwhile to introduce new technologies and a new web application, considering the costs it causes (a new web application) and considering the change in the way of doing business, i.e. process change. Of course, after testing the application before the final implementation, it is necessary to educate the end users of the new web application so that users can use it effectively. The ultimate goal of the implementation is to achieve higher profits for the company that implements the new information system, i.e. the web application.

5. ANALYSIS OF COLLECTED DATA (RESULTS OF THE SURVEY PROCEDURE)

Based on the research, the results of the survey procedure are presented, namely: (3.1) information about the importance of each individual participant in the implementation of the web application development project, (3.2) information about the necessity of monitoring changes in the environment in order for the project manager to successfully fulfill his roles and responsibilities and towards them adjusted his activities and processes (i.e. reengineered business processes as necessary) on the web application development project and (3.3) information on the importance of preparing for changes in the environment and the positive impact on the outcome of the project managed by the IT project manager. The sample consisted of respondents who deal with web design and web programming and also had work experience in the implementation of a website development project. Also, at point 3.1, information was obtained about the importance of employees in the following positions (for the implementation of the project): researcher of the needs for the web application and individual modules, web architect, web designer, web developer, web database developer for web applications, web developer of web applications intended for end users (Webmaster), end user for testing web applications and web application administrator. The scientific method of surveying was used in the research, and a modified Likert scale for six options was selected (in a digital survey) to determine the importance of a particular job position of the company's employees in order to avoid the possibility of "undecided selection", i.e. the middle rating. The sample is non-probabilistic, intentional and purposive due to the acquisition of relevant data by IT sector managers and potential project managers and project managers.

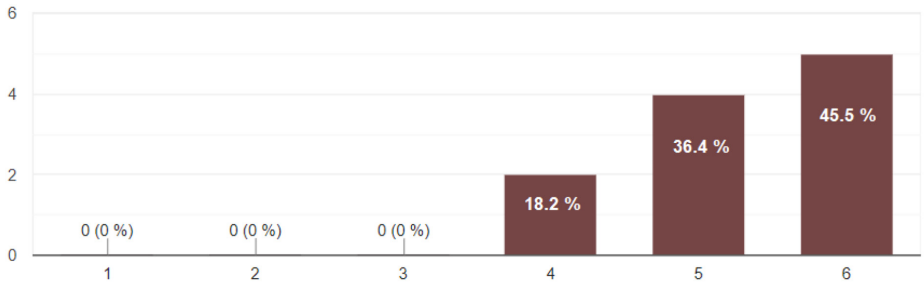

Figure 1. Presentation of the evaluations of the importance of company employees in the workplace, RESEARCHER NEEDS FOR WEB APPLICATIONS in individual companies and the need for individual IT modules within companies when implementing web application development projects

Source: Own research

Figure 1 shows the ratings: the importance of the company's employees in the workplace WEB APPLICATION NEED RESEARCHER in individual companies and the need for individual IT

modules within the company when implementing web application development projects. Most of the respondents rated the importance of the mentioned position with the highest rating 6. The rating 6 was chosen by 45.5% of the respondents, the rating 5 was chosen by 36.4% of the respondents, while the rating 4 was chosen by 18.2% of the respondents.

Figure 2 shows the ratings: the importance of the company's employees at the WEB ARCHITECT workplace for the realization of the web application development project. The majority of respondents chose the option, i.e. rating 5, which means that the WEB ARCHITECT employee is very important for the implementation of the web application development project. Then 36.4% of respondents chose the option i.e. score 6, while 9.1% of respondents chose the option i.e. score 4.

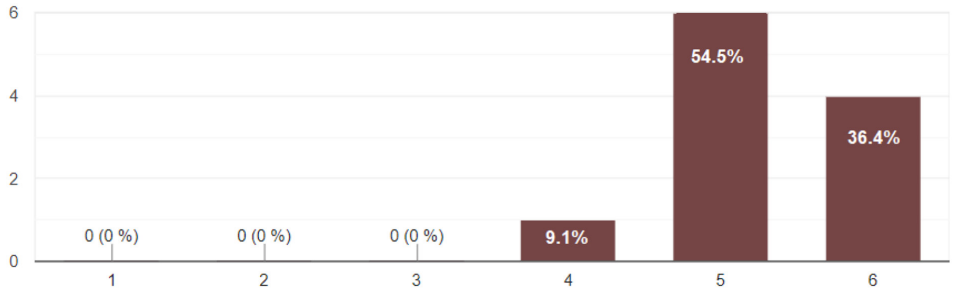

Figure 2. Presentation of the evaluations of the importance of the company's employees at the WEB ARCHITECT workplace for the implementation of the web application development project

Source: Own research

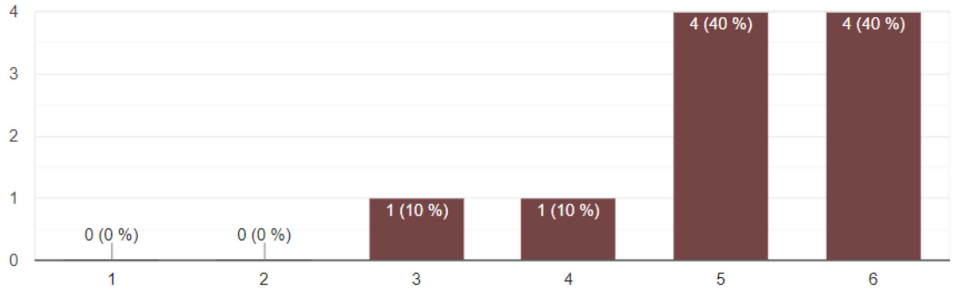

Figure 3. Presentation of the evaluations of the importance of the company's employees at the WEB DESIGNER's workplace for the implementation of the web application development project

Source: Own research

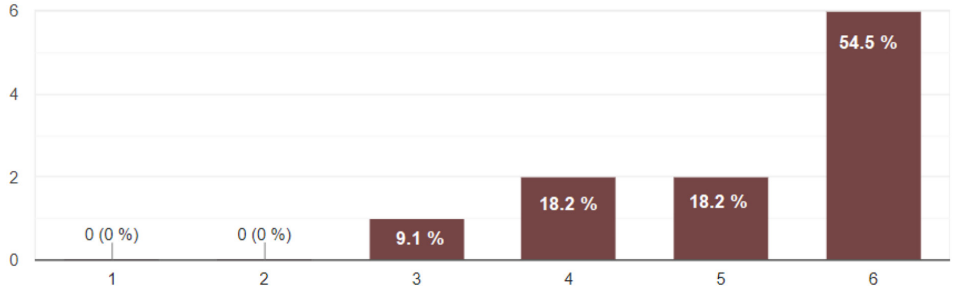

Figure 4. Presentation of the evaluations of the importance of the company's employees at the WEB PROGRAMMER's workplace for the implementation of the web application development project

Source: Own research

Figure 3 shows the evaluations of the importance of the company's employees in the WEB DESIGNER workplace for the implementation of the web application development project. Most of the respondents (40%) chose options 5 and 6, which means that the company's employee in the position of WEB DESIGNER is extremely important for the implementation of the web application development project. The fewest respondents chose options 1 and 2, followed by 3 (10%) and 4 (10%).

Figure 4 shows the ratings: the importance of the company's employees at the WEB PROGRAMMER's workplace for the realization of the web application development project. Considering the importance of project implementation, most respondents (54.5%) chose a score of 6, followed by 5 and 4, which means that WEB PROGRAMMER is a very important position for the implementation of a web application development project.

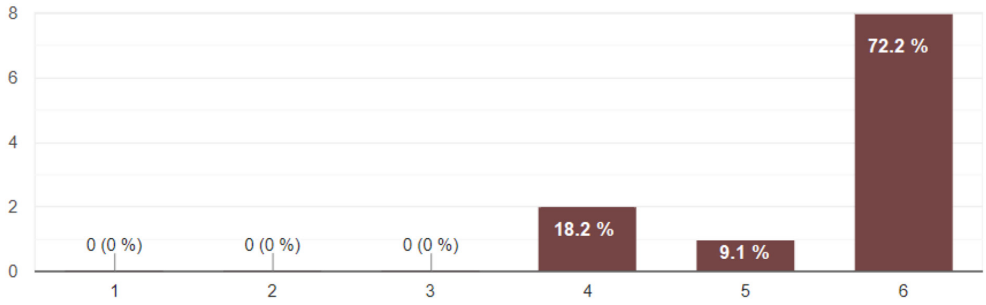

Figure 5. Presentation of the evaluations of the importance of the company's employees at the workplace WEB DATABASE PROGRAMMER FOR WEB APPLICATIONS for the implementation of the web application development project

Source: Own research

Figure 5 shows the evaluations of the importance of the company's employees at the WEB DATABASE PROGRAMMER FOR WEB APPLICATIONS for the implementation of the web application development project. The majority of respondents chose option 6, followed by 5 and 4, which means that WEB PROGRAMMER is a very important position for the implementation of a web application development project, while personnel is also important in the specified position (as well as the way the employee performs tasks).

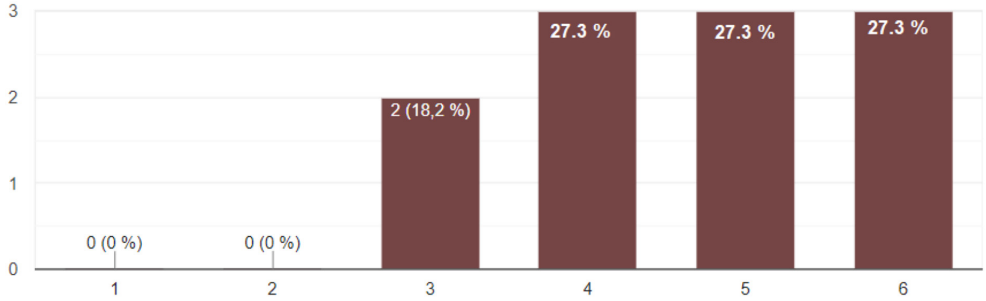

Figure 6. Presentation of the evaluations of the importance of the company's employees at the WEBMASTER workplace for the implementation of the web application development project

Source: Own research

Figure 6 shows the evaluations of the importance of the company's employees at the WEBMASTER workplace for the implementation of the web application development project. Most respondents (27.3%) chose grades 4, 5 and 6.

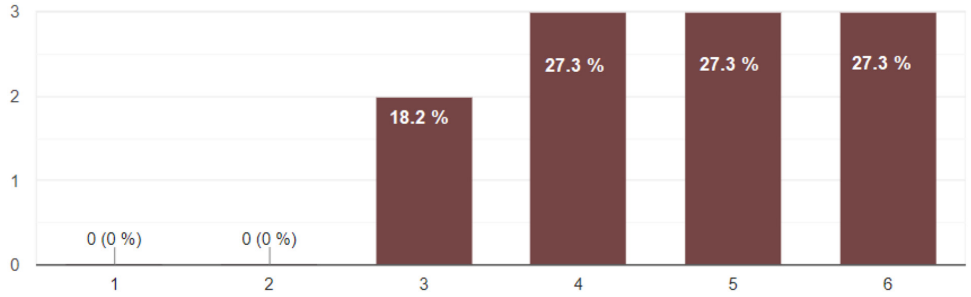

Figure 7. Presentation of the evaluations of the importance of the company's employees at the workplace USER FOR WEB APPLICATION TESTING for the implementation of the web application development project

Source: Own research

Figure 7 shows presentation of the evaluations of the importance of the company's employees at the workplace USER FOR WEB APPLICATION TESTING for the implementation of the web application development project. Most respondents (27.3%) chose grades 4, 5 and 6.

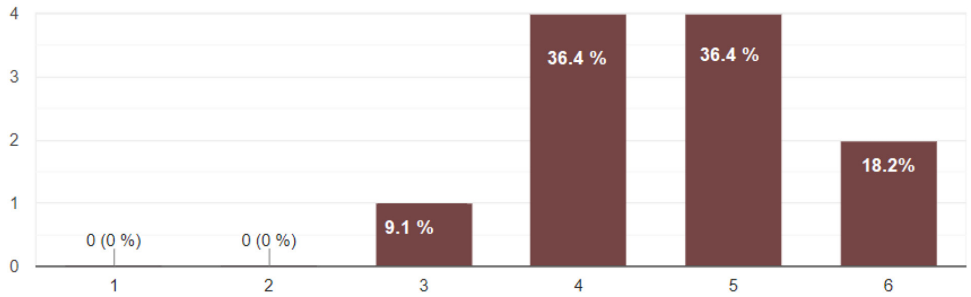

Figure 8. Presentation of the importance ratings of company employees in the WEB APPLICATION RESOURCE ADMINISTRATOR workplace for the implementation of the web application development project

Source: Own research

When we look at the results of the research globally (as a whole) vertically (according to the scale), we see that the maximum six (of all the listed positions) according to the importance rating of the company's employees (at the position WEB DATABASE PROGRAMMER FOR WEB APPLICATIONS for the implementation of the web application development project) received DATABASE WEB PROGRAMMER FOR WEB APPLICATIONS and after that WEB PROGRAMMER.

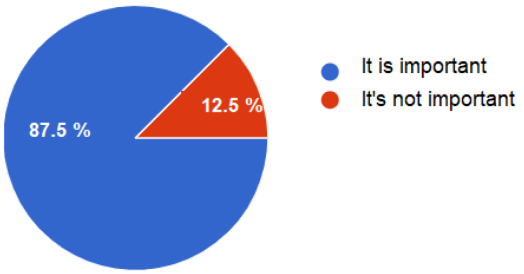

Figure 9. Presentation of the importance of monitoring changes in the environment in order for the project manager to successfully fulfill his roles and responsibilities and adapt his activities and processes accordingly (i.e. reengineer business processes as necessary) on a web application development project

Source: Own research

Figure 9 shows the importance of monitoring changes in the environment in order for the project manager to successfully fulfill his roles and responsibilities and to adjust his activities and processes accordingly (i.e. reengineering business processes as necessary) on the web application development project. According to the opinion of 87.5% of the respondents, it is important to monitor changes in the environment in order for the project manager to successfully fulfill his roles and responsibilities and to adapt activities, processes and, if necessary, functions (i.e. to reengineer business processes, if necessary) on the web development project applications, while 12.5% of respondents think that it is not important to monitor changes in the environment in order for the project manager to successfully perform his roles and responsibilities and adapt his activities and processes accordingly.

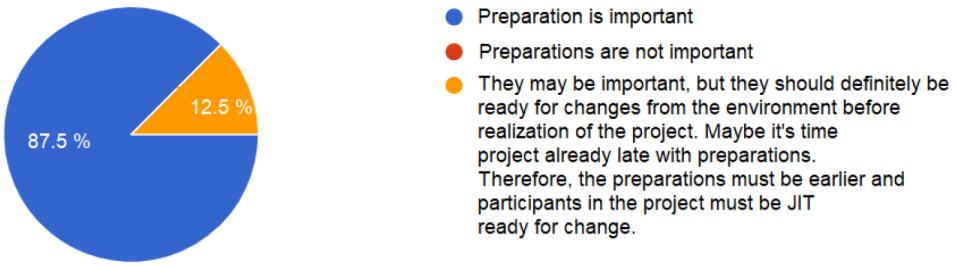

Figure 10. Presentation of the importance of preparation for changes from the environment and the positive impact on the outcome of the project managed by the IT project manager

Source: Own research

Figure 10 shows the importance of preparing for changes from the environment and the positive impact on the outcome of the project managed by the IT project manager. The majority of respondents, 87.5%, chose the option that preparations for environmental changes are important and have a positive impact on the outcome of the project managed by the IT project manager. One of the interviewees wrote his point of view: "Perhaps preparations for changes in the environment are important, but you should definitely be prepared for changes in the environment even before the implementation of the project.

6. CHI-SQUARE TEST FOR THE STATISTICAL PROCEDURE OF EXAMINING THE DEPENDENCE OF TWO QUALITATIVE CHARACTERISTICS

In this chapter 6, a review of the analysis of the results of the survey research was given, and a procedure called the chi-square test was carried out, which is used in most cases if it is about qualitative data or if the distribution of the data deviates significantly from normal. At the very beginning, it should be emphasized that the chi-square test is calculated with frequencies, and it is not allowed to enter measurement units in the calculation. The basic research data can also be measured values, but only their frequencies are entered into the chi-square (Krsto et al., 2008).

Table 1. Presentation of the chi-square test for answers to the 9th question of the online survey

	Important	It's not important	Empty	Total:	Shared:	
f_0	7	1	3	11	3.6667	f_0
f_t	3.6667	3.6667	3.6667	11.0001		f_t
	f_0	f_t	f_0-f_t	$(f_0-f_t)^2$	X^2	
	7	3.67	3.3333	11.1109	3.0302	
	1	3.67	-2.6700	7.1289	1.9425	
	3	3.67	-0.6700	0.4489	0.1223	
				Hi square	5.09501051746446	

Source: Own research

Table 1 shows the chi-square test for responses to question 9 of the online survey. In this case, the sum of chi-squares based on Table 1 (Σ chi-square) is: 5.09.

Table 2. Presentation of the chi-square test for answers to the 10th question of the online survey

	Preparation is important	Preparations are not important	Empty	Total:	Shared:	
f_0	7	1	3	11	3.6667	f_0
f_t	3.6667	3.6667	3.6667	11.0001		f_t
	f_0	f_t	f_0-f_t	$(f_0\text{-ft})^2$	X^2	
	7	3.67	3.3333	11.1109	3.0302	
	1	3.67	-2.6700	7.1289	1.9425	
	3	3.67	-0.6700	0.4489	0.1223	
				Hi square	5.09501051746446	

Source: Own research

Table 2 shows the chi-square test for answers to the 10th question of the online survey. In this case, the sum of chi-squares based on Table 2 (Σ chi-square) is also 5.09.

7. CONCLUSION

When we look at the results of the research globally (as a whole) vertically (according to the scale), we see that the maximum six (of all the listed positions) according to the importance rating of the company's employees (at the position WEB DATABASE PROGRAMMER FOR WEB APPLICATIONS for the implementation of the web application development project) received DATABASE WEB PROGRAMMER FOR WEB APPLICATIONS and after that WEB PROGRAMMER. Therefore, we can conclude that WEB DATABASE PROGRAMMER FOR WEB APPLICATIONS and WEB PROGRAMMER are extremely important (if not the most important) for the realization of a web application development project. Also, apart from the research part in the work on the topic: "Web application development project management", the following were clearly investigated and documented: (1) project management processes, which were broken down in detail and explained individually using the method of modelling and content analysis, (2) participants in the web development project applications and their tasks, and the stages through which the web application development project goes are elaborated in detail.

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MATLAB Modeling and Simulation of 3D Printers Noise Mapping in Faculty Design and Print Labs

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Noise;
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Abstract: *This paper discusses the need for noise modeling and simulation for better placement of noisy 3D printers in faculty laboratories where also teaching and research require audible levels of sound for human interactive speaking. The new development of 3D printers made them available and in current use for learning purposes in technical faculties from universities all around. While the noisy versions of 3D printers are operating in a lab where professors need to dialogue with the students it becomes compulsory to search for a placement that does not cumulate high levels of dB(A). As Sounds purposes, a Sound Level Meter device was used, and noise was recorded as a 0.5-meter grid map of the lab in various conditions of all 10 printers performing different tasks. Data was further processed and following sound propagation laws, considering wall reflection, a model of noise was developed and implemented as a MATLAB software simulation.*

1. INTRODUCTION

As MATLAB software uses a wide range of visual tools available to better understand the results of the implemented computations, the authors have chosen it for performing a spatial representation of the noise level in a specific area defined by a 3D Printing lab in the faculty. According to Ulmeanu et al. (2019), the use of 3D printing integration in technical disciplines also supports an interdisciplinary approach by connecting fields such as engineering, industrial design, and automation. This fosters collaboration between students and faculty, encouraging problem-solving and the integration of knowledge across multiple domains. Furthermore, the implementation of 3D printing in university curricula provides significant benefits in rapid prototyping, reducing costs and the time required for product development. This allows for the creation of not only educational models but also applied research and innovative solutions.

After recording and mapping the real sounds from the printers as cumulative while all working and having their fixed positions, the model was made by using known sound propagation law into the air and adapted to the area structure.

The model uses the individual and composite noise from one and then from more 3D printers spectral analyzed to check sources and adapt the parameters of log-based sound level propagation into air formula. The simulation allows the placement of noise sources and obstacles including walls. The model was then checked into another 3D printing hall and found to overall 93% accurate to real-time measurements done over a similar grid of 0.5 meters. Then the virtual position of the printers was changed into a simulation of the labs' available placement new positions searching

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for an increase in the area with lower noise and lower noise paths needed for better communications between professors and students while lab demonstrations take place.

An important conclusion of this paper was the recommendation of using a lateral wall near the placement of 3D noisy printers instead of the Central room or Lab location to minimize the percentage of the space covered with loud noise.

2. SOUND, SPEECH AND 3D PRINTERS NOISE MEASUREMENTS

2.1. Sound Level Key Points

Several pieces of information can be presented about sound and noise assessment and some are important for the paper's goals (Brixten, 2024; Tsingos, 2001) summarised in the following:

1. Sound Power is the total power of audible waves created by a generator of sound.
2. Perceived sound is the wave level at a certain distance location.
3. Sound levels during alarms are to be between 90 and 120 dB(A).
4. Background noise influences the perceived intelligibility of the speech signal. In this case, all signals other than the speech itself can be considered noise.
5. In a classroom, any noisy installations can make speech less intelligible. Also, the presence of other people generates noise.
6. The optimum speech level appears to be the level that maintains around 15 dB(A) of S/N ratio when the background noise level is more than 40 dB(A).

2.2. The 3D Printer's Placement in the Lab and Measurements

As the laboratory structure it is very possible to vary from one building to another it is important to calculate the specific perceived sound at the location of the students and teachers in the area.

General sound propagation laws applied to this research will be tuned with more information about the location shape and construction in order to better model the sound level at each point of the grid. The information needed for this is the level of sound absorption in the propagation area and size of the objects or free space between the human receiving the noise and the source.

Making a good and precisely model based on the sound propagation laws and specific conditions can be extremely helpful for the organisers of the respective laboratory in order to decide the location of 3DPrinters inside the working area and also the location of the people (both students and/or teaching staff) in order to keep noise under perceived intelligibility of the speech. In Figure 1 the placement of the 3D Printers is shown together with the positioning axes.

The use of MATLAB scripts to model and simulate the noise produced by 3D Printers placed virtually in different positions is cutting the effort of real placement and replacement so redoing changes and measurements many times.

1. For Sounds / Noise measurement, a Sound Level Meter device was used, and the noise was recorded as a 0.5-meter grid map of the lab in various conditions of all ten printers working and performing different tasks.
2. Data was further processed and following sound propagation laws, considering walls reflection, a model of noise was developed and implemented as a MATLAB software simulation.
3. The model uses the individual and composite noise from one and from more 3D printers spectral analyzed to check sources and adapt the parameters of log-based sound level propagation into air formula. The simulation allows the placement of noise sources and obstacles including walls.

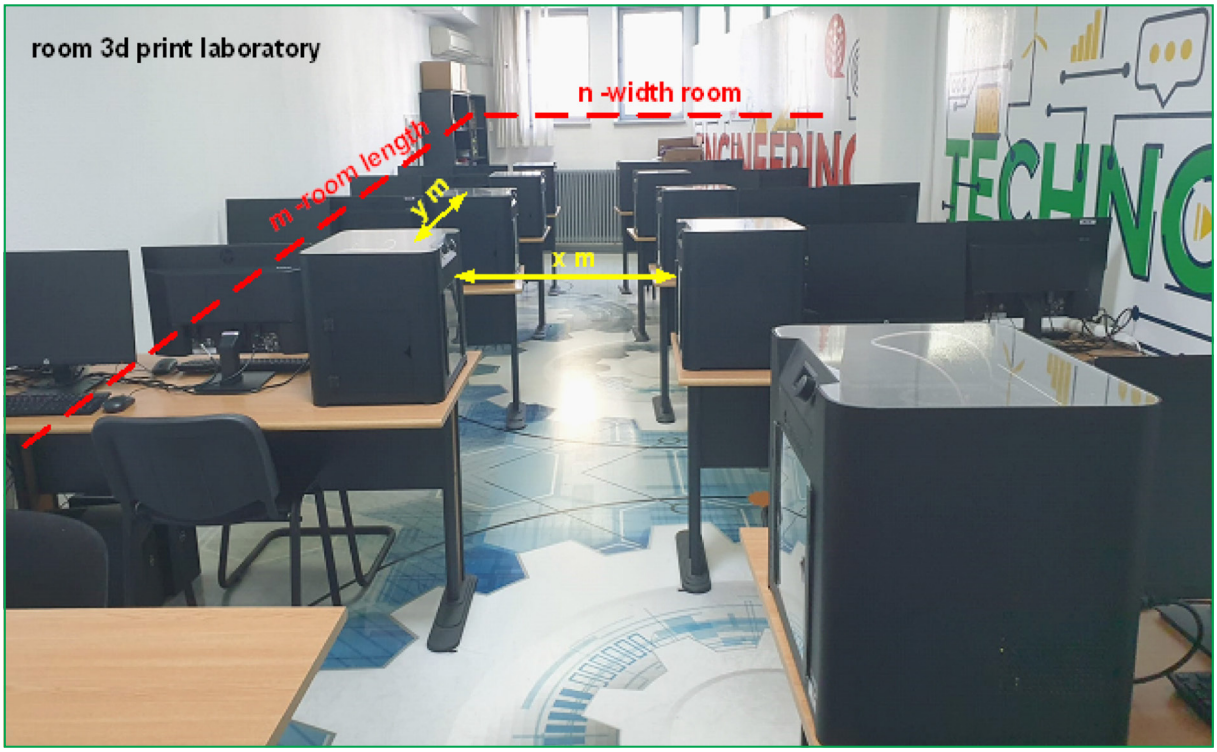

Figure 1. Laboratory room with 3D printers
Source: Own photo and processing

For the measurement, a SPER SCIENTIFIC DIGITAL SOUND METER 840029 was used.

Figure 2. Measuring the Laboratory room 3D printers Noise
Source: Own photo

A half-circle area of 3 meters around the noise source was measured with the Sound meter with a resolution of 0.5 meters as seen in Figure 2.

3. MATLAB MODEL IMPLEMENTED FOR NOISE SIMULATION ACCORDING TO 3D PRINTERS POSITIONING IN THE FACULTY LABS

For the model the authors of the paper started by implementing in MATLAB the Sound Wave propagation equations:

$$L_H = L_N - 10 \cdot log_{10}(2\pi r^2) - a \cdot r \quad (1)$$

In the above equation, the 3D printer is producing sounds that are noise for people in the room with the sound power of L_N measured in decibels; the perceived sound at distance r from the source is called L_H, the respective distance from the 3D printer and the people location, measured in metres is called ***r*** and the coefficient of attenuation is called ***a*** and is measured in decibels per meter.

When it is available the information about the frequency components of the sound wave so L_N is splitted in frequency bands called octave, so each is called $L_N(i)$ with ***i*** varying from one to **n** the following formula is used:

$$L_p(i) = L_N(i) - 10 \cdot log_{10}(2\pi r^2) - a(i) \cdot r \quad (2)$$

In equation (2) each frequency band contribution is called $L_p(i)$ and the attenuation coefficient is known from literature and called *a(i)*.

Table 1. The dependence between audio signal wave frequency measured in Hz and it's corresponding attenuation coefficient as value per decibel

Frequency value in Hertz	63	125	250	500	1000	2000	4000	8000
Coefficient of attenuation	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1

Source: Danish Environment National Agency for Environmental Protection, 1991

The summation of all existing frequency components of the noise can be computed as in (3):

$$L_p = 10 \cdot log_{10}\{\sum_{i=1}^{n} 10^{Lp(i)\cdot 10}\} \quad (3)$$

3.1. Taking Into Account the Real Case When Many 3D Printers Are Simultaneously Working

For such a case the 3D printer type information is used in the sense that some of those can be normal (high-noise) or noise reduced and for all of them (m – number of printers) calculate the perceived sound *Lp(j)*. The next step is to cumulate those in one value as in equation (4):

$$L_p = 10 \cdot log_{10}\left\{\sum_{j=1}^{m} 10^{\frac{Lp(j)}{10}}\right\} \quad (4)$$

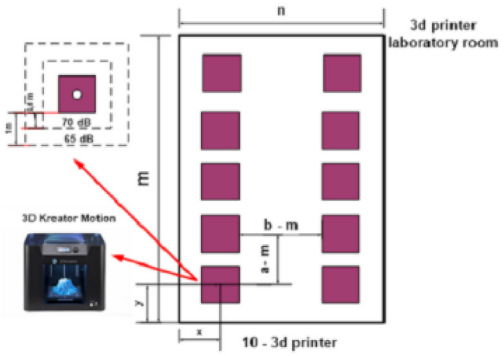

Figure 3. Laboratory room 3D printers with real noise measurement ranges

Source: Own processing

Employing the steps described in this section of the paper coded in MATLAB scripts the resulted model was used to simulate the noise level in the laboratory for many configurations of placement of the 3D printers, of course feasibly positions allowing students access to the facility and keeping some low noise paths/areas for understandable speech.

4. DISCUSSIONS AND RESULTS

4.1. Simulation Results

The software simulation of noise coded in MATLAB as scripts includes as inputs of the model the height where the 3D printer is located called h, all the individual 3D printer audible noise powers, and the distance to the location where the noise is to be simulated called r, the audio waves propagation laws presented in the previous chapter of the paper and also the cumulative noise approach from many working 3D printers described before. The results for the case when all the printers are operating are shown in Figure 4.

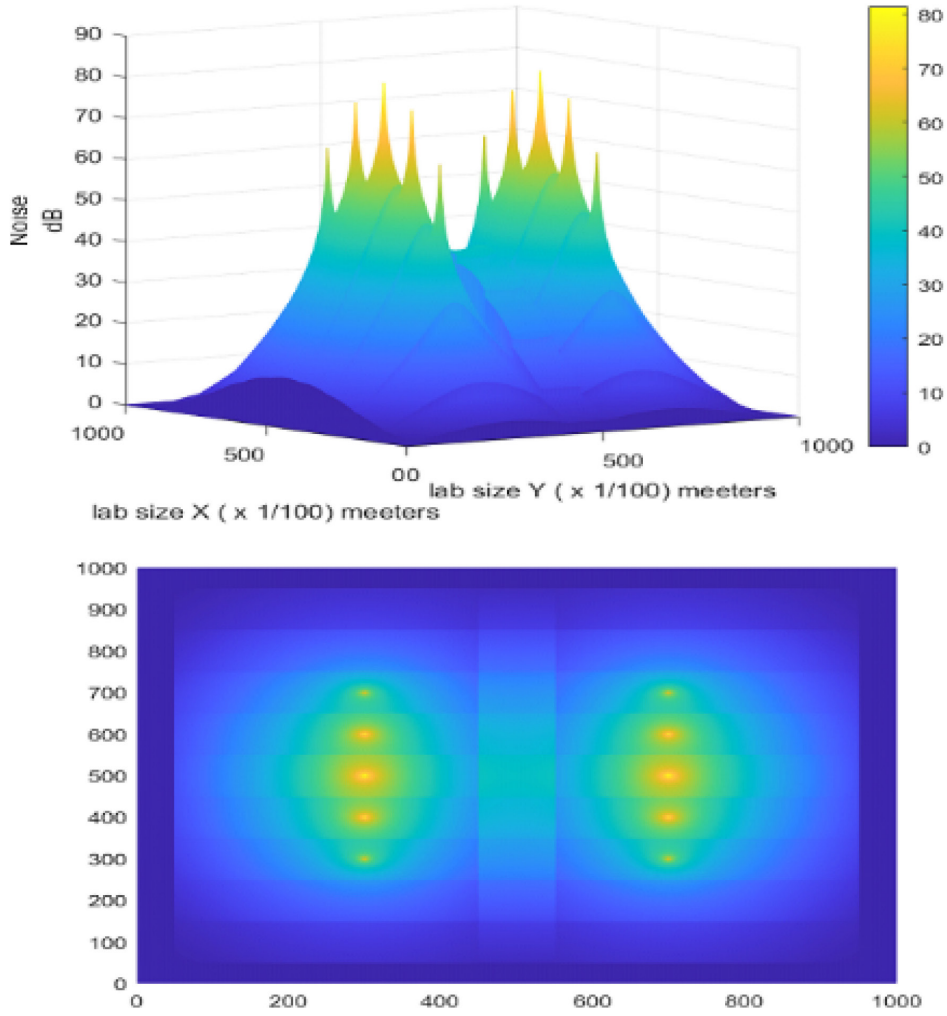

Figure 4. 3D printers' noise spreading in the lab area when all 10 are working and are placed on two symmetrical columns, having a width of about 2m from the centre of one to the centre of the next at the same column. Vertical axis shows the cumulative Noise in dB with peaks over 70-75dB (cumulative from all printers). Horizontal axes show lab size in m x 10^{-2}. 2D view is shown on the lower image

Source: Own processing

Here the 3D printer noise model computes all points of the area straight lines distances to the position of the printer taking into account the height of each position and then all the results were interpolated by the use of the mesh function in MATLAB as in the figures 4 and 5. The 10 3D printers shown in the figures and also recorded in on-site laboratory had independent printing tasks producing no noise correlation between them, noise that just summarizes the total. The results for the case when only 8 of all the printers are operating are shown in Figure 5.

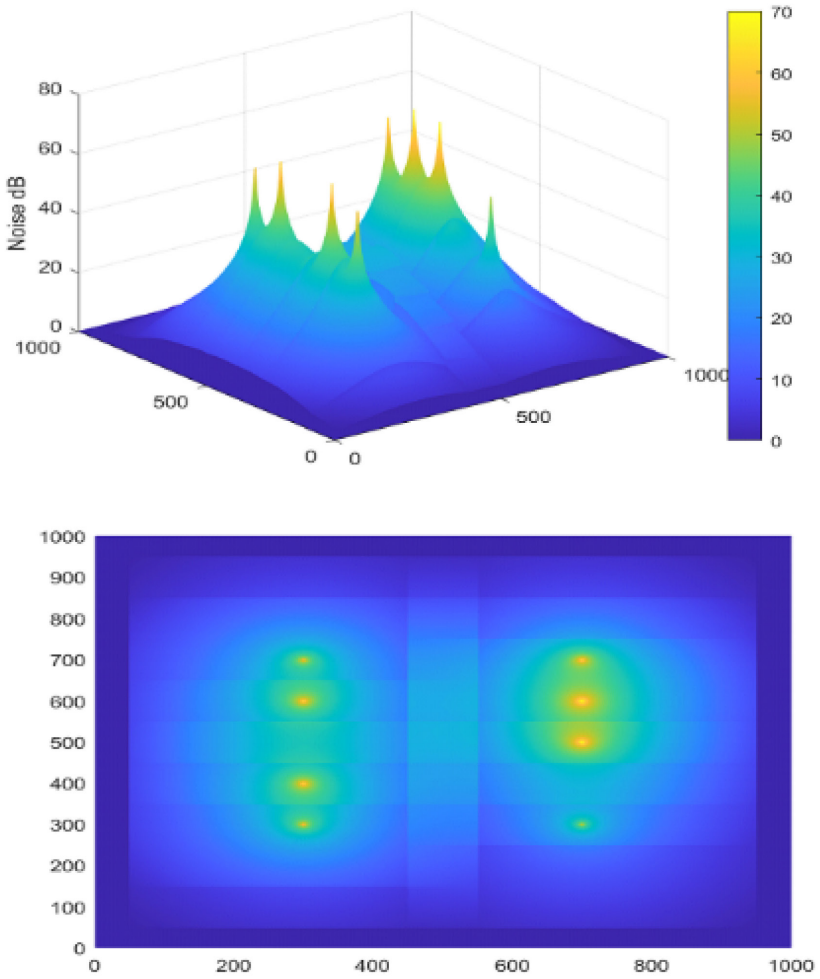

Figure 5. MATLAB simulation of Noise power level for only 8 of 10 3DPrinters in the lab (printers 3 and 7 not in work). Vertical axis shows the cumulative Noise in dB with peaks over 70-75dB (cumulative from all printers). Horizontal axes show lab size in m x 10^{-2}. 2D view is shown on the lower image

Source: Own processing

4.2. Matlab Simulation Compared with Direct Noise Measurements in Another Laboratory

The model was then checked in another 3D printing hall and found 93% accurate overall to real time measurements done over a similar grid of 0.5 meters as in Figure 6.

Noise measurements at different positions and distances were done in the same way as for the first lab and simulations of MATLAB mapping results were compared to them resulting an average similarity of 93-94%. That is a lower-noise 3D printing hall due to the printer's placement near the walls and far from the speech path.

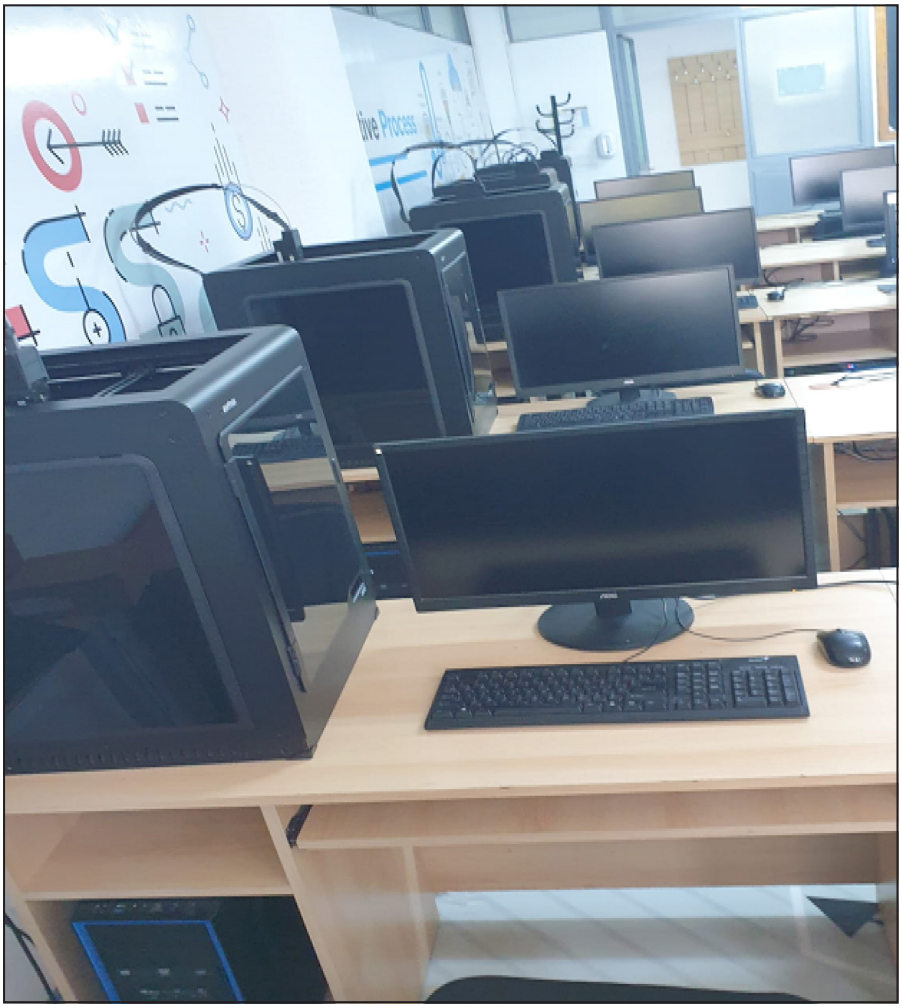

Figure 6. Another 3DPrinting lab used for measurement and simulations of the model
Source: Own photo

5. CONCLUSION

The work presented here is important and new as the only literature search for noise modelling using MATLAB refers to pulses noise in outdoor space (Remillieux et al., 2012) and any other web-based search for software discusses only other types of noise such as the one produced by the industry or by the environmental itself. According to the search, there is no software to help with noise reduction for a laboratory or specific indoor space.

Another accomplishment of this study is the conclusion that the perceived sound level as noise coming from a 3D printer depends on the height of the source placement. There is another dependence of the perceived sound on the humidity inside the location where the contamination with noise took place.

All of the real laboratory recordings of 3D printers sound considered as noise within the same input data and condition as the MATLAB software model simulated were providing closer results.

The proposed modelling software developed in MATLAB provides a closer to realistic recordings noise level computing at any point of the indoor facility and just clearing adjustments can be made to better fit the model to the phenomenon of 3D printers noise spreading around.

Any further research can consider that different positioning of 3D printers according to rotation in a horizontal plane can slightly change the results due to the printer insulation and another issue to be considered is that if many people are located at the same time in the discussed laboratories there must be added a related sound/noise attenuation.

An important conclusion of this paper is the recommendation of using a lateral wall near the placement of 3D noisy printers instead of a Central room or Laboratory location to minimize the percentage of the space covered with loud noise.

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Chaotic Dynamics in the Agricultural Monopoly Model and Innovation

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Abstract: *Innovation reduces the agricultural monopolist's marginal cost. This paper creates a simple chaotic agricultural monopoly model with some specific assumptions. Namely, using a simple nonlinear demand function, nonlinear marginal cost function, the profit-maximizing condition and cost-reducing innovation, it is demonstrated that an agricultural monopoly can show chaotic behavior. The basic aim of this paper is to create chaotic agricultural monopoly model that is capable of generating stable equilibrium, cycles, or chaos.*

1. INTRODUCTION

A monopoly is a market structure in which one firm is the dominant supplier of a good or service for which there is no substitute. The basic cause of monopoly is barriers to entry. The monopoly is the price-maker. By determining the point at which its marginal revenue equals its marginal cost, the monopoly can find the optimal level of output that maximizes its profit. A pure monopoly faces a downward-sloping demand curve for its goods or services. In this sense, a monopoly's marginal revenue is always below the price of its goods. A monopoly firm maximizes profit by producing the quantity at which marginal revenue equals marginal cost. The monopoly then chooses the price at which the quantity is demanded. Further, a monopoly firm's price exceeds its marginal revenue, so its price exceeds marginal cost.

A monopolist's profit-maximizing, optimal level of output is below the level that maximizes the sum of consumer and producer surplus. As a result, monopoly causes deadweight welfare losses. Characteristics of monopolies are : (i) Higher prices than in competitive markets; (ii) The monopoly output is below the socially efficient level (deadweight welfare losses); (iii) Innovation enables monopolists to lower their costs.

Rikap (2024) proposes the concept of the intellectual monopoly as a new pattern of corporate innovation systems. Economic, political, and institutional transformations are important factors in the development of intellectual monopoly. Holmes et al. (2012) develop a new theory of why a monopolistic industry innovates less. Sarafopoulos (2015) has analyzed the effects on the equilibrium of a monopoly when the monopolist has bounded rationality. It is assumed that the entire demand has a non-linear form. He uses a quadratic cost function. Also, he uses a discrete-time dynamical model. However, complex dynamics can arise.

Puu (1995) analyzes the equilibrium position of a monopolistic firm, given a demand function with variable elasticity of demand. He explains the chaotic behavior of a monopolistic firm. Matsumoto

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and Szidarovszky (2014) analyzed dynamic monopolies by assuming general forms of the price and cost functions. They prove the existence of the unique profit maximizing output level. Matsumoto and Szidarovszky (2022) examine two types of boundedly rational monopolists when the marginal revenue is not necessarily negative sloping. Matsumoto et al. (2023) have analyzed the dynamic characteristics of a nonlinear monopoly model involving two boundedly rational monopolists. Askar (2013) analyzes the stability of the equilibrium state of a bounded rational monopolist. Complex dynamics are obtained. Naimzada and Ricchiuti (2008) analyze the equilibrium position of a monopolist with bounded rationality. Complex dynamics can arise in the model.

Sumpeter (2021) argues that the corn seed industry is on the road to containing a monopoly. Lauck (1999) examines the nature of competition within meat-packing and grain markets and considers the use of farmer cooperatives which can increase the bargaining power of farmers. Murphy (2006) considers the concentrated market power in agricultural markets, defines market power and the elements of market power in the agriculture system, and examines how trade and investment reinforce market power. Stewart (1941) considers monopoly control of agriculture in Manchuria. Ashwood et al. (2022) propose how to compute the market power in agriculture and propose Social Network Analysis. Chi et al. (2023) provide an analysis of China's e-commerce development of agricultural products under the background of platform monopoly. Moon (2022) shows that there is a lack of dynamic competition in agriculture, making the market mechanism of agriculture insufficient for bringing about technological innovations.

2. THE MODEL

It is supposed that the inverse demand function facing the agricultural monopolist is:

$$P_t = a\,Q_t - b\,Q_{t-1}^2;\ a > 0,\ b > 0 \tag{1}$$

Where P – agricultural monopoly price; Q— agricultural monopoly output; a, b—coefficients of the inverse demand function. Because the firm's objective is to maximize profit, we can set marginal revenue equal to marginal cost.

Marginal revenue is:

$$MR_t = P_t\left[1 + \left(\frac{1}{E}\right)\right] \tag{2}$$

Where: MR—marginal revenue; P- agricultural monopoly price; E—the coefficient of the price elasticity of demand.

An agricultural monopoly firm maximizes profit by producing the quantity at which marginal revenue equals marginal cost. Thus the profit-maximizing condition is that:

$$MR_t = MC_t \tag{3}$$

Innovations can reduce marginal cost (-f MC_{t-1}), or

$$MC_t = (1 - f)MC_{t-1};\ f > 0 \tag{4}$$

Further, assume that the quadratic marginal-cost function for an agricultural monopoly is given by:

$$MC_{t-1} = c\,Q_{t-1} + d\,Q_{t-1}^2\ ;\ c > 0,\ d > 0 \tag{5}$$

Where: MC - marginal cost; Q - agricultural monopoly output; c, d – the coefficients of the quadratic marginal-cost function.

Because the firm's objective is to maximize profit, we can set marginal revenue equal to marginal cost:

$$P_t\left[1+\left(\frac{1}{E}\right)\right]=MC_t \tag{6}$$

Or

$$P_t\left[1+\left(\frac{1}{E}\right)\right]=(1-f)MC_{t-1} \tag{7}$$

By substitution (5) in (7) we obtain:

$$P_t\left[1+\left(\frac{1}{E}\right)\right]=(1-f)cQ_{t-1}-(f-1)d\,Q_{t-1}^2 \tag{8}$$

By substitution (1) in (8) we obtain:

$$a\,Q_t\left[1+\left(\frac{1}{E}\right)\right]=(1-f)\,c\,Q_{t-1}-\left\{(f-1)\,d+b\,\left[1+\left(\frac{1}{E}\right)\right]\right\}Q_{t-1}^2 \tag{9}$$

Or,

$$Q_t=\frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}\,Q_{t-1}-\frac{\left\{(f-1)\,d+b\,\left[1+\left(\frac{1}{E}\right)\right]\right\}}{a\left[1+\left(\frac{1}{E}\right)\right]}\,Q_{t-1}^2 \tag{10}$$

The maximum quantity Q_{max} is supposed that it can be determined.

Dividing the equation (10) with Q_{max} the following result is obtained:

$$\frac{Q_t}{Q_{max}}=\frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}\,\frac{Q_{t-1}}{Q_{max}}-\frac{\left\{(f-1)\,d+b\,\left[1+\left(\frac{1}{E}\right)\right]\right\}}{a\left[1+\left(\frac{1}{E}\right)\right]}\left(\frac{Q_{t-1}}{Q_{max}}\right)^2\,Q_{max} \tag{11}$$

Let $q_t=Q_t/Q_{max}$ and the equation (11) becomes:

$$q_t=\frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}\,q_{t-1}-\frac{\left\{(f-1)\,d+b\,\left[1+\left(\frac{1}{E}\right)\right]\right\}}{a\left[1+\left(\frac{1}{E}\right)\right]}\,q_{t-1}^2Q_{max} \tag{12}$$

If we take

$$Q_{max}=\frac{\frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}}{\frac{\left\{(f-1)\,d+b\left[1+\left(\frac{1}{E}\right)\right]\right\}}{a\left[1+\left(\frac{1}{E}\right)\right]}}$$

The equation (12) becomes the logistic equation:

$$q_t=\frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}\,q_{t-1}-\frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}q_{t-1}^2 \tag{13}$$

Or

$$q_t = \frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}\ (1-q_{t-1})q_{t-1} \tag{14}$$

Or

$$q_t = \pi q_{\,t-1}\,(1-q_{t-1}), \qquad \pi \in [0,4], q_{\,t} \in [0,1] \tag{15}$$

Where

$$\pi = \frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]} \tag{16}$$

Thus, the logistic map (15) is obtained. Logistic map is a simple nonlinear map that leads to complex behavior and has complicated dynamics. Lorenz (1963), a meteorologist from the Massachusetts Institute of Technology (MIT), constructed a three-variable weather model. Also, his deterministic weather model has incredible sensitivity to initial conditions, making long-term predictions impossible ("the butterfly effect"). He obtains the complex dynamics of three nonlinear differential equations. Li and Yorke (1975) discovered the simple logistic curve. Further, May (1976) described chaos in population biology. The logistic map can explain chaotic behavior. The logistic model was introduced as a demographic model by Pierre François Verhulst. The dynamic properties of the logistic equation (15) have been widely analyzed by Li and Yorke (1975) and May (1976). The logistic map exhibits the dependence on the initial condition (the "butterfly effect"): the slightest change in the initial condition causes a completely different evolution. Lorenz (1963) discovered this effect - the lack of predictability in deterministic systems. Sensitive dependence on initial conditions is one of the important concepts of deterministic chaos or Lorenz's "butterfly effect". In particular, Lorenz's three-variable deterministic model shows how an infinitesimally small change in the initial conditions of a system could end up having a considerable effect on the behavior of the system.

3. CONCLUSION

This paper, concerning the nonlinear demand function of agricultural goods, nonlinear marginal cost function, the profit-maximizing condition, and cost-reducing innovation creates a chaotic agricultural monopoly output growth model. This agricultural monopoly model can show stable equilibrium, cycles, or chaotic behavior of monopoly. The sensitivity of initial conditions and the unpredictable outputs are the essential characteristics of this agricultural monopoly model (15).

This paper creates the chaotic agricultural monopoly output growth model. This chaotic agricultural monopoly model can generate aperiodic and random behavior.

This paper shows that the coefficient

$$\pi = \frac{(1-f)c}{a\left[1+\left(\frac{1}{E}\right)\right]}$$

plays an important role in explaining the local stability of the agricultural monopoly output, where, f is the coefficient of the reduced marginal cost function, c is the coefficient of the marginal cost function; a is the coefficient of the inverse demand function; E is the coefficient of the price elasticity of demand.

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Evaluation of Serbian Innovation Performance Within the European Innovation Scoreboard Framework

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Abstract: *This paper examines the innovation performance of Serbia through the lens of the European Innovation Scoreboard (EIS), a comprehensive. tool for assessing and benchmarking the innovation capabilities of European countries. The paper aims to analyze Serbia's position within the broader.European context, identify strengths and weaknesses, and provide policy recommendations to enhance its innovation capacity. Using data from the latest EIS reports, the paper.evaluates Serbia's performance across individual EIS indicators and compares Serbia's performance with regional.counterparts, offering insights into the factors. influencing its innovation trajectory. This paper contributes to the understanding of Serbia's innovation performance.as measured by the EIS, offering a detailed examination of the underlying factors.influencing its current status and suggesting possible directions for future improvement.*

1. INTRODUCTION

Innovation serves as a critical driver of economic development, which reshapes industries and improves productivity across various sectors. As economies grow and qualitatively develop, the capacity for innovation becomes increasingly important as those regions and countries that prioritize research and development often achieve accelerated growth and improved living standards. Furthermore, the interplay between innovation and economic development is reflected in the way technological advancements create new markets, job opportunities and regulatory environment, thus helping reshape economies by replacing obsolete institutional and market structures. Moreover, for nations like Serbia that aim to catch up, development-wise, to the most advanced countries and break the middle income trap by restructuring their economies based on technological improvements, reliance on innovation is a necessity in the process of building sustainable, knowledge-driven economies. Taking into account the present institutional and market deficiencies that often hinder innovation inception in developing economies, a robust, well coordinated and sophisticated public policy in the domain of innovation is of utmost importance for establishing an effective and dynamic innovation ecosystem.

The aim of this paper is to examine the innovation performance of Serbia, as measured by the European Innovation Scoreboard (EIS) indicators. The EIS is a comprehensive analytical framework designed for assessing innovation capacities and performance of individual (primarily European) countries. By leveraging this tool, this study aims to provide a detailed account of the particularities that make up the Serbian innovation performance. Furthermore, the paper offers an in-depth evaluation of the myriad of underlying factors influencing the said performance, as well as suggestions for strengthening the national innovation ecosystem in Serbia in a manner that is conducive to making further improvements in the country's innovation performance and, in turn, overall economic development.

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2. LITERATURE REVIEW

The innovation performance of Serbia has received considerable scholarly attention in recent years, particularly in the context of the country's economic competitiveness and technological advancement, highlighting the significance of innovation in fostering sustainable economic growth. One of the key findings is the positive correlation between national innovation capacity and economic competitiveness. Domazet et al. (2022) demonstrate that Serbia's innovative capacity significantly influences its competitiveness, as measured by the Global Innovation Index and the Global Competitiveness Index. This relationship underscores the importance of fostering innovation as means to bolster national economic performance, and the authors indicate the critical role of innovation in the process of moving from a resource and efficiency driven economy towards the more resilient and knowledge-based model of development.

The adoption of advanced technologies is another critical area of focus. A study on technology adoption trends indicates that Serbian companies are increasingly embracing smart manufacturing technologies, despite the historical challenges associated with transitioning from a commodity-based economy (Savković et al., 2023). This shift is essential for accelerating productivity and competitiveness in the manufacturing sector, which has been identified as a key driver of economic growth (Radojević, 2021). Moreover, the investment in research and development (R&D), particularly in emerging technologies, positions Serbia to potentially lead in AI hardware innovation (Bojić & Čabarkapa, 2024). R&D investment is another critical factor influencing Serbia's innovation performance and is vital for export competitiveness, as the analysis of high technology exports indicates that Serbia's R&D investments and the number of researchers are pivotal in determining its position within the Central and Eastern European (CEE) context. Domazet et al. (2021) analyze the relationship between innovation indicators and the export of high technology products in Serbia, providing recommendations for enhancing the country's innovation index and export levels. Their findings align with those made by Marjanović (2019) about significant disparities between Serbia and its CEE counterparts, emphasizing the need for increased investment in R&D to enhance innovation outputs. The Western Balkan region, including Serbia, faces similar challenges in fostering innovation. A comparative analysis of innovation performance across several Western Balkan countries reveals that Serbia's innovation outputs lag behind those of selected EU economies (Cvetanović & Nedić, 2013). This gap highlights the necessity for targeted policies and strategies to enhance innovation capabilities, particularly in areas such as education, infrastructure, and access to funding (Cvetanović et al., 2014).

Regional disparities in innovation performance within the country are also a significant concern. Ivanič (2023) explores the strengths and weaknesses of regional innovation systems in Serbia, highlighting the differences between regions with strong administrative capacities, such as Belgrade and Vojvodina, and those lacking such infrastructure. This disparity affects the overall innovation landscape and suggests that targeted policies are necessary to boost innovation in less developed regions. The previous findings echo those made by Radonjić (2022) and Ivanović and Simić (2024), whose analyses of the Innovation Fund and Science Fund's support patterns indicate that regional asymmetries identified in the innovation activity and performance are often further amplified by the innovation policy and its distribution of direct financial support to innovation projects. These tendencies suggest that innovation policy in Serbia is currently not calibrated according to the imperative of reducing disparities in innovation capacity between different regions within the country, implying the need for a shift in the policy approach towards the more targeted support that would take into account the need to alleviate regional discrepancies (Simić & Miletić, In Press).

Moreover, the role of social enterprises in driving innovation is valuable in the context of sustainability. Đorđević (2023) highlights the role of entrepreneurship in adapting to new industrial tendencies, suggesting that Serbian entrepreneurs are increasingly integrating technology with humanistic values to encourage sustainable development. Mirić et al. (2019) investigate the factors influencing organizational innovativeness in Serbian social enterprises, finding that understanding these factors can enhance the success of socially oriented businesses. This is particularly relevant in the context of Serbia's ongoing economic transformation, as social enterprises can play a critical role in paving the way for inclusive growth. Sustainable practices and green technologies are emerging as critical components of Serbia's innovation strategy, thus aligning with the broader European agenda for sustainability and innovation, suggesting that Serbia might leverage its natural resources to stand as a leader in green technologies (Smaragdakis, 2024). Furthermore, Despotović et al. (2019) emphasize that innovation is crucial for sustainable agricultural and economic development in Serbia, which is vital for the country's economy given that the agricultural sector has traditionally been one of the areas in which Serbia possesses considerable competitive advantages and significant innovation potential, as recognized by the Smart Specialization Strategy of the Republic of Serbia 2020 - 2027 (2020). Additionally, the integration of circular economy principles indicates that Serbia is beginning to adopt innovative practices that promote environmental sustainability and economic resilience (Bucea-Manea-Ţoniş et al., 2021), indicating that innovation is a vital component of the ongoing global process of green transition towards sustainability.

3. ANALYSIS OF SERBIAN INNOVATION PERFORMANCE ACCORDING TO EIS FRAMEWORK

The European Innovation Scoreboard (EIS) provides a detailed comparative assessment of the innovation results and performance of the EU as a whole, all its member states individually, as well as the selected non-member European countries and several non-European global competitors. EIS framework analyses the innovation performance based on a set of carefully curated criteria that reflect specific different facets of innovation creation, including background conditions and support systems, inputs and resources, linkages between different actors and produced results, thus providing a comprehensive in-depth look at the specificities of each system, relative to the EU average. The methodology underpinning the EIS framework for assessing innovation performance is based on the composite index that comprises 4 sub-indices and within these 4 sub-indices there are 12 innovation dimensions which encompass 32 individual indicators overall. The detailed overview of the EIS structure is given in the picture below. Based on these criteria, the performance of observed national innovation systems is allocated into 4 clusters, reflecting their individual performance levels relative to that of the (base-period) EU average, and expressed in percentage of the EU average score for each indicator, and for overall performance as the summary index. The countries are divided into 4 groups according to the following thresholds:

- Innovation Leaders - performance is above 125% of the EU average;
- Strong Innovators - performance falls between 100 and 125% of the EU average;
- Moderate Innovators - countries that perform at the level above 70% of the EU average, but below 100%;
- Emerging Innovators - the lowest-performing group of countries below 70% of the EU average.

With the overall score of 63.2 points on the summary innovation index, Serbia falls short of the 70% EU average threshold necessary in order to place in the Moderate innovators cluster, as shown in Figure 2 below. Thus, Serbia's innovation performance places the country into the lowest-performing group of Emerging Innovators, together with the rest of the Western Balkans region (Albania,

Bosnia and Herzegovina, Montenegro, North Macedonia) and two other non-members, Türkiye and Ukraine. Serbia currently performs at 63.2% of the EU 2023 score (68.57% of the EU 2016), but the growth rate of Serbia (8.5 % points) outpaces the EU average growth rate, therefore indicating the process of convergence and that the existing gap relative to the EU is narrowing down, albeit slowly and in increments. Compared to its 2016 performance, Serbia has in the meantime, increased its score by 28% overall, indicating a cumulative improvement in performance by nearly a third of the level achieved in 2016. Innovation performance exhibited substantial growth from 2016 until 2022 and a decline in 2023, therefore showing a cumulative increase in performance compared to 2016 (Figure 3). The overall upward trend is primarily attributed to significant improvements made in the following dimensions: research systems, digitalisation, finance and support, innovators, linkages and employment impacts, with each of these dimensions having recorded substantial increases over the entire period. On the other hand, use of information technologies, environmental sustainability and intellectual assets are the areas with pronounced challenges and that exhibit decline (strong decrease of more than 30% points in the case of ICT technologies) in performance since 2016.

FRAMEWORK CONDITIONS

- Human resources
  - 1.1.1 New doctorate graduates (in STEM)
  - 1.1.2 Population aged 25-34 with tertiary education
  - 1.1.3 Lifelong learning
- Attractive research systems
  - 1.2.1 International scientific co-publications
  - 1.2.2 Top 10% most cited publications
  - 1.2.3 Foreign doctorate students
- Digitalisation
  - 1.3.1 Broadband penetration
  - 1.3.2 Individuals who have above basic overall digital skills

INVESTMENTS

- Finance and support
  - 2.1.1 R&D expenditure in the public sector
  - 2.1.2 Venture capital expenditures
  - 2.1.3 Direct government funding and government tax support for business R&D
- Firm investments
  - 2.2.1 R&D expenditure in the business sector
  - 2.2.2 Non-R&D innovation expenditures
  - 2.2.3 Innovation expenditures per person employed in innovation-active enterprises
- Use of information technologies
  - 2.3.1 Enterprises providing training to develop or upgrade ICT skills of their personnel
  - 2.3.2 Employed ICT specialists

INNOVATION ACTIVITIES

- Innovators
  - 3.1.1 SMEs with product innovations
  - 3.1.2 SMEs with business process innovations
- Linkages
  - 3.2.1 Innovative SMEs collaborating with others
  - 3.2.2 Public-private co-publications
  - 3.2.3 Job-to-job mobility of Human Resources in Science & Technology
- Intellectual assets
  - 3.3.1 PCT patent applications
  - 3.3.2 Trademark applications
  - 3.3.3 Design applications

IMPACTS

- Employment impacts
  - 4.1.1 Employment in knowledge-intensive activities
  - 4.1.2 Employment in innovative enterprises
- Sales impacts
  - 4.2.1 Medium and high-tech product exports
  - 4.2.2 Knowledge-intensive services exports
  - 4.2.3 Sales of product innovations
- Environmental sustainability
  - 4.3.1 Resource productivity
  - 4.3.2 Air emissions by fine particulates PM2.5 in Industry
  - 4.3.3 Development of environment-related technologies

Figure 1. EIS Summary Index structure
Source: European Innovation Scoreboard (2023)

A similar tendency in the overall performance can be observed by measuring scores relative to those of the EU in 2016. During the 7 years, Serbia's innovation performance score relative to the EU 2016 rose by 15.1% points, thus aligning with the previously observed convergence in innovation performance. The overall growth rate of 15.1 is the biggest one observed among all non-EU Emerging Innovators, followed closely by North Macedonia (Figure 4). Furthermore, taking into account the performance of the EU member states belonging to the Emerging Innovators cluster (Poland, Slovakia, Bulgaria, Latvia and Romania), it can be clearly seen that Serbia's progress in score between 2016 and 2023 relative to the 2016 EU level outperforms not only the non-member Emerging Innovators, but the entire Emerging Innovators group of countries, irrespective of their EU-membership status. Moreover, in comparison with fellow non-EU member countries included in the EIS 2023 report, it can be seen that in terms of summary score in 2023, Serbia outperforms

its Emerging Innovators peers continuously since 2020, in addition to recording a higher summary score than 4 EU members in 2023. However, Serbia's overall score and innovation performance is substantially lower than those of the non-EU members outside of the Emerging Innovators group, and it has been so continuously since 2016. This fact indicates that despite marked improvements made since 2016 and outperforming its regional and EIS-performance-cluster peers, Serbia still has a long way ahead in order to catch up with the leading innovators.

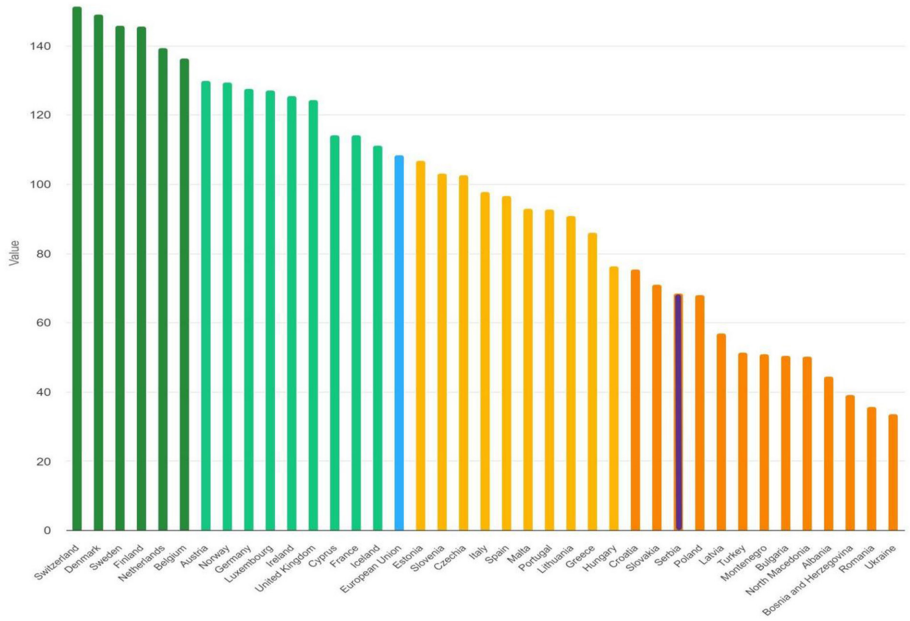

Figure 2. EIS 2023 Summary Index score of Serbia compared to other European countries, relative to the EU 2016

Source: European Innovation Scoreboard (2023)

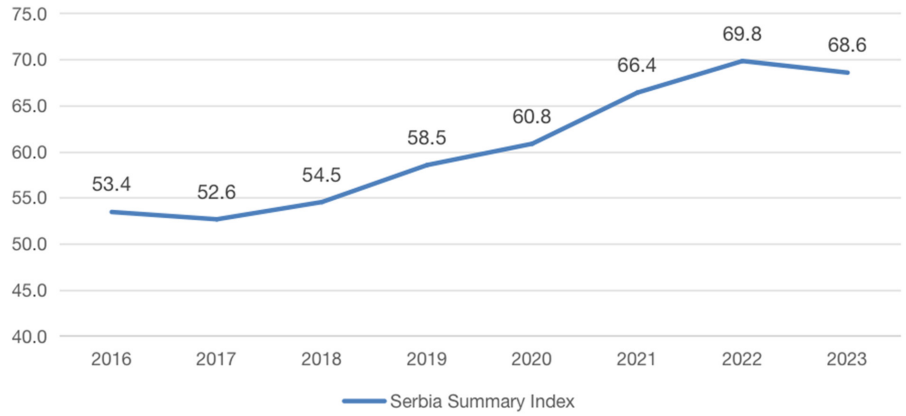

Figure 3. Change in EIS performance score of Serbia 2016 - 2023, relative to EU 2016

Source: Author, according to European Innovation Scoreboard (2023)

In order to assess the main drivers of Serbia's performance, it is crucial to consider the individual performance across specific dimensions and indicators of the EIS index. Such assessment is crucial for the identification of relative strengths and weaknesses that make up different aspects of the overall innovation performance and is pivotal in informing policy-makers about potential opportunities for improvements and/or identified bottlenecks that can be addressed through innovation policy. According to the EIS 2023, there are several dimensions and performance indicators in which Serbia performs strongly and above the EU average. These indicators include

(in descending score order): non-R&D innovation expenditures (81.5 % above EU average; Serbia is the leading performer on this indicator, as its' score is the highest across all countries), Product innovators SME (157.2 % of EU average), Employment in innovative enterprises (135.8 % of EU average), Business process innovators SME (10.2 % above EU average) and Innovation expenditures per employee (108.5 % of EU average). However, this above-average performance is offset by the significantly sub-standard scores received in the following indicators: Air emissions by fine particulate matter (0.0), Design applications (1.5), Resource productivity (3.1), Government support for business R&D (12.5) and PCT patent applications (23.2).

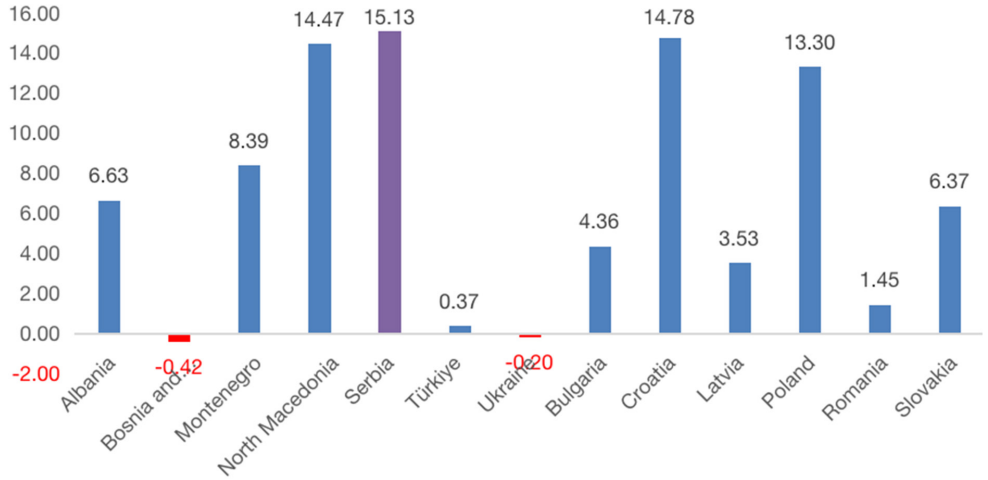

Figure 4. Change in EIS score 2016 - 2023 for all Emerging Innovators, relative to EU 2016
Source: Author, according to European Innovation Scoreboard (2023)

4. DISCUSSION AND POLICY IMPLICATIONS

Taking into account the distribution of relative strengths and weaknesses across different dimensions, several inferences about the state of the Serbian innovation system and its efficiency can be drawn. Beginning with the aspects of innovation in which Serbia accomplished above-average performance, it stands out that the recorded strengths are tied to 2 dimensions - Innovators (in which Serbia outperforms the EU average by a third) and Firm investments. Overall, the strongest points of Serbia's performance are connected to firms' activities with regard to investment in innovation (albeit of the non-R&D variety), applied product and, to a slightly lesser extent, process innovation in small and medium enterprises, employment and expenditure per employee in innovative enterprises. These trends indicate that Serbian companies see innovation as a significant and positive contributor to their success and position on the market, and a crucial component in the process of gaining a competitive advantage over competitors, and are therefore ready to dedicate funds to invest in innovative solutions. However, the allocation of investment resources is predominantly focused on non-R&D purposes and instead focuses on acquiring ready-made technologies and applicable knowledge developed externally and ready to be implemented in the production process. Put differently, the overwhelming approach to innovation in Serbian companies is reactive, meaning that it is based on the role of innovative followers and receivers of innovation previously made by other entities, as opposed to investing in the process of knowledge creation and development of their own innovative solutions and processes. This post-festum approach to acquiring innovation and implementing external knowledge illustrates the short-term attitude of the Serbian business sector to innovation as a tool to be applied to increase competitiveness, rather than the transformational shift in the entire way of doing business and value-creation based on promoting and generating knowledge as a source of long-term sustainability.

Although this approach has its benefits in terms of enabling a quick and cost-effective (relative to developing own knowledge through fundamental research) way of introducing new technologies to the market, it is not sustainable in the long run as it permanently constricts the firms' ability to make a qualitative transition towards autonomous knowledge creation and sustainable development as opposed to relying on existing external technologies. Moreover, the prevailing model of innovating in the Serbian business sector has broader implications for the innovation system in general. Namely, one of the most significant aspects of R&D-borne innovation is their ability to generate additional knowledge spillover effects (second-degree effects that increase overall productivity and efficiency of the innovation system) through implementation and diffusion of the original innovation outside its source, thus creating benefits that can be captured by entities outside the scope of original inventors, which represents a positive externality of innovation. The degree of positive spillover effects is severely impaired if businesses' modus-operandi relies heavily upon implementing ready-made applied innovation as opposed to innovating through own original research and creativity. Possible underlying causes for opting for the short-term approach to innovating include limited financial resources and support, insufficient material resources and human capital as fundamental components of innovation creation, lack of cooperation and coordination with scientific research institutions, government support system designed to promote applied innovation and technology transfer, sub-optimal domestic market sophistication for placement of innovative technologies and limited sales prospects for cutting-edge innovation. Another important explanation for comparative deficiency in private R&D can be found in one EIS indicator in which Serbia lags significantly behind the EU, namely Government support for business R&D is only at a meager level of 12.5 % of the EU average, suggesting a sub-par degree of R&D support in the business sector.

The rationale for public intervention in terms of providing financial assistance to private businesses for R&D is grounded in the market failure argument, as private firms systematically under-invest in R&D due to limited ability to fully capture and appropriate benefits of their investment caused by knowledge leakages that reduce firms' propensity to innovate. The role of government in providing subsidies for R&D investment is to close the gap and compensate for the insufficient private investment. Besides the conventional under-investment argument, government funding for R&D in Serbia has an additional dimension taking into account the limited amount of financial resources available to firms, in general and for research purposes specifically. Additionally, the inherent risks and uncertainty associated with R&D are, in the case of Serbia compounded by the comparatively inefficient protection and lower specificity of property rights (especially intellectual property rights, which are of fundamental importance for innovation), inefficiency and arbitrariness related to the prevalence of corruption, risks connected to potential political instability and increased vulnerability to global-scale crises and related disruptions.

Public support for R&D is not restricted to the immediate effects of supplanting private investment due to market failure, as government funding creates the so-called additionality effects. Behavioral additionality describes the interplay of government R&D support with absorptive capacities of firms and how public funding initiates processes of competence building, acquiring, and developing skills in the management of innovation projects and strategic collaboration with stakeholders and other external participants in the innovation system (Wanzenbock et al., 2013). In that sense, behavioral changes that occur indirectly in the recipient companies under the influence of government R&D support are mostly intangible, but these indirect impacts demonstrate the importance of R&D support from government funds. Namely, the significance of R&D support goes beyond the immediate effect on investment, and even outputs, as it possesses the twofold ability: to influence the recipient firms' entire approach to innovation, and to promote growing

collaboration, exchange of knowledge and acquisition of additional learning skills and capabilities, thus bolstering innovative competencies of firms and the entire system's innovative performance through collaboration and knowledge spillover effects. To that effect, public support-induced behavioral adjustments can play a pivotal part in improving not merely business R&D potential but, perhaps more importantly, their utilization of available resources and productivity in generating innovation, which is another crucial component of innovation efficiency and the one in which Serbia performs remarkably poorly given that the score in Resource productivity indicator is only marginally positive and stands at mere 3.5 % of the EU average.

In that context, the principal issue facing Serbian innovative businesses is not so much lack of resources but, equally importantly, the sub-par degree of their use and lack of capacity to convert available resources into valuable outputs. In that respect, the key role of public policy aimed at fostering innovation, besides providing financial incentives, that should not be overlooked is the one that addresses the business sector's lack of capacity for creating innovation and generating revenue from innovative outputs. This is a particular hurdle for medium and small businesses as they generally face a tight budget constraint and, according to official statistics, are only able to generate below 10 % of their operating revenue from new-to-market innovation (Statistical Office of Serbia, 2022). The design of innovation policy and its measures should therefore reflect the need to facilitate and improve innovation capacity, particularly through promoting R&D, and should avoid the one-dimensional focus on financial support. In the long run, boosting innovation capacity and enhancing productivity in generating innovation will also reflect on the efficiency of the policy itself and the optimal use of public resources by the private innovation-oriented sector. The problem of low productivity is tied to the Environmental sustainability dimension that is directly linked to the (in)ability of businesses and other actors to use resources efficiently and reduce waste. Productivity improvements would reflect positively on the amount and quality of resources available for innovation in two important dimensions - reduction of waste and environmental degradation, and freeing up and redirecting resources to more productive uses, thus increasing the investment potential. Moreover, low productivity ultimately poses limits on the longevity of the current model of government support to innovation, based on the assumption of diminishing returns, as simply increasing resources (or inputs) after a certain point without the corresponding rise in efficiency of their use would exhaust the resources and result in output stalemate and resource depletion. Thus, even though investment-heavy model of innovation policy has its advantages in the early stages of development due to the low technological base and is able to quickly yield innovation-induced improvement in outputs by boosting technical innovation capacity (as can be seen from the comparatively good convergence rate of Serbian innovation system; those improvements can be attributed to input- and output-additionality), in order to advance to the next stage of innovative development (and move forward to the Moderate Innovators group) and increase the system's efficiency in Serbia it is necessary to re-evaluate the current approach to innovation policy and establish a new framework predominantly focused on R&D support and enhancing resource productivity and firms' autonomous innovation capacity.

In light of the previous points, low scores recorded on indicators pertaining to tangible innovation outputs and intellectual assets are consistent with the systematic features outlined above, as well as some institutional shortfalls. Serbia's low performance scores regarding PCT patent applications and, especially, Design applications, are in accordance with the previous observations about the prevailing tendency of Serbian innovator firms to innovate in a non-original post-festum manner through adoption of external technologies. In addition to businesses' reluctance to engage in innovation in a strategic way and relative lack of internal capacity to innovate, another important factor that hinders companies' performance in terms of intellectual property is connected

to structural elements of the institutional environment regarding the security of property rights, as well as the regulatory and financial burden of corruption and risks associated with political arbitrariness. Widespread corruption (both in its petty and political forms) inhibits innovation through undermining enforcement of IP laws and regulations, erodes public confidence in institutions and rule of law and creates artificial barriers for innovators in the domain of registration and enforcement of IP laws through lack of transparency and legal uncertainty, thus making it difficult for businesses to navigate such unpredictable environment (Huang & Yuan, 2021). Both property rights uncertainty and corruption, therefore, substantially impede innovation and amplify inherent uncertainty and risk contained in innovation, which reduces innovators' incentives. As their impact is particularly severe for intellectual property rights, governments should prioritize curtailing corruption and increasing transparency and efficiency of property rights protection in order to ensure fundamental conditions for the development of intellectual property.

5. CONCLUSION

This paper examines the innovation performance of Serbia through the lens of the European Innovation Scoreboard (EIS) framework. Despite the progress made in the overall innovation performance from 2016 until 2023, Serbia remains in the lowest cohort of countries called Emerging Innovators, whose innovation performance lies below the threshold of 70% of the EU average. Several challenges are identified with regard to the country's long-term innovation potential. In particular, Serbian firms tend to innovate reactively, which prevents them from becoming autonomous knowledge creators and risks being stuck into a cycle of innovation dependence on external innovators. By failing to engage and invest in building their own innovation capacities through R&D, firms miss out on the opportunity to initiate overall growth in productivity and diffusion of generated knowledge throughout the innovation system. In order to rectify these challenges, a shift in the dominant innovation mindset is needed, which is where innovation policy can play a critical role. In order to form a more robust and efficient innovation system, policymakers should increase support for independent original research, stimulate the creation of sustainable linkages between different innovation sectors within the system, and foster an innovation environment that is conducive to sustainable value creation. As it stands, the current model of government support for innovation in Serbia itself compounds the reactive model of innovation, as it is tailored towards technology transfer and applied research instead of independent creation of knowledge through R&D and forming quality links with the research sector. Furthermore, a series of specific challenges facing the Serbian innovation ecosystem needs to be addressed as these factors amplify the problem of reluctance of R&D investment and compound risks associated with it, such as inefficient regulatory framework regarding intellectual property, corruption (both petty forms and political), and political arbitrariness, which all contribute to innovation hesitancy through increased uncertainty. Most importantly, these institutional barriers prevent a vibrant, innovative culture from emerging, which, coupled with the lack of resources, their inadequate use, and reluctance to engage in strategic innovation, pose considerable barriers for the future.

Aknowledgement

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Business Model Innovation – Opportunities in the Metaverse: A Literature Review

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Keywords:
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Abstract: *Digital technologies are changing the business world in an incremental or disruptive way. The metaverse is a combination of multiple technologies, combined to create virtual worlds. Within them, people can create an avatar, a virtual identity for themselves, and use it to perform various actions: play games, test physical products in their digital form, attend digital events, interact with others, etc. Thus, the metaverse creates multiple opportunities for businesses. To tackle them, business model innovation is needed. Businesses will need to develop their own metaverse or participate in an existing one. They can create virtual products fulfilling new customer needs, for example, having a personalized virtual identity or purchasing virtual products. The payments might be made using cryptocurrencies. The virtual world will require new forms of customer interaction and engagement. This article aims to improve the understanding of business model innovation in the context of the metaverse. Using literature review as a research method, the paper analyzes the opportunities brought by the metaverse and how businesses could take advantage of them. The required business model innovation is clustered using the key components of a business model.*

1. INTRODUCTION

The business world is characterized by Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). To thrive in such a competitive and unpredictable environment, companies strive to continuously innovate every part of their business model to tackle the most promising opportunities. The business model is the conceptual architecture of how a company creates, delivers, and captures value from customers (Teece D. J., 2010). It is described by nine pillars in the Business Model Canvas (Osterwalder & Pigneur, 2017).

Digital technologies have been transforming the social and economic landscape, disrupting existing business models or enabling the creation of totally new ones (Aagaard, 2024). One of the frontiers of digital technologies is the metaverse (Rehman et al., 2024), having the potential to create a global virtual economy (Latino et al., 2024). The investments in the metaverse have grown by +4.500% since 2021 (Latino et al., 2024).

This research focuses on business model innovation in the metaverse, starting from the following research question:

Does the metaverse trigger innovation in every pillar of the Business Model Canvas (BMC)?

Aiming to answer this question, the article was structured as follows: Section 2 describes the most important concepts: business model, business model innovation, and metaverse. Section 3 presents the results according to the nine pillars of Business Model Innovation. Section 4 highlights directions for future research. Section 5 summarizes the conclusion.

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2. THEORETICAL BACKGROUND

2.1. Business Model Innovation

A business model is a conceptual architecture of how the business creates and delivers value to its customers, while also capturing the financial architecture: revenues and costs (Teece D. J., 2010). It is a critical strategic tool (Aagaard, 2024) and should be made difficult to replicate by existing competitors and new entrants (Teece D. J., 2010). The business model is intertwined with strategy, and it will change in time based on the dynamic capabilities of the company (Teece D. J., 2018). It is of the highest importance for top management to sense opportunities and to seize them, which might involve transformations of the business model (Teece D. J., 2018). The business model and the operating model of a company have a reciprocal relationship, which implies that a business model redesign will require transformations within the operating model and vice versa (Lara Machado et al., 2024).

Business Model Canvas describes the business model by nine pillars: customers, value proposition, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure (Osterwalder & Pigneur, 2017). The customers describe the groups of people (business-to-customer) or businesses (business-to-business) that the company targets. The value proposition consists of the products and/or services that satisfy the needs of the targeted customers. The channels describe how the company reaches out to its customers, for promoting the value proposition, for delivering it, and for providing post-purchase services. The customer relationships depict how the company engages with its customers. The revenue streams outline how the company captures value from its customers. The key resources are used in the creation of the value proposition(s) and can be human, intellectual, financial, and physical. They can be owned, borrowed, or bought, depending on top management's decision. The key activities include the most important ones for creating, delivering, and capturing value. The key partners are the critical collaborators and suppliers for the company to complete its key activities. The costs detail the financial resources consumed in the operating model of the company.

Business model innovation implies changes to the elements of the business model, with the goal of proactively targeting new market opportunities or responding to disruptive challenges (Aagaard, 2024). The innovation can be incremental, radical or a result of exaptation (Latino et al., 2024). It can be triggered by external or internal factors. External opportunities can arise from megatrends, for example: demographic shifts (Aagaard, 2024), digital transformation, evolution of new technologies (e.g. distributed ledger technologies), orientation towards collaborative business models or ecosystems (Miehé & Gassmann, 2024), etc. Orientation towards sustainability triggers companies to integrate the *triple bottom line* approach, transforming their business model into an *impact business model*: *doing well by doing good* (Autio & Thomas, 2024). Changes in the internal operational processes can also determine the need to innovate elements from the business model (Lara Machado et al., 2024). Business model innovation should become a dynamic capability for a company, to sustain its competitiveness in the long term (Zott et al., 2024).

2.2. Metaverse

The metaverse is an online environment where people, represented by avatars, are able to interact socially and economically (Ritterbusch & Teichmann, 2023), with each other or with the virtual value propositions from companies (Mancuso et al., 2023). The environment shall be immersive, three-dimensional, and shared (Ritterbusch & Teichmann, 2023), allowing new digital offerings:

virtual or a combination of virtual and physical (Mancuso et al., 2023). The word combines *meta*, meaning virtual or transcendence, with *verse*, meaning world or universe (Ritterbusch & Teichmann, 2023). The term was first used by Neal Stephenson in *Snow Crash*, a science fiction novel (Ritterbusch & Teichmann, 2023).

The metaverse is highly scalable and facilitates co-creation between companies and customers in a hyperconnected and immersive environment, where people from everywhere can join (Cristache et al., 2024). It is an ecosystem characterized by virtualization and hyperglobalization, which are great premises for fostering innovation (Cristache et al., 2024). The impact of the metaverse depends on the adoption rate by people (Büchel & Spinler, 2024). The metaverse also has some risks and challenges any business should consider. Some examples are cybersecurity, data privacy (Cristache et al., 2024), digital inclusivity, being energy-efficient and other sustainability challenges (Xu et al., 2024).

There are also barriers in the adoption of the metaverse; some are generally applicable, while others are specific to an industry sector. For example, in the construction industry, there were five categories of barriers identified: technical, organizational, environmental, social, and economic (Irfan et al., 2024). Technical barriers include a lack of standardization and interoperability for the metaverse, latency and bandwidth problems, the quality and the maturity of the technologies involved, cybersecurity, etc. Organizational barriers include a lack of the required digital skills and knowledge of the employees, resistance to change within the company, budget constraints, etc. Environmental barriers include energy consumption, impact on the supply chain, an increase in the hardware resources needed for the high computational needs of the metaverse, etc. Social barriers include digital divide in the metaverse, data and privacy concerns, erosion of human interactions, etc. Economic barriers include high initial costs for implementation with an uncertain return on investment, lack of regulatory compliance, etc.

3. RESULTS

The research based on literature review and analysis of secondary data demonstrated that the metaverse triggers innovation in every pillar of the Business Model Canvas (BMC). The findings are presented in the following sub-sections, clustered within the nine pillars of the Business Model Canvas (Osterwalder & Pigneur, 2017).

3.1. Customers

In the metaverse, the customers have new needs that the company should target to solve. They want to create a virtual identity for themselves, thus transforming their avatar into a piece of self-expression (Mancuso et al., 2023). They want their virtual representation to be unique and to reflect their likes, their personality, and their values. This translates into the need for high customization or personalization, or for using products from their favorite brands not only in real life (IRL), but also in the metaverse. Some customers will satisfy it by purchasing virtual goods, for example, digital clothing for avatars, developed using Non-Fungible Token (NFT). Others will choose to contribute to creation before purchasing, by using the technological infrastructure provided by companies. This leads to co-creation between the customer and the company (Mancuso et al., 2023). A key enabler for this is the interface for co-creation, which shall be intuitive and user-friendly.

Customers want to have virtual experiences in the metaverse. This need was accelerated by the Covid-19 pandemic (Mancuso et al., 2023), which created the need for social interaction in a virtual

way due to the restrictions imposed worldwide to avoid the virus spread. This opened or amplified opportunities for applications in multiple fields, such as: education, entertainment, medicine, smart cities, finance, advertising, fashion, online meetings, etc. (Banaeian Far et al., 2023). Even museums have turned their attention towards the metaverse for virtual art exhibitions, which would permit users to customize their experience and create multiple narratives based on the same artwork pieces (Sylaiou et al., 2024). This would satisfy both the needs of the customer and the cultural organizations by bridging the gap between highly user-centric, personalized, interactive experiences and presenting artworks in a way that inspires, builds emotions, and educates the public (Sylaiou et al., 2024).

Customers also have the need for belonging to a community. The metaverse can contain multiple virtual communities. The way in which a company manages the virtual community might become a differentiator factor compared to its competitors in a future scenario of ecommerce in the metaverse (Büchel & Spinler, 2024). This would imply the existence of exclusive communities, where access is granted as a benefit to the customer (Büchel & Spinler, 2024). The community is a great way for a company to directly engage with customers via events, benefits, rewards, etc. (Mancuso et al., 2023).

Another need of customers in the metaverse is to pay using cryptocurrencies. To satisfy it, companies should diversify their payment methods in the metaverse by accepting cryptocurrencies. This targets especially the tech-savvy customers, already using cryptocurrencies as payment or investment. For example, Gucci has already implemented this in its own metaverse: Gucci Town (Mancuso et al., 2023).

In the metaverse, companies can also choose to diversify by targeting different customer segments than in real life. For example, Nike is targeting a unique customer segment: creators with a passion for sport, technology, and gaming, while Gucci is selling virtual items at lower prices than in real life (Mancuso et al., 2023).

3.2. Value Propositions

To address the new customer needs in the metaverse, companies need to build virtual products and services. One concern of the virtual products is creating ways in which they remain valuable and scarce throughout time (Büchel & Spinler, 2024). When it comes to products, the current solution is to create NFT items. When it comes to virtual services, the challenge remains unsolved, especially for services that capitalize on the best practices and experience of the companies and their employees, since the increased transparency and aggregator businesses in the metaverse might reduce the value of this unique selling point (Büchel & Spinler, 2024).

The value propositions in the metaverse can take three main forms. Firstly, companies can opt to create virtual products and services, targeting the specific needs of customers in the metaverse. Secondly, companies can create digital twins of IRL products (*physical-to-virtual*) (Mancuso et al., 2023). For example, Nike is providing digital twins of current and past sneakers (Mancuso et al., 2023). Customers can purchase them for their avatar and wear them in Nikeland, Nike's own metaverse, or in other Roblox virtual worlds. Thirdly, companies can combine virtual and real features into a product (*virtual-to-physical*) (Mancuso et al., 2023). For example, Samsung is offering a TV with an integrated platform for crypto-art and a digital wallet on their smartphones, allowing transactions with cryptocurrencies (Mancuso et al., 2023).

The services in the metaverse can also take multiple forms. Firstly, companies are providing the possibility for a user to interact with the IRL products in the metaverse. This is extremely useful for explaining more complicated features of a IRL product. Secondly, companies can prototype new

IRL products in a virtual form, retrieve feedback in the metaverse and integrate it in the version of the IRL product they release in the market. A virtual prototype will often be cheaper to build than a IRL prototype, of course, depending on the product. The company can also reach a broader audience since people from all over the world can test it in the metaverse. For example, Hyundai was offering in Hyundai Mobility Adventure, its own metaverse, the possibility for customers to test and to familiarize themselves with new car releases (Mancuso et al., 2023). Thirdly, companies offer a user-friendly interface for customers to use for co-creation, thus satisfying the customer's need for highly customized items.

3.3. Channels

Companies choose an omnichannel strategy, integrating the metaverse platform as an additional channel to their existing ones (Mancuso et al., 2023). This diversification allows them to reach customers in the metaverse, while also maintaining the existing channels in the physical world, especially relevant for customers who do not adopt the metaverse. The metaverse platform needs to have some attributes for customers to engage deeply within the virtual world. It shall provide an immersive and natural experience (Büchel & Spinler, 2024). The interface becomes as important as the content and shall provide multiple modalities for user interaction (Sylaiou et al., 2024). It shall allow natural language processing and use deep learning for continuously learning and adjusting to the preferences of the user (Irfan et al., 2024). It may even provide haptic feedback, a technology inspired by human skin (Xu et al., 2024).

3.4. Customer Relationships

There are three main goals for building customer relationships: attracting new customers, building customer loyalty and engagement, and increasing customer lifetime value (Osterwalder & Pigneur, 2017). In the metaverse, these goals need to be fulfilled by virtual interactions. Companies create digital experiences or events around their product. A good example is Gucci Garden, a virtual fashion exhibition organized by Gucci in a virtual world on Roblox (Mancuso et al., 2023). Marketing campaigns, designed as interactive and immersive in the metaverse, have high potential to draw customers and convince them to purchase (Rehman et al., 2024). Social activities and virtual communities are also highly impactful in the metaverse.

In the pre-purchase step, companies can create digital showrooms for presenting their product in an interactive way, especially useful for more complex products. Customers shall be able to customize the product using co-creation tools, or to provide feedback that is integrated in the final version of the product. Long-term, this builds customer loyalty. During the purchase and post-purchase steps, companies shall provide in-real-time and reliable virtual assistance to their customer. Virtual humans are recommended for customer assistance to create the desired human connection and engagement. This was also studied in virtual exhibitions where virtual humans, as mediators of cultural content, were more appreciated by human visitors than other forms of virtual assistance (Sylaiou et al., 2024). Virtual humans may take multiple forms: avatar-to-avatar or AI-to-avatar (Büchel & Spinler, 2024). Artificial intelligence is a great asset for customer service if it can learn the customer's preferences and adapt its responses accordingly.

Virtual games are another important way to interact with customer within the virtual environment. Gamification techniques, as practiced widely by the gaming industry, can also attract customers, engage their interest, and improve their satisfaction (Mancuso et al., 2023). Rewards can be cryptocurrencies, virtual products, or other benefits within the metaverse.

3.5. Revenue Streams

The metaverse brings opportunities for new revenue streams. Selling digital products or services will create a new stream for the company. The most well-known is the *direct-to-avatar* revenue model, in which companies capture value by selling virtual products for avatars to their customers (Mancuso et al., 2023). This revenue stream is unique to the metaverse since the avatar, the virtual identity of a human, is a concept specific to the metaverse. It is sometimes also referred to as business-to-avatar (B2A). Another revenue stream is the *play-to-earn*, in which purchases allow customers to earn rewards within games. Samsung went further in innovating games and added a virtual layer to a physical product by transforming a real Galaxy phone into a scooter for a game in the metaverse (Mancuso et al., 2023).

Another revenue stream can be created by applying different pricing strategies in the metaverse and IRL, targeting new customer segments and capturing value from them (Mancuso et al., 2023). This strategy is considered a diversification one. Accepting cryptocurrencies as payment might also generate new revenue streams (Mancuso et al., 2023). This opportunity might bring high revenues since few companies are currently accepting cryptocurrencies.

New revenue streams might appear in the metaverse of the future. Some projections include *avatar-to-avatar* (A2A) and data-driven revenue streams (Büchel & Spinler, 2024). The evolution of decentralized finance (DeFi), based on Blockchain, will play an important role in future innovations of the revenue streams (Banaeian Far et al., 2023).

3.6. Key Resources

The metaverse, the platform, becomes a key resource for the company. The technologies commonly used in the metaverse are: Augmented Reality (AR), Virtual Reality (VR), extended reality (XR), Mixed Reality (MR), Digital Twin (DT), Blockchain, 3D, Mobile Augmented Reality (MAR) (Latino et al., 2024), Internet of Things (IoT), cloud computing, networking (Sylaiou et al., 2024).

3.7. Key Activities

The metaverse will trigger new key activities for a company. Firstly, the company will create, maintain, and further develop a proprietary metaverse. It may choose to have an own metaverse or a space within an existing one, with a high adoption rate by its targeted customers. These activities can be carried out internally or outsourced to key partners.

Secondly, the company will create and deliver new digital value propositions: virtual, *virtual-to-physical*, *physical-to-virtual* (Mancuso et al., 2023). These activities can be done internally or outsourced. They are key areas in which the company will need to continuously innovate. A case study done on Roblox and Meta, two important companies tackling the Metaverse, discovered that important micro-foundations for business model innovation are: talented and skilled employees, flexible organization of the employees around value, efficient knowledge management, communities for learning and collaboration, communicating with impact towards stakeholders, strategic alliances, intrapreneurship (Mancuso et al., 2024). Generative Artificial Intelligence might also be used for product development, just as for real products (Kasar & Kumar, 2024).

Thirdly, the company shall create, maintain, and continuously improve a technological infrastructure for co-creation (Mancuso et al., 2023). The user interface must be simple to use, with all needed functionalities to allow customers to personalize or customize products.

3.8. Key Partners

The companies in the metaverse create strategic partnerships with other organizations for three main reasons. Firstly, they lack the technological skills, knowledge, and experience in that metaverse. They seek organizations that have it to support them with the new key activities required in the metaverse. They also benefit from their partners' experience by applying lessons learned and best practices. Examples of such companies are: Roblox, The Sandbox, Decentraland, Nvidia Omniverse, IBM, XpertVR, Meta, EduVerse, etc. (Banaeian Far et al., 2023).

Secondly, companies seek partnerships with other companies that have applications or platforms outside the metaverse, which are highly adopted by customers. Since the impact of the Metaverse depends highly on its adoption by people worldwide (Büchel & Spinler, 2024), companies also need to attract people and increase the adoption rate of the metaverse. By associating the metaverse with applications and platforms widely used, thus projecting a sense of familiarity and trust, people might be more willing to try the metaverse. A good example is Meta, which is integrating its platform and headsets with applications from Microsoft and Adobe (Mancuso et al., 2024).

Thirdly, companies should build strategic partnerships to build interoperability between their own implementations of the metaverse. Standards will be required to achieve this in the future. Meta did the first step in this direction by starting two initiatives: *The Metaverse Standards Forum*, *The Open Metaverse Alliance* (Mancuso et al., 2024).

3.9. Cost Structure

The new key activities in the metaverse, related to the metaverse platform, the new digital offerings, and the technological infrastructure, will imply new costs. For other key activities, the costs will decrease (Mancuso et al., 2023). The virtual products and services will be delivered directly to the customer, without the need for intermediaries, thus decreasing the costs of the supply chain. Companies can reach a broader and global audience within the metaverse platform, with lower costs than IRL. Creating a virtual prototype for a product, retrieving feedback from customers, and integrating it will also be done at lower prices compared to IRL. Digital experiences and events will have lower costs than physical ones, while allowing a greater audience.

4. FUTURE RESEARCH DIRECTIONS

Based on the research undertaken so far, the authors consider that the following two research directions might have contributed to the knowledge. On one hand, the characteristics of the industry in which the company operates impact the business model innovation in the metaverse. On the other hand, the differences between industries provide enablers and barriers for the metaverse.

5. CONCLUSION

This study demonstrates that the metaverse triggers business model innovation in each of the nine pillars of the Business Model Canvas (Osterwalder & Pigneur, 2017). Customers have new needs in the metaverse, for which they require new virtual products and services. Companies satisfy them with innovative value propositions while engaging with a global market in creative ways, including by using gamification techniques. New revenue streams emerge, for example, *direct-to-avatar*, while also accepting cryptocurrencies as a valid form of payment. The new channel, the metaverse, requires new key activities and strategic partnerships with other organizations. These changes also impact the cost structure of the company. This article contributes to existing literature by increasing understanding of the intersection between the metaverse and business model innovation.

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Innovation and Competitiveness: Key Drivers of SME Internationalization

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Abstract: *Small and medium-sized enterprises (SMEs) gain a competitive advantage through continuous innovation, which is crucial for their competitiveness on the market and their internationalization. By offering more valuable goods and services than their competitors, SMEs can thrive despite their different starting position compared to large companies. The dynamic competitive environment and changing customer preferences require constant innovation in products and services. This innovation is essential for long-term sustainability, growth and international competitiveness. Research shows that innovative SMEs are more successful in international markets. Innovation and internationalization are complementary processes that drive the growth and development of a company. Access to foreign resources, knowledge and capital increases competitiveness and mitigates weaknesses. The study uses qualitative research, including in-depth interviews with Croatian manufacturing SMEs, to investigate the role of innovation in internationalization. The results confirm that innovation is a key driver of competitiveness and successful market entry.*

1. INTRODUCTION

Small and medium-sized enterprises must recognize that their advantage lies in continuous innovation. By constantly looking for opportunities and recognizing the importance of innovation, they ensure their competitiveness in the market. Competitiveness is achieved by offering goods and services that are considered more valuable by customers than those of the competition. Thinking about competitiveness plays an even more important role when it comes to small and medium-sized enterprises (SMEs), which have a different starting position than large companies. An additional focus on competitiveness arises when these SMEs decide to internationalize. The competitive environment and customer preferences are constantly changing, forcing companies to constantly think about new products and services. To achieve long-term sustainability, growth and development, but also to keep up with international competition, companies need to improve and innovate products and processes (Singh et al., 2007). Innovatively growing companies are more successful in the internationalization process than companies that are not focused on innovation (Šarlija & Bilandžić, 2018). Innovation should be at the core of any understanding of accelerated internationalization, regardless of the industry in which the company operates (Weerawardena et al., 2007). Freixanet (2014) states that innovation and internationalization are the foundations for the growth and development of companies and emphasizes the complementarity of these two processes. By gaining access to resources, knowledge and capital in foreign markets, companies have the opportunity to increase their competitiveness and reduce their weaknesses, which they might not have been able to do through internationalization. Companies may decide to internationalize certain business activities or parts of the value chain. This can enable them to carry out these activities better, faster and with higher quality, thus creating the basis for their competitiveness. Companies that expand their activities to the international market are companies that grow, create jobs, strengthen competitiveness and ultimately influence the state of the country's

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entire economy. For this reason, it is extremely important to understand the relationship between innovation, competitiveness and internationalization. The main research question in this paper is therefore: Are innovation and competitiveness crucial for the internationalization of SMEs?

The focus of this paper is on qualitative research. Data was collected through in-depth, semi-structured interviews with owners and/or managers of selected companies. A deliberate (purposive) sample was used in the selection of cases. The sample consists of 8 small and medium-sized enterprises from Croatia from the manufacturing sector. Based on the data analysis, conclusions are drawn about the role of innovation in the process of internationalization of small and medium-sized enterprises and about the interrelation between these two processes.

2. THEORETICAL FRAMEWORK

2.1. Competitiveness

Companies develop a competitive strategy that defines and determines the way they compete in their industry in a profitable and sustainable way. This strategy should be consistent with the needs of the industry, the company's capabilities and assets (Porter, 1990). Competitive strategy means being different and consciously choosing a set of activities to deliver a unique blend of value (Porter, 1998). Feurer and Chaharbaghi (1994) propose the following definition in their attempt to define competitiveness holistically: Competitiveness is relative and not absolute, it depends on the values sought by shareholders and customers, on financial strength, which determines the ability to act and react in a competitive environment, and on the potential of people and technology to implement the necessary strategic changes. Competitiveness can only be maintained if there is a balance between these factors, which can conflict with each other. Although this definition focuses on large companies, it contains all the important elements that SMEs should also take into account, with the term "shareholders" replaced by the term "owners". Ajitabh and Momaya (2004) define corporate competitiveness simply as the ability to provide goods and services more efficiently than other market participants. Chikán (2008) defines business competitiveness as the ability of a company to fulfill the dual purpose of satisfying customer needs and making profits sustainably. This is achieved by offering goods and services that are considered more valuable by customers than those of competitors. Mahdi and Nassar (2021) discuss how strategic leadership capabilities and knowledge management processes contribute to sustainable competitive advantage, which is essential for organizations to succeed in a competitive environment.

Considering the limited resources of small and medium enterprises and the dynamic environment in which they operate, several significant constraints can be cited as challenges to achieving competitiveness (Singh et al., 2007): insufficient technology and other resources, high cost of product development, lack of effective sales and market research, lack of technological competences, gap between production and market information, lack of resources to implement the required software solutions. All these challenges are certainly a limitation for one of the most important processes in a company, which is also considered the basis of competitiveness – the ability to innovate.

2.2. Inovativeness

Companies create competitive advantage through new approaches, new processes, new technologies, or other inputs (Porter, 1990). The creation of something new and different or the enhancement and improvement of existing products, services, or ways of working is the basis of what differentiates one company from another, and thus the basis of business success. Any non-trivial change to a process

or product with which there is no prior experience is an innovation, and it is characterised by a high degree of uncertainty both before and after its introduction (Nelson & Winter, 1977). Companies must innovate in response to the changing needs and lifestyles of their customers in order to take advantage of the opportunities presented by new technologies and changes in the marketplace (Baregheh et al., 2009). Schumpeter (1934) sees innovation as the centre of economic development. This view stems from his definition of innovation, which he sees as any commercial or industrial application of something new – a new product, a new process, a new method of production, a new market for sales or supply, or a new form of commercial, business or financial organisation. He believes that innovation revolutionizes the economic structure from within by constantly destroying the old and creating a new structure, and he calls this whole process creative destruction. Drucker (2002) argues that innovation is a function of entrepreneurship, regardless of whether it is an existing company, a public organisation, or a new venture. For him, innovation is deeply rooted in entrepreneurship and actually gives resources a new ability to create wealth. Drucker (2014) also believes that innovation can be presented as a discipline, that it can be learnt and practiced – and that entrepreneurs should specifically look for sources of innovation and for changes that indicate opportunities for successful innovation, and ultimately apply the principles of successful innovation. Innovation is used as a means to change the organisation, whether in response to changes in the environment or as a preventive measure to influence the environment (Damanpour, 1988). The development of new products and processes is the result of building on existing capabilities and achievements through a critical review of new ways of thinking and methods in search of relevant novelties (Cantwell, 2000). On this basis, innovation is considered to depend on the creation of viable new capabilities on the basis of which new value is added to existing revenues. Innovation consists of several phases in which organizations transform ideas into new/improved products, services and processes to successfully improve, compete or differentiate the business in the marketplace (Baregheh et al., 2009). Innovation should be embedded in the strategic thinking of the organisation. The innovation strategy shows how the organisation's leadership uses innovation capacity to achieve a competitive position and improve performance (Gümüş & Gümüş, 2015). Without a clear innovation strategy of the organisation, innovation efforts may become mere attempts to adopt known practices without a clear context and direction, which does not lead to the achievement of organizational competitiveness and may pursue conflicting goals (Pisano, 2015). Companies that can leverage their knowledge and foster innovation are better able to respond to market demands and outperform their competitors. In line with that, Wang and Gao (2021) emphasize that dynamic capabilities, including knowledge management, are essential for achieving competitive advantage.

2.3. Internationalization of SMEs

Internationalization refers to the growth of business activity beyond national borders (Ruzzier et al., 2006). The term internationalization, as defined by Welch and Luostarinen (1988), refers to a growing engagement in global activities. This broad definition takes into account the dual nature of internationalization, which can encompass both inward and outward looking activities. Failure to take into account the risks associated with global competition can lead to both growth and survival problems for small and medium-sized enterprises (Ruzzier et al., 2006). The incentive to engage in the internationalization process often stems from the pursuit of financial gain and expansion, competitive forces, prospects in foreign markets, and saturation of the domestic market (Costa et al., 2015).

Competitive and innovative companies are important for the economy of the entire country. Internationalization can lead to competitiveness at company level, which can ultimately translate into improved economic performance at national and European level (European Commission, 2014): (1) the international activity of companies is associated with higher turnover, (2) internationally active

companies tend to have a higher employment rate, (3) there is a close link between internationalization and innovation. The study by Tuominen et al. (2022) suggests that companies that place a high value on innovation are better able to identify and exploit opportunities abroad, thereby facilitating their internationalization efforts. By aligning their innovation capabilities with customer needs, companies can effectively penetrate new markets and gain a competitive advantage. Casadesus-Masanell and Ricart (2010) emphasize that there is no single path for all companies, i.e. companies should use innovation and internationalization as drivers of their competitiveness through their business model. Companies should develop a business model that incorporates all the opportunities that internationalization offers them (available resources, new knowledge, technologies, markets) in order to create innovative products and services and thus ensure sustainable competitiveness.

3. METHODOLOGY

The aim of this study is to understand the role of innovation in the process of internationalization of small and medium-sized enterprises and how these two processes are interrelated. The main research question in this paper is therefore: Are innovation and competitiveness crucial for the internationalization of SMEs? This paper is based on qualitative research. The data was collected through in-depth, semi-structured interviews with owners and/or managers of selected companies. The sample consists of 8 small and medium-sized enterprises from Croatia from the manufacturing sector. A purposive sample was used to select the cases. In this type of sampling, the researcher uses their own judgment to identify and search for cases that contribute to answering the research question (Saunders et al., 2012). The purposive sampling technique is based on the deliberate selection of research participants based on the characteristics they possess, does not require a predetermined number of participants, and the researcher decides what information to collect and looks for individuals who have that information and are willing to provide it (Etikan et al., 2016). This sampling technique is not statistically representative, but is based on the strategic decision of the researcher and the overall logic of the study. The data was analyzed using the thematic analysis method. Thematic analysis is a method for systematically identifying, organizing and extracting insights about significant patterns (themes) in a data set. It is an accessible, flexible and popular method of qualitative data analysis (Braun & Clarke, 2012).

4. RESULTS AND DISCUSSION

After conducting and transcribing the interviews, a thematic analysis was carried out. It revealed some interesting aspects about innovation and competitiveness of small and medium-sized enterprises in Croatia. As already mentioned, the companies studied come from the manufacturing sector. There are four small and four medium-sized companies.

C1 is a traditional family business that is gradually internationalizing. Its focus on product and process innovation, coupled with knowledge acquisition through partnerships, indicates a strategy of differentiation and concentration on niche markets.

C2 demonstrates an aggressive export strategy even in its early stages. The emphasis on innovation, combined with strong customer relationships and possible utilization of research results, indicates a focus on quality and market response.

C3 is a young, technology-oriented company with a strong international focus. The use of foreign capital and subsidiaries indicates rapid expansion and a global market vision. The focus on innovative products and technologies is crucial for the company's competitiveness.

C4 is a family business with a diversified approach to internationalization. The focus on exports and foreign investments in combination with product innovations and research collaborations points to a long-term, sustainable growth strategy.

C5's internationalization is primarily driven by exports, but significant imports indicate a global supply chain. Dependence on public tenders indicates a B2G (business-to-government) focus. Process innovation and technology adoption likely target cost efficiency and competitiveness in this segment.

C6 serves different market segments with product and process innovations. The focus on public auctions indicates B2B sales. The dual focus on premium and low-cost products indicates a diversified product portfolio to appeal to different customer segments.

C7 shows a balanced approach to internationalization, combining export growth with global sourcing of materials and knowledge. The focus on product and process innovation and technology adoption indicates a commitment to continuous improvement and market leadership.

C8 is a medium-sized company that has successfully internationalized its operations, primarily through exports. Its strategic approach includes building partnerships, focusing on a key foreign market and emphasizing innovation in both products and processes. This enables the company to compete effectively in the demanding automotive industry.

Table 1 Cross company analysis

	COMPANY	INTERNATIONALIZATION	INNOVATION AND COMPETITIVENESS ASPECTS
Case 1	• Small family enterprise • Establishment 1982/2004 • Second generation family in management / ownership structure • Production of orthopedic and anatomical shoes • Export 25%	• Late internationalization • Focus on the export of products • Occasional internationalization others activities • Focus on small number of foreign markets • Partnership relations with customers	• Innovation of products • Innovation of processes • Exchange of the knowledge, technology and suppliers with a partner from abroad
Case 2	• Small business • Established in 2001 • Production of fresh pasta and inputs for bakery • Export 35%	• Early export orientation • Focus on export of products • Focus on larger number of foreign markets • Long term relations with customers and distributors	• Innovation of products • Innovation of processes • Cooperation with scientific and research institutions
Case 3	• Small business • Established in 2014 • Production of smart benches and smart city solutions • Export 77.4%	• Early export orientation • Focus on the export of products • Focus on large number of foreign markets • Long term relations with partners • Foreign capital • Foreign subsidiary	• Innovative product • Latest technology
Case 4	• Small business • Established in 1990 • Second generation family in management / ownership structure • Production of honey and other beekeeping products • Export 21.5%	• Early export orientation • Export and investments abroad • Focus on key markets, additional markets with small share	• Innovative products • Cooperation with scientific and research institutions

	COMPANY	INTERNATIONALIZATION	INNOVATION AND COMPETITIVENESS ASPECTS
Case 5	• Medium sized enterprise • Established in 1992 • Production working clothes • Export 11.1%	• Later internationalization • Focus on export of products • Focus on small number of foreign markets • Significant import • Sales through public tenders	• Innovation of process • Latest technology
Case 6	• Medium sized enterprise • Established in 1990 • Production of chips and *snacks* • Export 39.5%	• Focus on export of products • Sales through public auctions • Focus on small number of foreign markets	• Innovation of products (premium brands) • Innovation of process (low-cost segment) • The latest technology
Case 7	• Medium sized enterprise • Established in 1992 • Second generation family in management / ownership structure • Production decorative panels for entrance doors • Export 47.1%	• Gradual growth of export • Focus on export of products • Import of raw materials, materials, machines, knowledge • Focus on key markets, additional markets with small share	• Innovation of products • Innovation of process • Latest technology
Case 8	• Medium enterprise • Established in 1998 • Production of machines and tools for the automotive industry • Export 83.7%	• Export of products and services • Cooperation with companies abroad • Foreign subsidiary • Focus on one key foreign market	• Innovation of products (prototypes) • Innovation of process • Latest technology

Source: Own research

To summarize, early internationalization is common, as many companies, even small ones, seek international markets early on. Exporting is the most important form of internationalization, although some companies also use partnerships, foreign investment or subsidiaries. In all cases, the importance of innovation is emphasized, whether in products, processes or both. Technology also plays a crucial role, i.e. adopting the latest technology is a common theme, enabling both innovation and efficiency.

The pace of technological change, the speed at which technology is becoming accessible to everyone, globalization, the information age and the intensity of knowledge are leading to a hypercompetition in which the survival of companies is becoming increasingly difficult (Barbosa & Romero, 2016). Internationally successful companies are not passive observers in the process of creating competitive advantage, but are in a never-ending process of searching for new competitive advantages and fighting with competitors to protect and improve these competitive advantages (Porter, 1990). During the analaysis of the data, it has been shown that companies are indeed aware of the global competition and their position in that competitive market. All of the interviewed companies took steps to ensure they have capabilities to innovate in order to sustain their competitive advantage. This is also in line with what was stated before by Singh et al. (2007) and Weerawardena et al. (2007), meaning that innovation needs to be in the core of internationalization process to be able to compete with international competitors. There was evidence that observed companies invested in the latest technology, innovated their products, processes, or both.

Filippetti et al. (2011) emphasize the bidirectional causality of the link between internationalization and innovation. More innovative companies are more likely to be successful in international markets and/or attract foreign investment. However, it should be emphasized that there is a risk of creating a vicious circle - innovative companies are more successful in international business, which enables them to acquire additional knowledge, which in turn enables them to be more

innovative and thus better equipped for the international market. On the other hand, less innovative companies fall into the opposite vicious circle - a lower rate of innovation leads to a lower rate of internationalization, which denies them access to certain knowledge and opportunities, leading to an innovation gap. Osuna (2014) takes the same approach and confirms the bidirectional causality of the relationship between internationalization and innovation. He also claims that they can be considered as a single business strategy, since both processes influence business performance, and he has also identified the same factors that influence both processes: technological capabilities, technological investments, alliances and decision-making structures. Therefore, his conclusion is that innovation activities lead to internationalization and internationalization leads to innovation. This has also been show from own research. Observed companies have used the resources and technology available on international markets to innovate their own products or processes. Some of the observed cases have also utilized the knowledge of their international partnerships to help them improve their offering and create sustainable competitive advantage.

Yin and Liang's (2022) study on the impact of different types of innovation on export performance highlights that companies need to strategically manage both internal capabilities and external partnerships to maximize their internationalization outcomes. By integrating these strategies, companies can improve their innovation capabilities and better manage the complexity of global markets. For the observed companies, internationalization process has not been accidental, it was a strategic focus of the owners. Internationalization requires a lot of preparation, knowledge and awareness of the factors and challenges influencing this process, therefore it needs to be part of the company strategy. All of the owners have shown that internationalization was a process that they prepared for, but their main focus was specifically on innovation.

To become competitive, SMEs try to improve their innovation potential and bring new products/services to the market, and thanks to international business, companies have access to: (1) international skills and resources (technology, know-how…), (2) international business relations (education, research, knowledge exchange) and (3) capital from foreign markets (Daszkiewicz & Wach, 2012). All of the analyzed companies have shown how they utilized these aspects to improve their innovativeness and competitiveness.

5. CONCLUSION

Small and medium-sized enterprises must base their path into the international arena on innovation, because innovation is one of the most important strengths of companies and a fundamental element in ensuring competitiveness. Only competitive companies can be successful on the international market. By gaining access to resources, knowledge and capital in foreign markets, companies have the opportunity to increase their competitiveness and reduce their weaknesses, which they might not have been able to do without internationalization. Companies may decide to internationalize certain business activities or parts of the value chain. This can enable them to carry out these activities better, faster and with higher quality, thus creating the basis for their competitiveness.

Innovation has indeed proven to be one of the most important drivers of competitiveness and entry into foreign markets. Companies have managed to find a way to position themselves in these markets through various aspects of innovation. It is clear from the above that there is a close connection between competitiveness, innovation and the internationalization of small and medium-sized enterprises, and that this connection goes in several directions. Certainly, companies must be competitive and innovative in order to be able to hold their own on the international market, but it is precisely this international market that offers them a multitude of new opportunities to

strengthen or expand their competitiveness and to acquire new knowledge that can be translated into innovations within the company. If you consider that internationalization does not only mean exporting, but also placing every part of business activity in an international context, the reciprocal link between competitiveness, innovation and internationalization becomes clear.

Of course, this study is only a first step in understanding the relationship between innovation, competitiveness and internationalization of SMEs. A more comprehensive quantitative study could provide generalizable conclusions. It would also be interesting to observe how open innovation or artificial intelligence (AI) affect the internationalization of SMEs. Nonetheless, the UN Sustainable Development Goals are becoming increasingly important in companies' strategic considerations, so it is important for future research to consider the aspect of sustainability in relation to innovation and internationalization.

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Social Innovation - A New Innovation Paradigm

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Abstract: *To remain competitive in the market, enterprises—especially micro, small, and medium-sized enterprises (SMEs)—must be innovative, as their size often limits their resources and scalability. Various types of innovation represent a new paradigm, with social innovation being one of the key forms. Social innovation refers to innovative activities and services driven by the goal of meeting social needs, or novel ideas aimed at addressing those needs, building relationships, and fostering collaboration. These innovations can manifest as products, services, or models that provide more effective solutions to previously unmet challenges. The European Commission has identified six key areas for social innovation: demographic shifts, environmental trends, new community dynamics (such as the digital society), poverty-related issues like social inclusion and child poverty, health and well-being, and the growing demand for ethical goods and services, such as fair trade and local production. This paper explores the definition and various types of social innovation, highlighting its importance in today's world. It also examines the crucial factors needed for successful social innovation implementation and concludes with examples of companies that have effectively incorporated social innovation into their business models.*

1. INTRODUCTION

"Innovation is *conditio sine qua non* for obtaining competitive advantage; they are crucial for growth and development of every organization." (Vukojevic & Tanovic, 2023) The term 'innovation' is derived from the Italian verb *innovate*, which signifies "the act of creating or introducing something new." (Drucker, 1985) Several scholars emphasize the importance of novelty in the definition of innovation, highlighting the creation of something new as a fundamental aspect. According to Baregheh, innovation is "the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace." (Baregheh et al., 2009) Nikolic claims that innovations are "the best instrument for solving contemporary social challenges, such as climate changes, lack of resources and energy, health protection and aging society." (Nikolic, 2014) Various authors highlight creativity as a fundamental element of innovation, but purpose is equally important. Trott defines innovation as "an idea transformed into practical reality" (Trott, 2005) while other (Schumpeter, 1934) introduced the first classification in 1934, categorizing innovations into "product, process, market, and organizational types". In addition, there are various types of innovation, distinguished by their specific characteristics.

Based on different levels of novelty, innovation varies from minor tweaks to existing systems to the creation of entirely new structures. Generally speaking, "incremental innovation is recognized as small variations or improvements of existing products or processes, whereas radical innovation

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encompasses new products or processes that make the prevailing ones obsolete." (Tushman & Anderson, 1986) On the other hand, "radical innovations are frequently linked to aggressive and unpredictable processes of creative destruction with unplanned outcomes." (Dew & Sarasvathy, 2016) Some authors claim that "modular innovation can be understood as an innovation that does not change the architecture of an existing product, but introduces new components that add additional functionality to it." (Henderson & Clark, 1990)

Another typology is to closed and open innovations. "The main characteristic of the close innovation model is vertically integrated research and development departments that develop technology in-house for use in-house." (Chesbrough, 2003) Ot the other hand, "open innovation refers to how organizations use internal and external sourcing and markets paths for innovation, or share innovation processes." (Oberg & Alexander, 2019) Nowadays, thanks to the online platforms, firms can gain new ideas and solution from individuals and institutions all over the world.

"While the concept of innovation has been present in scientific literature since the 20th century, its approach has undergone significant transformation in the context of the knowledge-based economy" (Vukojevic & Tanovic, 2023). This shift has led to the emergence of new paradigms, such as open innovation and social innovation.

2. SOCIAL INNOVATION

Unlike innovations with a commercial focus, "social innovations are described as innovative activities and services driven by the aim of addressing and fulfilling social needs." (Mulgan, 2006) According to some authors (Vale, 2009), social innovation plays a key role in empowering people and serves as a means of "creating social cohesion and contributing to economic dynamism", thus driving social change. "What triggers social innovation is not competition but rather the need to overcome adversity and risk, although the ability to seize opportunities and meet challenges also seem to be major incentives." (Cunha et al., 2015) Social innovation can be described as "a novel solution to a social problem that is more effective, efficient, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals". (Phillips et al., 2015) Other authors see innovation as "innovative activities and services that are motivated by the goal of meeting a social need" (Mulgan, 2006) The conclusion can be drawn that "the goal of social innovation is the systemic transformation of society and not only the attention of a specific problem". (Cajaiba-Santana, 2014) According to European Commission, "social innovation can be defined as the development and implementation of new ideas (products, services and models) to meet social needs and create new social relationships or collaborations." (European Commission, 2013) Speaking of identification of social needs, European Commission determined "six key areas, such as: Demography; Environmental trends; New community trends (digital society); Poverty-related trends – social inclusion and child poverty; Health and wellbeing; The trend of ethical goods and services: fair trade and local production."(*ibid.*)

"Social innovation refers to new solution (products, services, models, markets, processes, etc.) that, simultaneously, satisfies a social need (more effectively than existing solutions), creating new or better capacities and relationships, making a better use of assets and resources." (The Young Foundation, 2012, p. 18) These factors align with the following questions. At the core lies the purpose of social innovation, represented by the question "Why". The question "How" addresses the originality of the solution and its impact on society. The final question, "What" focuses on what has been improved—whether a process, product, or another element—while also revealing the societal capabilities and relationships at play (Portales, 2019).

Table 1 shows crucial elements of social innovation. Innovation inherently involves novelty, where the value of an idea is realized only when it is effectively implemented, not merely conceived. Addressing a social need is central to social innovation, which must lead to tangible improvements in outcomes. It requires the creation of new roles and relationships, as well as the more efficient utilization of resources.

Table 1. Core elements of social innovation

Core elements	Description
Novelty	Social innovations are new to the field, sector, region, market or user, or to be applied in a new way.
From ideas to implementation	There is a distinction between invention (developing ideas) and innovation (implementing and applying ideas).
Meets a social need	Social innovations are explicitly designed to meet a recognized social need.
Effectiveness	Social innovations are more effective than existing solutions - create a more measurable improvement in terms of outcomes.
Enhance society's capacity to act	Empowers beneficiaries by creating new roles and relationships, developing assets and capabilities and/or better use of assets and resources.

Source: Caulier-Grice et al. (2012)

There are several challenges for social innovators. Some research has shown that "key barriers to social innovation can be categorized into four main themes:

- Access to finance
- Scaling models
- Skills and formation
- Networks and intermediaries." (Young Foundation and The Social Innovation eXchange (SIX), 2010)

Securing financial resources poses a major challenge to the initiation and expansion of social innovation. Conventional funding structures tend to favor profit-driven commercial ventures over socially oriented projects, resulting in constrained capital access for social innovators. A key barrier to scaling is the absence of scalable business models that successfully balance social impact with financial sustainability. Social innovation demands a distinctive skill set, combining entrepreneurial, managerial, and creative problem-solving abilities. Human resources are vital for driving and sustaining innovation. Moreover, the spread of social innovation depends on connecting innovators with resources, partners, and markets, but smaller innovators often struggle to access key networks where opportunities are concentrated. These networks are fundamental because they serve as ecosystems, facilitating collaboration, knowledge sharing, and scaling.

Other authors emphasize the importance of regulations. "Government can open up the problem space for more sustainable policies by fostering greater technological innovation. That, in turn, requires integration of environmental, health, and safety regulation with industrial, employment, and trade policies." (Ashford & Hall, 2011) Supportive policies can provide incentives like tax breaks and grants, while encouraging public-private partnerships that align resources and goals for innovation. Regulations set standards for accountability; ensuring social innovations deliver on their promises and protect beneficiaries, especially vulnerable groups. Other source identifies "several aspects of the environment that could be important drivers and barriers to innovation, including the social and political complexity of the environment in which public organizations operate and the relationships between public and private organizations at different levels." (Bekkers et al., 2013)

3. TYPES OF SOCIAL INNOVATION

There are various types of social innovation, distinguished by their specific characteristics.

Firstly, "social innovations can be divided into (Boelman et al., 2014):
- New products and services;
- New practice;
- New processes;
- New rules and regulative."

"A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses." (OECD, 2005). Product innovation can be achieved through new materials, improved components, or enhanced performance or by modifying service methods and adding new features. One of the great examples can be *solar-powered lanterns for off-grid communities,* designed to replace kerosene lamps in rural areas with no access to electricity. These environmentally friendly, affordable products improve safety and reduce carbon emissions while providing reliable lighting for households. Moreover, mobile health clinics bring medical services directly to underserved communities, especially in remote or impoverished areas.

Social innovation practice often involves the development of new services that address social needs in more effective, sustainable, or inclusive ways. These innovations often require the creation of new professional roles or the establishment of new relationships between professionals, communities, and organizations. Great examples are social entrepreneurs; these individuals create and lead social ventures aimed at addressing social problems while maintaining a business model. They often take on dual roles, being both innovators and advocates of social change.

"A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software." (*ibid*.) An illustration of this is Community-Supported Agriculture (CSA). In CSA, consumers purchase shares of a farm's harvest in advance, which helps farmers with upfront costs and secures a market for their produce. The process of connecting farmers directly to consumers promotes sustainable agriculture and ensures that fresh, local produce is accessible to communities.

New rules and regulations ensure that social innovations operate within legal and ethical boundaries, scale effectively, and deliver long-term positive impact. These regulations help foster a supportive environment where social innovations can thrive while addressing social challenges. Some of the examples are regulations for green technology or the circular economy. These laws ensure increased focus on key environmental practices, such as recycling, sustainable packaging, and the design of durable products, as well as the adoption of renewable energy solutions, green construction practices, and the enforcement of emissions standards.

Alternatively, other author (Pausch, 2023) differentiates "four types of social innovation, based on several characteristics such as goals, methods and initiators".

The first type of social innovation (SI), emancipation, aims to achieve political freedom and equality through bottom-up approaches like reform, rebellion, or revolution, typically initiated by revolutionaries and reformers, with generally positive long-term democratic impact. One of the examples is climate justice movements. These movements emphasize that climate change is not just an environmental issue, but also a social, economic, and human rights issue, as its effects

exacerbate existing inequalities. The second type of SI, adaptation to technological advancement, is profit-driven and follows a top-down approach led by entrepreneurs and inventors, with a mixed impact on democracy depending on how the technology is applied. As an illustration, we can use social media platform, which have changed how people interact and access information. The third type of SI, problem-solving, uses a technocratic approach to address societal issues through governance and management, led by managers or civil servants, with potentially neutral or positive effects on democracy. In particular, smoking bans in public spaces by governments is an example of problem-solving through technocratic management. The fourth type of SI, local norm deviation, focuses on solving local problems through bottom-up efforts by activists, promoting democracy on a smaller scale with primarily positive outcomes. Namely, community-led urban gardening projects in cities, initiated by local activists.

Table 2. Four types of Social Innovation

	SI as emancipation	**SI as adaption to technological innovation**	**SI as problem solving**	**SI as local norm deviation**
Goals	Emancipation	Profit	Problem solving by management	Local problem solving with emancipatory goals
Methods	BOTTOM UP through reform	TOP DOWN through open innovation	TOP DOWN through technocratic management or governance	BOTTOP UP through subversion
Initiators/actors	Revolutionaries, rebels, reformers	Entrepreneurs, inventors	Mangers, civil servant	Activists
Spatial dimension	Global	Market - oriented	State levels (government)	Local
Time dimension	Midterm to long-term	Short and midterm, but long-term impact	Short and midterm	Midterm
Democratic impact	Positive with a possibly negative turn	Possibly positive, negative or neutral	Possibly positive, but negative or neutral	Mainly positive

Source: Pausch (2023)

4. EXAMPLES OF SME SOCIAL INNOVATORS

In contemporary society, social innovations have become an increasingly prevalent phenomenon across various sectors of life. These innovations, driven by the dynamic interplay of evolving societal needs, technological advancements, and cultural shifts, are reshaping traditional systems and fostering new approaches to addressing complex challenges. In the following section, we will present an overview of several prominent social innovators, highlighting their contributions to advancing societal progress through innovative approaches and strategies.

Social enterprises are regarded as key drivers of transformation and crucial vehicles for fostering labour market integration, promoting social inclusion, and stimulating economic progress. They are distinguished by a supportive work atmosphere, emphasizing collaboration and adaptability to evolving circumstance "The poor access to funding and the need of self-financing is the major challenge for them to become sustainable and grow." (Sdrali et al., 2016) Therefore, social enterprises "often depend on institutional partnerships for help (i.e. public private partnership), state-supported embedded ties and collaboration with key public actors to build and maintain their ventures." (Vannebo & Grande, 2018) Social entrepreneurship can be understood as "being generated by entrepreneurs tuned to social problems or opportunities outside the organizations

and are synchronized with the entrepreneur's goals, missions and commitment to those social problems or opportunities" (Grilo & Moreira, 2022) or as "business activity with a central social purpose." (Austin et al., 2006).

One of the examples of a medium-sized social enterprise that combines business innovation with social purpose, offering economic empowerment and supporting the marginalized is The Big Issue. Founded in Great Britain in 1991, they are focused on reduction of poverty and homelessness. They exist as "a social business to create impact and make a profit, always re-investing this profit back into extending our mission, to help millions of people in the UK affected by poverty to earn, learn and thrive." (Big Issue Group, n.d.) The Big Issue operates with the purpose of providing individuals experiencing homelessness and socio-economic disadvantage with opportunities to generate legal income, thereby supporting their socioeconomic reintegration. Vendors engage in a micro-entrepreneurial model wherein they purchase the magazine at a subsidized rate and resell it at market value, allowing them to generate profit and promote financial independence. Support services are also provided to vendors to facilitate access to essential services aimed at improving their quality of life. These services include assistance with housing, health and wellbeing support (including mental health), access to identification and bank accounts, provision of fuel and food vouchers, and the delivery of necessary training and support to enable vendors to transition into sustainable, long-term employment. The Big Issue has expanded globally, with sister titles established in Australia, South Africa, Japan, Taiwan, and Korea, alongside over 100 affiliated street papers spanning 41 countries. Their mission is to "create innovative solutions through enterprise, to unlock social and economic opportunity" is with the main goal "to have 11 million people every year engage with our products and services by 2027". (*ibid*.)

In examining the contributions of these social innovators, the objective is to explore the varied and transformative ways in which social innovation is being applied to drive positive change, both within local communities and on a broader, global scale.

5. CONCLUSION

Innovation plays a fundamental role in fostering growth and development, not only within enterprises and economies but also at the societal level. Social innovations, in particular, hold significant value as their objectives extend beyond purely economic considerations. At the forefront, the primary impact of social innovations lies in their capacity to address and fulfil a wide range of social needs. These needs may encompass critical areas such as poverty alleviation, environmental sustainability, and the enhancement of health and well-being. This paper gave various definitions of social innovation, based on highlighting some of their characteristics. Moreover, several typologies of social innovations were given. In addition, paper presents example of social innovation with great impact to society. Looking ahead, future trends must prioritize the creation of new regulatory frameworks and the establishment of supportive ecosystems that nurture and promote social innovation. Such efforts are essential for maximizing the broader societal benefits of innovation, ensuring that it contributes meaningfully to societal advancement and collective well-being.

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The Impact of Innovation on the Adoption of Greener Supply Chains: Evidence from Firms in the Western Balkans

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Abstract: *In response to global pressures for environmental responsibility and sustainable growth, businesses are increasingly seeking to transform their supply chains by adopting greener practices. In the Western Balkans, however, the transition to greener supply chains remains limited, hindered by structural challenges and a lack of integration with global sustainability standards. While existing literature emphasizes innovation as a key enabler of sustainable business practices, its specific role in supporting the shift to greener supply chains, especially in the WB6 context, has not been sufficiently explored. This study investigates the impact of innovation on the likelihood that firms adopt environmentally friendly sourcing practices, with a particular focus on the supply of greener materials. Drawing on data from 1,200 firms surveyed through the 2024 Business Opinion Balkan Barometer, the binary logistic regression model is applied to assess whether firms that engage in innovation are more likely to green their supply chains. The findings demonstrate a strong positive relationship between innovation and the adoption of greener material sourcing, suggesting that innovation serves as a critical driver in promoting sustainable supply chain transformation.*

1. INTRODUCTION

Sustainability has emerged as a central priority in business, environmental, and policy discourse over the past decade. As firms are increasingly called upon to address ecological and social concerns, sustainability is no longer viewed as an optional strategy but as an integral component of business operations. As Giovannoni and Fabietti (2013) argue, achieving sustainability requires embedding it into every function of the organization, from establishing governance systems to integrating it into product design and service delivery, and implementing robust management and reporting mechanisms. In the Western Balkans, while the importance of sustainability is gaining traction, businesses face persistent challenges in operationalizing sustainable practices. These include institutional limitations, fragmented regulatory frameworks, and limited access to technical knowledge and support. As a result, despite rising awareness, the pace of transition remains uneven (Kosta, 2022; Ignjatović et al., 2024; Bjelić et al., 2024; Licastro and Sergi, 2021; Mitić et al., 2022). Amid these barriers, innovation has been increasingly recognized as a catalyst for sustainability. A growing body of literature emphasizes that process improvements (Moyano-Fuentes et al., 2018), green product design (Dangelico et al., 2017), R&D investments (Fernández et al., 2018), sustainable business model innovation (Evans et al., 2017), and open innovation mechanisms (Rauter et al., 2019) play a critical role in driving environmental transformation. In particular, innovation is essential for greening supply chains by promoting the use of environmentally friendly materials, reducing dependency on virgin resources, and fostering circularity. However, there is still a notable research gap concerning how innovation affects the uptake of green supply chain practices in the Western Balkans. Specifically, the extent to which firms in the region adopt greener material sourcing as a result of innovation remains unexplored.

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This article addresses this gap by examining the role of innovation in advancing greener supply chains, with a specific focus on the supply of greener materials. Using firm-level data from 1,200 businesses across the Western Balkans, collected as part of the 2024 Business Opinion Balkan Barometer survey, this study applies binary logistic regression to evaluate whether firms that report introducing product or service innovations are more likely to use greener inputs in their operations. By doing so, the study sheds light on how innovation serves as a strategic lever for improving environmental sustainability in regional supply chains.

The article is structured into five sections. Following this introduction, the literature review synthesizes key research on innovation and green supply chain management. The methodology section outlines the data sources, variable construction, and analytical methods. The results section presents empirical findings on the relationship between innovation and the adoption of greener materials. The conclusion discusses the broader implications for firms and policymakers. Finally, the study offers recommendations and suggests directions for future research.

2. LITERATURE REVIEW

2.1. Sustainability Practices

Sustainability is a dynamic economic system that is centered on resource use efficiency, waste minimization, and responsible material management throughout its lifecycle. Sustainability seeks to strike a balance between economic advancement and protection of the environment to provide long-term advantages to companies and society in general. Sustainability is integrated in different ways in companies, using particular strategies and practices that enable profitability as well as ecological accountability. One of the key sustainability strategies is to transition towards using renewable energy to replace fossil fuels. Solar, wind, and biomass energy are a cleaner alternative, reducing carbon footprints and helping towards a more sustainable energy system (Kandpal et al., 2024). The adoption of renewable energy can assist companies in reducing their ecological footprints dramatically without compromising their financial resilience (Korhonen et al., 2018; Yang et al., 2023). The adoption of renewable energy also facilitates decoupling of economic growth from ecological decline, making it possible to pursue industrial expansion without exacerbating climate change (Dung et al., 2023). Another crucial sustainability approach is material conservation and waste minimization in more efficient modes of production. Organizations apply lean manufacturing and precision engineering to extract maximum use of resources, thereby reducing raw material use and unnecessary waste (Maldonado-Guzmán & Garza-Reyes, 2023). Such approaches enable industries to produce high-quality goods without compromising their impact on the environment, argues Stahel (2019). Sustainability also encourages industries to use environmentally friendly material substitutes. By applying more green inputs, industries can cut their use of virgin resources, helping to conserve biodiversity and cut pollution (Geissdoerfer et al., 2018). To enhance sustainability, companies also sell waste material and byproducts to other companies, promoting industrial symbiosis that maximizes resource utilization. Industrial symbiosis is a system in which companies collaborate to reuse waste in one business as a material in a different business, thereby reducing waste generation and resource utilization (Kimuli et al., 2025). Such cooperation shows how sustainability can drive business process innovations that lead to cost savings and protection of the environment. Recycling also has a key function in sustainability, in that it permits companies to take useful material from waste streams and reuse it in manufacturing processes (Park & Chertow, 2014). Recycling not only reduces the use of new material, but it also reduces energy utilized in making new material, thereby making processes more sustainable (Bogoviz et al., 2020; Mandpe et al., 2023). Another essential sustainability

strategy is making products more durable, easy to maintain, and repairable. Product design that facilitates after-sales maintenance, reuse, and repair is increasingly used in companies, helping to enable consumers to extend product lifecycles rather than dispose of their products prematurely (Bocken et al., 2016). By making easy-repairable and maintainable products, companies help to restrict total resource use and waste generation (Moreno et al., 2016).

2.2. Innovation and Green Supply Chain Management

The link between innovation and sustainability has garnered increasing attention in the academic literature, particularly as firms and policymakers seek effective strategies to align economic growth with environmental responsibility. Innovation is now widely recognized as a key enabler of sustainable business practices. Among these, the supply of greener materials stands out as a crucial component of sustainable supply chain management, facilitating resource efficiency and emissions reduction.

A significant body of research underscores the transformative potential of technological innovation in sustainability transitions. Innovative firms tend to adopt advanced production methods and substitute traditional inputs with environmentally friendly materials, contributing to improved sustainability performance across industries. This process is especially relevant in the context of green supply chain management, which emphasizes the use of green materials, waste reduction, and the creation of closed-loop systems that promote circular resource use (Chizaryfard et al., 2023). Their study on the electric vehicle supply chain demonstrates that co-development of technologies and product design innovations enabled through long-term collaboration among supply chain actors can significantly enhance the uptake of greener inputs.

Firms that actively pursue innovation are typically better positioned to experiment with and adopt alternative materials that are both eco-friendly and technically viable. According to Habib et al. (2021), innovation-oriented organizations tend to build collaborative relationships with suppliers and participate in knowledge-sharing networks, which expand their access to emerging green material solutions. This innovation-driven mindset not only fosters continuous improvement but also strengthens firms' capabilities in material substitution, thus contributing to more sustainable supply chain configurations.

Empirical research further supports this relationship. For example, Fusillo et al. (2025) find that U.S.-based firms investing in green product development also tend to adopt greener technologies and material inputs in response to both regulatory demands and shifting consumer expectations. Similarly, Barriga Medina et al. (2022), in a study of Brazilian agribusiness firms, reveal that eco-innovation enhances organizational and resource-based capabilities, enabling firms to explore environmentally responsible sourcing strategies and to integrate greener materials into their production processes.

These findings suggest that innovation is a strategic driver of greener material adoption, reinforcing the idea that sustainable supply chains are not merely operational choices but outcomes of intentional innovation efforts. However, despite this growing consensus, there remains a gap in understanding how this dynamic unfolds in transitional economies, such as those in the Western Balkans, where institutional and infrastructural limitations may inhibit such innovation-sustainability linkages. The present study addresses this gap by empirically examining the extent to which innovation increases the likelihood that firms in the Western Balkans supply greener materials.

3. DATA, VARIABLES AND METHODS

3.1. Data

This study utilizes data from the 2024 Business Opinion Balkan Barometer survey, conducted between March and April 2024 across six Western Balkan economies: Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, North Macedonia, and Serbia. The survey was financially supported by the Regional Cooperation Council (RCC), which also oversaw the initial drafting of the questionnaire in English. Once finalized, the questionnaire was translated into the respective local languages to ensure clarity and accessibility for respondents. To facilitate data collection, the Computer-Assisted Personal Interviewing (CAPI) methodology was employed. This approach involved digitizing the questionnaires and uploading them onto tablets or laptops, enabling interviewers to conduct structured and efficient surveys. Each economy had a designated supervisor responsible for reviewing the digital questionnaires before fieldwork began, ensuring accuracy and readiness. The selection of participating businesses followed a stratified random sampling method, designed to ensure a representative distribution across the Western Balkans. The sample was stratified based on region, industry sector, firm size, and ownership type, allowing for a balanced representation of different business activities. Official statistical office records from each economy served as the sampling frame, providing a reliable basis for selecting firms. A total of 1,200 businesses participated in the survey, with 200 firms interviewed per economy. This structured methodology ensures that the dataset is representative and robust, providing valuable insights into business sentiment and economic trends in the region.

3.2. Variables

3.2.1. Dependent variables

This analysis applies a binary logistic regression model to investigate the influence of innovation on the likelihood of firms supplying greener materials. The dependent variable is represented by a binary (dummy) variable that takes the value 1 if the company has implemented the following sustainability principle "Supply of greener materials". The variable takes value 0 if the company has not taken this sustainability practice.

3.2.2. Independent variable

The main independent variable is innovation, which is a dichotomous variable measured through the question "Did your company introduced any new/improved products/services during the last year?" If the response is yes that it is coded with 1 and 0 if otherwise.

3.2.3. Control variables

- **Firm Age**: This variable captures the number of years a company has been active in the market. It is measured as a continuous variable, reflecting the firm's level of experience, which could influence its approach to sustainability initiatives. Due to its non-normal distribution, a logarithmic transformation was applied for analytical purposes.
- **Company Size:** This categorical variable classifies businesses according to their workforce size. The categories are defined as follows: 1 = Micro enterprise (fewer than 10 employees), 2 = Small enterprise (10–49 employees), 3 = Medium enterprise (50–249 employees), and 4 = Large enterprise (250 or more employees).

* Under the UN Resolution 1244.

- **Country:** This categorical variable denotes the country in which the firm is based. The classification includes the following codes: 1 = Albania, 2 = Bosnia and Herzegovina, 3 = Kosovo*, 4 = Montenegro, 5 = North Macedonia, and 6 = Serbia.
- **Legal Structure:** This variable represents the company's legal classification, which may influence its operational flexibility and strategic decision-making regarding sustainability adoption. It is categorized as follows: 1 = Sole proprietorship, 2 = Limited liability company, and 3 = Joint-stock company.

4. RESULTS

To analyse the data, the binary logistic regression model is utilized, considering the dichotomous nature of the dependent variable.

Model describes the impact of innovation on the likelihood of firms supplying greener materials. Firms that have introduced new or improved products/services in the past year are 2.13 times more likely to supply greener materials than those that have not. This statistically significant result confirms that product/service innovation is a strong predictor of greener input adoption, aligning with the broader literature linking innovation to environmentally responsible sourcing. Older firms are less likely to supply greener materials. This could suggest that younger or newer firms are more adaptable or responsive to sustainability trends and customer expectations related to green inputs. Firms in Albania, BiH, and especially Kosovo* are significantly more likely than those in Serbia to supply greener materials. This may reflect differences in national policy environments, market demand for green practices, or donor influence. In contrast, firms in Montenegro and North Macedonia do not differ significantly from those in Serbia. The model explains approximately 18% of the variance in firms' decisions to supply greener materials, which is a moderate explanatory power for a logistic regression in a business context.

Table 1. Results of binary logistic regression

	Model 1			
	B	**S.E.**	**P-value**	**Expected Beta**
Innovation	,754	,174	,000	2,125
Age (log)	-,236	,121	,051	,790
Size (RC: Large)				
Micro (2-9 employees)	,195	,552	,725	1,215
Small (10-49 employees)	,540	,551	,326	1,717
Medium (50-249 employees)	,387	,569	,497	1,472
Legal status (RC: Joint stock)				
Physical person	,103	,517	,842	1,109
Limited liability	,196	,396	,622	1,216
Country (RC: Serbia)				
Albania	1,298	,340	,000	3,662
BiH	1,042	,343	,002	2,834
*Kosovo**	1,678	,327	,000	5,353
Montenegro	-,611	,447	,172	,543
North Macedonia	-,037	,412	,928	,963
Constant	-2,716	,766	,000	,066
N	1200			
The Nagelkerke R Square	0,180			
Standard errors in parentheses: ***p< 0.01, **p<0.05, *p<0.1				

Source: Authors' calculations from the Balkan Barometer 2024 Business Opinion (Regional Cooperation Council, 2024)

* Under the UN Resolution 1244.

5. CONCLUSIONS, IMPLICATIONS AND FUTURE RESEARCH AGENDA

This study contributes to the growing literature on sustainability and innovation by empirically examining how product and service innovation influences firms' likelihood to adopt greener material sourcing in the Western Balkans. Drawing on survey data from 1,200 firms across six economies in the region, the findings reveal that innovative firms are significantly more likely to supply greener materials, suggesting a strong link between innovation capacity and sustainable supply chain practices. The analysis further shows that country-specific factors matter, firms in Kosovo*, Albania, and Bosnia and Herzegovina display a higher likelihood of adopting greener materials compared to Serbia, while firm age is negatively associated with such adoption, indicating that younger firms may be more flexible or sustainability-oriented.

For managers and business leaders, the findings highlight the strategic value of innovation in achieving environmental sustainability goals. Firms investing in new or improved products and services are not only enhancing competitiveness but are also advancing their capacity to shift toward greener supply chain models. This implies that sustainability and innovation should be treated as mutually reinforcing priorities. Additionally, younger firms may have a comparative advantage in adopting such practices, but established companies must also invest in innovation to remain relevant in increasingly eco-conscious markets.

From a policy perspective, the study suggests a need for more targeted support mechanisms to stimulate green innovation, particularly in firms with legacy systems or those operating in less advanced institutional environments. Public authorities and development partners in the Western Balkans should incentivize innovation activities, through grants, tax credits, or public-private partnerships with a clear sustainability dimension. Moreover, national strategies should aim to harmonize regulations and introduce standards that reward green procurement and environmentally responsible sourcing.

While this study provides initial insights, it opens several avenues for future inquiry. First, there is scope to explore the mediating role of firm capabilities in the relationship between innovation and green material adoption. Second, qualitative case studies could provide a deeper understanding of how firms operationalize innovation for greener inputs. Third, future research should expand to investigate supply chain dynamics more broadly, including collaboration with suppliers, buyer pressure, and digital tools that facilitate traceability and sustainability assessments. Finally, longitudinal data would be valuable in assessing how consistent and durable the relationship between innovation and green supply chain practices is over time.

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Strategic Management: Are Groups the Best Way to Make Decisions?

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Abstract: *Strategic management is the process with the greatest impact on firm's success or failure. Through the analysis of the current situation and the situation in which the company wants to be, strategic management has the responsibility for its growth. Risk and uncertainty are common conditions for strategic decision-making. Considering that the external environment is becoming increasingly unpredictable and also the bounded rationality, companies are more oriented towards the use of groups, especially for strategic decisions. The main purpose of the current research is to investigate the use of groups in strategic decision-making. Through a quantitative approach, this research upgrades the evidence arising from the existing literature by providing new elements to support a deeper understanding of the effects of the way strategic decisions are made on firm performance, enhancing the knowledge base in the field of strategic management.*

1. INTRODUCTION

Strategic management is the part of the entire management process that has the greatest impact on firm's performance. It deals with the future and helps the company to find the best way to move from the current situation to the situation it wants to be. Of all the activities that managers do, nothing affects firm's success or failure more than how well its top management team determines the long-term direction, develops effective competitive strategies, and implements objectives, strategies and business methods. Thus, strategic management is responsible for elaborating a strategic vision. Then, the strategic vision must be converted into specific performance results the appropriate strategy must be selected and designed. The tasks of top managers require strategic decision-making that are not simple. The complexity of these decisions stems from the fact that the external environment is increasingly characterized by dynamism and turbulence, and certainty is a condition that rarely occurs, especially for strategic decision-making (Deep, 2023). As a result, strategic managers make decisions about new situations that are non-programmed, unstructured and complex. Thus, risk and uncertainty are an integral part of strategic management theory and empirics (Arrfelt et al., 2018). On the other side, there is the bounded rationality of the decision maker as an obstacle to optimal decisions (Peterson, 2017). For all the above reasons, but not only, firms are increasingly oriented towards group decision-making, especially in the context of strategic decisions. There is abundant empirical evidence that groups make better decisions than individuals, highlighting various benefits of group decision-making (Bang & Frith, 2017; Hsieh et al., 2020).

The motivation for the current research derives from the consideration that strategic decisions have important consequences on firm's successes or failures and their effectiveness depends also on the way they are made. The main goal of the current research is to investigate the use of groups to make strategic decisions. The intention is to identify variables and elements and to discover

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possible relationships between them, so as to be able to define some general reflections about top managers' propensity for group decision-making processes, offering important insights on the dynamics of strategic management, competitive advantages and firm performance. To support the main purpose, the research questions are as follows:

1. How much are groups used for strategic decisions?
2. What are the most important benefits that determine top managers propensity for group decision-making?
3. What are the most important limits of group decision-making in the context of strategic decisions?

2. LITERATURE REVIEW

Practice has shown that firms that engage in strategic management are better positioned than those that do not attach importance to it or ignore it (Barney & Hesterly, 2020). The more unstable the environment in which organizations operate, the more important strategic management becomes. According to Wheelen et al. (2018), the benefits of strategic management are numerous. Thus, it provides a clearer understanding of the organization's vision, helps the organization understand what is important from a strategic point of view, improves understanding of a rapidly changing environment, and orients the efforts of everyone in the organization in one direction. Strategic managers are engaged in making decisions that directly impact the organization's performance. Strategic decisions refer to firm's future, are important and not routine. They affect the entire organization and require numerous resources (Osmani, 2017).

While the dynamism of the external environment is increasing, companies are faced with rapid technological changes, short-life products, the threat of new powerful competitors, frequent maneuvers by competitors to consolidate their position, and the rapid evolution of customer demand and expectations. In a literature review of the environment influence on firm performance, Nyaberi (2021) found important support for the conclusion that the external environment can be at the same time a source of opportunity and threat. In a dynamic environment, strategic managers must make decisions under conditions of uncertainty. Uncertainty means that they do not have sufficient and timely information to anticipate changes and make good decisions. The unpredictable environment increases the degree of complexity that top managers must deal with. In conditions of complexity, the only behavior that can guarantee survival is exploration at high levels and the ability to quickly develop temporary structures that can exploit any opportunity or cope with any threat that may arise (Rothaermel, 2021).

The characteristics of the external environment also have important implications for the internal organization of the firm. The more dynamic the external environment, the more flexible processes must replace rigid ones, making it necessary to adopt an organic organizational structure, instead of a mechanical one (Gutterman, 2023). The organic structure can take an ad hoc configuration, characterized by high flexibility and the ability to adapt to changes. Organic structures are characterized by a low level of formalism and standardization, while decision-making is decentralized. Such a structure is horizontal, therefore characterized by several decision-making centers and decision-making by groups (Martela, 2019).

Referring to Surowiecki (2004), who introduced the concept of "wisdom of crowds", the many are smarter than the few. However, for this to happen, several conditions must be met. The first condition is related to the diversity of opinions. Each member of the group must have its own opinion, formulated based on the information he has on the problem/situation. The second condition refers to the independence of opinions. So, the opinions of the members should be personal and

not determined by the opinions of others. The third criteria is the decentralization. According to the author, members are able to specialize and draw on local knowledge. He states that the best decisions are a product of disagreement and contest, but aggregation of private judgements is needed in order to make collective decisions. The last criteria, is the trust, which means that each member should believe that everyone within the group will be fair.

According to Lunenburg (2010), the group collects a greater amount of information than a single individual could collect for the same situation. Thus, the group has the advantage that the lack of information of one individual is supplemented by another individual. In addition to the advantage that the group can be a greater pool of knowledge, Kinicki (2021) highlights other important advantages of group decision-making. Thus, the group can analyze the situation in different contexts because members' backgrounds and experiences are different. Also, in group decision-making, we have a better understanding of the decision and greater commitment.

The study of Bang and Frith (2017) highlighted that group decision-making overcomes biases. According to the authors, biases increase the efficiency of information processing and make decision-making a less frustrating process, but can often lead to bad decisions. Panicker and Sharma (2020) found that group decision-making positively influences growth opportunities and members' outcomes. Previously, Miller and Monge (1986) concluded that a participatory decision-making process improves personal motivation. Other empirical studies have shown that group decision-making increases satisfaction (Wright & Kim, 2004) and self-confidence (Crandall & Parnell, 1994). Referring to Hsieh et al. (2020), group detection sensitivity is better than the detection sensitivity of the best individual. On the other hand, workload capacity measures showed evidence of supercapacity processing.

The dynamic external environment, globalization and intensification of competition make top managers operate in conditions of a high degree of complexity that requires the analysis of a large number of variables related to each other in a non-linear manner. The nonlinearity makes predictions more difficult, turning the decision-making process into uncontrollable (Sammut-Bonnici, 2015). Classical science was based on linearity, a concept that makes us think that decision-making is a simple task. But complexity theory, based on the study of nonlinear dynamical systems, emphasizes the opposite. Each element of the system can change randomly and therefore the final state of the system cannot be predicted, starting only from the initial conditions and we can't view the whole as the sum of its parts (Turner & Baker, 2019). Under these conditions, based also on the benefits of group decision-making evidenced by previous studies, the question that arises is whether the use of groups is the best way to make strategic decisions.

3. EMPIRICAL APPROACH

3.1. Research Methodology and Participants

For the current study is adopted the quantitative research and for data collection is used the questionnaire, which is designed in order to understand the use of groups for strategic decisions. In doing this, it should be said that we do not refer to a specific model, but the statements have been elaborated based on the literature review and conclusions of previous investigations. In consistency with the research questions, the questionnaire was built and developed on the basis of 11 statements to be evaluated on Likert scale 1-5, which represents a simple technique that records the intensity of the agreement of each participant for each proposed statement, instead of simply approving or refusing them.

The target population refers to top managers, CEO, COO and CFO, of banking institutions, insurance institutions and real estate operating in Albania. For the current research is chosen the non-probability sampling technique, mainly in the form of purposive sampling. The sample was also determined based on the geographical criteria. Thus, the current research is focused on the companies with location in Tirana and Durres as the two main cities of Albania. A total of 204 questionnaires were distributed and 113 collected, with a response rate of 55.4%, which indicates the low willingness of top managers to participate to this investigation.

Table 1. Participants characteristics

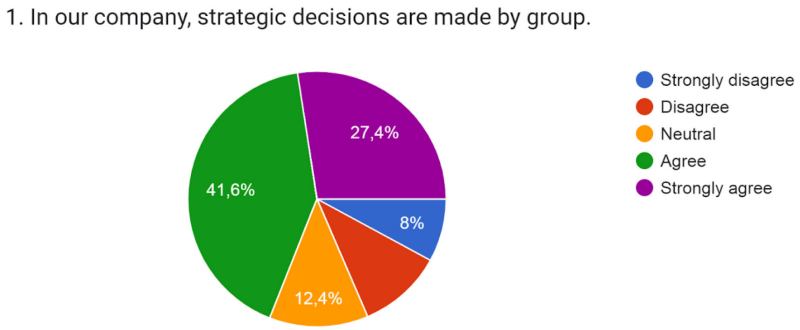
Distribution	
Firm's profile	
Banking Institutions	40.7%
Insurance Institutions	37.2%
Real Estate	22.1%
Age	
25-38 years	25.7%
39-52 years	39.8%
53-66 years	34.5%
Gender	
Female	31.9%
Male	68.1%
Position	
CEO	40.7%
COO, CFO	59.3%

Source: Own research

3.2. Data Collected and Discussion

The main purpose of this study was to investigate the use of groups in strategic decision-making. Following, using graphs, is discussed about the data collected for each statement included in the questionnaire.

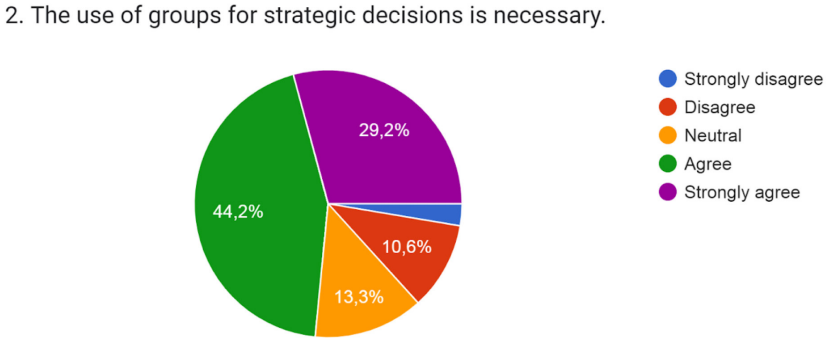
As Graph 1 shows, 69% of participants claim that within their company, strategic decisions are made in a group. 18.6% of them state that strategic decisions are not made in groups, while 12.4% of top managers refuse to comment on the use of groups to make strategic decisions.



Graph 1. The use of groups for strategic decisions

Source: Own research

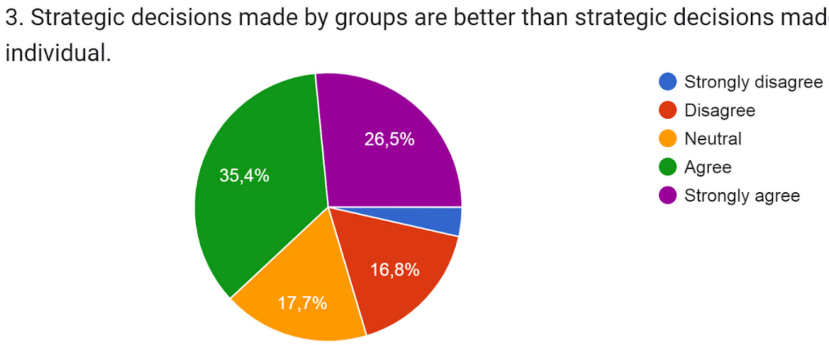
73.4% of top managers perceive the use of groups for strategic decision-making as a necessity. 13.3% of them think that groups are not necessary for decision-making, and also, 13.3% of the participants choose not to express their position regarding this statement.



Graph 2. The necessity to use groups

Source: Own research

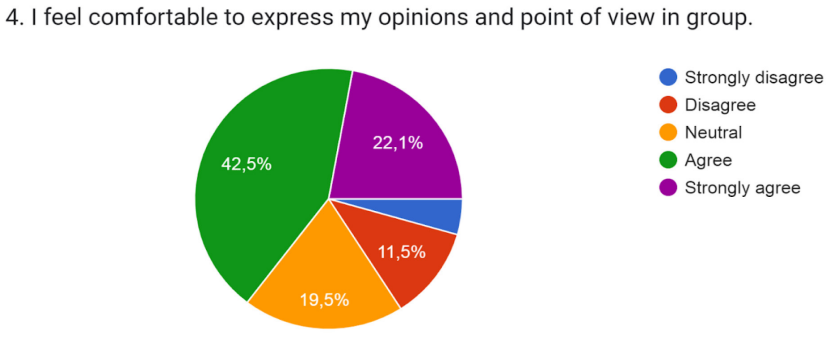
62% of participants agree and strongly agree with the opinion that groups make better decisions than individuals. However, 20.4% of top managers do not think so, while 17.7% of them hold a neutral position regarding who makes better decisions.



Graph 3. Group vs. individual decisions

Source: Own research

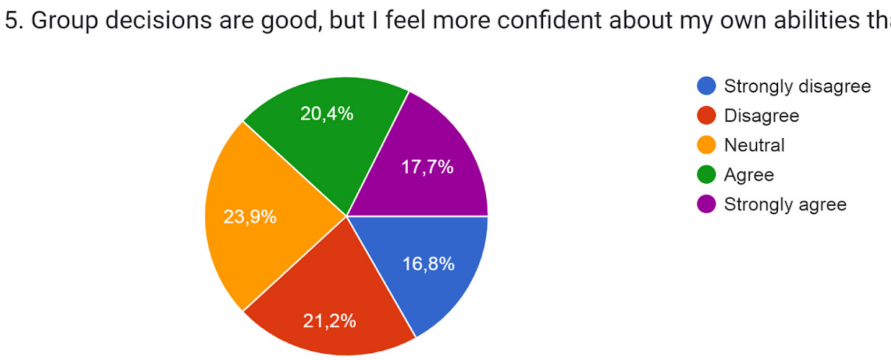
64.6% of participants said they feel comfortable being a member of a group. On the other hand, 15.9% of top managers participating in this study do not feel this way, while 19.5% of them chose not to answer.



Graph 4. Feeling comfortable as a group member

Source: Own research

As shown in Figure 5, 38.1% of participants stated that they feel more confident about their own abilities than those of others. Also, 38% of top managers do not overestimate their abilities, while 23.9% of them have a neutral stance on this.

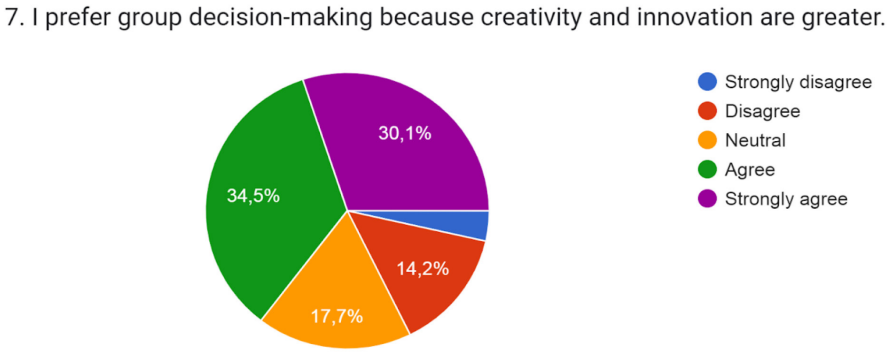


Graph 5. The confidence in others' abilities
Source: Own research

As shown in Graph 6, 31.9% of participants believe that the use of groups is a threat to the power of top managers. 46.9% of top managers do not have this perception of groups, while 21.2% of them choose not to express their opinion.

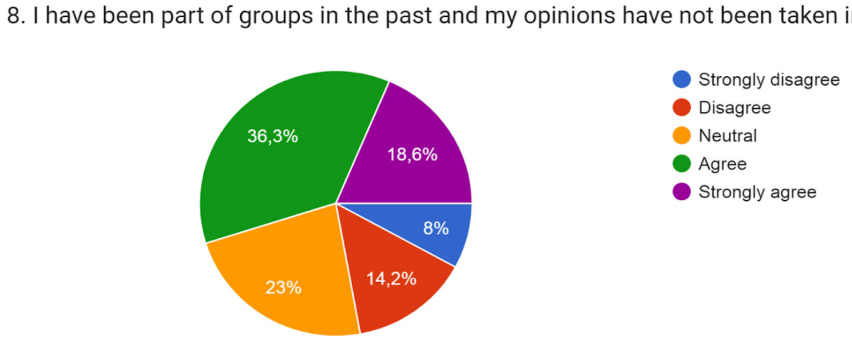
Graph 6. Group impact on personal control and power
Source: Own research

64.6% of top managers participating in this study believe that the use of groups in decision-making leads to more creativity and innovation. 17.7% of them do not think so, while another 17.7% of participants have a neutral stance on this matter.



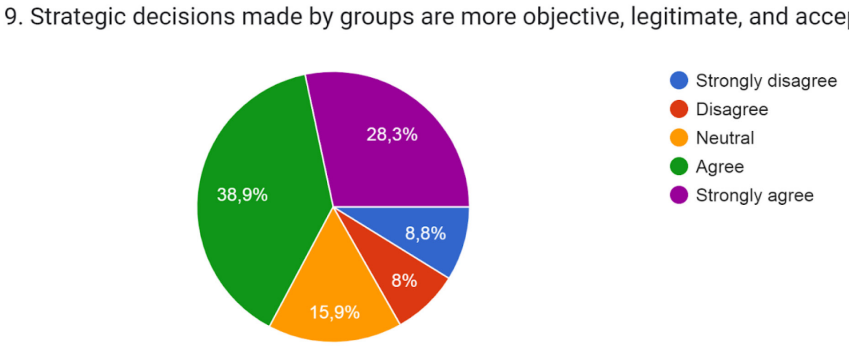
Graph 7. Creativity and innovation
Source: Own research

55% of top managers participating in this study declare that there have been cases where their thoughts and opinions have not been taken into account by other members of the group. 22.2% of them state that this has not happened in the past, while 23% of top managers do not comment on this.



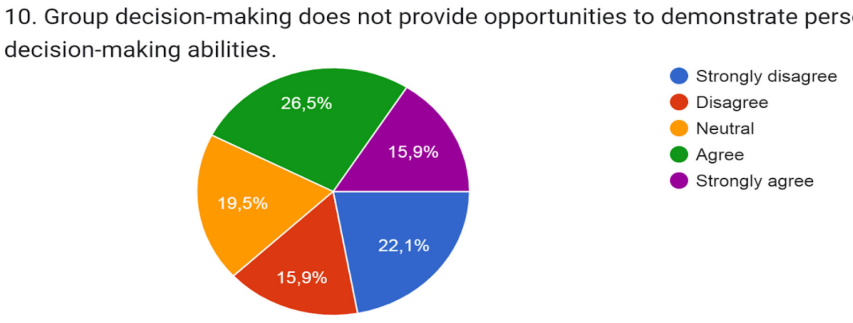
Graph 8. Diversity of opinions within the group
Source: Own research

67.2% of top managers participating in this study admit that decisions made by a group are more objective, legitimate and acceptable than decisions made by an individual. 16.8% of them do not think so, while 15.9% have maintained a neutral stance regarding these characteristics of decisions.



Graph 9. Decisions' characteristics made by groups
Source: Own research

As shown in Graph 10, 42.4% of top managers participating in this study admit that group decision-making does not allow showing what the decision-making skills are. However, 38% of them do not think so, while 19.5% have maintained a neutral stance regarding this statement.



Graph 10. Personal abilities within the group
Source: Own research

4. FUTURE RESEARCH DIRECTIONS

The present investigation contributes in several ways to the existing literature on how group impacts strategic decisions and can be the starting point for future research, which can offer important

information on how strategic decisions should be made. First, it specifically investigates top managers' perceptions of group decision-making. While this investigation allows for in-depth generalizable insights on group decision-making and attitudes of top managers, we cannot understand if the findings are directly related to top manager characteristics, company size, characteristics of the industry or management philosophy. These could be interesting topics for future research. Second, this study employs a quantitative methodology. While such methodology provides results that can be generalized, they may lack rich and context-specific insights. Also, this study focuses on a specific geographic area within a country. Would the same or similar findings be found in different geographic areas and countries? Third, this study is conducted within a specific timeframe, and the findings are reflective of the economic, social, political, and industry conditions prevailing during that period. In a dynamic environment, these conditions change over time, impacting the way strategic decisions are made.

5. CONCLUSION

Strategic decisions aim to modify firm's balance to ensure satisfactory levels of firm's efficiency and competitive effectiveness. The most important strategic decisions refer to the choice of sectors to invest in, the needs firm's product or services will meet, the way firm's resources will be allocated, the competitive advantages to create, how to maintain them, the position against competitors, etc. As can be understood, these are complex decisions that directly affect the success or failure of a firm and are made under risk and uncertainty. Thus, the question that arises is whether it would be better for strategic decisions to be made by groups, to increase their effectiveness and minimize the negative consequences of bounded rationality, since previous studies have shown that groups make better decisions than individuals.

69% of top managers participating in this investigation claim that in their companies, strategic decisions are made by groups, and for 73.4% of them the use of groups is a necessity. 62% of participants agree with the opinion that groups make better decisions than individuals. For 64.6% of participants is comfortable being a member of a group, but 38.1% of top managers state that they feel more confident about their abilities than those of others. On the other side, 46.9% of participants do not perceive groups as a threat to the power of top managers. 55% of participants declare that there have been cases in the past where their thoughts and opinions have not been taken into account by other members of the group. 67.2% of top managers admit that decisions made by a group are more objective, legitimate, and acceptable than decisions made by an individual, while 64.6% of them believe that strategic decisions made by groups are more creative and innovative. 42.4% of participants believe that group decision-making does not allow showing personal decision-making skills.

By exploring the attitudes of Albanian top managers, the study offers important insights. The research provides some important implications. Scholars can build upon the insights gained from the present research to explore related topics, expand the geographical scope, or delve into specific aspects of group decision-making and strategic management. These contributions collectively enhance the knowledge base in these fields. Referring to managers, the study contributes to the understanding that group and participative processes, by improving creativity, inclusivity, and collaborations, create suitable conditions for good strategic decisions and firms' performance. Referring to policymakers, first, they should encourage and incentivize large participation in decision-making processes to support a more objective promotion and performance evaluation. Second, policymakers and managers can actively collaborate on policies that support employee equality and the prohibition of discrimination.

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Strategic Approaches of Entrepreneurship in the Modern Business Environment

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Abstract: *The modern business environment is defined by constant and dynamic changes within the globalized market. Small and medium-sized enterprises (SMEs) are increasingly competing with large corporations, creating challenges for both groups. Rapid market changes and technological advancements demand the adoption of agile frameworks, robust innovation ecosystems, and data-driven decision-making strategies. Entrepreneurship is becoming an important driver of innovation and technological advancement within enterprises, supporting competitiveness and growth. Governments, enterprises, and individuals play important roles in improving strategic entrepreneurship through policy support, innovative practices, and active engagement in sustainable approaches. Collaboration among these stakeholders is important to address evolving market demands and ensure the development of resilient, forward-looking enterprises capable of thriving in a competitive landscape. In this paper, strategic approaches of entrepreneurship in enterprises are analyzed. The main goal is to develop a theoretical model for improving business performance and competitiveness. Additionally, based on the analyzed literature and the developed model, suggestions and guidelines are proposed for improving the business performance and competitiveness of SMEs. The paper provides a strong basis for future research in this domain.*

1. INTRODUCTION

Entrepreneurship in the modern business environment demands a multifaceted strategic approach that aligns with the dynamic nature of global markets and technological advancements. Central to this process is the ability to innovate and create competitive advantages. Innovation has become a cornerstone of entrepreneurial success, as it enables businesses to distinguish themselves through unique products, services, or operational methods (Ireland & Webb, 2007). Entrepreneurs are increasingly adopting cutting-edge technologies, supporting creative environments, and prioritizing customer-centric innovations. This approach not only helps businesses stand out in competitive landscapes but also ensures they remain adaptable to evolving market demands. The emphasis on cultivating a culture that values experimentation, adaptability, and rapid prototyping allows businesses to stay relevant in industries that are characterized by rapid change and unpredictability (Schiuma & Santarsiero, 2024).

Economic uncertainties and market volatility have highlighted the need for resilient business models. Entrepreneurs are navigating a world that is increasingly shaped by disruptive forces such as global pandemics, geopolitical tensions, and shifting consumer behaviors. Resilience in entrepreneurship is not merely about surviving disruptions but thriving amidst them. Developing such resilience requires an understanding of risk management principles and the implementation of flexible strategies that can respond to unforeseen challenges. Entrepreneurs are employing tools like scenario planning, financial stress testing, and market diversification to safeguard their

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ventures against adverse conditions (Protogerou et al., 2022). The ability to improve quickly and adapt to new realities is now a critical component of entrepreneurial strategy, ensuring that businesses can sustain their operations and continue to deliver value even in times of crisis.

Digital transformation has emerged as a transformative force in entrepreneurship, revolutionizing the way businesses operate and engage with stakeholders. Entrepreneurs are leveraging advanced technologies, including artificial intelligence, big data analytics, and the Internet of Things, to improve efficiency, gain insights, and improve decision-making processes (Corvello et al., 2022). The adoption of digital tools also facilitates ecosystem collaboration, allowing businesses to build stronger networks with suppliers, partners, and customers. Such collaborations enable co-creation of value, where all participants in the ecosystem contribute to and benefit from shared innovation. Entrepreneurs are recognizing that digital transformation is not merely a technological upgrade but a strategic imperative that integrates operational efficiency with customer-centricity and market relevance (Protogerou et al., 2022; Corvello et al., 2022).

Ethical considerations and social responsibility are becoming integral to entrepreneurial strategies in response to changing consumer expectations and global challenges. The modern business environment requires entrepreneurs to address societal concerns such as sustainability, inclusivity, and transparency. Aligning business goals with broader social objectives, including the United Nations Sustainable Development Goals, demonstrates a commitment to ethical practices that resonate with stakeholders (Krannich & Reiser, 2023). Entrepreneurs are embedding environmental, social, and governance (ESG) principles into their operations, ensuring that their ventures contribute positively to society while maintaining profitability. This approach not only builds trust and brand loyalty but also positions businesses as responsible leaders in their industries.

Entrepreneurs today are operating at the intersection of innovation, resilience, digitalization, and ethics, navigating a complex environment that demands strategic agility and foresight. The interaction of these factors highlights the changing nature of entrepreneurship in a period characterized by fast technological advancements and increased social awareness (Krannich & Reiser, 2023; Protogerou et al., 2022). This context sets the stage for examining how strategic approaches can shape entrepreneurial success in the modern business landscape.

2. INNOVATION AND RESILIENT BUSINESS MODELS FOR COMPETITIVE ADVANTAGE

Innovation plays an important role in shaping entrepreneurial success within the modern business environment, where rapid technological advancements and evolving consumer expectations are commonplace. Entrepreneurs must strategically integrate innovative processes into their business models to remain competitive and relevant. This integration requires not only the adoption of cutting-edge technologies but also supporting an environment that encourages creativity and experimentation (Ireland & Webb, 2007; Protogerou et al., 2022). Innovation is not limited to product development; it extends to operational strategies, service delivery, and customer engagement. Entrepreneurs who prioritize innovation can create unique value propositions that distinguish them from competitors, establishing a foundation for sustainable growth and market leadership.

Incorporating innovation into a business strategy involves recognizing opportunities within market trends and consumer demands. Entrepreneurs often rely on market research, predictive analytics, and customer feedback to identify areas for improvement or entirely new avenues for growth. The implementation of emerging technologies such as artificial intelligence, augmented reality, and blockchain enables businesses to address complex challenges while optimizing their processes

(Corvello et al., 2022; Ireland & Webb, 2007; Joel & Oguanobi, 2024). Moreover, innovation requires a willingness to experiment and take calculated risks. Entrepreneurs must embrace uncertainty, as groundbreaking ideas often emerge from trial and error. This proactive approach allows businesses to adapt quickly to changing market conditions and seize new opportunities, reinforcing their competitive edge.

Entrepreneurs who embed innovation into their organizational culture benefit from increased employee engagement and motivation. Encouraging a culture of creativity empowers team members to propose and develop novel solutions, supporting a collaborative environment where ideas can flourish. This internal dynamic is important for driving continuous improvement and ensuring the organization remains agile in a rapidly shifting business landscape (Azevedo et al., 2021). Furthermore, partnerships and collaborations with research institutions, technology providers, and industry peers amplify the potential for innovative breakthroughs. These collaborations offer access to resources, expertise, and perspectives that may not be available within the organization, improving the ability to innovate effectively.

Resilience has become an essential characteristic for entrepreneurs navigating an increasingly volatile and unpredictable global economy. Economic crises, technological disruptions, and societal shifts create challenges that require strategic adaptability and foresight. Entrepreneurs must develop business models capable of withstanding external shocks while remaining aligned with long-term goals. Resilient business models often incorporate diversification, allowing entrepreneurs to spread risk across multiple products, markets, or revenue streams. Diversification ensures that the impact of a downturn in one area is mitigated by stability or growth in another, contributing to overall business sustainability.

Strategic planning plays a critical role in building resilience. Entrepreneurs frequently employ tools such as scenario analysis to anticipate potential disruptions and prepare contingency plans. These tools enable them to explore a range of possible outcomes and develop strategies tailored to various scenarios, ensuring they are equipped to respond effectively to unforeseen challenges (Singh et al., 2024; Datta et al., 2023). Financial management also forms a cornerstone of resilience. Entrepreneurs prioritize maintaining healthy cash reserves, minimizing debt, and optimizing cost structures to preserve financial stability during periods of uncertainty. Access to capital is another key consideration, as having flexible funding options provides the resources necessary to adapt and improve when required.

The ability to respond rapidly to changing circumstances is a defining feature of resilient businesses. Entrepreneurs must remain vigilant in monitoring market conditions, competitor activities, and regulatory developments to identify early signs of disruption. Rapid decision-making, supported by data-driven insights, enables timely adjustments that can mitigate risks and capitalize on emerging opportunities. Additionally, resilience is strengthened through strong relationships with stakeholders, including employees, suppliers, and customers. Open communication and trust-building create a network of support that helps businesses navigate challenging periods while maintaining operational continuity.

Entrepreneurs who prioritize resilience are better positioned to thrive in environments characterized by uncertainty and change (Settembre-Blundo et al., 2021). This capability not only safeguards the business from potential threats but also enables it to emerge stronger, with improved strategies and a deeper understanding of market dynamics. Resilience, coupled with innovation, forms the foundation of a strategic approach that equips entrepreneurs to succeed in the complexities of the modern business environment.

3. DIGITAL TRANSFORMATION AND ETHICAL ENTREPRENEURSHIP WITH SOCIAL RESPONSIBILITY

The advent of digital transformation has revolutionized the entrepreneurial landscape, enabling businesses to leverage technology to optimize operations, improve customer engagement, and improve decision-making processes. Entrepreneurs who embrace digital transformation are able to streamline workflows, reduce inefficiencies, and gain deeper insights into market trends and customer behavior. Digital tools such as artificial intelligence, big data analytics, and cloud computing have become essential in modern entrepreneurial strategies (Schiuma et al., 2022). These technologies allow businesses to process vast amounts of data, identify patterns, and make data-driven decisions that improve competitiveness and operational efficiency. Entrepreneurs are increasingly relying on these tools to refine their marketing strategies, improve product development cycles, and anticipate customer needs with greater precision.

Collaboration within digital ecosystems is another critical element of digital transformation. Entrepreneurs are forming partnerships with suppliers, distributors, and even competitors to create mutually beneficial networks that support innovation and resource sharing. These ecosystems enable the co-creation of value, where businesses combine their unique capabilities to offer more comprehensive solutions to customers. For example, small and medium enterprises can collaborate with larger organizations or technology providers to access advanced tools and infrastructure that might otherwise be beyond their reach. Such partnerships improve the scalability and reach of entrepreneurial ventures, allowing them to compete more effectively in a global market.

The use of digital platforms has also transformed customer engagement. Entrepreneurs are utilizing social media, e-commerce sites, and mobile applications to interact with their customers in real time (Corvello et al., 2022; Schiuma et al., 2022). These platforms provide a two-way communication channel, enabling businesses to gather feedback, address concerns, and build stronger relationships with their target audience. Additionally, the integration of technologies like chatbots, virtual reality, and augmented reality improves the customer experience by offering personalized and immersive interactions. Entrepreneurs who adopt these technologies can differentiate their offerings and create lasting impressions, supporting customer loyalty and long-term business growth.

Ethical considerations and social responsibility have become increasingly important in the modern entrepreneurial context. Consumers, investors, and other stakeholders are placing greater emphasis on the ethical practices and societal contributions of businesses. Entrepreneurs are expected to align their operations with principles of sustainability, inclusivity, and transparency (Settembre-Blundo et al., 2021; Krannich & Reiser, 2023). These values are no longer optional but are integral to gaining trust and maintaining a positive reputation in the marketplace. Ethical entrepreneurship involves making decisions that balance profitability with social impact, ensuring that business activities contribute positively to the communities they serve.

Sustainability is a key aspect of ethical entrepreneurship. Entrepreneurs are adopting environmentally friendly practices, such as reducing waste, conserving resources, and minimizing carbon footprints. Businesses are also exploring circular economy models, which emphasize reusing and recycling materials to create sustainable production cycles. Such initiatives not only address environmental concerns but also resonate with consumers who prioritize sustainability in their purchasing decisions. Entrepreneurs who demonstrate a commitment to sustainability often attract a loyal customer base and gain a competitive advantage in markets where ethical consumption is on the rise.

Inclusivity and diversity are other important dimensions of ethical entrepreneurship. Entrepreneurs are increasingly recognizing the value of creating inclusive workplaces and offering products and services that cater to diverse customer groups. Inclusive practices support innovation by bringing together people with different perspectives and experiences, resulting in more creative and well-rounded solutions. Additionally, businesses that prioritize diversity and inclusion are better equipped to address the needs of a global customer base, ensuring their relevance in an interconnected world (Suseno & Abbott, 2021; Settembre-Blundo et al., 2021; Krannich & Reiser, 2023).

Transparency and accountability are important for building trust with stakeholders. Entrepreneurs are implementing clear and open communication practices, providing stakeholders with accurate and timely information about their operations, performance, and impact. This level of transparency not only strengthens relationships with customers and investors but also helps businesses navigate regulatory requirements and avoid reputational risks (Sendlhofer & Tolstoy, 2022). Social responsibility initiatives, such as supporting local communities, addressing social inequalities, and contributing to charitable causes, further demonstrate the ethical commitment of entrepreneurs. These efforts improve brand image and create a positive legacy that benefits both the business and society as a whole.

Entrepreneurs who integrate digital transformation and ethical considerations into their strategies are better positioned to succeed in an increasingly complex and demanding business environment (Corvello et al., 2022; Schiuma et al., 2022). These elements are not only essential for achieving operational excellence but also for meeting the expectations of modern stakeholders who value innovation, responsibility, and transparency in their interactions with businesses.

4. DEVELOPED MODEL

Adoption of emerging technologies significantly influences innovation and digital transformation by acting as the driving force behind operational efficiency and competitive advantage. Advanced tools such as artificial intelligence and big data analytics enable businesses to process and analyze vast amounts of data, leading to informed decisions and the ability to anticipate market trends. This adoption strengthens market-driven innovation, where predictive analytics and trend analysis directly align product and service offerings with customer needs. The influence extends further into collaborative ecosystems, where shared technological resources and expertise improve the scalability and scope of innovation. Customer-centric solutions are also a direct outcome of technology adoption, as platforms like augmented and virtual reality create immersive and personalized experiences that support stronger connections with consumers.

Figure 1. Model for improving business performance and competitiveness
Source: Authors

Market-driven innovation shapes resilience and strategic adaptability by ensuring that entrepreneurial efforts remain aligned with evolving consumer demands and market conditions. The feedback loop generated through customer interactions and trend analysis informs the diversification of risk. Understanding market dynamics enables businesses to identify alternate revenue streams or product lines,

thus mitigating the adverse effects of market volatility. Scenario planning benefits from innovation as well, with analytics tools offering simulations and stress tests that allow businesses to anticipate disruptions and craft effective responses. This interplay ensures that financial agility is not only reactive but proactive, allowing entrepreneurs to allocate resources where they will generate the highest impact.

Collaborative ecosystems contribute to ethical practices and social responsibility through shared resources and networks that prioritize sustainable and inclusive approaches. Partnerships within ecosystems facilitate the development of sustainability initiatives by pooling expertise and resources to design environmentally friendly processes. These collaborations often lead to the creation of inclusive products and services that cater to diverse customer groups, demonstrating a commitment to social equity. Transparency and accountability are improved within these ecosystems, as partners hold each other to ethical standards, ensuring that the collective goals align with broader societal values. Community engagement initiatives also benefit from such collaboration, enabling businesses to amplify their impact through combined efforts.

Risk diversification is deeply connected to ethical practices, as businesses that spread their operations across multiple markets or revenue streams are better equipped to implement sustainable practices without compromising profitability. The ability to invest in resource conservation or waste reduction initiatives becomes feasible when financial stability is secured through diversified risk. Scenario planning, which relies on anticipating market disruptions, plays a critical role in sustaining community engagement and philanthropic efforts during periods of uncertainty. Entrepreneurs who strategically plan for adverse conditions can maintain their commitments to social responsibility, ensuring that their ethical initiatives remain consistent and impactful.

Financial agility bridges innovation and resilience by providing the resources needed to invest in emerging technologies and adapt to market changes. Businesses with strong financial management can allocate funds toward digital tools and infrastructure, ensuring that their operations remain at the forefront of technological advancements. Rapid decision-making complements this dynamic by utilizing real-time data generated through digital platforms, enabling businesses to improve quickly and maintain their competitive edge. The interplay between these sub-elements ensures that entrepreneurial efforts are not only innovative but also resilient, capable of withstanding external pressures while maintaining strategic direction.

Sustainability initiatives influence digital transformation by shaping the design and implementation of technologies that reduce environmental impact. Entrepreneurs who prioritize resource conservation often leverage tools such as IoT sensors to monitor energy usage and waste management systems. This integration of sustainability with technology reinforces transparency and accountability, as businesses can track and report their environmental performance with precision. Inclusivity and diversity further intersect with digital transformation, as advanced analytics tools enable businesses to understand and cater to the needs of diverse customer groups. These efforts reflect a broader commitment to ethical practices, demonstrating that innovation and resilience are deeply interconnected with social responsibility in the modern entrepreneurial landscape.

5. SUGGESTIONS AND GUIDELINES

- Encourage innovation through government grants and tax incentives. Governments should provide financial support to businesses investing in research and development, enabling access to emerging technologies. Tax relief programs can further motivate companies to allocate resources toward innovative practices that improve competitiveness.

- Establish collaborative innovation hubs and ecosystems. Governments and enterprises can set up physical and digital spaces where businesses, academia, and technology providers collaborate on new solutions. These hubs should focus on knowledge sharing, joint ventures, and supporting a culture of co-creation to accelerate technological advancements.
- Promote digital transformation through accessible infrastructure. Governments should invest in building robust digital infrastructure, including high-speed internet and cloud computing resources, especially in underserved areas. Enterprises can take advantage of this by integrating advanced tools into their operations, optimizing processes, and improving customer experiences.
- Support risk management and resilience-building programs. Financial institutions and governments can offer training and funding opportunities to help businesses diversify revenue streams and prepare for disruptions. Entrepreneurs should also adopt scenario planning and stress testing techniques to ensure their ventures can withstand economic and market fluctuations.
- Develop sustainability-focused regulations and incentives. Governments should implement policies that promote sustainable business practices, such as carbon credits or subsidies for eco-friendly operations. Enterprises must align their operations with these guidelines, adopting circular economy models to minimize waste and environmental impact.
- Support inclusivity through education and policy reform. Governments can introduce training programs to empower underrepresented groups in entrepreneurship and leadership roles. Enterprises should ensure that their hiring practices and product designs cater to diverse markets, creating an inclusive business environment.
- Encourage transparency and accountability in business operations. Governments and industry bodies can mandate the publication of ESG (Environmental, Social, and Governance) reports for businesses. This ensures that enterprises maintain ethical practices, building trust with consumers and stakeholders.
- Invest in community engagement initiatives. Governments and enterprises should partner on programs that benefit local communities, such as infrastructure development, education, and health services. Entrepreneurs can support these efforts by creating jobs, contributing to local economies, and addressing social inequalities through targeted initiatives.
- Improve digital literacy among individuals and enterprises. Governments can provide workshops and resources to educate businesses and citizens about the use of emerging technologies. Enterprises should invest in training their employees to maximize the benefits of digital tools and platforms.
- Promote public-private partnerships for competitive growth. Collaborative efforts between governments and enterprises can address large-scale challenges like technological advancement and economic resilience. These partnerships should aim to create policies and programs that improve the business environment and attract foreign investment.

6. CONCLUSION

The modern business environment presents a complex landscape where innovation, resilience, and ethical practices are indispensable for achieving superior performance and sustained competitiveness. Entrepreneurs, enterprises, and governments must strategically align their efforts to address the rapid technological advancements, economic uncertainties, and shifting societal expectations that define the contemporary marketplace. Innovation, driven by the adoption of advanced technologies and customer-centric solutions, emerges as a critical element, enabling businesses to differentiate themselves and adapt to evolving market demands. Digital transformation acts as a catalyst, supporting efficiency, collaboration, and improved decision-making processes.

Resilience remains equally important as businesses navigate a volatile global economy characterized by disruptions and uncertainties. Strategic adaptability, supported by tools such as scenario planning and risk diversification, empowers businesses to withstand external shocks while maintaining operational stability (Settembre-Blundo et al., 2021). Financial agility and rapid decision-making further bolster the ability of enterprises to improve in response to changing circumstances, ensuring that they remain competitive in an ever-changing environment.

Ethical practices and social responsibility have become fundamental in building trust and loyalty among stakeholders. Sustainability initiatives, inclusivity, and transparency are no longer optional but essential components of modern business strategies. Enterprises that prioritize these values demonstrate a commitment to societal well-being while improving their reputations and long-term viability. Governments, in turn, play a important role in shaping policies, providing incentives, and supporting ecosystems that support these objectives.

The interconnectedness of innovation, resilience, and ethical practices highlights the need for integrated approaches to improving business performance. Entrepreneurs and enterprises must adopt strategies that leverage technology, embrace adaptability, and prioritize societal impact. Governments and individuals have a important role in creating environments conducive to growth, collaboration, and sustainability. These collective efforts are essential for driving competitiveness and ensuring the success of businesses in the dynamic and demanding global marketplace.

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Women Entrepreneurs as Agents of Change. The Impact of Female Empowerment on Company Sustainability

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Abstract: *This study investigates the influence of female empowerment on the economic, social, and environmental dimensions of business sustainability. Starting from the premise that women entrepreneurs are agents of change, it is hypothesized that their empowerment positively impacts the pillars of sustainability. Employing a quantitative design with a structural equation modeling (SEM) approach and a sample of women entrepreneurs, the results confirm that female empowerment is significantly associated with greater economic, social, and environmental sustainability. The implications suggest that women entrepreneurs, by integrating holistic values into their strategies, contribute to long-term viability, social well-being, and responsible environmental management. This finding underscores the need for policies that promote female empowerment as a key strategy for achieving the Sustainable Development Goals.*

1. INTRODUCTION

Sustainability, understood as the capacity to meet the needs of the present without compromising the ability of future generations to meet their own needs, has gained increasing relevance in the business sphere. While its initial focus centered on the environmental dimension, the concept has evolved to include economic and social pillars (Grewatsch & Kleindienst, 2017). In this context, female empowerment, especially through entrepreneurship, emerges as a critical factor for achieving the Sustainable Development Goals (SDGs) of the 2030 Agenda (ODS, 2023). Female entrepreneurship not only fosters economic growth but also promotes gender equality and social inclusion, elements intrinsic to business sustainability (Dutta, 2020).

This study aims to analyze the impact of female empowerment on the economic, social, and environmental dimensions of business sustainability. It is argued that women entrepreneurs, due to their intrinsic characteristics and business approach, can be fundamental agents of change in building more sustainable and resilient companies. Despite the growing attention on female entrepreneurship and sustainability, there is a gap in the literature that comprehensively addresses the relationship between female empowerment, entrepreneurship, and the three pillars of sustainability.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The theoretical framework is based on the interconnection between female empowerment, entrepreneurship, and the dimensions of sustainability.

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2.1. Sustainability

Business sustainability goes beyond mere profit maximization, integrating social and environmental aspects into business strategy (Markman et al., 2019; Muñoz & Cohen, 2018). For entrepreneurship to enhance sustainability, policy must consider the gender dimensions that inhibit and enable entrepreneurship (Figueroa-Domecq et al., 2022). Sustainability is an important motivational factor for women entrepreneurs, strongly linked to the potential of their entrepreneurial initiative to generate environmental products and inclusive work environments, whereas men are more likely to view sustainability in terms of business opportunities (Figueroa-Domecq et al., 2022).

Female empowerment in the business sphere manifests as access to resources, decision-making, autonomy, and active participation in the economy (World Bank, 2012a; Kabeer, 1999, 2005). It is postulated that women entrepreneurs, by facing and overcoming barriers, develop a more holistic business vision oriented towards social and environmental impact, in addition to profitability (Warnecke, 2015). Previous research suggests that women-led businesses tend to be more socially responsible and integrate sustainable practices (Xheneti & Karki, 2018).

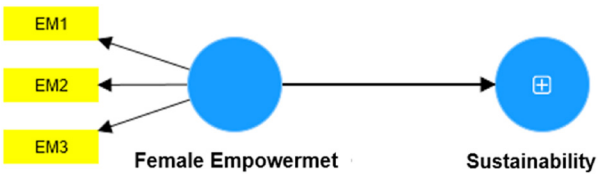

Figure 1. Model 1. Relates empowerment to the second-order variable sustainability.
Source: Own research

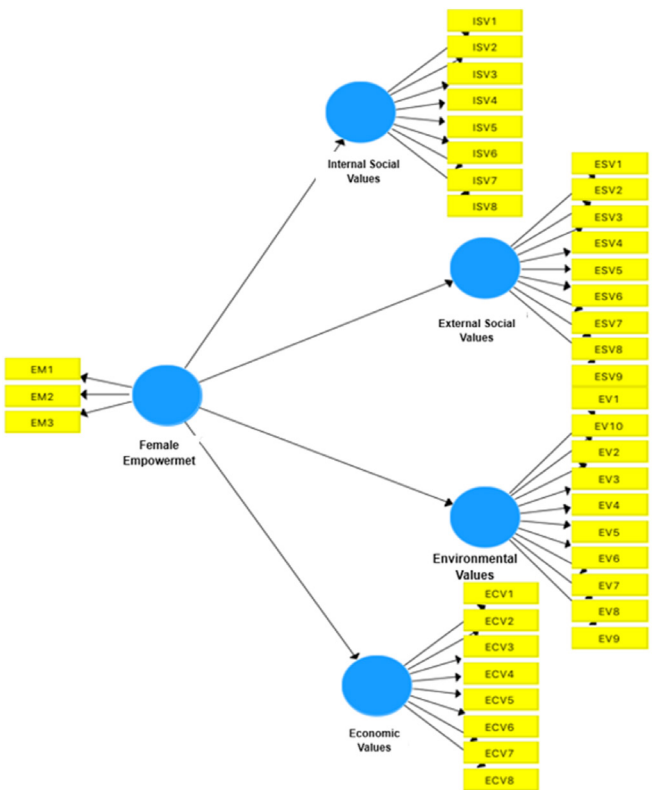

Figure 2. Model 2. Relates empowerment to the four dimensions of sustainability (Tarnanidis et al., 2019)
Source: Own research

In this study, based on the theoretical framework presented, we examine the effect of empowerment and its dimensions, according to the model identified by Chatterjee et al. (2018), with sustainability, according to the model proposed by Tarnanidis et al. (2019) which presents four categories of sustainable entrepreneurship: internal social values, external social values, economic values, and environmental values. This serves as a basis for developing and proposing a series of hypotheses. For a better understanding of the relationships between the variables of empowerment and sustainability, we developed the following conceptual models (Figures 1 and 2). We divided this initial model into two sub-models for a clearer understanding of the relationships between the variables of empowerment and sustainability, as well as their categories (see Figures 1 and 2).

Based on the above, the following general hypotheses are proposed:

H1: Female empowerment has a positive impact on the economic sustainability of the company.

H2: Female empowerment has a positive impact on the social sustainability of the company.

H3: Female empowerment has a positive impact on the environmental sustainability of the company.

3. METHODOLOGY

The present study adopts a quantitative approach and uses structural equation modeling (SEM) to analyze the hypothesized relationships.

3.1. ample and Procedures

The sample consisted of women entrepreneurs from various industries, selected through non-probabilistic sampling. Data were collected through an online survey.

3.1.1. Survey

The survey was structured into several sections to gather information on the socio-demographic data of the entrepreneurs, company characteristics, and measures of female empowerment and sustainability. 35 Likert scales were used to evaluate participants' perceptions.

3.2. Measurement of Study Variables

The key variables were:

- Female Empowerment: Measured through items related to autonomy in decision-making, control over resources, confidence in entrepreneurial skills, and participation in support networks.
- Economic Sustainability: Evaluated by indicators such as long-term profitability, financial stability, and value generation for the company.
- Social Sustainability: Included items on employee well-being, fair labor practices, impact on the local community, and diversity.
- Environmental Sustainability: Addressed waste management, efficient resource use, carbon footprint minimization, and adoption of ecological practices.

3.2.1. Methods

A pilot study was conducted to validate the reliability and validity of the scales. Data analysis was performed using statistical software for SEM, allowing for the simultaneous evaluation of relationships among multiple variables.

4. ANALYSIS

4.1. Sample Description

4.1.1. Socio-demographic Data

The sample consisted mainly of women with higher education, within a productive age range, and with previous experience in the business or professional field.

4.1.2. Company Data

The companies represented were predominantly small and medium-sized enterprises (SMEs), with varied seniority and operating in diverse economic sectors.

4.1.3. Descriptive Statistics of the Measurement Instruments Used

Descriptive analyses of the items showed adequate variability in responses, indicating that participants perceived different degrees of empowerment and sustainability in their companies.

4.1.4. Total Sustainability Score

Preliminary results indicated a general trend towards a positive perception of sustainability practices among the companies led by the surveyed entrepreneurs.

4.2. Structural Equation Modeling

The SEM analysis was conducted in two phases: the evaluation of the measurement model and the evaluation of the structural models.

4.2.1. Measurement Model Evaluation

Table 1. Measurement Model Evaluation 2. Cronbach's Alpha, Composite Reliability (ρc), Dijkstra-Henseler's (ρA) and Average Variance Extracted (AVE)

	Cronbach's Alpha	ρA	Composite Reliability	Average Variance Extracted (AVE)
Sustainability	0.941	0.966	0.945	0.5
Environmental Values	0.959	0.963	0.965	0.735
Economic Values	0.955	0.956	0.962	0.76
External Social Values	0.906	0.928	0.925	0.586
Internal Social Values	0.911	0.957	0.923	0.607

Source: Own research

The reliability and validity of the latent constructs were assessed using confirmatory factor analysis (CFA). The fit indices of the measurement model were satisfactory, indicating that the scales used

adequately measured the conceptual variables (Williams et al., 2009). Composite reliability and average variance extracted (AVE) for each construct met acceptable thresholds, which confirmed convergent and discriminant validity (see Table 1).

4.2.2. Structural Model Evaluation

The results of the structural model revealed significant and positive relationships between female empowerment and the three dimensions of sustainability.

- H1 (Female Empowerment - Economic Sustainability): A positive and significant relationship was found. The empowerment of women entrepreneurs is associated with greater economic sustainability, possibly due to a long-term strategic vision, more prudent risk management, and greater adaptability.
- H2 (Female Empowerment - Social Sustainability): This relationship was also positive and highly significant. Women entrepreneurs, as agents of change, tend to prioritize the well-being of their employees, equal opportunities, and contribution to the community, which strengthens the social dimension of sustainability.
- H3 (Female Empowerment - Environmental Sustainability): The hypothesis was supported by the data, showing a positive and significant correlation. Women entrepreneurs exhibit greater environmental awareness and a propensity to integrate ecological practices into their business models, which contributes to environmental sustainability.

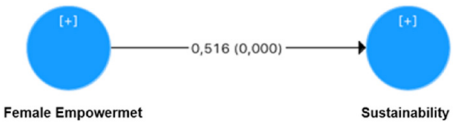

Figure 3. Results of the structural relationships of Model 1 and p-value (significance)

Source: Own research

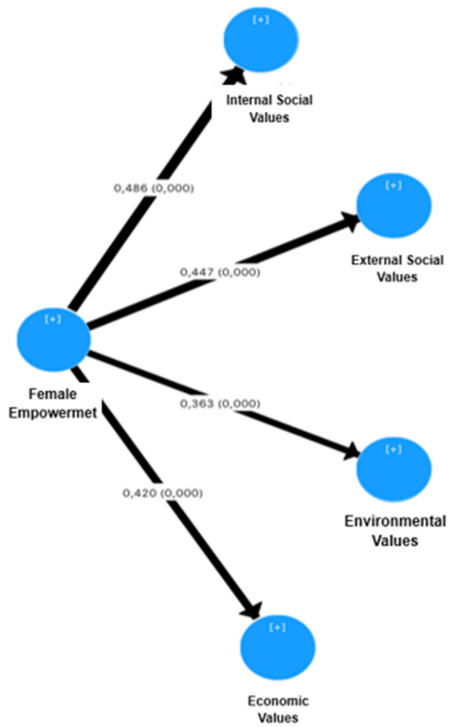

Figure 4. Results of the structural relationships of Model 2 and p-value (significance)

Source: Own research

5. CONCLUSION

The findings of this study provide strong evidence that female empowerment, through entrepreneurship, is a significant driver for business sustainability across its economic, social, and environmental dimensions. Women entrepreneurs not only seek profitability but also intrinsically integrate values related to social impact and environmental responsibility into their business strategies. This suggests that their active participation in the economy not only contributes to growth but does so in a more balanced and sustainable manner. The ability of women to innovate, adapt, and build resilient networks, coupled with their propensity to consider a wider spectrum of stakeholders, positions them as catalysts for the adoption of more sustainable business practices. The study reinforces the idea that investing in female empowerment is an effective strategy to advance the 2030 Agenda and build a more just and sustainable global economy.

6. THEORETICAL AND PRACTICAL IMPLICATIONS

Theoretical implications: This study contributes to the literature on female entrepreneurship and sustainability by offering an empirical model that directly links empowerment with the three pillars of sustainability. It expands the understanding of how the inherent characteristics of female entrepreneurship can translate into more sustainable business outcomes. Furthermore, it underscores the need for theoretical frameworks that more deeply integrate gender perspectives into business sustainability studies.

Practical implications: The results have important implications for policymakers, investors, and entrepreneurship support organizations.

Public policies: Governments and institutions should actively design policies that promote women's empowerment through entrepreneurship, facilitating access to funding, training, and support networks. Gender-sensitive incubation and acceleration programs could be particularly effective.

Funding: Financial institutions and investors should recognize the added value of women-led businesses in terms of sustainability. The development of specific financial products for women entrepreneurs that integrate sustainability criteria could further drive this trend.

Education and Training: It is crucial to strengthen entrepreneurial education with a gender focus, promoting awareness of sustainability from the initial stages of business training.

Corporate Culture: Organizations should foster a culture that values diversity and inclusion, recognizing the transformative potential of women in leadership and entrepreneurial roles to achieve sustainability goals.

7. LIMITATIONS AND FUTURE RESEARCH LINES

This study presents certain limitations. The sample, although significant, was non-probabilistic, which may affect the generalizability of the results. The cross-sectional nature of the survey does not allow for establishing direct causality, but rather associations. Future research could benefit from longitudinal studies to observe the evolution of the impact of female empowerment on sustainability over time. Likewise, it would be valuable to explore the role of mediating or moderating variables, such as industry type, cultural context, or the country's level of economic development, in the relationship between female empowerment and sustainability. Qualitative research could

also complement these findings, providing a deeper understanding of the experiences and motivations of women entrepreneurs on their path toward sustainability. Finally, it would be interesting to compare the results with male-led businesses to identify differences and similarities in the adoption of sustainable practices.

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From Vision to Reality: The Transformative Power of Consultancy Services for Non-governmental Organizations

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Abstract: *Non-governmental organisations (NGOs) and civil society have become one of the most important actors in society over the last fifty years. The way they operate in society and the importance of their work to modern society have been the subject of much research. Non-governmental organisations are also seen as great consultants, offering business advice and working with large international companies. Slowly, they have entered the arena of business consulting providers.*

On the other hand, there is very little research on how others, especially consultants, can help with business consulting for NGOs and, more importantly, what kind of consulting they need.

The purpose of this article is to analyse the results of the government programme aimed at building the capacity of NGOs throughout Croatia, but also to find out, through five interviews and case studies with NGOs that have used these services, what type of advice or training was most helpful, along with the other types of assistance they might use.

The results of this research can help in a better understanding of the civil sector and creation of more appropriate third sector (civil sector) development programmes, but also if a well-developed and organised, civil sector helps build more open and democratic societies.

1. INTRODUCTION

Non-governmental organisations (NGOs) are all non-profit and non-governmental organisations that are active in the areas of development, humanitarian aid, advocacy or civil society. Their number and importance exploded after the 1980s with the democratic changes throughout the world. Non-governmental organisations have been defined as organisations that have to deal with uncertainty in various forms (Watkins et al., 2012). Irvine (2007) sees them as a major economic force in the world. Smilie (1997) defines them as "an expression of people's need for organisation, self-improvement, and change" (p.571). NGOs are also seen as barriers to a dominant world culture (Watkins et al., 2012) and as organisations that mobilise people, promote increased information sharing, support alternative practical and political ideas, and empower the disadvantaged (Boulding & Ginson, 2009). NGOs are more efficient, effective and innovative than other organisations (Boulding & Ginson, 2009). NGOs are generally defined by four characteristics: they are voluntary, non-partisan, non-profit and non-criminal (Abiddin et al., 2022).

In the past, NGOs were involved in supporting the poor and disabled. Gradually, their focus shifted to promotion, empowerment, development and sustainability (Ahmad et al., 2024). NGOs are now the main promoters of democratic freedom and ideas, especially in developing countries. According

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research findings of Bronic (2005) in Croatia, citizens should not rely on the state and state aid, but should stimulate and determine their own development and improve their socio-economic position through their actions. The state is often seen as an inefficient and corrupt provider of public services, and since there is no correct and complete feedback and cost analysis of the implemented programs, there is not much hope that the state will be the bearer of equal support and development of different social groups in society. Faster economic development will not come from government aid programs, which, according to Mackintosh (1995), should be reduced as much as possible, and the provision of social services should be left to NGOs and the private sector. Development, according to Nelson and Wright (1995), can only be achieved through learning, democratization, democracy and diversity. Active citizenship requires participants to rely on and develop their own strengths rather than relying on the provision of government services from above (Nelson & Wright, 1995).

Non-governmental organizations are a platform for the development of a strong society with citizens who actively contribute to the development of society while preserving democratization and freedom. Compared to their public counterparts, NGOs are considered to be more efficient, effective, flexible and innovative, more oriented and committed to democracy and pro-poor development, more accountable and transparent (Fowler, 1991; Owiti et al., 2004). Their role in society is irreplaceable and their number in society is the first indicator of socio-economic development. However, in order to fulfill their tasks, NGOs must also be supported and be free in their work. The main objective of this research and this paper is to examine whether the Republic of Croatia contributes to the capacity building of NGOs and their further development for a stronger and more resilient society. In the period from 2013 to 2016, there were programs through which new NGOs could receive advice and support from already established and strong NGOs. This document provides evidence of the success and impact of this program on the establishment of new and strengthening of existing NGOs in the Republic of Croatia, but also recommendations for the right kind of advice that NGOs need at different stages of their development.

2. WHAT KIND OF HELP DO NGOS NEED?

Several conclusions can be drawn from the research findings of previous studies on NGO development. First, researchers tend to view NGOs through the lens of multidisciplinarity, the majority of published articles are authored by academics from the North (although there are articles authored by others, but they are not among the most cited), and research on NGOs is qualitative rather than quantitative (Brass et al., 2018). Second, previous studies focus on six broad research questions: the nature of NGOs, their emergence and development, how they operate, their impact on and contribution to society, and the relationship between NGOs and other actors (Brass et al., 2018). Third, researchers usually focus on the positive impact of NGOs in society, and therefore, there is still a fundamental debate about whether NGOs do more harm or good (Fisher, 1997). Despite the large number of publications in this area, Brass et al. (2018) conclude that the synthesis of the literature remains sparse.

Hailey (2000) argues that the particular values that NGOs embody give them a special advantage over other types of organizations. Fowler (1991) claims that NGOs are able to pay higher salaries and attract the most competitive employees from the public sector (Schuller, 2009). They are usually portrayed as flexible and responsive organizations with strong ties to local communities and great commitment from their staff and volunteers (Fowler, 1997).

However, as the number of NGOs grows rapidly, competition for limited aid funds increases, and "donors are in a stronger position to impose their terms and influence NGOs' core values" (Hailey,

2000, p. 402). Therefore, NGOs must simultaneously work on their capacity building, but also promote and nurture their own core values. In this sense, there is a stream of researchers who argue that NGOs should act more like profitable businesses and develop their management skills, adapt to new management techniques and adjust to new changes in the business environment. The other group of researchers argues for taking care of core values and ideologies: People-centered development, participation and empowerment, local legitimacy and sustainability, good governance, transparency and shared learning (Fowler, 1997). According to Aruna and Thanasundari (2015), there is a growing debate about whether NGOs should become more "corporate-like". In the face of these challenges, the NGO sector has shifted from a collaborative culture to an intensely competitive one (Irvine, 2007). To successfully navigate the changes in the competitive environment, NGOs are receptive to the expertise and security that consultants can provide (Irvine, 2007, p. 15). According to Fincham (1999), consultants bring expertise to NGOs that their management lacks. According to Irvine (2007), advisors and consultants have been instrumental in embedding business practices in NGOs.

But for-profit consultants often neglect core values in their recommendations, which can lead to a misunderstanding of the unique role and mission of NGOs (Schlesinger et al., 2004). Therefore, NGOs in need of external assistance require the expertise of consultants, but it must be tailored to their needs.

3. CONSULTANCY SUPPORT FOR NGOS IN THE REPUBLIC OF CROATIA

In order to understand the specific needs of NGOs during their development and the process of capacity building, the National Foundation for Civil Society Development in the Republic of Croatia has developed the "Active in the Community" advisory program for NGOs in the period 2013-2017. The National Foundation for Civil Society Development concluded a contract with four cooperating institutions in Split, Zagreb, Osijek, and Pula. The program included the implementation of activities in local communities to develop social capital, a culture of giving for charitable purposes, and the implementation of social programs in local communities. The National Foundation, in cooperation with the individual cooperating foundations, ensured the uniformity and integrity of the program throughout the Republic of Croatia, so that the same types of activities were carried out in all counties or participating local communities: direct services that include the provision of training (project cycle management and needs assessment in the local community, volunteer management, quality system in civil society organizations with examples of effective management models, ensuring the quality of implementation of projects funded from public sources, innovative models of fundraising for the activities of civil society organizations, models of advocacy for positive change in local communities, models of citizen participation in the work of civil society organizations, (e.g. development of social capital in the local community and models of partnership/collaboration of civil society organizations in the community, models of internal and external evaluation of activities/programs of civil society organizations) and indirect activities in the form of implementation of programs to support the development of civil society organizations involved in the development of local communities in the county or region through various forms and methods of consulting and informing interested organizations.

Although the program was very successful and delivered excellent results, it was discontinued in 2017 due to a lack of funding sources. The National Foundation for Civil Society Development in the Republic of Croatia still provides educational support to NGOs, but the advisory approach and assistance are no longer available, and none of the four participating institutions provides free advice and technical assistance. After 2017, the new concept of support will be introduced. A new concept of the program includes information on social networks and education.

The activities of the cooperating institution in Osijek, "Salter", were examined as part of this study. The regional development program "Salter" was a project of the Volunteer Center Osijek (from 2020 dKolektiv), the PRONI Center for Social Education, the Vukovar Branch, the Information and Legal Center Slavonski Brod and the Oppidum Association, which began its implementation in early 2013 and ended in 2017. The program aimed to strengthen active citizenship, civil society and the development of social capital based on connections, reciprocity and trust in the region of Slavonia and Baranja.

During this period, the "Salter" program has advised more than 250 NGOs and organized training courses on the topics of founding NGOs, project management, volunteer management, financial management in NGOs, public advocacy and lobbying. In 2017 alone, the Salter" program organized 13 workshops, spent 215 hours advising 410 NGOs, active citizens and institutions and 390 hours providing technical assistance.

This included 5 organizations that were selected for interviews and case study development. These organizations were at different stages of their development and had different needs, but used the advisory support of the "Salter" program several times and for different purposes. Their main characteristics are summarized in Table 1.

Table 1. Main characteristics of the NGOs, users of the consultancy recommendations and advice in program "Šalter"

Case	Focus of the NGO	Type of service they are offering	No of employess	Type of consultancy support
No 1	• promotion and protection of human rights • civil society development • building society of equal opportunities	• free legal aid and support for victims of domestic violence • protection of minority rights (especially Roma people)	• 18 employees • 3 volunteers	• consulting services in resolving organizational development issues
No 2	• social awareness developing • advocating for the rights and needs of people with disabilities • active and equal inclusion of persons with disabilities in community development	• personal assistance and help at home for people with disabilities • education and psychosocial support • organization of social, cultural and sports-recreational activities for people with disabilities	• 57 employees • 6 volunteers	• project management services • development of communication and conflict resolution skills • financial management advice and services • human resource management
No 3	• active inclusion of Roma people in society, especially youth, women and children	• active advocacy and support for quality, integrated and regular education of Roma people • empowering young Roma people and raising their competitiveness on the labor market	• 15 employees	• education in project management • consultancy support for capacity building • internship for new employees
No 4	• improving life in the local community (Adriatic island)	• development of critical thinking in children • working with people with mental disabilities	• 10 volunteers	• consulting support for project • proposals preparation and project management
No 5	• support for women in exercising their rights, children with malignant and other serious illnesses, the elderly, sick and infirm	• providing free accommodation for sick children during treatment outside their place of residence • psychosocial support • development of palliative care	• 1 employee • 58 volunteers	• counseling and consulting support for capacity building

Source: Own research

4. RESEARCH DESIGN AND RESULTS

The users of the advisory and training services under the "Salter" program were NGOs at different stages of development, indicating the different challenges faced by these organizations and their leaders. In order to find out how and why certain decisions were made in the NGOs, the users of the advisory services, it was necessary to select those organizations that used different services on different occasions and for different purposes. Only these organizations could take full advantage of the program. The consultants of the "Salter" program suggested 5 NGOs and people who were still working as organization managers. These individuals were able to analyze the entire journey of the selected NGOs - from their beginnings to building strong organizations that are recognized in their field of activity.

The aim of this study was to show that the advice and support provided by the "Salter" program was crucial to the managers' decision-making. Therefore, individuals who have influence on their organizations or communities, i.e. key informants (KIs), were selected for the interviews (Aguinis, 2025). To substantiate all the benefits of the Salter" program, secondary data was used - internal data from dKolektiv.

The people appointed as consultants and advisors in the "Salter" programme have been carefully selected. In addition to their experience in founding and managing NGOs, their educational background was also an important criterion, as was the intensive training they were to undergo in order to be prepared for the new tasks and challenges. All consultants have extensive experience in the fields of education, consultancy and support in the NGO sector.

During the interview, the KIs were asked about the type of service they had used, the quality of the service, but also the results and final conclusion on the benefits of the advisory support. The results of the survey are summarised in Table 2.

The research findings point to the importance of trust and the development of good relationships between advisors and clients (NGOs). The relationship was based on openness and a willingness to help and share knowledge and ideas. The KIs emphasized several times that building a good relationship was very important for the final results and for building future sustainability and resilience of their organizations. KI 1 and KI 3 even added that they have started to give help and advice to others, i.e., new organizations in their environment.

The clients greatly appreciated the experience and expertise of dKolektiv's consultants and sneakers. Their advice was timely, clear, easy to follow, and very professional. Job shadowing or internships for new employees were also part of the service and support provided to clients. These AIs state that dKolektiv has become their role model, which has helped them raise their profile and build bridges with other organizations and local authorities.

All AIs interviewed state that the consultancy support helped them to learn the necessary management skills (in the area of project proposal preparation, human resources, but also financial management of the organization) that enable sustainability and resilience.

All AIs used education and technical assistance in the area of management: project management, human resource management, financial management, and accounting. Although a focus on the NGO's mission and vision is critical to its sustainability and visibility, NGO leaders also need to develop their management skills. While these skills are essential, they also enable resilience.

Table 2. Results of the interviews with KIs from the choosen NGOs, users of the consultancy support in "Salter" program

KI	Type of the consultancy support used	Quality of the support	Results and benefits
1	• consulting on organizational development • project proposals preparation (technical support) • project management	• "We have choosen dKolektiv because we trusted them. Trust was very important part of that relationship" • highly professional services • rich experience in NGO sector colaboration and team work	• creation of completely new service for end users - cosulting for other NGOs in their environment • 3-years institutional support from the donor • capacity building • sustainability • higher visibility of the NGO • organization of the local volunteer program • developed cooperation with local government
2	• education on project management, human resource management, communication skills and conflict resolution • consulting on human resource management, financial management • project proposals preparation (technical support)	• "Trust and trusting communication were cruical" • prevenance • expertise and reliability	• streghtening competencies in human resource management • financial management competencies • accountancy and project management competencies developed • sustainability and resilience
3	• education in different fields • management of the NGO • project proposals preparation • internship for new employees	• "Relationship full of trust and mutual respect were cruical" • they were our role model • high ethical standards • always available - prompt answers	• development of good organizational practices • developed skills for leading and managing organization • sustainability
4	• consulting on ideas development • capacity building	• opennes and readiness to share all their knowledge and ideas • clear and easy instructions	• development of organizational capacity for project management • sustainability and resilience
5	• counsulting and infromation providing on capacity building • project proposal preparation (technical support)	• on-time, free and highly professional support • expertise, availability and willingness to help • trust and reliability	• continuity in operationg thorugh securing financial aid • sustainability and resilience • volunteers management

Source: Own research

The program's consultants had experience in NGO creation, management, and development. Their advice was professional, but also focused on the core values of each organization with high ethical standards. These qualities of the advisors and the support they provided enabled trust and relationships that were crucial to the implementation of the recommendations.

5. FUTURE RESEARCH DIRECTIONS

Future research in the field of consulting for non-profit organizations should definitely be based on the needs of employees in non-profit organizations and their specific characteristics. Despite the fact that they operate in an increasingly competitive environment where there are fewer funding sources and donors and more initiatives and organizations, their vision and mission must remain the main objectives of their activities. It would be interesting to examine to what extent knowledge from the business sector or expertise can be applied in civil society organizations and to what extent consultants can adapt to the conditions of working with non-profit organizations. It is also important to examine how the consulting cycle works and whether there are differences in the consulting process itself between the for-profit and non-profit sectors, and what characteristics non-profit organizations look for in consultants.

The success of the advisory process also depends to a large extent on the relationship between the advisor and the client, which is particularly important in all cases in our study and was emphasized by all interviewees, but also by all key persons. Ultimately, this is a qualitative study designed to investigate the effectiveness of advice provided by consultants in the non-profit sector to strengthen their role in society.

6. CONCLUSION

The growing debate about creating NGOs that operate more like businesses raises the question of the available and appropriate advisory support to enable NGOs to compete. While researchers agree that NGOs should develop their management skills, consultancy support cannot be valuable without taking into account their core values.

NGOs are an important actor in upholding democracy, social inclusion, and the development of society. Therefore, the socio-economic development of the country depends heavily on the level of development and freedom of NGOs. The provision of advisory services to build their capacity is important, but the support should be tailored to their needs and specificities. NGOs need training in management skills, but this interface between NGOs and the business sector should be carefully analyzed. Successful examples of consultancy support are based on trust, mutual understanding, and maintaining and building good relationships. Clients are always looking for experts, i.e., consultants who understand the sector and the sector-specific challenges. The ability to communicate and transfer knowledge is among the most desirable qualities of consultants. Clients also need consultants who can help them uphold their core values and mission. Finally, the results of consultancy support to NGOs should be visible not only in the management of staff, but also in the creation of change through the engagement of volunteers and society as a whole with the mission to create necessary change and the change we want to see in the world. Knowledge transfer is the side effect of effective consultancy support for the NGO sector.

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Corporate Due Diligence for Enhancing Logistics Operations

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Abstract: *The new rules mandated by the European Union through the Corporate Sustainability Due Diligence Directive (CSDDD) aim to enhance the protection of human rights, environmental responsibility, and business transparency. In its initial implementation phase, starting in 2027, the directive applies to large companies and extends to all others by 2029. Given that logistics companies rely heavily on global value chains, the directive will undoubtedly impact their entire operations, including partnerships not only within Europe but also globally. This paper outlines the key guidelines for implementing the Corporate Sustainability Due Diligence Directive, with a particular focus on its effects on logistics companies, exploring both potential consequences and opportunities that arise from the directive's application.*

1. INTRODUCTION

The European Union officially began implementing the Directive (2024) Corporate Sustainability Due Diligence Directive (CSDDD, Directive 2024/1760) in 2024. The goal of this directive is to promote sustainable and ethically responsible corporate practices, not only within companies' operations but also throughout their global value chains. The directive establishes a framework ensuring that companies within its scope proactively identify, mitigate, and address adverse impacts on human rights and the environment caused by their activities, both in Europe and worldwide. These new rules represent a significant step forward in aligning corporate strategies with the principles of sustainability and responsibility.

The European market is increasingly demanding that suppliers adhere to high standards regarding human rights, environmental responsibility, and business transparency. This means that, to comply with the CSDDD, companies must identify, prevent, mitigate, and account for negative impacts on human rights and the environment within their own operations, as well as those of their subsidiaries and entire value chains—not only in Europe but across the globe. These new regulations mark a significant step forward in aligning corporate strategies with the principles of sustainability and accountability.

For individuals, this directive ensures stronger protection of human rights, including workers' rights, a healthier environment for present and future generations, addressing climate change mitigation, greater trust in businesses, increased transparency through more informed choices, and improved access to justice.

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For companies, this directive primarily establishes a harmonized legal framework across the EU, ensuring legal certainty and a level playing field. It fosters greater trust in business operations among both clients and employees, raises awareness of potential negative impacts on human rights and the environment, reduces liability risks, enhances risk management, and boosts competitiveness. Additionally, it increases attractiveness to talent, sustainability-focused investors, and public procurement opportunities, while also driving incentives for innovation and improving access to finance.

For developing countries, including the Republic of Serbia, the directive promotes stronger protection of human rights and the environment, sustainable investment, capacity building, and support for companies within the value chain. It encourages improved sustainability practices, greater adoption of international standards, and overall better living conditions.

The directive establishes a corporate due diligence obligation. The key elements of this obligation include identifying and addressing potential and actual negative impacts on human rights and the environment within a company's own operations, its subsidiaries, and, when related to its value chain, its business partners.

Additionally, the directive requires large companies to adopt and implement, to the best of their ability, a transition plan for mitigating climate change. This plan must align with the goal of climate neutrality by 2050, as outlined in the Paris Agreement, which aims to limit global warming to 1.5°C by the end of the century. The agreement was ratified by the National Assembly of the Republic of Serbia through the Law on the Ratification of the Paris Agreement (Zakon o potvrđivanju Sporazuma iz Pariza, 2017).

The paper focuses on logistics operators and their adaptation to the CSDDD directive. It presents the modern operations of logistics operators, followed by an analysis of the directive's impact on business, particularly in the logistics sector. Before the conclusion, the paper examines the process of adjusting logistics operators' business practices to meet the obligations imposed by the directive.

2. THE ROLE OF THE CORPORATE SUSTAINABILITY DUE DILIGENCE DIRECTIVE (CSDDD) IN MODERN BUSINESS

Today's business operations of large companies involve global value chains. Consumer and investor concerns about human rights protection and environmental sustainability are growing. Existing international standards for responsible business conduct recognize the need for companies to protect human rights and address environmental protection across all aspects of their operations and value chains. The directive mandates companies to identify and mitigate risks related to human rights and environmental protection at all stages of their supply chains.

The UN Guiding Principles on Business and Human Rights (2011) recognize the responsibility of companies to exercise due diligence in respect of human rights by identifying, preventing, and mitigating the negative impacts of their operations on human rights, as well as by taking responsibility for how they address those impacts. The UN Guiding Principles state that companies should avoid infringing on human rights and should work to eliminate potential negative human rights impacts in all aspects of their operations, regardless of the business segment involved (e.g., affiliated entities, subsidiaries, branch offices, etc.).

According to the CSDDD Directive, all companies are required to respect human rights, which are universal, indivisible, interdependent, and interconnected. The improvements outlined in the CSDDD Directive include the following:

- The due diligence obligations in the CSDDD Directive apply not only to the upstream part of the supply chain but also to the downstream, covering all links up to the end users;
- The CSDDD Directive requires companies to maintain meaningful relationships with stakeholders, such as trade unions, to ensure a positive impact;
- The CSDDD Directive stipulates that companies must ensure living wages and adequate income levels within their value chains, with adherence to the fundamental labor standards of the International Labour Organization;
- In the case of violations, rights holders must have access to justice and legal remedies. The CSDDD Directive ensures that rights holders have access to an effective remedy through legal proceedings;
- The CSDDD Directive calls for support to small and medium-sized enterprises (SMEs) by EU member states and customers. Clauses in the European Commission's model contracts could contribute to fair agreements between buyers and suppliers.

The CSDDD applies to companies both within and outside the EU that meet certain criteria. The provisions of the CSDDD Directive are expected to be integrated into national laws by 2026, with implementation beginning in 2027 for very large companies in the EU (with more than 5000 employees and a turnover exceeding 1.5 billion euros) and in 2029 for all other companies. Non-EU companies fall under its scope if they generate more than 450 million euros in net turnover within the EU. Although many smaller businesses are not directly affected, they are still required to assess and report on their operations and those within their supply chains that are connected to entities directly covered by the directive.

Starting from 2027, the CSDDD requires companies to identify, prevent, mitigate, and disclose negative impacts on human rights and the environment arising from their operations and supply chains. For companies using artificial intelligence, this means they must ensure that their AI systems do not contribute to such negative impacts, including third-party AI solutions.

The concept of due diligence concerning human rights is established and further elaborated in the Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises, which extend the application of due diligence to environmental and governance issues. The OECD Guidelines on Responsible Business Conduct and sector-specific guidelines are internationally recognized frameworks that outline practical steps for due diligence to help companies identify, prevent, and mitigate actual and potential impacts, as well as to be accountable for the ways in which they seek to address those impacts in their operations, supply chains, and other business relationships.

The directive will impact Serbian companies in the segment related to foreign direct investments, so Serbian businesses must understand the requirements that will enable them to negotiate better with companies and partners within the European Union..

2.1. Key Components of the CSDDD

Through comprehensive reporting and disclosure requirements, the CSDDD aims to shed light on often hidden practices within global supply chains. This increased transparency serves several purposes:

- Accountability: Companies are held accountable for their actions and the actions of their suppliers, reducing the risk that unethical behavior goes unnoticed.
- Consumer Trust: Transparency fosters consumer trust. As consumers become more aware of the ethical aspects of their purchases, they are more likely to support companies committed to sustainability.
- Investor Confidence: Investors are increasingly considering environmental, social, and governance (ESG) issues. Transparent reporting provides them with critical information to make informed decisions.

Key components that fulfill the purpose of the directive are:

Due Diligence Obligations: Companies must carry out comprehensive due diligence to identify potential risks in their supply chains, including assessing the environmental and human rights impacts of their operations and the impacts of their suppliers.

Reporting and Transparency: Companies are required to publicly report their due diligence activities, ensuring that stakeholders can see their commitment to sustainability standards.

Preventive Measures: After identifying risks, companies must take measures to prevent, mitigate, and eliminate these harmful impacts. This could involve changing business practices, collaborating with suppliers to raise their standards, or severing ties with partners who do not comply with the rules.

Remediation: When negative impacts occur, companies are required to take effective actions to address them.

3. IMPACT OF CSDDD ON THE LOGISTICS SECTOR

According to Spadafora et al. (2022) as more people shop online, the demand for intelligent logistics services is growing. The logistics sector is experiencing a growth rate of around 8.5% annually from 2022 to 2027, as claimed by Melton (2022). Additionally, according to Radosavljević et al. (2024), logistics is the backbone of the global economy, but increasingly unstable economic conditions have a significant impact on global supply chains. Omerovic (2024) emphasizes that such conditions create a need for logistics companies to provide sustainable end-to-end delivery solutions while adapting to environmental conditions. Challenges include legal interventions, compliance issues, stakeholder engagement, and impacts on the global supply chain. However, CSDDD offers economic benefits, technological advancements, and social improvements, including increased employment levels and heightened consumer awareness..

The Corporate Sustainability Due Diligence Directive (CSDDD) significantly impacts logistics companies as it introduces obligations for sustainable and responsible practices across all supply chain. The impact on supply chain efficiency means that CSDDD raises the due diligence standards for supply chains, requiring companies to adopt proactive management strategies, which include:

- Risk assessment. This involves conducting regular and thorough risk assessments to identify potential human rights and environmental preservation issues.
- Supplier engagement. Actively engaging all suppliers within the value chain to ensure compliance with required standards, potentially including training, capacity building, and frequent audits.
- Continuous improvement. Establishing mechanisms for continuous monitoring and improving supply chain practices.

The steps for implementing the CSDDD by logistics operators involve adapting to the new requirements set forth by the directive through the following activities:

- Defining responsibilities in supply chains. Logistics operators must identify, prevent, and mitigate negative impacts on the environment and human rights during their operations through their own supply chains. Compliance is expected not only within their own operations but also across entire value chains, including transportation, storage, and partnerships. Transparency in the supply chain becomes a legal and operational priority.
- Improved reporting and transparency. Companies are required to submit detailed reports on sustainability practices, including initiatives to monitor and reduce carbon emissions, ethical labor practices within their own operations and those of their partners, as well as adherence to environmental, social, and governance (ESG) criteria.
- Integration of sustainable practices. Logistics companies will need to adopt technologies and practices that align with the directive's goals, such as investing in efficient or electric vehicles to reduce carbon emissions, optimizing routes and operations to minimize environmental impact, and transitioning to renewable energy sources for warehouses and distribution hubs.
- Contractual adjustments. Logistics companies will need to renegotiate contracts with clients and suppliers to include sustainability clauses, ensuring compliance across the entire value chain.
- Legal and financial risk obligations. Failure to comply with the directive may expose logistics companies to legal actions, fines, or damage to their reputation. They must establish strong due diligence mechanisms to meet these obligations. Non-compliance carries the risk of penalties, including fines up to 5% of the company's global turnover, as well as civil liability.
- Opportunities for competitive advantage. Companies that proactively align with CSDDD standards can position themselves as leaders in sustainable logistics, attracting clients who prioritize ESG criteria. CSDDD enables logistics firms to innovate by adopting cleaner energy solutions, optimizing routes to reduce emissions, and collaborating with partners for sustainable outcomes. This shift can provide a competitive advantage.

3.1. Opportunities for Suppliers

Opportunities for suppliers include:

- Adjusting purchasing practices to minimize risks and improve labor, environmental, and social standards presents an opportunity for suppliers to negotiate favorable prices, deadlines, and delivery terms.
- By keeping records of business processes, existing risks, regulations, and corrective measures, suppliers can gain valuable insights into their own supply chains.
- Improved dialogue with customers can strengthen trust, credibility, and encourage long-term relationships.
- Robust due diligence processes can enhance suppliers' standing with customers.
- The use of renewable energy sources, as well as improved management of wastewater and chemicals, can reduce operating costs. Additionally, satisfied employees are more motivated to work.

3.2. Potential Consequences for Suppliers

The potential consequences for suppliers can be summarized as follows:

- Customers are requesting more information about the company's human and environmental risks.
- Customers are increasingly considering compliance with human rights and environmental standards when selecting suppliers.

- Commitment to human rights and environmental standards may be included in contracts, along with monitoring and training mechanisms.
- Human rights compliance checks, such as audits or inspections by third parties, are becoming more common.
- Customers may take steps themselves to rectify human rights or environmental standard violations, and/or request supplier cooperation in implementing corrective measures.
- Instead of terminating business processes in the case of violations, according to Gaven (2024), customers might become engaged in assisting their suppliers with corrective actions.
- Suppliers will increasingly be required to establish effective internal grievance mechanisms within the company to ensure protection for those using the procedures.

4. PROCESS OF ADAPTING LOGISTICS OPERATORS TO CSDDD

The process of adapting logistics operators primarily involves familiarizing them with due diligence obligations through training sessions and appointing employees who will integrate the requirements through regular training courses. Additionally, it is necessary to maintain continuous records of the process to obtain the required information. Along with other planned activities conducted with customers, it is essential to integrate customer notifications regarding the need for support, which leads to a more complete fulfillment of customer requirements as stipulated in the contract. Existing management systems and certification schemes within the business operations should not be overlooked. Of course, along with all these activities, logistics operators must have knowledge of their own risks within their business processes and supply chains in order to compare data with the findings of auditors.

The activities that stand out in the adaptation process can be categorized into the following groups:

- Mapping the supply chain for environmental and social risks. CSDDD mandates a "risk-based approach" for due diligence, requiring companies to scan their supply chain for a wide range of sustainability risks and identify potential risks that need further investigation. This process is accelerated and improved through risk profiling by country and industry, based on a database of sustainable business practices. Data can be enhanced by real-time monitoring, as well as the use of artificial intelligence to scan the entire supplier base and create a clear overview of risks.
- Conducting in-depth assessments of high-risk and priority suppliers. These assessments allow companies to evaluate their most risky strategic suppliers. Assessment reports generate priority areas for improvement, and the integrated tool for corrective actions enables companies to collaborate with their suppliers to resolve these issues.
- Assessing supplier carbon dioxide emissions and collecting emission data. To develop a climate transition plan that meets compliance requirements, most companies covered by the law will need to significantly improve the visibility of their suppliers regarding carbon dioxide emissions practices and enhance the scope and quality of the emission data they collect.

Hargreaves (2024) cites an example of how the company EcoVadis highlights three aspects to pay attention to when adapting supply chains to CSDDD regulations:

1. Global reach in supply chains. Around 5,500 companies based in the EU will be directly covered by the law, with the first group required to comply by 2027. As companies prepare for compliance, they will increasingly pressure their suppliers to provide better sustainability data and greater transparency. This will inevitably affect deeper levels of supply chains and across regions, significantly increasing the number of impacted companies.

2. CSDDD covers environmental and social issues. The law requires procurement and sustainability teams to develop a comprehensive due diligence approach, with the CSDDD component related to climate change being particularly challenging, as companies must develop a time-bound, scientifically-based transition plan that shows how they will achieve net zero by 2050.
3. Non-compliance may lead to brand damage, financial penalties, and civil liability. Companies that fail to comply with the law may face consequences for their brand reputation, product recalls, and fines up to 5% of global turnover. The directive also provides for civil liability, allowing affected stakeholders worldwide to file lawsuits in European courts if it is determined that companies were negligent in their due diligence efforts.

For the aspects of adaptation defined in this way, EcoVadis offers three key alignment processes:
1. Mapping the supply chain for environmental and social risks. CSDDD mandates a "risk-based approach" for due diligence, requiring companies to scan their supply chains for a wide range of sustainability risks and identify potential "risk points" that need further investigation. This process can be accelerated by profiling risks based on country and industry using the company's existing sustainability database.
2. Conducting deep assessments for high-risk and priority suppliers. Existing data allows companies to assess their highest-risk strategic suppliers. Sustainability management indicators can be viewed across four thematic areas: environment, labor and human rights, ethics, and sustainable sourcing. These criteria closely align with the themes of CSDDD. Reports generate priority areas for improvement, and an integrated tool for corrective action planning enables companies to collaborate with suppliers on resolving them.
3. Assessing carbon dioxide emissions of suppliers and collecting emissions data. In order to develop a transition plan that meets climate goals, many companies subject to regulations will need to significantly improve their visibility into their suppliers' carbon emissions practices and enhance the scope and quality of the emissions data they collect. Companies can use various tools to request emissions data and other emission-related metrics from their suppliers.

The consequences of non-compliance and failure to adhere to CSDDD can lead to serious repercussions for companies, such as:
- Legal penalties: Companies may face significant fines and legal actions, with penalties designed to serve as strong deterrents against non-compliance. In addition to financial penalties, this may also disqualify companies from participating in public tenders.
- Investor withdrawal: As investors increasingly prioritize ESG factors, non-compliance can lead to withdrawal and a decrease in investor confidence, jeopardizing the financial stability of the company.
- Reputation damage: In today's digital age, news of non-compliance can spread quickly, causing significant harm to a company's reputation. This can result in loss of consumer trust, decreased sales, and a damaged brand image.
- Operational disruptions: Non-compliance may require severing ties with non-compliant suppliers, leading to delays, higher costs, and operational inefficiencies.

5. CONCLUSION

Logistics operators must first familiarize themselves with the due diligence obligations through training and appointing employees who will integrate the requirements through regular training courses. Additionally, it is essential to maintain continuous records of processes to gather the necessary information. Notifying customers about the need for support leads to fulfilling customer

requirements as stipulated in the contract. Of course, alongside all these activities, logistics operators must be aware of their own risks within their business processes and supply chains to compare data with audit findings.

CSDDD encourages logistics companies toward more sustainable, transparent, and responsible business models. While compliance may require significant investments and operational adjustments, it also opens opportunities for innovation and long-term resilience in the evolving global market. CSDDD marks a significant step forward in promoting value chain transparency and enhancing supply chain diligence. Through stringent due diligence, preventive actions, and transparent reporting, the directive fosters accountability and sustainability in global supply chains. Companies adhering to these standards will gain greater consumer trust, investor confidence, and operational resilience, while non-compliance may lead to serious legal, reputational, and financial consequences.

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Management Perspectives on Service Recovery Strategies in the Hotel Industry, Albania

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Abstract: *The hotel industry significantly contributes to tourism, local economies, employment, and destination development.*

Despite their dedication to effective management and service, hotel managers still experience service failures. Due to the simultaneity of production and consumption in hotels, achieving a completely flawless service is impossible (Del Río-Lanza et al., 2009).

A service failure triggers the service recovery process. This recovery effort gives hotels a valuable opportunity to please customers affected by service disruptions.

This study uses primary research by conducting interviews with hotel managers to explore their perspectives and strategies regarding service failures and recovery efforts. Thirty-two Albanian managers from hotels and hotel complexes participated in interviews. The analysis is presented descriptively, with a summarized overview of the managers' responses to each question. This research lays the groundwork for future studies exploring consumer viewpoints.

1. INTRODUCTION

Changes in the hotel industry environment are a result of globalization, domestic economic conditions, developments in the service, tourism, and hospitality industries, and increased competition (Petzer, 2005).

This paper centers on service failure and recovery within the hotel and tourism industry. Hotel employees interact with customers frequently. This interaction significantly increases the chance of service failure. According to numerous researchers, a service failure occurs when the service doesn't meet customer expectations. Kelley and Davis (1994) identify frequency and severity as the two key factors influencing service performance, in addition to the timing of service failures. The hospitality industry is significantly affected by service failures because of these factors (Lewis & McCann, 2004). Since services are produced and consumed simultaneously through co-production, ensuring a 100% error-free service is not possible (Fisk & Coney, 1982). In other words, in services, it is impossible to guarantee "zero defects" (Lewis & McCann, 2004; Kim et al., 2009).

Service recovery policies involve actions taken by service providers to respond to service failures (Gronroos, 2000). Therefore, recovering from any failure is a good opportunity for hotels to satisfy their customers, who may have encountered a service malfunction. Customer perception of a hotel is heavily influenced by service recovery (Kuenzel & Katsaris, 2009).

Several authors offer their definitions of service recovery. The process of dealing with service failures is termed "service recovery" by Hart et al. (1990) and Johnston (1995). According to Zemke and Bell (2003), service recovery is a planned process that aims to regain customer satisfaction following unmet expectations. Therefore, they see it as a process. According to Dutta et

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al. (2007), "effective service recovery is a planned and managed event to satisfy a customer, after a service failure", so it can be seen as a means to retain customers after a failure. In other words, service recovery can be thought of as the ultimate goal to encourage customers to continue to buy.

2. INTERVIEW DESIGN

An extensive literature cited and throughout the summary analysis of the interviews was used to draft the interview. The literature delves into many aspects such as the study of the failure phenomenon (Fisk et al.,1993; Hoffman & Bateson, 2010; Koc, 2017; McCollough et al., 2000; etc.), service recovery strategies (Cranage, 2004; Bitner et al., 1990; etc.), the role of personnel in service failure and recovery (Cranage, 2004; Saleh & Ryan, 1991; Boshoff & Allen, 2000; etc.), consumer satisfaction after service recovery (Hoffman & Bateson, 2010) the impact of customer satisfaction after recovery on customer retention and word of mouth (Chen & Gursoy, 2000; Yuksel et al., 2006), etc. Some of the literature focuses on research within the hotel industry (Mattila et al., 2000).

The interview uses a semi-structured format, incorporating both open and closed questions. The guided questions highlight failure and the role of service recovery in keeping customers loyal and spreading positive feedback.

The interviews were conducted in 32 hotels and hotel complexes in Albania. The intended snowball method sample selection failed in some cases because of distance, repeated structures, or hotel refusal. The data analysis was done in a descriptive form, where for each question the opinion of the interviewees was summarized.

3. ANALYSES OF INTERVIEW RESPONSES

Despite continuous improvements in service quality, service firms inevitably make mistakes resulting in dissatisfied customers. Therefore, effective complaint handling is crucial for successful customer recovery and retention. Hotel companies and other service firms need a service recovery program.

How well do hotel managers understand when service has failed? Several interviewees don't grasp that dissatisfied customers always indicate service failure. Regarding service failure, only a few interviewees had theoretical knowledge. Meanwhile, it's important to acknowledge that international service businesses always face the risk of failure. Some studies recognize that failures are hard to prevent because of the service nature (Fisk et al., 1993; Hoffman & Bateson, 1997), and service recovery is now a strategy used by companies to regain customer satisfaction and loyalty (McCollough et al., 2000). The high customer-employee interaction and inherent service characteristics (inseparability, heterogeneity, perishability) make tourism and hospitality prone to service failures (Koc, 2017). According to the data, 81.25% of interviewees are familiar with service failures, whereas 18.75% have difficulty admitting their awareness. They defend their response by citing few customer complaints, inflated claims, insignificant problems, unwillingness to admit fault, employees not reporting failures, etc. The main challenge in understanding the issue is the low percentage of dissatisfied customers who voice their complaints.

Instead, a majority of customers switch providers, sometimes even retaliating with negative word-of-mouth (Singh, 1990; Andreassen, 2001). Recent studies continue to highlight the phenomenon of silent dissatisfaction among customers. Hyken reported in 2020 that 96% of customers remain silent about complaints, with 91% never returning, for instance. Similarly, a 2020 Forbes article

indicates that 96% of customers are willing to switch companies due to poor service. Recent studies continue to highlight the significant impact of negative word-of-mouth from dissatisfied customers. A survey revealed that 22 out of 32 managers (68.75%) could identify customer dissatisfaction, with the remaining 10 (31.25%) unable to do so. The positive outcome can be attributed to their relevant experience, their approach to pinpointing issues (e.g., written records, or direct contact), and management's acknowledgment of the company's service weaknesses. Failure to identify dissatisfaction signifies a deficit in management skills.

To boost offerings and maintain customer satisfaction, service providers need to encourage customer complaints in case of failures Tax et al. (1998) offer various ways to boost customer complaints, including setting performance goals, highlighting service recovery's value, providing complaint instructions, and leveraging technology. The question of whether management supports customer complaints regarding service failures elicits varied responses. Ten (31.25%) of the respondents stated they are open to customer complaints, but do not use a concrete strategy (they occasionally ask customers personally or check all the hotel premises in terms of hygiene, furnishings, tidiness or staff behavior); six (18.75%) are directly interested in encouraging customers to inform about their dissatisfaction using direct communication to the staff or written communication form in the room/reception; ten (31.25%) think that although the hotel structure does not use any strategy, it creates confidence with customers to be open about the concerns they have; the rest (six or 18.75%) are skeptical about encouraging customers to complain. A significant portion (81.25%) is keen to learn about customer problems and comments. Yen et al. (2004) highlight that comprehending service failures causes getting customers' internal perspectives on their causes. Employee and customer interaction observation and interviews with employees dealing with customers are additional methods for determining causes of service failures (Yen et al., 2004). Complaint data is crucial for quality management, as it helps fix service design and delivery issues, leading to first-time service success (Lovelock, 1994). Three methods for failure detection and data collection are recognized in the existing literature (Michel et al., 2009): total quality management (TQM) widely used in services (Lovelock & Wirtz, 2004; Corbett, 2006; Lee et al., 2006; George, 2003); mystery shopping (Finn, 2001); and the critical incident method (Edvardsson & Strandvik, 1999; Bitner et al., 1990; Nexhipi, 2015).

Regarding the question "What are customer complaints? "we have made a grouping using the approach of Cranage (2004) into failures attributable to the physical environment and failures of personnel service. To help identify cases, Saleh and Ryan's (1991) hotel service elements are listed for each of the two groupings. Cases of failure in the physical environment are hygiene, basic services and structural design.

For eighteen (56.25%), customer complaints in the hygiene area are focused on the cleanliness of the rooms/toilets, the lack of products and towels (from most frequent to least frequent). Cleanliness is a top priority, so complaints are infrequent. To summarize, all hotel managers considered cleanliness important. While, in the complaints regarding the design of the structure, a concern was the noise outside the hotel (31.25%) and the lack of additional services (18.75%).

Customer-employee interactions are frequent in the hospitality industry. The intensification is most evident in hotel services, characterized by continuous, 24/7 operations (Lewis & McCann, 2004). Essentially, customer experience success hinges on how employees handle crucial moments of interaction with customers (Ford et al., 2012). Sternlicht's 2002 study showed that most customer complaints centered on employee staff. Referring to the grouping, (33.33%) of the nine complaints refer to the physical environment. All other complaints are addressed to the staff (66.67%).

The managers' overall response was positive when asked during the interview about the importance of a structured service recovery program. However, among the responses: 56.25% (eighteen) deemed it very important; 31.25% (ten) consider it important, but prioritize avoiding failures more; meanwhile, 12.5% (four people) believe the situations aren't serious and are immediately resolvable. Their objective is to rectify the error and ensure customer satisfaction. Effective service recovery can boost customer perceptions of quality, generate positive word-of-mouth, improve satisfaction, and foster stronger, more loyal customer relationships (Michel et al., 2009).

Research indicates a positive correlation between customer satisfaction and effective service recovery, as well as perceived fairness. When assessing service recovery, customers compare their investment (time, effort, money) against the return (recovery methods, policies, and staff conduct). Perceived fairness is precisely how customers evaluate inputs versus outputs (Sumaco & Richardson, 2011). The extent to which customers are satisfied depends on the effectiveness of recovery and their perception of fairness (Hassan et al., 2014). Whereas, perceived fairness is "the key factor influencing customers' judgments on the evaluation of the recovery process" (Tax et al., 1998; Schoefer & Ennew, 2005) and satisfaction after service recovery (McColl-Kennedy & Sparks, 2003). Equity theory (Adams, 1965) is frequently applied by customers assessing service recovery efforts of companies. Adams (1965) initially suggested that fair treatment in relationships hinges on a perceived balance between economic inputs and outputs (Kau & Loh, 2006). From the literature review, justice theory and its three dimensions (distributive, procedural and interactional) appear to be the dominant theoretical framework applied to studies of service recovery (Tax & Brown, 2000). For Boshoff (1999), Davidow (2000) and Estelami (2000), the three dimensions of service recovery for firms are compensation, employee behavior and responsiveness/speed of response. Davidow (2000) defines compensation as the benefits a customer receives after complaining to a service provider. Employee behavior refers to interpersonal communication between employees and complainants, while responsiveness refers to the speed perceived by customers regarding the way their complaints are handled (Davidow, 2000).

Next, we asked, "How frequently do you utilize these service recovery methods? Following this, a series of scientific articles were assessed. In total, the following were listed: inaction; apology; repair/correction of the service/product; replacement; and compensation (offering a price discount; offering free gifts; offering a service/product of higher value; giving the service/product for free). The question was designed with a Likert scale from 1-never to 5-always.

The data shows most managers apologize for failures; inaction is rare. Corrections are made more often than replacements. Concerning compensation, dissatisfied customers most often receive gifts or higher-value products/services. According to their philosophy, offering discounts or free services to dissatisfied customers is less common. Regardless of the failure's severity, managers seem to prefer using apologies for recovery.

Kysilka and Csaba (2013) report that conflicting attitudes between customers and frontline personnel contribute to customer loss. While prioritizing customer satisfaction, managers neglect employee support (Kysilka & Csaba, 2013). Meanwhile, some factors affecting hotel service provision are beyond a manager's control. Customer service staff are vital to the success of hotels (Magnini & Ford, 2004). Marketing literature significantly highlights the employee role, particularly front-line staff, within service quality models. Staff and customer interaction is significant in the hotel industry (Chebat & Slusarczyk, 2005; Collie et al., 2000; Karatepe, 2006). A hotel's success and progress hinge on its staff's expertise, abilities, and creativity (Crawford & Riscinto-Kozub, 2010). Moreover, frontline staff (customer-facing) are key to quality assurance (Lewis & McCann, 2004;

Boshoff & Allen, 2000). In light of this reality, effective service recovery strategies are crucial for overcoming failures and restoring customer satisfaction (Cranage, 2004). The interaction between customers and staff during recovery is key to overall customer satisfaction (Martin, 1993). Service recovery is achieved by training and managing employees to effectively handle complaints, empowering them throughout the resolution process, celebrating successes, and disseminating best practices across the organization (Eccles & Durand, 1998).

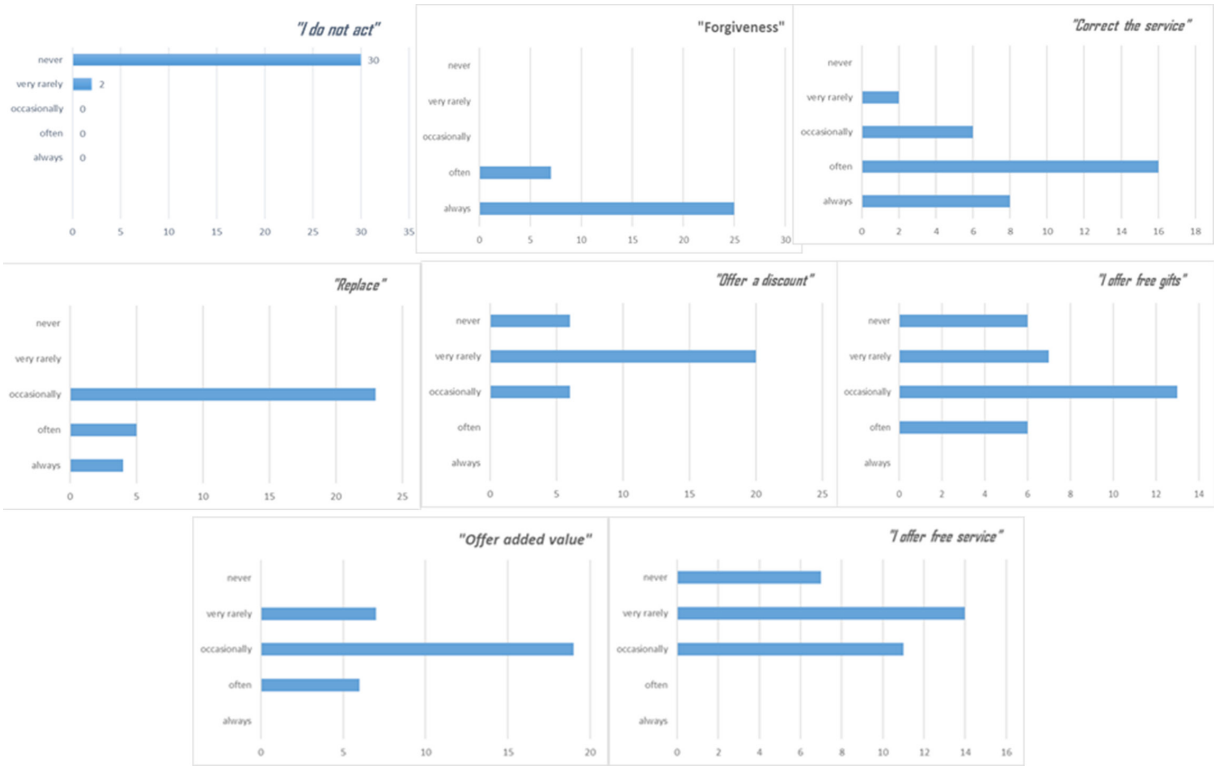

Chart 1. Utilization of the service recovery methods

Source: Own research

For the question "How would you define a satisfied customer?" we have listed several statements that interpret customer satisfaction as a function of the service provided.

1. Customer satisfaction is a key indicator of service quality;
2. Satisfied customers result from providing fair service, procedures, and delivery that meet or exceed expectations.;
3. Returning customers are a result of satisfied customers;
4. A satisfied customer means a positive advertisement, without cost;
5. Addressing customer complaints effectively leads to even higher satisfaction (Diving into the service recovery paradox).

Chart 2: "Satisfied customer", according to the vision of the managers of a hotel structure

Source: Own research

What's the significance of keeping your loyal customers to you? Manager responses show 68.75% consider it important and 31.25% consider it very important. Many of them still don't see customer retention as crucial. To what extent do online comments from customers matter to your hotel? What do you think their effect will be? The answers all highlight the high importance of the matter. They are positive about information technology's progress because online rumors can create fame. The final three interview questions focused on customer profiles, hotel features, and staff characteristics. Research consistently highlights the importance of customer demographics in shaping expectations, perceptions of satisfaction, and subsequent behavior (Mattila et al., 2000; Mok & Armstrong, 1998; Chen & Gursoy, 2000; Yuksel et al., 2006). Predominantly, their customers are males aged 25-50, of foreign origin, and possessing high average incomes. Demand is influenced by seasonality. Stays usually last for fewer than five nights.

4. FUTURE RESEARCH DIRECTIONS

Scientific studies on service marketing's service failure and recovery aspects are limited in Albania. Since most local businesses are service-based, efficient service failure and recovery are crucial for the national service industry. In addition, the quality of services offered by hotels has a direct effect on how local tourism is viewed.

- This study concentrates on how hotel managers view service failures and recovery; future studies should include the customer perspective.
- The paper indicates that consumer demographics are influential factors, prompting a call for further research to assess the impact of both demographic and behavioral characteristics on consumer perceptions of service failures.
- Our study highlights the critical role of frontline employees in service recovery, making further research on their complaint management and recovery contributions valuable.
- Furthermore, concentrating on recovery enables research into various service recovery types and their effects on customer satisfaction post-recovery.
- Let's examine the crucial role of service recovery in key sectors like finance, telecoms, and healthcare within our nation.

5. CONCLUSION

Tourism and accommodation services are interdependent. The complexity of hotel service, its duration, tangible and intangible aspects, and constant staff involvement, increase the risk of service failure. High customer expectations and readily available information often lead to a disconnect between perceived and expected service quality. Under these circumstances, recovering from service failure is critical. Effective recovery is crucial because customer retention hinges on how well service failures are addressed. Management decisions and the characteristics of service failures influence the choice of recovery strategies.

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Assessing Hotel Reservation Forecasting Models to Inform Dynamic Pricing Strategies

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Abstract: *Accurate forecasting of hotel bookings is crucial for optimizing dynamic pricing strategies and ensuring efficient resource management in the hospitality industry. This study analyses daily booking data from a hotel from Vlora, Albania, covering two distinct periods: June 2021 - April 2022 and May 2022 - January 2023. It evaluates the performance of two widely used forecasting models: SARIMA, known for its robustness in capturing seasonal patterns, and Prophet, recognized for its flexibility in handling irregularities and holiday effects. Forecast accuracy and stability are analyzed using key performance metrics (MAE, MSE, RMSE, R^2), with Monte Carlo simulations providing additional insights into forecast variability under different scenarios and enhancing the reliability assessment of each model. The findings reveal that model performance varies across different periods, highlighting the need for a dynamic model selection approach that adapts to evolving booking trends. These insights offer practical guidance for hotel managers, supporting improved reservation management and data-driven pricing strategies to enhance overall operational efficiency.*

1. INTRODUCTION

The hospitality industry is increasingly characterized by the need for accurate forecasting of hotel bookings, driven by the unstable nature of demand and the influence of external factors such as holidays, local events, and seasonal changes (Kamola & Arabas, 2020; Phumchusri & Suwatanapongched, 2023). Effective forecasting enhances revenue management through dynamic pricing strategies while ensuring optimal resource allocation, which is crucial in an industry with substantial operational costs. This necessity is particularly evident in markets that have experienced disruptions, such as the hotel sector in Vlora, Albania, following the COVID-19 pandemic, where shifts in travel demand have necessitated robust forecasting models capable of adapting to evolving trends.

Numerous studies have explored forecasting models in the hospitality sector, addressing key aspects such as reservation management, price optimization, and consumer behavior analysis. These research efforts highlight the importance of accurate forecasts in ensuring efficient resource management and revenue maximization. Additionally, forecasting models have been widely applied across various fields, showcasing their flexibility and managerial relevance. Building on our previous research (Sinani & Godolja, 2024a, 2024b), we contribute to this growing body of work by further refining forecasting methodologies.

This study analyzes daily booking data from a hotel in Vlora, covering a post-pandemic period from June 2021 to January 2023. By examining two distinct periods and applying two widely used forecasting models SARIMA and Prophet models, we aim to assess their effectiveness in predicting

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hotel bookings (Kamola & Arabas, 2020; Konarasinghe, 2018; Kumari & Muthulakshmi, 2024; Parise et al., 2021; Phumchusri & Suwatanapongched, 2023; Taylor & Letham, 2018; Tsiamitros et al., 2023). SARIMA is preferred for capturing seasonal patterns, while Prophet is recognized for its flexibility in handling irregular data and holiday effects.

In this study, we evaluate the accuracy of these models using key performance metrics, including Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), and R-squared (R^2). Additionally, Monte Carlo simulations are employed to assess the variability and reliability of forecasts under different scenarios (Sinani & Godolja, 2024a; Bouhaddour et al., 2023; Danbatta & Varol, 2021; Danbatta et al., 2024). This comprehensive approach enables a deeper understanding of hotel booking patterns and provides valuable insights to inform strategic decision-making for hotel managers.

Overall, the insights derived from this study will contribute not only to the academic literature on forecasting within hospitality but will also provide practical guidance for practitioners in the field, enabling them to leverage data-driven strategies for improved booking management and enhanced operational efficiency. As the sector continues to evolve in response to changing consumer behaviors and market conditions, the ability to adapt forecasting methodologies will be essential for maintaining a competitive advantage.

This paper is structured as follows: Section 2 details the materials and methods, outlining data collection and forecasting model selection. Section 3 presents the results and discussions, including the comparative performance of SARIMA and Prophet models, while also incorporating Monte Carlo simulations to evaluate forecast variability. Section 4 summarizes the conclusions and discusses the practical implications of the findings for hotel revenue management and strategic planning.

2. MATERIALS AND METHODS

This study employs a structured methodology to comprehensively evaluate forecasting models for hotel bookings. Forecasting models play a crucial role in hotel revenue management, with various studies highlighting their importance in optimizing pricing strategies and resource allocation. Kamola and Arabas (2020) emphasized the relevance of time-series forecasting in hospitality, demonstrating that seasonal fluctuations significantly impact booking patterns. Phumchusri and Suwatanapongched (2023) explored multiple forecasting techniques, finding that machine learning models and statistical models like SARIMA and Prophet are effective in predicting reservation trends. Additionally, Taylor and Letham (2018) introduced Prophet as a flexible and adaptive model suited for dynamic environments. The integration of forecasting models with Monte Carlo simulations has also been widely discussed. Danbatta et al. (2024) highlighted how Monte Carlo methods improve uncertainty assessment in prediction models, providing deeper insights into the reliability of forecasts. These studies support the selection of SARIMA and Prophet models for this study and validate the application of Monte Carlo simulations for improving forecast robustness.

The dataset used in this study consists of daily hotel reservations collected from a hotel in Vlora, Albania, spanning from June 20, 2021, to January 31, 2023. The dataset includes information on reservation dates and the total number of bookings. The hotel had a capacity of 27 rooms during the first period (June 2021 – April 2022) and 45 rooms in the second period (May 2022 – January 2023). This segmentation allows for an assessment of forecasting models across different occupancy capacities and demand conditions.

Two widely used time series forecasting models are employed to analyze reservation trends. SARIMA is known for its ability to model time series data with strong seasonal components (Konarasinghe, 2018), while Prophet (developed by Facebook's data science team) is recognized for its flexibility in handling missing data, trend shifts, and holiday effects (Parise et al., 2021). The models are trained and tested using the collected booking data, and their performance is evaluated based on key forecasting accuracy metrics, including Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Percentage Error (MAPE), Symmetric Mean Absolute Percentage Error (sMAPE), Theil's U Statistic, and R-squared (R^2). These metrics provide a detailed analysis of the prediction accuracy and model reliability in forecasting hotel reservations.

To assess the variability and reliability of the forecasts, Monte Carlo simulations are conducted. The process involves generating 1,000 simulations to model different potential reservation scenarios (Danbatta & Varol, 2021), utilizing model residuals to create a distribution of possible outcomes, calculating the mean and standard deviation of errors to estimate uncertainty in predictions, and analyzing forecast confidence intervals to provide hotel managers with a risk assessment of booking trends. Monte Carlo simulations help evaluate potential deviations in forecasted reservations, ensuring that predictive models are robust under different scenarios.

3. RESULTS AND DISCUSSION

This study analyzes daily bookings at a hotel in Vlora, Albania, using data collected from 2021 to 2023, covering the post-COVID-19 period. The analysis was conducted using R statistical software. The dataset is segmented into two distinct periods: June 20, 2021 – April 30, 2022, and May 1, 2022 – January 31, 2023. During these periods, the maximum number of available rooms was 27 in the first period and 45 in the second period. This segmentation was chosen to reflect industry-relevant operational conditions, where hotels adjust capacity based on seasonal demand fluctuations or expansion strategies. The study evaluates the forecasting performance of SARIMA and Prophet models in predicting hotel bookings, offering insights into demand fluctuations and booking trends.

The forecasting models were implemented using structured data preparation techniques. First, the Prophet model was structured with historical booking data, incorporating seasonal effects, trend changes, and holiday influences. In contrast, the SARIMA model was optimized for capturing seasonal dependencies and time-lag effects. The trained models were evaluated using multiple performance metrics, including MAE, MSE, RMSE, MAPE, sMAPE, Theil's U, and R^2, to determine their predictive accuracy.

To ensure the forecasts were comparable, normalization of predicted and actual values was performed relative to the corresponding room capacities. This normalization allowed for a fair assessment of accuracy across different occupancy levels, ensuring that forecast errors were analyzed in the context of room availability. The comparative performance of SARIMA and Prophet across the two periods provides valuable insights into model suitability under varying demand conditions.

The performance of SARIMA and Prophet models is compared across the two periods, revealing distinct patterns in accuracy and reliability. The results, summarized in Table 1, indicate that Prophet outperformed SARIMA in the first period, achieving lower error values and higher explained variance. However, in the second period, SARIMA demonstrated significant improvement, surpassing Prophet in predictive accuracy.

Table 1. Performance Metrics Results of SARIMA and Prophet Models Across Two Periods

Metrics	SARIMA (Period 1)	Prophet (Period 1)	SARIMA (Period 2)	Prophet (Period 2)
MAE	0.1399	0.1155	0.0970	0.1187
MSE	0.0342	0.0235	0.0202	0.0238
RMSE	0.1849	0.1534	0.1421	0.1543
MAPE	87.26%	58.19%	60.10%	79.52%
sMAPE	67.36%	54.05%	46.55%	49.14%
Theil's U	0.5969	0.4952	0.4241	0.4605
R^2	0.6437	0.7548	0.8201	0.7879

Source: Own processing

During the first period, Prophet demonstrated superior forecasting performance across all key metrics. The lower MAE, MSE, and RMSE values suggest that Prophet's predictions were closer to actual booking values. Additionally, the R^2 value of 75.48% indicates a strong ability to explain variations in booking patterns, compared to 64.37% for SARIMA. These results highlight Prophet's effectiveness in capturing fluctuations and anomalies within shorter time horizons.

In the second period, SARIMA outperformed Prophet, showing a notable decrease in error metrics. The MAE, MSE, and RMSE values declined significantly, indicating improved forecast precision. The R^2 value increased to 82.01%, suggesting that SARIMA better captured the booking trends in this period. This shift in performance suggests that demand patterns became more stable over time, allowing SARIMA's seasonality-based approach to provide more reliable forecasts.

Figures 1 and 2 illustrate the forecasted values for SARIMA and Prophet across both periods.

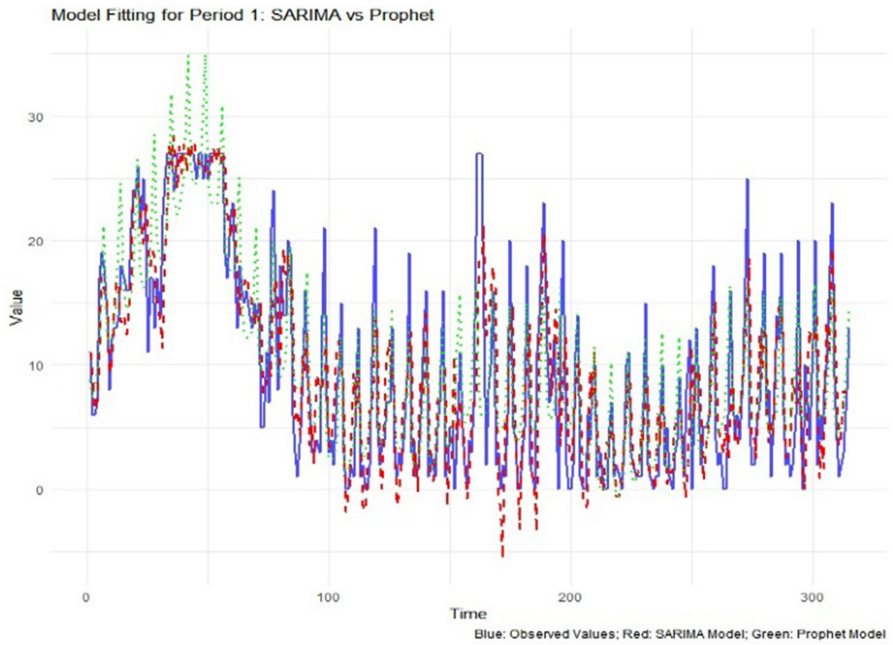

Figure 1. The graph comparing the SARIMA model and the Prophet model for the first period of data analysis.

Source: Own processing

In the first period, the observed values (blue) exhibit high variability, reflecting seasonal fluctuations in hotel bookings. Prophet (green, dotted line) aligns well with these fluctuations, demonstrating its capability to adapt to irregular demand. Meanwhile, SARIMA (red, dashed line) shows a less flexible fit, capturing general trends but struggling with abrupt changes.

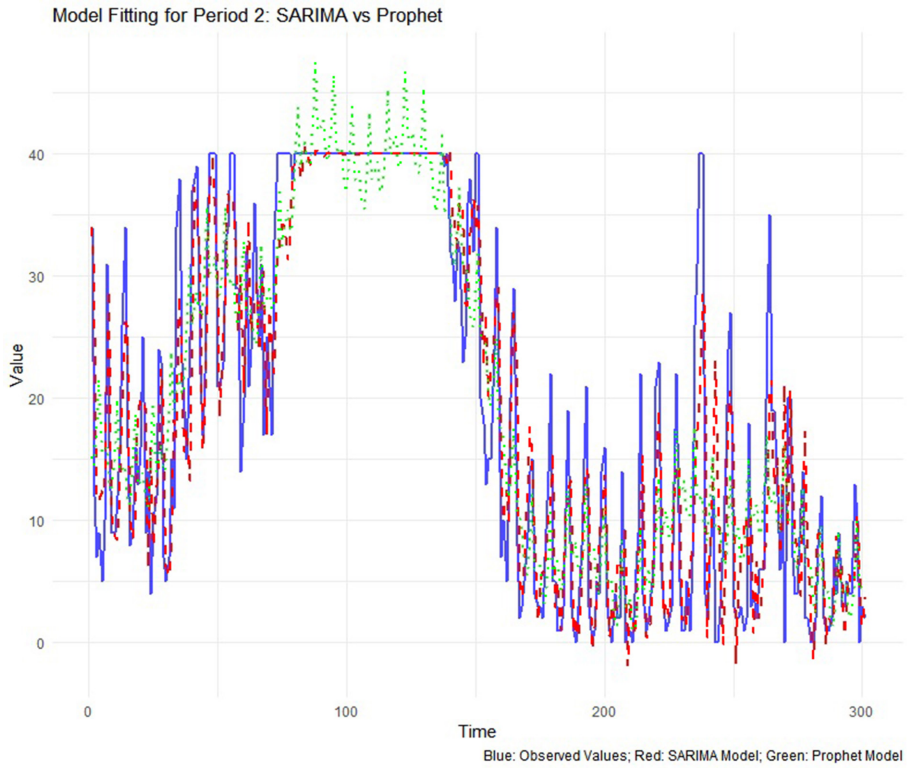

Figure 2. The graph comparing the SARIMA model and the Prophet model for the second period of data analysis.

Source: Own processing

In the second period, the trend appears more stable, with fewer abrupt fluctuations. SARIMA's fit significantly improves, closely tracking actual booking patterns. Prophet continues to perform well, but its flexibility in capturing anomalies appears less necessary given the more predictable demand.

3.1. Monte Carlo Simulations

To further assess model reliability, Monte Carlo simulations were conducted, generating 1,000 simulated booking scenarios for each model. This approach evaluates forecast variability and provides confidence intervals for expected bookings.

Table 2. The results of MMSP values for SARIMA and Prophet models across two periods

Model	Period	Min Value (MMSP)	Max Value (MMSP)	Average Value (MMSP)
SARIMA	Period 1	5.81	7.29	6.73
Prophet	Period 1	7.14	8.65	7.83
SARIMA	Period 2	18.22	20.58	19.43
Prophet	Period 2	18.39	20.36	19.36

Source: Own processing

In the first period, Prophet exhibited higher variability, as indicated by a broader range of simulated values (7.14 to 8.65), compared to SARIMA's range (5.81 to 7.29).

In the second period, SARIMA produced more stable and reliable forecasts, with an average predicted booking of 19.43, closely matching actual demand trends.

Figure 3. SARIMA vs. Prophet: Graphical Comparison with Monte Carlo Simulation
Source: Own processing

Monte Carlo simulations highlight forecast variability, showing that Prophet exhibited greater fluctuations in the first period, while SARIMA produced more stable predictions in the second period. The confidence intervals demonstrate that SARIMA's forecasts aligned more closely with actual bookings during the second period, reinforcing its suitability for stable demand patterns.

These results emphasize the importance of dynamic model selection in hotel revenue management. Prophet is more effective when demand is volatile, while SARIMA performs better when demand stabilizes. The ability to switch between models ensures accurate forecasting under different market conditions.

Incorporating Monte Carlo analysis enhances forecast confidence and risk assessment, helping hotel managers anticipate demand fluctuations and develop contingency plans. By leveraging these insights, hotels can optimize pricing strategies, resource allocation, and marketing campaigns to align with demand patterns.

Prophet is highly effective for periods with volatile demand, capturing fluctuations better. SARIMA becomes more reliable when demand stabilizes, outperforming Prophet in the second period. Monte Carlo simulations enhance forecast robustness, offering a probabilistic view of future bookings. Hotels should adopt a hybrid approach, switching models based on prevailing demand patterns. By integrating these findings into hotel revenue management strategies, decision-makers can enhance forecast accuracy, optimize pricing models, and improve overall business efficiency.

4. CONCLUSION

This study highlights the necessity of dynamic forecasting models in hotel revenue management, emphasizing that model selection must align with evolving demand trends. The analysis revealed that Prophet is particularly effective in handling volatile demand patterns, capturing fluctuations and irregularities with higher accuracy in dynamic environments. On the other hand, SARIMA showed superior performance in more stable periods, leveraging its ability to model seasonality and long-term trends. This finding highlights the necessity for hotel managers to adopt a flexible, data-driven approach to forecasting, where model selection is continuously reassessed based on changing market conditions.

The integration of Monte Carlo simulations further enhances forecast reliability by providing a probabilistic assessment of future bookings. This technique allows decision-makers to quantify uncertainty, improving their ability to mitigate risks associated with fluctuating demand. The findings suggest that incorporating Monte Carlo analysis into revenue management strategies can enhance predictive accuracy, enabling hotels to optimize pricing, maximize occupancy, and allocate resources more efficiently.

While this study provides valuable insights, it is limited to data from a single hotel, which may restrict generalizability. Future research should expand the dataset to include multiple hotels of varying sizes, locations, and market segments to assess the broader applicability of SARIMA and Prophet models. Additionally, the study does not incorporate external economic factors, marketing influences, or competitor pricing strategies, which may impact booking trends. Incorporating these variables in future studies could enhance model accuracy.

Another limitation is the lack of real-time dynamic adjustments within the forecasting models. Future studies could explore hybrid forecasting techniques, integrating SARIMA, Prophet, and machine learning approaches to develop more responsive predictive systems. Furthermore, the potential integration of forecasting models with dynamic pricing algorithms should be investigated to enable real-time adjustments based on fluctuating demand.

Ultimately, this study highlights the transformative potential of forecasting models in hotel revenue management. By adopting advanced predictive tools and continuously refining forecasting methodologies, hotel managers can make more informed strategic decisions, improving both operational efficiency and long-term profitability. As the hospitality industry continues to evolve in response to global trends and economic fluctuations, leveraging data-driven forecasting solutions will be instrumental in maintaining sustainable growth and a competitive advantage.

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Mediation from a Strategic Aspect Through Mediation in Conflicts

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Abstract: *This study explores strategic mediation as an effective approach to managing conflicts within organizations. Conflict, as a concept, can naturally emerge in a work environment, potentially impacting productivity and interpersonal relationships negatively. Mediation, as a neutral method of conflict resolution, enables constructive problem-solving through dialogue and cooperation, which helps reduce tension and strengthen team cohesion. This study will analyze the main types of conflicts, elaborate on the phases of their development, and present key mediation models. Special emphasis will be placed on implementing mediation as part of an organizational strategy, providing long-term benefits through a stable work climate and increased efficiency.*

1. INTRODUCTION

The strategic concept of mediation is increasingly recognized as a critical approach to conflict resolution, especially in organizations, as it integrates technical and interpersonal aspects of conflict management. This approach involves proactive alignment of the interests of all involved parties, utilizing strategic resources and skills to achieve sustainable solutions and enhance collaboration.

One of the fundamental components of strategic mediation is its focus on the future relationships between disputing parties. When long-term collaboration is necessary, mediation relies on techniques that promote empathy, communication, and relationship preservation. Conversely, in conflicts where relationships are not expected to continue, mediators can concentrate on achieving quick and effective agreements, with less emphasis on interpersonal aspects.

Strategic mediation is also increasingly linked to the broader framework of Strategic Human Resource Management (SHRM), where it contributes to the development of human capital and increased employee engagement. Research demonstrates that mediation strategies, combined with employee skill development and the promotion of open communication, can significantly enhance organizational competitive advantage. Moreover, cultural and institutional factors substantially influence the effectiveness of mediation. Integrating cultural dimensions, such as individualism versus collectivism, can improve the understanding of participants' needs and perspectives, tailoring the mediation approach to the specific conflict context.

This strategic framework highlights the importance of adapting mediation techniques to the specific needs of a situation, considering participants' skills, the nature of relationships, and the long-term goals of the organization. Integrating this approach within organizational strategies contributes not only to conflict resolution but also to strengthening a culture of collaboration and innovation.

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2. CONFLICTS IN ORGANIZATIONS AND THEIR SOURCES

Conflicts are a common occurrence in organizational settings, often arising from differing attitudes, goals, and interests among employees. In modern organizations, where relationships are complex and multidisciplinary, strategic conflict management is crucial for achieving organizational efficiency (Deutsch, 2000). Mediation, as a neutral conflict resolution technique, plays a vital role in reducing tensions and enhancing productivity (Moore, 2014).

Conflict is defined as a state of disagreement between two or more parties due to differences in interests, values, or attitudes. Functional conflicts can stimulate innovation and teamwork, while dysfunctional conflicts cause stress and damage relationships (Deutsch, 2000; Lewicki et al., 2020).

Conflicts can be classified according to various criteria: (1) intrapersonal conflicts occur within an individual, whereas interpersonal conflicts are disputes between individuals in a group; (2) intergroup conflicts arise between different groups, while role conflicts stem from mismatched expectations of the roles an individual performs; (3) affective conflicts are emotional and destructive, while cognitive conflicts involve the exchange of differing opinions about a problem and can be productive.

Interpersonal differences also contribute to organizational conflicts. Factors such as misperception, communication errors, mistrust, personal characteristics, and value systems often serve as conflict triggers (Schermerhorn et al., 2005).

Sources of conflict include organizational factors, such as limited resources, task interdependence, and divergent goals, as well as interpersonal factors, such as communication errors and differing perceptions (Cloke, 2001). Recognizing these sources allows managers to identify conflicts early and implement effective strategies for resolution (Fisher et al., 2011). Conflicts in organizations can arise from various causes, which can generally be divided into two categories: organizational and interpersonal. Organizational sources of conflict are characteristics of the organizational structure and systems that create conditions conducive to conflict among employees (Luthans, 2005).

Organizational conflicts refer to disagreements between two or more members or groups within an organization that arise from shared scarce resources, differing work tasks, or conflicting goals, attitudes, or perceptions (Pondy, 1967). Conflict involves situations where individuals or organizational units work against each other rather than with each other. Another definition of conflict describes it as "a process that begins when one party perceives that another party is taking or intends to take actions that threaten their interests" (Robbins, 2003). For a situation to be classified as a conflict, four elements must be present: (1) preconditions for conflict: scarcity of resources, flawed organizational policies, inadequate reward systems, and group misperceptions; (2) Affective states: stress, tension, hostility, and anxiety among individuals and groups; (3) Cognitive states: beliefs, awareness, and knowledge that a conflict situation exists or that the opposing side has or intends to threaten the subject's interests; (4) Conflict behavior (actions): ranging from passive resistance to aggression toward the other side (Pondy, 1967).

The effects of conflicts on an organization can be negative, such as increased stress, reduced productivity, and strained interpersonal relationships, or positive, such as stimulating critical thinking and creativity, which can foster innovation (Grinberg & Baron, 1998; Bollen & Euwema, 2013). Managing conflicts through mediation enhances organizational efficiency by minimizing destructive conflict outcomes while amplifying their positive aspects.

Conflict management strategies include setting superordinate goals, improving communication, and, in some cases, using authority (Lewicki et al., 2020). Mediation, a key method, enables constructive conflict resolution by involving a neutral third party (Moore, 2014).

Johan Galtung cautions against the naive belief that all conflicts can be resolved satisfactorily. Many conflicts must be transformed into new structures that do not generate further violence, even if the conflicts themselves are not permanently resolved (Galtung, 1997).

He explains, "The Western way of thinking influences our belief that there is an ultimate stage where the conflict is either resolved or deemed a hopeless case that will persist indefinitely. Conflict resolution can be defined as the creation of a new formation that is (1) acceptable to all actors and (2) must be implemented by all actors." Galtung emphasizes that conflict resolution is not merely the signing of agreements by elites but a transformation process that ensures sustainable and inclusive solutions.

Undoubtedly, there are phases in the life cycle of a conflict that could be called 'resolutions' if they meet both of the criteria mentioned above. However, the transformation of conflicts is, in principle, an ongoing process with no end. Old conflicts may reappear, or new ones may arise. A resolution in the form of a stable and lasting formation is, at best, a time-bound goal. It is far more important to achieve the capacity for transformation, the ability to create transformations that are sustainable and accepted by all parties involved in the conflict. 'The path is the goal,' said Mahatma Gandhi. We might say that the process is the goal, as a stable resolution can break down at the very moment we think we have achieved it."

Conflict Norms According to Gandhi

- Accurately define the conflict,
- Clearly set your own goals,
- Try to understand your opponent's goals,
- Emphasize common and agreed-upon goals,
- Present the facts that are crucial to the conflict objectively,
- Approach the conflict positively,
- Give the conflict a positive meaning,
- View the conflict as an opportunity to meet your opponent,
- View the conflict as an opportunity to restructure society,
- View the conflict as an opportunity to build and change your own character.

The Course of Conflict

- During a conflict, one should behave non-violently,
- Refrain from actions that could hurt someone or cause harm,
- Refrain from words that could hurt someone or cause harm,
- Refrain from thoughts that could hurt someone or cause harm,
- Protect the private property of the opponent,
- Respond with goodness even to those who harm,
- Act in a way that has a clear goal and purpose,
- Be prepared for sacrifice,
- Avoid opening false fronts,
- Avoid unnecessary steps.

Conflict Solutions

- Resolve conflicts,
- Insist on important issues, not trivial ones,

- View yourself as someone who can make mistakes,
- Be generous in your relationship with your opponent,
- Change, not force.

3. MEDIATION MODELS IN ORGANIZATIONS

Mediation, as a specific method, plays a crucial role as it enables the constructive resolution of conflict situations by involving a neutral third party. Face-to-face mediation involves the parties sitting at the table "face to face," where the environment must be neutral. The process allows both sides to express their views without interruption or interference, after which the mediator encourages them to engage in dialogue. Shuttle mediation is used when the conflicting parties do not feel comfortable meeting face-to-face or when it is not the right moment for direct contact. This type of mediation usually requires three or more mediators: two are placed with each side of the conflict, while a third acts as a "shuttle," moving between them and conveying important information.

The approach of conflict resolution through mediation is more widespread than commonly thought. In family or marital conflicts, there is divorce mediation or inheritance mediation. In criminal law, we find victim-offender mediation, while on a local level, "round tables" are used, and in schools, there are programs such as "Student - Conflict," among others. Moreover, we can discuss broader and more complex processes like intercultural, international, or ethnic mediation. Therefore, a general division of the use of mediation in society includes the judicial system, business, cultural mediation, and peer mediation.

Mediation within the legal framework enhances flexibility in addressing conflicts by intervening at various stages of a dispute, unlike traditional court procedures that often follow conflict escalation. Mediation can serve both preventive and reparative functions. Preventive mediation allows parties to address conflicts before escalating to legal action, while reparative mediation provides a platform for resolution even after legal proceedings have been initiated (Ministry of Justice of the Republic of Serbia, 2024).

In business settings, mediation may involve internal disputes within a company. Managers assume a new role as mediators, addressing organizational, personnel, or financial challenges. By focusing on the interests that underpin the conflict, mediation opens avenues for productive solutions, resolving disputes within teams, departments, or organizations. It is particularly useful in navigating challenges during mergers, acquisitions, or the succession of firms.

Cultural mediation has gained prominence in multicultural societies formed through immigration. Facilitating understanding and mutual respect between people from diverse cultural, linguistic, and religious backgrounds is a cornerstone for harmonious coexistence. Recognizing and appreciating differences mitigates biases and fosters a democratic and inclusive social framework.

In educational settings, peer mediation involves students as mediators. Trained students apply mediation skills to resolve conflicts among their peers, such as disputes between students, teacher-student conflicts, or even parent-student disagreements. Experience demonstrates that young individuals can effectively serve as mediators, contributing to conflict resolution in their communities.

4. INTEGRATION OF MEDIATION INTO ORGANIZATIONAL STRATEGY

The integration of mediation into organizational processes can occur through several key steps: (1) formalization of procedures – defining guidelines for mediation, as done by companies like Google. This includes developing guidelines and procedures that specify when and how mediation is used. For example, Google uses formalized mediation protocols as part of their internal conflict management policies; (2) employee and manager training – Organizations like IBM conduct regular training sessions for employees and managers to familiarize them with the mediation process and equip them with the skills to recognize and resolve conflicts early. This contributes to strengthening a culture of open dialogue and trust (Ford, 2007); (3) development of internal teams – For example, Toyota has teams of trained mediators, demonstrating how internal mediation resources can be a crucial tool for resolving conflict situations quickly and efficiently (Moore, 2014).

Organizations that successfully integrate mediation into their conflict management strategies use structured programs and formalized procedures that make mediation more accessible to all employees. These organizations often have internal mediators trained to resolve workplace conflicts or hire external mediation experts.

Organizations that effectively utilize mediation as part of their strategic framework often cultivate a culture of open communication and transparency, reducing the likelihood of conflict escalation. This culture is fostered through an "open-door policy." For example, companies like Intel and Microsoft encourage employees to freely express their opinions and disagreements without fear of repercussions, which helps alleviate tensions and facilitates the resolution of disputes.

Regular feedback sessions further reinforce this culture. Cisco, for instance, organizes regular feedback sessions where employees can openly discuss problems and potential conflicts. Such initiatives promote openness and help managers identify and address issues before they escalate into serious disputes (Bollen & Euwema, 2013).

Regular implementation of mediation reduces costs associated with workplace disputes, absenteeism due to stress, and declines in productivity. Regular implementation of mediation reduces costs associated with workplace disputes, absenteeism due to stress, and declines in productivity. Case study: British Airways implemented a mediation program as part of its conflict management policy, which led to significant reductions in costs related to employee legal disputes. Internal mediators were engaged to facilitate resolution before conflicts escalated into formal legal processes. The results demonstrated that mediation reduced the number of formal complaints and improved workplace morale (CEDR, n.d.).

Mediation serves as a tool to mitigate the destructive effects of conflicts, which often lead to stress, demotivation, and diminished productivity. A strategic approach to mediation enables organizations to minimize these negative impacts while promoting constructive dispute resolution. Case study: In healthcare institutions, where conflicts frequently arise due to stress and workload pressures, the implementation of mediation strategies has shown notable benefits in reducing complaints. At Mayo Clinic, a mediation program between medical staff and management improved communication, reduced grievances, and enhanced employee satisfaction.

Mediation not only resolves immediate conflicts but also drives long-term changes in organizational culture. Companies that focus on developing employees' conflict management skills lay the foundation for stable interpersonal relationships and proactively prevent destructive disputes.

Case study: Ikea employs mediation as a tool for fostering team cohesion, empowering employees to resolve disputes through collaborative means. This approach has enhanced teamwork, encouraged creativity, and reduced employee stress, resulting in a more positive work environment and increased productivity (Kriesberg, 2007).

The integration of mediation as part of an organizational strategy can be pivotal in achieving long-term stability, efficiency, and sustainable growth. Organizations that adopt a strategic approach to mediation realize tangible benefits, such as reduced stress and absenteeism, where employees feel heard and valued. This also leads to increased employee satisfaction as staff recognize the organization's investment in their well-being, fostering higher levels of motivation. Ultimately, mediation contributes to stronger team dynamics and collective cohesion, enabling employees to resolve disagreements constructively.

A strategic approach to mediation is a vital component for modern organizations aiming to manage conflicts constructively. Practical examples from organizations like British Airways, Mayo Clinic, and Ikea demonstrate that mediation not only resolves disputes but also enhances workplace climate, strengthens interpersonal relationships, and boosts organizational efficiency.

5. CONCLUSION

Mediation stands out as an effective tool in strategic conflict management within organizations. Through mediation, destructive conflicts can be neutralized, and team collaboration and a positive work atmosphere strengthened. A strategic approach to mediation integrates this method into the organizational culture, thereby enhancing workplace climate and mitigating the risks of destructive conflicts (Moore, 2014).

Organizations that incorporate mediation into their conflict management strategies achieve long-term stability and sustainability (Wall & Dunne, 2012).

Employing mediation as a formal strategy contributes to organizational productivity by fostering a positive culture. By adopting mediation, organizations build a foundation for sustainable relationships, enhancing resilience and achieving operational success.

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Wide Open Spaces: How Low-Context Cultures Foster Creativity

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Abstract: *Why are some cultures more creatively productive than others? This paper explores this question through the framework of high- and low-context cultures. It argues that low-context cultures—where listeners are assumed to have minimal background knowledge or implicit understanding—foster creativity by forcing evaluation of a larger mental search space and encouraging speakers to assess and present their ideas explicitly. High-context cultures promote seamless communication through shared understanding, but they may inadvertently stifle creativity by limiting the mental flexibility of presenters and audiences. They also tend to enforce conformity to cultural expectations. This paper concludes with recommendations to nurture originality and non-traditional thinking in high-context cultures.*

1. INTRODUCTION

Communication does not take place in a vacuum. Rather, it occurs within a specific time, environment, and *meaning-space*. Recent technological advancements, the internet, social media, and generative AI enable messages to cross historical, cultural, geographical, and linguistic boundaries, only to encounter new limitations and challenges later in their journey to new audiences and minds.

In addition to aiding communication, these tools increase the potential for miscommunication when messages lose their original nuance or are presented in unfamiliar settings. A key distinction in communication styles is between high- and low-context. First introduced in Edward T. Hall's Beyond Culture (1976), the high/low-context framework categorizes cultures by the extent to which messages must be stated explicitly or can be communicated using less direct, implicit means. Low-context cultures demand definite and direct communication, assuming little shared knowledge with the audience or even shared goals. In contrast, high-context cultures rely on implied and indirect messages, with communicators and audiences depending on entrenched norms and mutual understanding to interpret meaning.

Building on this theme, this paper argues that low-context cultures amplify creativity by requiring explicit communication, which expands the mental search space by demanding communicators construct robust and unambiguous messages engineered for audiences that may have a fundamentally different understanding of reality. Equally important to how a message should be interpreted is how it should *not* be interpreted, further challenging the communicator's capacity for thought and reason.

This broader effort and range of options boost creativity at the cultural and national level, helping communicators and audiences view ideas from different angles. It also encourages more equal communication, where leaders consider their audience's understanding, and audiences feel freer to ask questions (Gill, 2017).

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Generally, this assertion holds. Countries with low-context cultures that emphasize individualism (a trait strongly correlated with low-context communication) have demonstrated elevated levels of intellectual and creative achievement over the last 600 years, particularly in the modern era (Hall & Hall, 2000; Murray, 2003). For instance, in music production and book publishing, the United States and England hold the per capita records (Garcia, n.d.; Guinness World Records, 2015). Similarly, evaluations of the most innovative countries, an admittedly nebulous concept encompassing R&D investments, venture capital, and high-tech production rank Switzerland, Sweden, and the United States, all having comparatively low-context cultures, as the top three (Wood, 2021).

However, none of this suggests that high-context cultures cannot produce creative individuals. For example, China, Japan, and South Korea generate a significant percentage of patent applications globally, with China and the United States having comparable per capita rates. A closer analysis reveals that certain firms in high-context cultures (Huawei, for instance) excel at innovation, prompting consideration of what these companies do to nurture creativity and how these practices might be emulated (WIPO, 2023). Furthermore, while high-context cultures may limit explicit ideation, their emphasis on shared understanding and implicit communication facilitates harmony, strengthens interpersonal connections, and inspires creativity in domains deeply rooted in tradition, such as arts and skilled craftsmanship, with Japan offering vibrant and widely admired examples (Holt & Yamauchi, 2023).

This paper elucidates the relationship between communication styles and creativity by examining these dynamics. It concludes with actionable strategies to promote cultural changes that enhance independent thought in high-context societies while respecting their organic strengths. Additionally, it offers suggestions for future research.

2. DEFINING HIGH-CONTEXT AND LOW-CONTEXT CULTURES

2.1. High-Context Cultures: Definitions and Examples

A high-context culture is characterized by communication that relies on implicit messages, non-verbal cues, and the surrounding context. Much of the information in a message is *understood* and *assumed* without explicit statements, with the communicator and audience using shared experiences and unspoken interpretative filters. Some better-known high-context cultures are those of Japan, Saudi Arabia, China, and Hungary (IOR, 2024; United Language Group, 2024; Yadav, 2023a). In addition to a reliance on implicit knowledge, these cultures are commonly defined by several other shared traits, including:

1. Collectivism/Group Orientation,
2. Flexibility in Rule Interpretation,
3. Respect for Authority/Hierarchy,
4. Polychronic Time (Khalaila et al., 2023; Yadav, 2023a).

One cannot fully appreciate high-context cultures without understanding *polychronic time*, which involves a flexible approach to tasks, where multiple activities happen simultaneously, and relationships are prioritized over adherence to strict schedules or deadlines. This mindset values adaptability, focuses on the present and ongoing tasks rather than rigid timeframes, and accepts interruptions and changes as normal (Marino, 2019). While this flexibility bolsters cooperation and shared understanding, it can also shape how creativity is encouraged or limited, particularly if creative individuals are expected to adjust their workflow and behavior to accommodate social relationships and group priorities.

2.2. Low-Context Cultures: Definitions and Examples

Low-context cultures contrast their high-context counterparts by focusing on easily interpreted, direct communication. Messages are explicit, with little use of non-verbal signals or assumed context. Communicators state information plainly and assume the audience has limited prior knowledge. Australia, Canada, Germany, Sweden, Switzerland, and the United States have low-context cultures (Todd, 2024; Yadav, 2023b). These cultures are defined by several shared traits, including:

1. Individualism,
2. Rigidity of Rule Interpretation,
3. Respect for Merit/Willingness to Challenge Authority,
4. Monochronic Time (Khalaila et al., 2023; Yadav, 2023b).

Low-context cultures tend to be low power distance cultures, where authority can be challenged, and power, status, and wealth do not necessarily go together (Hofstede et al., 2010; Prodanović & Crespo, 2024). The divisibility of these three makes for a different interpretation of positional importance, with the wealthiest person not necessarily being the highest status, the most powerful person not necessarily the wealthiest, and the highest status person not necessarily having the most money or power. Additionally, low-context cultures are generally monochronic, meaning they prioritize following a schedule even if doing so is somewhat at the expense of interpersonal interactions and relationships (Khalaila et al., 2023). This direct approach to communication encourages explicit ideation, which has implications for organizations that wish to tap their workforce's deep reservoir of creativity.

2.3. High- and Low-Context Culture Overlap and Limitations

Although the high/low-context model offers valuable insights into communication styles, it intersects with other cultural dimensions, such as individualism and collectivism, in ways that cannot be understood without rational effort. The individualism/collectivism paradigm strongly correlates with low/high-context cultures, while masculinity/femininity can vary within both. Geert Hofstede, a Dutch social psychologist, developed a four-dimension model to evaluate cultures (with two additional dimensions added later by other researchers). These dimensions *overlap* with the high/low-context model but are distinct. They include:

1. Power Distance,
2. Uncertainty Avoidance,
3. Individualism/Collectivism,
4. Masculinity/Femininity,
5. Long-/Short-Term Orientation,
6. Indulgence/Restraint (Pogosyan, 2017).

It is important to remember that the high/low-context divide does not describe every attribute of a society. Quite different societies can share values, even if they implement them differently. For example, Japan and the United States have relatively masculine cultures. However, masculinity is defined differently in each. In Japan, masculinity manifests through duty, group loyalty, and responsibility; in the U.S., it is linked to independence, assertiveness, and personal success (Hofstede Insights, n.d.). This is not to say that one is more *authentically* masculine than the other, only that different aspects of masculinity (independence versus duty) are emphasized.

Considering these cultural distinctions, this paper now considers their relationship to creativity.

3. COMMUNICATION STYLE AND CREATIVITY

3.1. Low-context Communication, Theory of Mind, and Creativity

Low-context communication demands that the communicator evaluate and incorporate the relevant background information needed to convey a message effectively, ensuring that all critical details are explicitly and efficiently communicated to an audience with members of varied abilities and likely diverse cognitive and perspective backgrounds.

Working within these limitations demands much of the communicator, requiring anticipation of the audience's level of knowledge and identifying potential gaps in understanding and comprehension, as well as interpretations that are outside the expectations of the communicator. As a result, low-context communicators must perfect their message to minimize ambiguity and maximize clarity, leaving as little as possible to implicit assumptions or shared cultural context (Duffy, 2019; Hall, 1976; Krauss & Fussell, 1991). This process is fundamentally creative in that it requires *engendering* or *constructing* a model of the mind of another, often with little knowledge of the audience's background.

By requiring communicators to consider the audience's mindset and knowledge explicitly, low-context communication compels active perspective-taking—a key component of the *theory of mind*, which entails assessing the beliefs, knowledge, and intentions of another based on external signals (Sutton, 2024). This, the process of engaging with the audience's possible interpretations improves cognitive flexibility, empathy, and the ability to predict responses, strengthening key social skills needed for effective communication (Clark, 2009; Rivero-Contreras et al., 2023; Qiu et al., 2024).

There are at least seven mechanisms by which low-context communications can promote creative thinking.

1. Perspective-taking as Creative Mental Modeling - By requiring communicators to consider the audience's mindset, low-context cultures explicitly promote theory of mind development through mental exertion. This mirrors creative problem-solving, with communicators imagining and constructing the mental state of their audience (Krauss & Fussell, 1991).
2. Enhancing Cognitive Flexibility for Creativity - In low-context communication, thinking about different ways people might understand something helps the mind stay flexible. Mental flexibility makes developing new ideas quickly and easily possible (Kloo et al., 2024; Orakci & Khalili, 2024).
3. Clear Communication as a Catalyst for Innovation - In low-context cultures, people communicate clearly, even if it means losing some subtlety. Transparent communication makes sharing ideas and giving feedback easier, working like the refinement state of the creative process, where ideas are shaped into useful solutions (Clark, 1996).
4. Adversarialism and Creative Tension - Low-context environments often allow or encourage open debate and occasional conflict, which enables debaters and thinkers to challenge assumptions and spark creative, unconventional ideas (Nemeth & Nemeth-Brown, 2003).
5. Cross-disciplinary Collaboration - Low-context communication is direct, helping people from different fields and cultures work together. Plainly expressed concepts help everyone to build on each other's input (Chua et al., 2012).
6. Training Creativity Through Explicit Expression - Creating clear messages for specific audiences in low-context cultures helps train creative thinking. Communicators learn to explain matters with certainty, a skill they can use in creative work (Rojas-Drummond et al., 2006).

7. Promoting Divergent Thinking - People in low-context cultures try different ways to make their message understood. This habit of exploring options helps them think creatively (Guilford, 1967; Nisbett et al., 2001).

With its unambiguous and direct style, low-context communication can help maximize creativity by compelling clarity, teamwork, competition, and diverse ideas. High-context cultures, however, have their own strengths in supporting creativity, particularly through shared understanding and implicit communication. At the same time, the adversarialism and combativeness often found in certain low-context cultures can introduce unique challenges (Thompson, 2024). How these issues are addressed varies across low-context cultures.

3.2. Examples of Successful Low-Context Creative Cultures

The United States, Germany, and Sweden all have low-context cultures that have produced significant technical and creative innovations (Wood, 2021; Yadav, 2023b).

United States

Home to the laser, microwave oven, and integrated circuit, the United States is one of the most significant contributors to technical progress in the 20th century (Bellis, 2017; Hank, 2024). The national culture is distinctly low-context. While the government and large business ventures (such as Bell Labs) subsidized many innovations during the late 20th century, the country has shifted toward a more dynamic startup and venture capital model (Gertner, 2022; Greenwood et al., 2022). This transition has made the United States' innovation culture more agile than many of its peers. It also demands a culture of directness and clarity that celebrates potential innovation, the genius of the individual inventor, and the value of the unique individual while leaving comparatively little room for modesty (Kohls, 1984; Zócalo Public Square, 2015).

Germany

With aspirin, electronic television (meaning a television that operates without moving parts), movable type printing, and X-ray imaging, Germany boasts a storied history of invention (Reich, 2022). Like the United States, Germany has a low-context culture, though it is not identical. Compared to Americans, Germans tend to be even more blunt, rarely softening the blow of criticism. They are also more procedure-driven, less rebellious, and more formal (McGann, 2024; Meyer, 2024). While both American and German cultures value purposeful directness, the manifestation of directness differs considerably, and the German approach to independence relies less on radical individualism.

Sweden

From Bluetooth to dynamite, Sweden has a long history of technical accomplishments (Andersson, 2024). Like the United States and Germany, it has a low-context culture, which is not to say it is identical to either. Swedish culture is more consensus-driven, guided by a concern for collective welfare, and oriented toward moderation in work and leisure. Much of this stems from the concept of *lagom*, roughly meaning *just enough*, a Swedish ideal that emphasizes moderation in actions and consumption (Thomson, 2023). Sweden is an outlier compared to Germany and the United States, demonstrating that low-context cultures need not be characterized by overwhelming bluntness.

3.3. High-Context Communication, Incrementalism, and Creativity

High-context cultures emphasize social harmony, collective effort, shared credit and blame, and implied (indirect) messaging. Fundamentally, they rely on the collective understanding and knowledge of the group, enabling efficient communication through a shared perspective.

The historical emphasis on group effort and achievement has allowed certain high-context cultures to accomplish great collective undertakings. In China, massive civil engineering projects, such as the Dujiangyan Irrigation System along the Minjiang River and Chengdu Plain, were completed during the Warring States Period (475–221 BCE) through remarkable communal effort. While the construction of the Roman aqueduct system began around the same time (circa 300 BCE) and demonstrated equal or greater complexity, it was largely abandoned over the centuries and eventually ceased functioning. In contrast, the Dujiangyan Irrigation System continues to operate to this day (Matthews, 1970; Tan, 2021). The reasons for the decline of one system and the maintenance of the other are not purely cultural. Rome's collapse brought with it the inability to maintain infrastructure, whereas the Chinese government retained a measure of continuity across centuries despite many dynastic changes. Nevertheless, China's long history of civic stability was not merely the product of luck, with culture playing a major role.

In Japan, another high-context culture, *wa* (和), meaning harmony, is central to many aspects of life. Social interactions, business practices, and family relationships are all shaped by the pursuit of harmony and the effort required to sustain it (Allaci, 2024). This mindset has contributed to Japan's low crime rate and its operation as a high-trust society (Komiya, 1999). Moreover, it has not stifled creativity but instead shifted Japanese (and Eastern, more broadly) creativity toward incrementalism, in contrast to the more extreme and unpredictable creativity often associated with the West (Shao et al., 2019).

That said, high-context cultures can slow creative output in several ways. A summary of these includes:

1. Conformity to Norms and Traditions. High-context cultures emphasize adherence to shared norms, traditions, and collective values, which can discourage individuals from challenging the status quo or exploring unconventional (and potentially revolutionary) ideas, especially when doing so creates the risk of loss of face or social standing. This conformity may restrain innovation and limit the range of creative expression, which is not to say it always does so (Ferwerda & Bauer, 2022; Helfand et al., 2016; Nouri et al., 2015). While conformity is common across many cultures, its importance and dynamics vary (Capuano & Chekroun, 2024).
2. Reliance on Implicit Communication. The heavy use of implicit communication and unspoken understanding in high-context cultures can create barriers to open discussion of new ideas. Ambiguity and indirect messaging may prevent optimal articulation and feedback. Such a lack of feedback may severely hinder the refinement of innovative concepts critical to innovation (Adair et al., 2024; Wrench et al., 2023).
3. Priority on Social Harmony. Maintaining social harmony is a central value in high-context cultures, which can suppress constructive conflict and debate. While this strengthens group cohesion, it may also discourage the adversarial or dissenting perspectives often critical for generating original and disruptive ideas (Allaci, 2024; Nemeth & Nemeth-Brown, 2003).
4. Deference to Authority and Hierarchy. High-context cultures often emphasize hierarchy and respect for authority (Wurtz, 2006). This can discourage lower-ranking individuals from contributing novel ideas or questioning the perspectives of those in leadership positions, limiting opportunities for diverse and innovative input and conditioning subordinates to passively accept orders and hand problems to managers without suggesting solutions (Meyer, 2017).

5. Preference for Incremental Over Radical Creativity. High-context cultures favor incremental improvements over disruptive or extreme innovations. Incrementalism minimizes the risk of damaging social and cultural structures and bonds and aligns with a cultural preference for stability. However, it can limit breakthroughs that require adventuresomeness and splitting from established practices (Shao et al., 2019).

High-context cultures have made significant achievements in infrastructure and social welfare. However, their focus on tradition can limit the more transformative and revolutionary forms of creativity of those within them, which may pose challenges in a highly competitive global market for innovation. That said, some high-context cultures have demonstrated tremendous creativity, albeit in ways that differ from the patterns typically observed in low-context cultures.

Counterexamples of Successful Low-Context Creative Cultures

Japan, China, and Hungary all have high-context cultures; nevertheless, their technical achievements are substantial, albeit distinct from those of low-context cultures (IOR, 2024; Yadav, 2023a).

Japan

With a history of significant incremental innovations, Japan has developed and refined technologies used worldwide. The Walkman, the blue LED, and the laptop computer are all Japanese inventions. As a literary form, the novel is also a Japanese innovation (Goto, 2022). Another technology, the home video player, was based on a system initially developed by an American company (Ampex) and later refined into an affordable consumer product by Japanese companies JVC and Sony (Perry, 2016). This pattern of perfecting technology, rather than inventing it outright, likely reflects a cultural aversion to confrontational and self-aggrandizing behavior. It also aligns with the Japanese corporate philosophy of *kaizen*, meaning *continuous improvement*, which has helped Toyota become a global leader in reliable transportation (Allaci, 2024; Hargrave, 2024; Vrij-Alahwal, 2023).

China

China's historical inventions, compasses, gunpowder, and paper are well-known, but its more recent contributions may be less recognized. Huawei and Tencent, two major Chinese companies, have driven numerous innovations over the last decade. Huawei holds 140,000 active patents worldwide, spanning 5G technology, semiconductor design, and network operation, while Tencent has over 2,000 patents related to generative AI (Hart, 2024; Huawei, 2024). However, neither company operates strictly as a high-context organization. Both emphasize social cohesion and implicit communication where appropriate while adopting low-context directness as they expand their global reach (De Cremer, 2018; Ofek et al., 2020; Wang, 2023). The hybridization and adaptation process these companies use will be examined more thoroughly later in this paper.

Hungary

Although a small country, Hungary boasts a remarkable list of intellectual achievements. From Edward Teller's contributions to the hydrogen bomb to Albert Szent-Györgyi's isolation of vitamin C from paprika to László Bíró's development of the ballpoint pen, Hungarians have advanced science and technology in fascinating and creative ways. A review of the biographies of these esteemed researchers reveals that Hungary excels at producing scientists and engineers but struggles to retain them. All three aforementioned men eventually emigrated, Teller and Szent-Györgyi to the United States and

Bíró to Argentina (American Chemical Society, n.d.; Fell, 2003; Schultz, 2012). The terror, tyranny, and limited opportunities under Hungary's pre-Communist and Communist governments were almost certainly motivating factors for these departures. However, Hungary's persistent inefficiencies, funding challenges, reliance on networks and relationships, and bureaucratic constraints continue to drive scientists and innovators elsewhere (Hargittai & Hargittai, 2023; IOR, 2024; O'Dowd, 2024; Valkó, 2017). With its unique blend of Eastern and Western cultural elements and its membership in the EU, Hungary is well-positioned to integrate the best aspects of low- and high-context communication styles.

3.4. *Toward a Best-of-Both Culture of Innovation*

While high-context cultures, known for their deep-rooted traditions and emphasis on interpersonal connection, may curtail the creative abilities of their members, particularly at the outermost boundaries of human potential, culture is not destiny. Dynamic organizations can address these limitations by borrowing and learning from low-context cultures and the businesses and systems within them. Elements such as clear communication, structured teamwork, and active engagement with worker ideas—hallmarks of low-context cultures—are not exclusive to any single people or culture. The next section outlines practical strategies to help high-context societies enhance creativity while remaining true to their heritage.

4. FOSTERING CREATIVITY IN HIGH-CONTEXT CULTURES: STRENGTHS, NUANCES, AND PRACTICAL STRATEGIES

Below, this paper considers strategies for improving transformative creativity in high-context cultures.

4.1. Strategy 1: *Leverage Cultural Strengths for Creativity*

Implicit (high-context) communication promotes nuanced understanding within a group and maintains the group's collective mastery and knowledge traditions. From the Chinese and Japanese lacquerware tradition to swords and calligraphy, high-context cultures can produce extremely refined artistry that relies on generations of accumulated skill and tradition (Department of Asian Art, 2004; Delbanco, 2008; Reyes, 2024). The skills and respect for excellence required to develop these arts are multifunctional and can be applied to promoting accelerated creativity through broad thinking and well-reasoned idea development.

The Art of Seeing the Net: Histophany and Its Practical Applications

In the United States, challenging the beliefs and customs cherished by older generations is both a canonical practice and a rite of passage. Even the countercultural revolution of the 1960s, despite its efforts to unweave the fabric of American culture, was an extension rather than a rejection of this and furthered the values of change, individualism, and equality (Forgeard, 2024; Kohls, 1984).

Considering this highlights an important point: a culture can evolve without undermining its foundational principles. High-context institutions have the opportunity to adopt the most beneficial aspects of low-context cultural advancement by integrating creative argumentation and competition into their traditions and daily practice. This allows them to foster innovation while preserving social stability. Developing a tradition of questioning ideas and synthesizing new concepts from diverse sources is key to stimulating radical creativity in such cultures. Here is what that might look like in practice:

1. Build a diverse team of experts and skilled workers:
   a) Find qualified workers from throughout the organization,
   b) Designate and develop groups and teams under leadership that encourages open dialogue, interdisciplinary thinking, and goal-oriented creativity.
2. Promote the respectful exchange of ideas and knowledge:
   a) Establish rules for effective and considerate communication,
   b) Create protocols to evaluate the strength of an idea on its merits, not the reputation of the person who developed it, such as a system in which an idea is evaluated *before* the person who developed it is revealed.
3. Develop new solutions and ideas from what is presented:
   a) Make the formulation of robust new ideas a team goal,
   b) Establish a process for carrying ideas from formation to implementation through an efficient idea-to-production pipeline.
4. Develop idea relationship-discovery into a recognized art form:
   a) Learn from established argumentation and reasoning traditions—the Socratic method, brainstorming, Tibetan monastic debate, or any other tradition that proves useful—to create a robust model for idea evaluation,
   b) Incorporate major concepts of idea-linking and relationship-finding into the process, borrowing from storytelling, poetic, and creative techniques from around the world,
   c) Build a flexible educational system that integrates multiple disciplines and rewards creativity as an indispensable skill,
   d) Promote respect for the art of idea relationship-discovery throughout the organization.

A key to making this process work is to develop the recognition of patterns across knowledge boundaries and fields of expertise *into a craft and art in its own right*. Formal argumentation and reasoning have long been acknowledged as arts worthy of study and practice. Other reasoning and critical practices have heritages of their own. In Japan, the *renga* tradition entailed writing poetry by a group. In such events, which began in the Heian period (794-1185), several poets would gather together and write chains of stanzas, all following certain forms and conventions. Vital to the smooth flow of the process and the poem itself was the *sōshō*, a respected poet who composed the *hokku* (opening stanza) and guided the poets so that the style and themes of the poem remained consistent (Keene, 1999). *Linking*—the elegant and logical connection of stanzas—was critical to constructing a proper renga (Parks et al., 2022).

Just as poetic linking is an acquirable skill, so is the ability to uncover hidden connections between existing ideas and recombine them in transformative ways. This leads to the fourth suggestion: fusing the craft of formal reasoning with relevant literary and artistic traditions, along with the broader practice of pinpointing non-obvious patterns and relationships, to create a new discipline—*histophany*. Derived from *histos* (Greek for "web") and *phaino* ("to reveal"), *histophany* refers to "the revelation of the web" and involves discovering ties between seemingly unrelated concepts. This idea aligns closely with Eastern thought, particularly the Buddhist philosophy of Indra's net—a metaphorical web in which each node reflects and connects all others. Indra's net is extensively described in the *Avatamsaka Sutra*, a Mahayana Buddhist text widely read in China, Japan, and Korea, which presents reality as a vast, interdependent web (Cleary, 1993). By establishing the identification of novel relationships between ideas and their synthesis into new concepts as a respected art, centered on originality, elegance, and boldness of presentation and by promoting this art across high-context cultures, these societies can harness their traditions of respect, attention to detail, and social cohesion to compete directly with the dynamism of low-context cultures.

4.2. Strategy 2: *Balance Implicit and Explicit Communication and Create Experimentation Spaces*

While respect for national and regional cultures is crucial for organizations operating within them, it is no less important for organizations to cultivate their own distinct cultures. *Corporate culture* is not just a marketing or human resources term; it is the foundation for values, behaviors, and practices that define an organization. While the term *corporate culture* did not become popular until the 1980s, the idea of a business having a particular way of doing things is far older (Tarver, 2024). In international organizations spanning multiple national and regional cultures, a cohesive approach to hiring, promotion, termination, and idea development is essential to prevent miscommunication between business divisions in different countries (Cascio & Collings, 2024; Edwards et al., 2016).

Major Chinese multinationals, such as Huawei, have already learned to integrate different cultural practices into their operations, and there is no reason smaller companies in high-context cultures cannot learn to do likewise. Indicative of Huawei's approach to bridging the East/West divide is its stance on individualism. Founder Ren Zhengfei articulated the company's perspective: "Collectivism should allow for individualism because each individual is different and thinks in his/her own way. However, individualism must serve the collective interests of the team" (De Cremer, 2018).

Just as important as the collectivism/individualism divide is the implicit/explicit one. Promoting explicit, low-context communications in an otherwise high-context organization can be done without invalidating the broader cultural norms. Here is how:

1. Encourage explicit communication in creative settings:
    a) Design workshops where participants articulate and evaluate ideas explicitly.
    b) Use structured discussions that require clarification and reasoning.
2. Adopt flexible communication practices:
    a) Shift to more explicit documentation during creative processes to ensure transparency,
    b) Encourage detailed explanations and clarifying questions during the ideation phases.

Establishing a designated time and place for such communications is critical to incorporating a low-context communication style into a high-context environment. This time and place can be physical or virtual. Real-time in-person meetings are one environment where creative/collaborative efforts can occur in a low-context framework. However, virtual forums, email communications, designated Slack channels, and video or audio-based chats can serve the same purpose to varying degrees. Every bit as important as the forum itself is the understanding of workers and managers alike that directness and effective questioning are acceptable in the said forum and are not to be taken as offensive, disrespectful, or contrary to organizational goals.

These spaces can be considered *creativity and experimentation zones*, in which participants feel free to challenge norms and expectations without fear of negative repercussions. If combined with an effective incentive structure that rewards workers and leaders for developing new and effective ideas, the use of the spaces would likely be of even greater effect.

4.3. Strategy 3: *Enhance Creative Processes Through Tools and Roles*

In addition to creating designated spaces and forums for the open sharing of ideas, technology and role development can do much to spur creativity in high-context cultures. Here are several ways to implement a well-founded strategy:

1. Use technology to provide anonymity where appropriate
    a) Make anonymous surveys, dropboxes, and idea forums available to workers and managers alike to encourage idea sharing by even the timidest team members,
    b) Ensure these tools are secure and confidential to build trust among employees.
2. Introduce a designated contrarian, disruptor, or *histophanist* (one who practices histophany):
    a) Designate a team member as a contrarian, disruptor, or *histophanist*
        i) Hire a trained histophanist to find relationships and combine and refine ideas (for example, by working with a design team to merge creative ideas into a cohesive product strategy),
        ii) A simpler approach is to appoint someone as a disruptor—an individual who challenges existing ideas and arguments, identifies weaknesses, and proposes unconventional alternatives. Work to ensure disruptors challenge ideas constructively, cultivating innovation without alienating team members.
    b) Hire both a disruptor/contrarian *and* a histophanist:
        i) Both roles may be valuable in some cases: one person could develop group ideas into new ones. At the same time, another acts as a contrarian, critically evaluating both existing and novel ideas,
        ii) The contrarian would serve more as a challenger of the status quo and its derivatives than an ordinary collaborator.
3. Construct a culture of inquiry:
    a) In addition to the specialized histophany education, develop creativity institutes and sectors throughout the organization,
        i) See that these promote a broad, critical approach to learning and encourage learners to ask not just *how* something is done but *why,*
        ii) Make certain that these actively demonstrate the utility of inquiry inside and throughout the organization,
    b) Promote creativity institutes through partner organizations and suppliers to vertically grow the culture of inquiry.

Organizations in high-context cultures implementing these strategies with unrelenting care and diligence can promote radical creativity while retaining the best of their high-context cooperative and collaborative mindset.

5. FUTURE RESEARCH DIRECTIONS

The strategies described in this paper are untested suggestions. Future research should involve identifying organizations within high-context cultures that might benefit from these strategies, implementing them, and tracking their creative output over time. Pre- and post-intervention data would be analyzed, and the creative output of these organizations could be compared to that of similar organizations that do not implement these strategies in the same time frame.

6. CONCLUSION

Both high- and low-context cultures have contributed richly to human creativity. This paper has explored how these cultures influence and channel creativity through their communication styles and provided strategies to integrate the clarity and dynamism of low-context norms into the rich collaborative heritage of high-context environments. Organizations in high-context cultures that adopt these strategies can cultivate creativity while retaining their intrinsic and deeply held values of harmony, collaboration, and unity.

The proposed framework applies to organizations and offers broader lessons for empowering workers and managers alike to embrace their creativity in a globalized world where cultural boundaries are increasingly blurred. Integrating diverse communication styles may transform how creativity is nurtured, extending beyond business to fields such as education, technology, science, the arts, and international cooperation.

The careful and artful blending of high- and low-context cultural strengths can kindle the spirit of innovation in a way that respects cultural uniqueness and heritage while embracing the possibilities of collaboration and shared understanding, providing greater opportunities and advancements for all.

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Customer Loyalty in the Telecommunications Sector in Albania

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Abstract: *Telecommunications is a rapidly evolving industry in Albania and globally, necessitating constant strategic adjustments focused on customer-centricity. This study investigates the factors influencing customer loyalty within this sector, examining elements such as service quality, customer experience, satisfaction, precived price, and trust. Demographic findings revealed a majority of young adults, with diverse income levels. Multiple linear regression analysis identified service quality, perceived price, and trust as key loyalty predictors, with service quality and trust positively impacting loyalty, while perceived price has a negative effect. Logistic regression further highlighted experience, service quality, and trust as significant predictors, with experience notably enhancing loyalty likelihood. This research offers valuable insights for telecommunications companies, marketers, and policymakers aiming to strengthen customer loyalty and comprehend consumer behavior in the industry.*

1. INTRODUCTION

Telecommunications has been, and continues to be, profoundly shaped by technological advancements. This progress has spurred economic and social development across many countries by greatly enhancing our connectivity and ensuring information is transmitted seamlessly. This industry plays a vital role in supporting both personal activities and business operations. Entry into this market is difficult; for this reason, it has an oligopoly structure where a few companies interact by offering similar services and products (Chouhan et al., 2021). Around the world, 196 major telecom companies are active, employing a total of 4,310,906 people and T-Mobile US company dominates the market with a market capitalization of nearly 215 billion U.S dollars (Statista, 2024).

The telecommunications sector began in the late 18th and early 19th centuries, with the discovery of electromagnetic waves by Clark Maxwell marking a key development (Meena & Geng, 2022). The invention of the telegraph in the 1830s initiated modern telecommunications, but the 1980s were crucial due to the advent of mobile phones. The wireless communication era, as we know it today, started in the 20th century with the pioneer Guglielmo Marconi (John, 2018). The first telecommunications company, The Telephone Company, launched in 1987 in the United Kingdom (Vonage, 2023). Telecom companies have significantly improved network coverage, including in mountainous areas, enhanced data rates, and service quality, while reducing reliance on physical cables. The evolution of telecommunications began with 1G, which used analog signals and faced limitations in capacity, noise, and security (Parker et al., 2022). The transition to 2G introduced digital signals, effectively addressing these issues (Paudel & Bhattarai, 2018). The launch of 3G in Japan by NTT DoCoMo in 2001 brought notable advancements in data rates and security (Ezhilarasan & Dinakaran, 2017). In 2010, 4G focused on speed and flexibility (Asmare & Ayalew, 2023), followed by 5G's development due to increased demand (Kania, 2019). The upcoming 6G aims for high efficiency and eco-friendly infrastructure (Maduranga et al., 2024).

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The aim of this study is to identify the factors that influence customer loyalty in the telecom industry in Albania, utilizing both linear and logistic regression models. This study considers several key factors, including service quality, customer experience, satisfaction, perceived price, and trust.

2. TELECOM INDUSTRY IN ALBANIA

The fixed-line operator Albtelecom was established in Albania as early as 1912 and the first company to enter the Albanian mobile communication market was AMC (Albanian Mobile Communications) in 1996 (Muharremi et al, 2013; Mansaku et al, 2016). One of the most long-standing companies is Vodafone Albania, which began its operations by acquiring a license in 2001, and it continues to operate to this day (Haxhi & Dumi, 2014). According to AKEP (2014) the third company was Eagle Mobile Establishment in 2008. Since 2013, it merged with Albtelecom and continued its operations under the Albtelecom name also the same fate befell AMC in 2015. The fourth company, also with significant economic value for the market, was Plus Telecommunications, which began its operations in 2010 and concluded them in 2017 (AKEP, 2019). After Albtelecom merged with One Albania in 2023, and today it is now known by this name. Since that time, only two companies remain in the market: One Albania sh.a and Vodafone Albania sh.a (AKEP, 2024).

In 2023, One Albania held 53% of the cellular service market, including SIM cards and broadband data cards, while Vodafone Albania had 47%. However, Vodafone led with 51% of active cellular users compared to One's 49%. In the broadband sector, Vodafone dominated with 56% of active 3G/4G users, while One had 44%. Vodafone also excelled in outgoing calls (55%) and SMS (58%), with One at 45% and 42%, respectively. In data traffic, Vodafone captured 54% of the market, generating 56% of total communications revenue, compared to One's 44%. This illustrates Vodafone's stronger market position across key metrics (Table 1).

Table 1. Market Shares for Key Cellular Service Indicators for year 2023

Year 2023	One Albania	Vodafone Albania
Cellular Service Users	53%	47%
Active Cellular Service Users	49%	51%
Active Broadband Users (3G/4G)	44%	56%
Outgoing Calls	45%	55%
Outgoing SMS	42%	58%
Data Traffic (GB)	46%	54%
Total Revenue from communications	44%	56%
Retail Revenue	44%	56%

Source: AKEP (2024)

3. LITERATURE REVIEW

Customer loyalty is a concept that has gained special attention in marketing. Loyalty is an asset for a company because it is more expensive to attract new customers than to retain existing ones (Hoffmann, 2013). Loyalty is an old concept and has been a subject of study since the 1930s (Bhatnagar et al., 2017). In the study by Vilkaite-Vaitone and Skackauskiene (2020), the author concludes that customer factors, service provider factors, and environmental factors can influence customer loyalty. It is precisely the satisfaction that a customer feels after receiving a service that creates a close connection between the client and the company, thereby increasing customer loyalty (Rahayu et al., 2021). Customer satisfaction is critical to customer loyalty. Different studies have concluded that customer satisfaction is a key factor with a positive impact on customer loyalty (Vilkaite-Vaitone & Skackauskiene, 2020; Sumadi & Soliha, 2015; Kuo et al., 2013). Consumer satisfaction is often measured by how well the product or service meets or exceeds expectations.

Satisfied customers are more likely to return, make additional purchases, and share their positive experiences with others (Oliver, 2010). Customer loyalty is strongly influenced by trust studied by Kuo et al. (2013). Building and maintaining trust is essential for long-term customer retention and fostering positive relationships. In support of this, Gul (2014) demonstrates through a model that there is a significant and positive relationship between trust and customer loyalty. According to Sumadi and Soliha (2015) customer satisfaction can affect loyalty, and customer trust can enhance customer satisfaction, which in turn leads to greater customer loyalty.

Service quality refers to the measure of how well a service meets or exceeds customer expectations. In (Supriyanto et al., 2021), service quality and customer loyalty are closely linked, with high service quality leading to greater customer satisfaction and increased but service quality has no direct effects on customer loyalty. In telecommunications, service includes network coverage, customer support services, and other related aspects (Izogo, 2017). Price perception also influences loyalty, acting as an indicator of value. Studies suggest that while price affects satisfaction, its impact on loyalty is mediated through satisfaction (Martín-Consuegra et al., 2007; Lymperopoulos et al., 2013). In the telecommunications sector, price increases can negatively affect customer loyalty. Finally, customer experience is the totality of a customer's interactions with a retailer, encompassing their perceptions and feelings about the service or product they receive throughout the entire engagement process (Lin & Bennett, 2014). Customer experience is the overall impression and emotional response a customer forms through interactions with a brand, encompassing sensory, emotional, and behavioral aspects that shape satisfaction and loyalty (Carmo et al., 2022). It plays a crucial role in influencing customer satisfaction and loyalty, significantly impacting perceptions of the brand (Lin & Bennett, 2014; Carmo et al., 2022; Imbug et al., 2018).

4. METHODOLOGY

This study targets individuals who are 16 years old or older and are subscribers to one of the telecommunications companies, Vodafone Albania sh.a. or One Albania sh.a. A self- administered questionnaire with closed-ended questions was used for data collection. Responses were gathered from April to August 2024. The sample was randomly selected, and 600 questionnaires were distributed randomly, of which only 163 were returned completed and valid for the study. The questionnaire was designed in three sections: the first section included questions about respondents' personal characteristics such as age, gender, monthly income, experience, and the company they are currently subscribed to. The second section contained questions on customer satisfaction (5 questions), trust (4 questions), service quality (5 questions), loyalty (1 question), and price (3 questions). This section was based on the literature (Tutz, 2021), with all items measured on a five-point Likert scale, where 1 represents strongly disagree and 5 represents strongly agree. The final section also included a closed-ended question asking if respondents would continue to be subscribers to their current company in the future. For the study of the relationship between loyalty and the factors influencing it, multiple linear regression and logistic regression analysis were used.

Multiple linear regression analysis estimates the coefficients of a linear equation involving multiple predictors, helping to understand their collective influence on an outcome variable (Pandis, 2016).

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \varepsilon \quad (1)$$

y in this study is the customer loyalty variable. β_0 is the intercept, indicating the value of customer loyalty when all independent variables $x_1, x_2 \ldots x_n$ are zero. $\beta_1, \beta_2, \ldots \beta_n$ are coefficients representing the impact of each independent variable on loyalty.ε is the error term, capturing the variance in y not explained by the model (Kaya Uyanık & Güler, 2013).

Logistic regression, commonly used in studies, models the relationship between a binary outcome variable and predictors (Stoltzfus, 2011).

$$\ln(p/1-p) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n \quad (2)$$

In equation (2) p represents the probability that a subscriber is loyal, while (1−p) represents the event where the subscriber is not loyal. The independent variables $x_1, x_2 \ldots x_n$ are used to study loyalty, and $\beta_1, \beta_2 \ldots \beta_n$ are the coefficients for each independent variable, with β_0 being the intercept. This model estimates loyalty probability by transforming a linear function into the range [0,1] using log-odds transformation (Izogo, 2017).

For this study, STATA 18 was used.

5. STUDY RESULTS

5.1. Demographic Results

The respondents were 53 % female and 47% male. Among them, 63 % were aged 16-30, making up the largest group in the study, 18% were aged 31-40, and 19% were 41 years old or over. For 38% of the respondents, monthly income was between 40,001 ALL and 60,000 ALL, 36 % had income exceeding 60,001 ALL, and 26 % had monthly income less than 40,000 ALL. Regarding experience, 45% had been customers of the companies for 2-5 years, 42% had been customers for 6 years or more, making up a significant portion, and only 13% had been customers for 1 year or less. Of the two leading and currently sole telecommunications companies in Albania, Vodafone accounted for 63% of the respondents who completed the questionnaire, while One accounted for 37% of the sample (Figure 1).

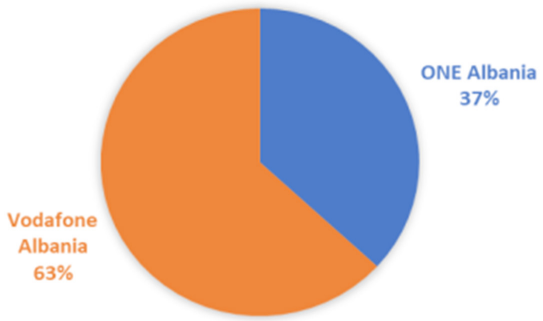

Figure 1. Subscribers by the company they are currently with
Source: Own research

The majority of the respondents, around 51%, express dissatisfaction with billing clarity. Furthermore, 15% believe their network connection is reliable, and 21% perceive product quality as high. Among the respondents, 37% disagree that promotions for new customers are effective, while 25% declare they are dissatisfied with the service overall (Table 2).

Perspectives on trust factors show considerable variation. Only 10% believe services are reliable, while 28% disagree. Trust in data security is low, with just 7% strongly agreeing and 36% disagreeing. Perceptions of network security are slightly better, with 10% strongly agreeing and 23% disagreeing. The impact of quality on trust is minimal, as only 6% strongly agree it matters, while 56% disagree (Table 3).

Table 2. Demographic data about service quality

	Service Quality				
	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
Your connection to the network is on time without interruptions.	15 %	16%	25%	25%	19%
Clear information is provided about billing.	3%	5%	18%	23 %	51%
The company offers promotions for new customers	7 %	9 %	30 %	37%	17%
Customer service is available 24/7	9%	30%	36 %	18%	7%
The products offered are of high quality.	21%	17%	26 %	16%	20%

Source: Own research

Table 3. Trust in being a subscriber at a telecom company

	Trust				
	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
The services provided are very reliable.	10 %	10%	31%	28%	21%
My trust in the security of data is very high.	7%	11%	18%	36%	28%
The network has high security.	10%	14 %	36 %	23%	17 %
My trust is greatly influenced by quality.	6 %	6 %	14 %	18 %	56 %

Source: Own research

Customer satisfaction reveals significant dissatisfaction: only 1% strongly agree that internet speed meets their needs, while 56% disagree. Just 2% feel service packages align with their requests, compared to 65% who disagree. Overall satisfaction is low, with 7% strongly agreeing and 22% strongly disagreeing. Additionally, only 13% view the company as competitive, while 23% disagree. Service quality satisfaction is also lacking, with 5% strongly agreeing and 42% strongly disagreeing, highlighting critical areas for improvement (Table 4).

On perceived pricing, only 4% strongly agree that the price is ideal, while 42% strongly disagree, indicating widespread dissatisfaction. For additional services priced lower than competitors, 7% strongly agree, while 29% disagree, reflecting mixed opinions. Just 5% think package pricing is suitable, with 57% strongly disagreeing, highlighting significant concerns about overall pricing strategies (Table 5).

Table 4. Customer Satisfaction

	Customer Satisfaction				
	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
I feel satisfied when receiving service from the company.	7%	9%	22%	40%	22%
The company I am subscribed to is very competitive in the market.	13%	12%	16%	36%	23%
The internet speed meets my needs	1%	5%	10%	28%	56%
The amount of service in the packages matches my request.	2%	6%	8%	19%	65%
The quality of service is always satisfactory to me.	5%	8%	23%	22%	42%

Source: Own research

Table 5. Perceived Price

	Perceived Price				
	Strongly agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly disagree (1)
The offered price is ideal.	4 %	6 %	20%	28%	42%
Additional services are provided at a lower price than competitors.	7%	18 %	34%	29%	12%
The price of the packages is very suitable for me.	5%	7%	11 %	20%	57%

Source: Own research

5.2. Multiple Regression Analysis

The results of the multiple linear regression model, presented in Table 6, indicate key findings related to customer loyalty. The model reveals that customer satisfaction has the most substantial positive impact on loyalty (p-value = 0.000), followed by trust (p-value = 0.001) and service quality (p-value = 0.011). Experience approaches significance (p-value = 0.057), while perceived price negatively affects loyalty (p-value = 0.003). Other variables like gender, age, and income do not show significant effects. Overall, the model accounts for approximately 65.1% of the variance in customer loyalty, reflecting a robust fit.

Table 6. Results of Multiple Regression

Variable	Coefficient	p-value
Constant	1.367	0.007
Gender	0.101	0.38
Age	-0.092	0.186
Monthly income	-0.078	0.351
Experience	0.184	0.057
Subscribers	-0.046	0.729
Service quality	0.19	0.011
Percived price	-0.168	0.003
Trust	0.234	0.001
Customer satisfying	0.347	0.000
N=163 Prob>F=0.000 R^2=0.6511 Adj. R^2=0.5963 Root MSE=0.66448		

Source: Own calculations

5.3. Logistic Model Analysis

The binary logistic regression model (Table 7) reveals significant factors influencing customer loyalty in the telecommunications sector. Key predictors include experience, which has an odds ratio of 4.259, indicating that longer tenure with a provider greatly increases loyalty. Service quality also positively impacts loyalty, with an odds ratio of 2.669. Other variables, such as gender, age, monthly income, perceived price, and trust, did not show significant effects at the 5% level. The results of the logistic regression model indicated that the model was statistically significant (LR $chi^2(22) = 126.76$, $p < 0.05$). The Pseudo-R^2 value was 0.7360.

Table 7. Results of Binary Logistic Regressions

Variable	Coefficient	p-value	Exp.(b)
Constant	-14.403	0.001	0.000
Gender	-0.176	0.826	0.838
Age	-0.517	0.287	0.596
Monthly Income	-0.172	0.75	0.842
Experience	1.449	0.028	4.259
Subscribers	0.211	0.775	1.235
Service quality	0.982	0.074	2.669
Percived price	-0.611	0.176	0.543
Trust	0.609	0.118	1.84
Customer satisfying	1.602	0.297	0.565
LR chi2(22) = 126.76 Prob > chi^2 = 0.000 Log likelihood = -36.276135 Pseudo R^2 = 0.7360			

Source: Own calculations

Both models underscore the importance of experience and service quality, but the linear regression places greater emphasis on customer satisfaction, whereas the logistic regression focuses on the likelihood of loyalty based on customer experience.

6. CONCLUSION

The primary aim of this study is to identify and evaluate the key factors influencing customer loyalty among telecommunications subscribers by using multiple linear regression and logistic regression models. The research involved a diverse group of respondents, predominantly female and younger, with many in mid-range income brackets. Most were long-term Vodafone subscribers. In the multiple linear regression, customer satisfaction emerged as the strongest predictor of loyalty, aligning with Kuo et al. (2013) and Vilkaite-Vaitone and Skackauskiene (2020). Trust significantly influenced loyalty, supporting Gul's (2014) study, while service quality also played a notable role, consistent with Supriyanto et al. (2021). Experience approached significance, echoing Lin and Bennett (2014). The logistic regression highlighted experience as a crucial factor, showing that longer tenure increases loyalty, in line with Lin and Bennett (2014). The significant role of experience suggests that companies should prioritize initiatives that encourage long-term relationships, such as personalized communication and consistent service improvements. By understanding and addressing the key factors influencing loyalty, telecommunications providers can develop effective marketing strategies that not only attract new customers but also retain existing ones, ultimately leading to sustained business growth. Service quality again positively impacted loyalty, while factors like gender, age, and perceived price did not show significant effects, contrasting with Martín-Consuegra et al. (2007).

Limitations include a small sample size and reliance on self-reported data. In future research, it would be beneficial to consider a larger and more diverse sample to enhance generalizability. Incorporating qualitative methods, such as interviews, could provide deeper insights. Additionally, examining other factors like digital engagement and social media influence would be useful. This approach could lead to a more comprehensive understanding of customer loyalty dynamics.

Overall, this study provides practical recommendations for telecommunications companies to enhance customer loyalty by improving customer satisfaction, building trust, and ensuring high service quality. Tailored marketing strategies and personalized communication can strengthen relationships, particularly with long-term and younger customers, driving sustained business growth.

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Responsible Consumption and Production as a Part of CSR

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Abstract: *The paper is devoted to responsible consumption and production as a part of the Corporate Social Responsibility (CSR) of companies. Achieving responsible consumption and production is one of the United Nations's twelve sustainable development goals. Partial goals are waste reduction and the adoption and promotion of sustainable actions by companies. As part of the research, the authors investigated consumers' interest in sustainable actions in terms of their willingness to apply them in their consumption. The research was conducted on a sample of 535 respondents. The contribution aims to recommend companies to apply such sustainable actions as part of CSR, which will be significant from the point of view of their application by consumers.*

1. INTRODUCTION

Responsible consumption is a broad concept based on consumer behavior. It is the process by which consumers satisfy their needs in a way that ensures that the needs of future generations are met. It is a multidimensional concept including economic, environmental and psychological variables (Syed et al., 2024). Together with responsible production, they form one of the sustainable goals set by the United Nations by 2030. Currently, more and more people understand that they must contribute to the protection of the environment themselves, that they cannot rely on the sphere of business or politics (Wang et al., 2014). Responsible consumption is considered the most effective way to achieve sustainable goals (Mukendi et al., 2020).

Companies respond to this with their socially responsible behavior, which serves as a company strategy of fulfillment of ethical responsibilities in business and interaction with their stakeholders (Hamdani et al., 2024). From this point of view, CSR is recognized for having both internal and external typologies depending on its focus. Internal CSR refers to a company's social responsibility initiatives aimed at its employees, whereas external CSR involves activities directed towards society and the environment (Bolton, 2020). In general, it could be said that through CSR, companies want to achieve a balance between economic, environmental, and social priorities while simultaneously meeting the expectations of both shareholders and stakeholders, such as employees, local communities, government, customers, and the environment (Apsari & Mansur, 2016). CSR speaks of incorporating societal and moral practices into business strategies that help consumers in building an optimistic brand image (Mohan, 2020).

2. LITERATURE REVIEW

Responsible consumption and production are the twelfth of the 17 sustainable goals defined by the United Nations. The partial objectives of this objective are: to reduce waste generation through

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prevention, reduction, recycling and reuse; reduce food waste; achieve sustainable management and efficient use of natural resources; ensure that people everywhere in the world have relevant information and awareness about sustainable development and a lifestyle in harmony with nature; develop and implement tools for sustainable tourism that creates jobs and promotes local culture and products (United Nations, 2022).

There are many definitions of responsible consumption. Each of them emphasizes fulfilling the needs of consumers in a certain way and respecting a certain factor. The most common ways include the purchase of eco products, recycling and reuse, efficient use of products and services, support of the local economy (Kempton et al., 2019; Gordon et al., 2006; Seyfang, 2013; Barrera-Verdugo & Durán-Sandoval, 2024). The factors most often mentioned in connection with responsible consumption are mainly the satisfaction of future needs, respect for the capacity of the ecological system, respect for biodiversity, or respect for the ecological and socioeconomic conditions of all people (Vantamay, 2018; Di Maio & Rem, 2015).

People are increasingly interested in sustainability, but their interest is not always reflected in their consumption (Cornelissen et al., 2008). One of the reasons why consumers do not behave sustainably is the cost (Follows & Jobber, 2000). This opens opportunities for businesses to offer solutions that are socially responsible, sustainable, and also financially acceptable.

In the business sphere, CSR is crucial in promoting an empowered and sustainable society, especially concerning environmental conservation initiatives (Apriliani et al., 2024). In this context, organizations usually take actions to prevent pollution, identify the possibilities of energy savings, workforce improvement, or deal with raw material efficiency, as well as waste control and reduction. Companies realize the importance of their environmental behavior with the aim of attracting an increasingly demanding and aware customer. Companies are trying to gain positive public opinion and company support, but achieving these goals is not possible only by meeting legal requirements and preventing incidents. Companies should take a more proactive approach. Thinking about sustainable development gives many opportunities to enrich the way of influencing the environment through: resource efficiency, sustainable economy, development of new processes and technologies, green technologies, strengthening the competitive advantages of companies, building customer awareness of the value of resources and energy efficiency, efforts to reduce emissions CO2, preventing damage to biodiversity and the climate-resilient economy (Arsić et al., 2016).

3. METHODOLOGY

We carried out the research using the survey method through a questionnaire. The questionnaire consisted of 24 questions related to consumers' perception of ecological problems and their willingness to contribute to fulfilling responsible consumption. The questionnaire was distributed in the Slovak Republic in October and November 2024 and was filled out by 535 respondents.

In order to generalize the results of the survey to the entire population, an analysis of representativeness concerning gender was done in use chi-square test. The null (the sample set is representative according to gender of consumers) and alternative (the sample set is not representative according to gender of consumers) hypotheses were set. The testing was done in SPSS Statistics and as shown in Table 1.

The value of Chi Square Test statistic is 2.265. That is, with one degree of freedom and a level of significance at 0.05, less than the critical value (3.84). It means that the null hypothesis can be

confirmed, and the sample set is representative according to gender of the consumers. This fact is also confirmed by p-value (Asymp. Sig.) which is at level 0.132 which is more than the level of significance (0.05).

Table 1. Verification of representativeness using Chi-Square test

Test Statistics	
	OT18
Chi-Square	2,265
df	1
Asymp. Sig.	0,132

Source: Own processing

4. RESULTS AND DISCUSSION

According to the results of the research, Slovak consumers currently prefer to separate waste in order to protect the environment. Furthermore, they are willing to save electricity and water and also buy and use ecological packaging (e.g. bags, bottles, etc.). They are also willing to buy products in ecological/separable packaging and local products or grow and produce own products. They also showed a high willingness to manage products: either to buy fewer products, or to use them as long as possible after purchase and thus eliminate waste. On the contrary, they are the least willing to rent, share or swap products. The following figure 1 shows the degree of willingness of Slovak consumers to implement the mentioned activities.

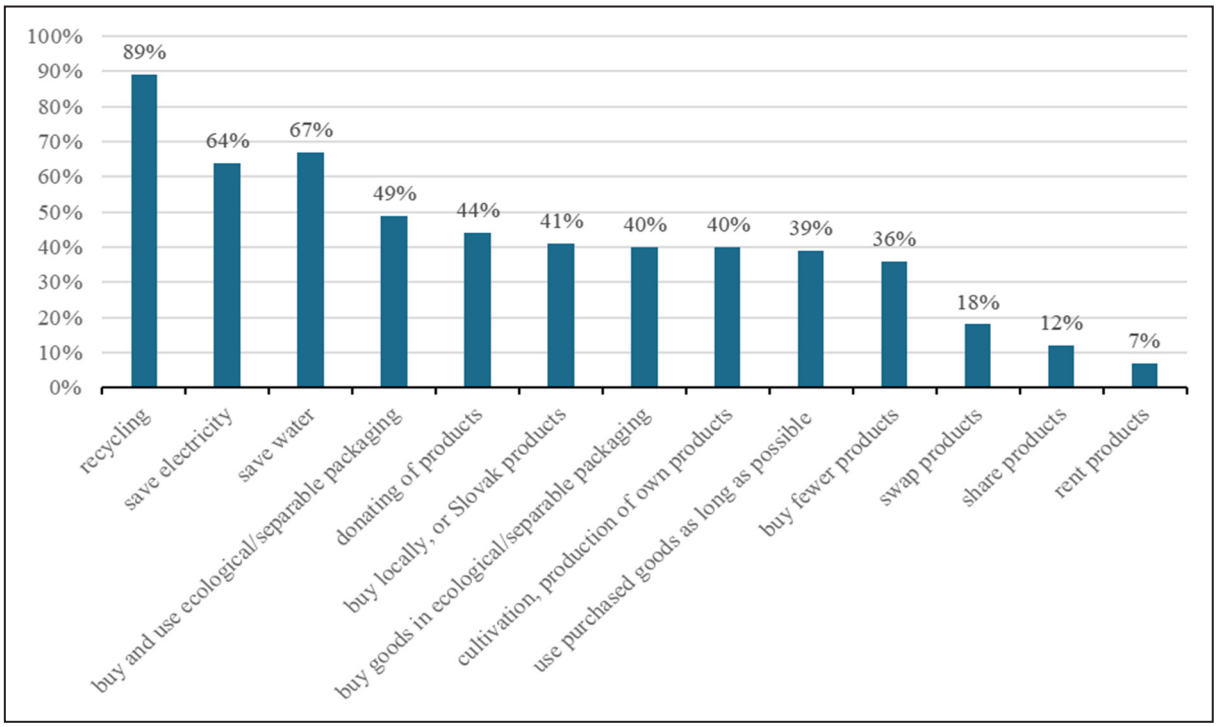

Figure 1. The degree of willingness of Slovak consumers to implement selected activities within the framework of responsible consumption

Source: Own research

As can be seen from the results of secondary research, similarly in other countries, these activities are perceived by consumers as ecologically beneficial and sustainable. Buying a smaller amount

of products, or long-term use of products is especially evident in the fashion industry (Rhee & Johnson, 2019; Chang & Jai, 2015).

On the other hand, about swap, sharing, or renting products (use of used products) is not a big interest even abroad. If consumers share some products, they do so mostly on an informal basis with close people, such as family members, neighbors or colleagues (Ribera Jemio et al., 2024). It turns out that emphasizing the ecological nature of the use of used products as well as economic savings are the main motives for implementing this activity in the framework of responsible consumption (Piscicelli et al., 2018; Aptekar, 2016; Becker-Leifhold, 2018; Day et al., 2020; Park & Joyner Armstrong, 2019).

However, it should be noted that, e.g., when comparing EU countries, the new member countries lag in their willingness to apply responsible consumption for the so-called old member countries (Jankiewicz, 2024). Responsible consumption is inextricably linked to responsible production. Companies should target the practices and techniques to produce goods and services outside of it that minimizes environmental impact, maximizes resource efficiency, and promote social and economic well-being. These methods aim to balance the economic, environmental, and social aspects of production and ensure that the resources used in the production process are managed responsibly and sustainably (Kirchherr et al., 2017). This is possible to do by using green energy sources, recycling and reusing materials, and coming up with ways to make things that use less energy (Moses et al., 2024).

5. CONCLUSION

According to the research results, most respondents are willing to recycle products. However, responsible consumption does not only include getting rid of products, but also their purchase and use. It is therefore important to focus attention on these stages of the purchasing process and inform consumers which products are sustainable and how to use them to make them last as long as possible. It is important to educate people about why sustainability should be preferred over materialism. In this area, space for businesses and CSR is opening. Businesses should focus on activities that are closest to consumers in terms of their consumption.

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Disruptive Technologies, Economic Implications, and Cybercrime

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Abstract: *Modern digital technologies have a strong impact on the way we live and work, which is why they are called disruptive in the business context. Under their influence, there are changes in traditional business models in various areas, due to which policymakers face numerous challenges, including new forms of cybercrime. Consequently, a particular challenge is to find the best solutions for decision-making that will lead to the realization of benefits or, at the very least, the mitigation of potential negative effects. With that in mind, the aim of this paper is to explore the dual nature of the economic implications of these technologies: the stimulation of innovation on the one hand, and criminal activities on the other. Through analysis of key disruptive technologies, as well as through case studies and examples, conclusive findings are drawn that offer policymakers, practitioners and academic researchers insights into the nature of impacts, highlighting the necessity of adapting to change and implementing innovations that foster cyber resilience and promote sustainable growth.*

1. INTRODUCTION

The modern development of technology enables the implementation of various technological innovations in business. Due to their ability to fundamentally change the structure of different industries and challenge existing business models, thus altering the way companies operate, some of these innovations are called disruptive technologies.[2] The development of these technologies is extremely dynamic and, given the new challenges they produce, very demanding for the organizations that implement them. New markets are created, but existing ones are also expanded, which collectively allow for more favorable product and service offerings, thus forming new consumer bases and income streams. Also, disruptive technologies contribute to changes in already existing technologies - offering new, better solutions, influencing the dynamics of the industry. By implementing these technologies, users allow for easier access to different industries, both existing and new ones. In the chain, the consequence increases competitiveness, because the United States and smaller companies can compete with the larger ones. To take a step with competitors, it is necessary to change business strategies, which requires leaders capable of adapting to the dynamic evolution of these technologies. Thus, these technologies are characterized by their special characteristics and a very dynamic impact on the business environment (Christensen et al., 2018).

With the rapid adoption of these technologies, new types of vulnerabilities in business systems appear, which affect the economy of businesses. This paper aims to explore the economic implications of disruptive technologies, identifying their impact on industries and markets. The expected impacts of these technological innovations are not only positive, but their implementation is accompanied by risks such as the dispersion of business, the need for retraining of the workforce,

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[2] This term popularized Kristensen in his book "The Innovator's Dilemma" pointing out the challenges that companies can face if they do not adapt to these innovations.

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as well as the increased threat of cyber resistance. This paper draws on real-world examples to show how disruptive technology is reshaping industries. Imagine that like a double-edged sword – for every innovation that simplifies workflow, there's a vulnerability waiting to be exploited.

The structure of the paper is as follows: first, a literature review summarizes existing research on disruptive technologies and their economic implications; then the methodology used in this research is described; the subsequent section offers a detailed analysis of selected case studies, revealing changes in industry structure influenced by disruptive technologies; before concluding, the discussion emphasizes the importance of adapting to these technologies and the disruptions they cause, highlighting the significance of adjusting business operations to the evolving digital economy.

Qualitative methods and methods of case study analysis are used in the paper in order to achieve the goal of this research, which is reflected in elucidating the deep economic impacts of disruptive technologies and pointing out the potential of business entities to respond and use these changes for sustainable growth.

2. LITERATURE REVIEW: DISRUPTIVE TECHNOLOGIES AND CYBERCRIME

Disruptive technologies – artificial intelligence (AI), blockchain, and the Internet of Things (IoT) – are developing at a pace that is rapidly reshaping the industry, which inevitably produces new cybersecurity challenges. This literature review highlights the contributions and limitations in considering this issue in some of the existing works.

Artificial intelligence opens numerous possibilities for enhancing business functions and operations, but these possibilities are also available to cybercriminals. On this subject, Md Fazley (2024) researched the role of AI in improving cybersecurity measures. He provided a broad overview of various applications used to combat modern cyber threats. However, not all potential risks, e.g., adversarial attacks, are addressed, and ethical implications are also not considered, which is most often lacking in other papers as well. On the other hand, Das and Sandhane (2021) have provided a comprehensive overview of how AI technology is applied in various aspects of cybersecurity, clearly showcasing its advantages, especially given that these authors also provided practical examples of AI application in real situations. On that occasion, they did not pay enough attention to a more detailed analysis of the limitations and effectiveness of the application of AI solutions. Those questions were dealt with more by de Azambuja et al. (2023), especially pointing to new trends related to digital transformation in Industry 4.0. This research also employed a survey that effectively demonstrates various AI-based solutions, but the article does not provide insight into the challenges companies may face in integrating these AI tools into their existing security infrastructures. However, they also did not pay enough attention to possible obstacles during integration, as well as to the development of the methodology used by cybercriminals. Due to the disproportionate development of cryptographic protocols in the conditions of the fast pace of technological development, Ramos-Cruz et al. (2024) see their AI integration as an effective solution. While this is a good solution, more attention needs to be paid to the ever-present problem with AI – the invasion of privacy spheres. Other authors, such as Kumar et al. (2023) and Roshanaei et al. (2024), explore the potential of AI in the field of cybersecurity, not paying enough attention to the shortcomings, such as invasion of privacy and transparency.

Anwar et al. (2022) provide a broad overview of blockchain technology – historical development, applicability, and potential. When talking about potential impacts, they rely on empirical evidence, neglecting the safety aspects of their application. Patmanathan et al. (2023) discuss leveraging

this technology to prevent financial cybercrime. The authors point to the high potential of this technology for increasing security, and thus trust. They believe that the ability to track transactions and securely store data is a key advantage of this technology. Nevertheless, these theoretical advantages of blockchain technology are not illustrated with appropriate empirical data or case studies of effectiveness in preventing financial cybercrime, which can somewhat limit its practical applicability. They also do not consider some important practical issues, such as integration costs or regulatory hurdles for its implementation. It would be useful to supplement this research with answers on how cybercriminals can improve their strategies in response to the potential of blockchain technology. Fakiha (2023) explores the impact possibilities of blockchain technology for application in forensic investigations of digital content. He sees these possibilities in "ensuring the integrity of data, the possibility of monitoring incidents in real time", as well as in "the possibilities of securely collecting evidence and sharing it among interested parties". This paper does not provide answers to the questions of obstacles to the integration of this technology with other systems, and it does not sufficiently deal with the ethical and legal implications.

In their work, Sadhu et al. (2022) address the vulnerabilities of IoT systems, such as data privacy sensitivity and network vulnerability due to device authentication problems in various fields. Besides identifying challenges, they also offer solutions, including encryption protocols, intrusion detection systems, and generally secure communication frameworks. However, this research lacks concrete examples, a short reach concerning new threats as a result of the development of AI and machine learning, and no responses to potential problems with implementing security measures. The security vulnerabilities of IoT are also addressed by Almazroi and Alghamdi (2020). Both authors note that there are security flaws related to these devices, which makes them attractive to cybercriminals. Due to these security weaknesses, significant privacy breaches, data vulnerabilities, and disruptions in critical infrastructure can occur. Therefore, they emphasize the need for improved security protocols and standards for IoT devices, but they do not specify what these improvements would entail or how these protocols could be more effectively implemented. Further research must include case studies or empirical analysis to better understand the vulnerability of IoT and, in this regard, the effectiveness of the proposed security measures.

The economic implications of cybercrime, in the form of enormous economic costs, are highlighted by one of the world's leading cybersecurity companies, McAfee and the Center for Strategic and International Studies (CSIS) (2018), which emphasizes in their report that such negative economic impact will increase with the growing presence of disruptive technologies. They propose a proactive approach to cybersecurity, which would focus not only on defense but also on operational resilience and recovery. However, this report is not precise enough, as it does not connect the dots between specific technologies and their negative economic impacts, so further research should clarify these relationships to enable effective risk assessment and application in management strategies. Cybercrime threats related to disruptive technologies are described in the report by the European Union Agency for Cybersecurity (ENISA) (2021). However, the report is largely descriptive, lacking deeper research into the long-term economic impacts on certain sectors.

Other literature, as mentioned here, significantly contributes to understanding the interaction between cybercrime and disruptive technologies, with similar gaps, which mostly reflect the lack of empirical data and real-case analyses. This indicates the necessary direction for further research – the connection of disruptive technologies with practical implications for cybersecurity.

3. METHODOLOGY

The methodology of this research focuses on the complex aspects of the impact of disruptive technologies on industries, markets and cyber resilience. Qualitative methods and case study analysis were found to be most suitable for achieving this research.

To gain insight into existing research, a literature review on previous studies regarding disruptive technologies was conducted, with a focus on recent literature. The particular focus was on the connection between AI, blockchain, and IoT with economic implications and cybercrime. In order to obtain a valid understanding of this issue, it was necessary to review academic articles, industry reports, and other relevant sources. Given the spatial constraints of this work, a selection of significant case analyses was made to present real-world examples related to the problem of this research. These case studies provide concrete evidence of both the contributions and challenges, as well as the risks of applying disruptive technologies in different organizational circumstances.

The research design and data collection methods determined the choice of analysis. Thematic analysis was simply imposed, as it allows for the identification, analysis, and interpretation of themes within qualitative data. By setting such a framework, it was possible to identify key themes in the reviewed literature and case studies. This was crucial to gain insight into the economic implications of disruptive technologies and their relationship with the impacts on cyber resilience in a rapidly evolving digital environment.

This qualitative approach also has its limitations, as noted in the previous section; there are gaps in the literature that may affect the findings of this work. This is expected, given that the rapid development of these technologies accelerates the process of obsolescence of some previous research findings. Additionally, the selected case studies do not cover all sectors, as such an undertaking would require a different nature and a much broader scope of research.

Considering that insufficient attention is given to this aspect, ethical considerations have been taken into account during the process of this research, with a focus on data privacy. The work itself doesn't deviate from this framework, especially regarding the use of external empirical results. All sources are properly cited, taking care of the integrity of data and information to ensure adherence to academic standards.

4. CASE STUDY ANALYSIS: CHANGES IN INDUSTRY STRUCTURE INFLUENCED BY DISRUPTIVE TECHNOLOGIES

For the purposes of the analysis in this paper, the case studies were chosen in such a way as to respond to the research objective, i.e., to show the impact of disruptive technologies both in the dynamics and in the structure of the industry. In order for this analysis to have the qualities of general representativeness, case studies were selected from three prominent sectors – finance, production and healthcare.

4.1. Case Study 1: Financial Services and Blockchain Technology (Patmanathan et al., 2023)

Few industries seem to be as receptive to blockchain technology as the financial services industry. This impact is especially reflected in payment systems, smart contracts, and asset management. Due to its security sensitivity, one of the prominent examples is the application of blockchain

technology in the processing of cross-border payments by financial institutions. What has been achieved with the application of this technology? The biggest contribution is reflected in the reduction of the payment burden. In the earlier payment system, several intermediaries were involved, which often caused delays. This also increased the risk of fraud. For the functioning of such a cumbersome system, the user had to pay high fees. The biggest contribution is reflected in the reduction of the payment burden. In the earlier payment system, several intermediaries were involved, which often caused delays. This also increased the risk of fraud. Thanks to blockchain technology, transactions can take place without intermediaries. If it is also taken into account that it is a digital environment, then it is clear that the process itself is speeding up; that is, payments take place practically instantly. At the same time, the costs are much lower.

As for the impact on the industry structure, it is reflected in the acceleration of the development of decentralized finance, calling traditional banking models into question. To remain competitive, organizations must delve deeper into the problem of implementing blockchain technology; otherwise, they will not be able to respond to new entrants using such solutions.

This case study can be helpful to expand research on the practical application of blockchain technologies in the financial services sector, where it would be useful to strengthen the new research with more empirical evidence.

4.2. Case Study 2: Manufacturing and IoT (Altulaihan et al., 2022)

This study provides a detailed overview of cyber threats specific to IoT devices. It is not strictly specified for production, but it is also relevant for the production sector due to the increasing prevalence of these applications. Guidelines for countermeasures that can be applied to secure IoT systems (encryption, authentication, regular security assessments) are provided, thanks to which manufacturers can improve their approach to cybersecurity for integrated IoT technology.

One of the weaknesses of this study is the insufficient attention to detail of the impact of IoT on industry structure. However, on careful reading, one can see from the context of the study an indication of increased vulnerability and risk management. From this, it is not difficult to draw the conclusion that there may be requests for changes within industries. This is logical, as with new cybersecurity threats, organizations must adjust their risk management strategies. Since cyber threats are becoming a central concern, it is essential to integrate cybersecurity roles into operational manufacturing processes. Any change in functioning, especially those related to cyber resilience, also requires appropriate alignment with regulations. The nature of cybersecurity is such that information about detected attacks must be shared with others, not only for collegiality, but also for possible feedback on solutions that someone has already implemented before. Cooperation between companies within the same industry, but also between sectors, encourages responsible persons to find new solutions for cybersecurity. With greater security, the organization is more ready for market competition. This encourages other organizations to improve their security systems in order to maintain competitiveness, and in the overall outcome, everyone benefits.

This study lacks more empirical evidence on the effectiveness of the proposed countermeasures, which would greatly help organizations in assessing their applicability in their own circumstances. Additionally, insufficient attention is paid to the possibilities of cybercriminals adapting to the development of IoT technology, which is significant for the development of proactive security measures. It goes without saying that this also touches on the issue of ethics in relation to the use of IoT.

4.3. Case Study 3: Healthcare and Artificial Intelligence (Binhammad et al., 2024)

Binhammad et al. (2024) point out the dual nature of AI, highlighting its substantial contribution to the protection of digital systems and emphasizing the importance of a balanced approach to its application. The significance of AI for the healthcare industry is enormous, especially for diagnostics. The study investigates the ways in which AI algorithms analyze medical images, achieving remarkable success in detecting diseases, including the most severe ones like cancer.

In terms of impact on the industry structure, the study highlights that the application of AI in medicine is not limited to diagnostics, but also to the improvement of all services in healthcare, particularly to better interaction with patients in order to meet their demands and expectations.

The study points out the risks of AI misuse in the digital environment generally, but does not delve into the details of potential abuses in healthcare, including ethical issues.

4.4. Conclusion of the Analysis

All three case studies highlight the potential of these disruptive technologies to enhance efficiency in certain industrial sectors. In this regard, it points out the necessity of proactively adjusting their strategies to keep pace with technological advancements.

As in the research reviewed in the literature review, these case studies also show a lack of empirical evidence. Additionally, as a rule, ethical implications are not identified, nor are future research directions.

5. FUTURE RESEARCH DIRECTIONS

Through the analysis of these case studies, as well as other reviewed works, a direction for future research is observed, which can be described as the necessity of continuous innovation and entrepreneurship in terms of modifying existing ones and creating new strategies for managing a digital environment that is in continuous and dynamic development. There are gaps in the analyzed studies, which need to be filled with new research, in order to achieve a better understanding of this problem, and with a better understanding, a more effective application of these technologies.

These technologies must be empirically validated. This implies that there is a need for empirical studies, through which researchers will assess the effectiveness of disruptive technologies that are embedded in different industries. To achieve this, it is necessary to work on collecting data from those organizations that have already implemented these technologies. The data collected in this way needs to be further analyzed in order to study the impacts of these technologies on operational efficiency and security. Skilled analysts will also find case studies where implementations were successful and those that were unsuccessful useful. Because the best way to learn is from someone else's mistakes. If not the best, then certainly the most painless.

Although it is done through case studies and recent literature, the same gaps are constantly observed, insufficient attention to the barriers to implementation, the adaptation of cybercriminals and in general the potential that disruptive technologies provide them, as well as the ethical implications. It says a lot about works of an older date, which are not considered here, but it is completely clear that they have at least the same shortcomings. Analyzing this insight, it is not difficult to conclude that they all have the same shortcoming, which needs to be given more attention in future research

– research into the long-term effects of vulnerability, which are the result of the integration of these technologies. This is significant not only because of the stability of the security system, but also because of the opportunity to monitor the development of these vulnerabilities and their impact on business continuity over a long period of time. Also, research on long-term effects leaves room for legislators to develop regulatory frameworks that will respond to such changes.

As already pointed out, disruptive technologies have found their place in various industrial sectors, exerting a significant influence on their development. Therefore, future research must strive for interdisciplinarity, which is primarily in the interest of cybersecurity. Namely, the misuse of these technologies can be devastating, and it is necessary to devise holistic solutions to these challenges. To devise such solutions, it is necessary to have integrated knowledge from different fields, not only from computer techniques but also from organizational sciences, law, and ethics.

Future studies should consider the compliance of the implementation of disruptive technologies with ethical and legal standards. Ethical frameworks related to the use of these technologies are very important in cybersecurity, as they regulate not only data privacy issues in terms of user consent but also the handling and management of that data after collection.

The need for integration of different knowledge in future research indicates that such integration is also necessary for organizations, or for responsible persons in organizations whose responsibility is cybersecurity. Therefore, future research would also be good to consider the types of training and retraining that technical personnel would undergo.

6. CONCLUSION

By looking at the existing literature that deals with the study of disruptive technologies – specifically AI, blockchain, and IoT – in a scientific way, it can be seen that the volume of relevant references is not negligible, that is, a large number of scientific researchers recognize these technologies as very important tools of technological progress, and thus the improvement of life in all its aspects. The analysis of these technologies from the point of view of the authors of the literature discussed in this paper shows that disruptive technologies have at least a double impact on both the dynamics and the structure of industries. On the one hand, the implementation of these technologies contributes significantly to the improvement of business efficiency, and on the other hand, it also brings certain challenges and risks. The paper focuses on case studies from three major industry sectors – financial services, manufacturing, and healthcare. These studies demonstrate how the implementation of disruptive technologies improves operational efficiency. At the same time, they also highlight the need for certain adjustments to make risk management work.

The decentralization of finance through the integration of blockchain technology in the financial services sector is an example of a positive transformation, which is encouraging traditional institutions to rethink their way of doing business and adapt their business strategies to the digital environment. This is not only because of competitiveness but also because blockchain technologies increase business efficiency and contribute to customer satisfaction. Similarly, the application of IoT in manufacturing introduces new risks, and the case study highlights the need to integrate cybersecurity into these processes. It is wrong to have a limited view of the application of artificial intelligence, considering that it contributes only to diagnostics. In practice, artificial intelligence has also proven useful in other activities of healthcare organizations, such as patient care or providing patients with administrative services related to medical care. Of course, we must never lose sight of the ethical issue of the application of artificial intelligence, especially considering the specific sensitivity of patient data.

Each case study highlights the ability of these technologies to make certain improvements in the dynamics and structure of industries. Ideal changes do not exist, especially when they occur at such a speed, which is why each change produces different challenges and risks. Adapting to changes, especially of such intensity and speed, is an integral part of the management process. Given the nature of cyber incidents, in order for the reaction to be timely and effective, it is necessary to practice appropriate adjustments and adopt proactive management.

The gaps identified in the analysis primarily relate to the lack of empirical evidence on the effectiveness of the solutions implemented, as well as the underdeveloped discourse on ethical issues. In addition to the need to pay more attention to these issues in future research, other research directions were identified – an interdisciplinary approach to cybersecurity challenges, continuous workforce training, and developing models of operational collaboration regarding cybersecurity.

The insights from this study highlight the need for entrepreneurship to keep pace with the rapid development of disruptive technologies and to prevent cyber incidents in a timely manner.

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The Intelligent Alarm System Based on Sensors and Supported by IoT

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Keywords:
Microcontroller;
Sensor;
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IoT;
Security

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Abstract: *Microcontrollers are increasingly used in all aspects of modern life. In this paper, a microcontroller, a distance sensor, a sound alarm, C++ programming code, IoT, and a digital camera are used to build an intelligent and secure alarm system. All this to protect against unauthorized intruders in private buildings such as residential homes, government institutions, banks, commercial premises, businesses, and the like. In the case when the sensor identifies a suspicious movement, the system activates the alarm and a camera that captures the image of the intruder. At the same time, a real-time e-mail message is sent based on IoT, notifying the presence of an unauthorized intruder and the photos captured by the digital camera are stored in a folder for visual evidence. The distance sensor is able to detect movements at different distances within its observation perimeter. This intelligent IoT-based system increases security control to the maximum level by minimizing unauthorized access to high-security environments. The completion of the work will provide an efficient and highly reliable solution for protecting the environment against unauthorized intrusions.*

1. INTRODUCTION

The intelligent alarm system is an advanced and efficient solution for securing sensitive and high-security environments. It combines ultrasonic sensors, microcontrollers, buzzers, digital cameras, programming code, and IoT support to detect and respond to unauthorized intrusions into protected areas (Bowler et al., 2022).

This system identifies unauthorized motion within secured premises and, upon detecting an intrusion attempt, triggers a warning alarm to alert of the potential threat. Simultaneously, a digital camera captures images of the intruder and sends them to a predefined email address programmed into the system, enabling real-time and immediate notification of the event.

This work enables the replacement of traditional alarm methods by providing a higher level of security and efficiency in monitoring spaces such as homes, businesses, government offices, banks, and valuable material storage facilities (Jogdand et al., 2021).

Focusing on enhancing security and ease of use, this study contributes to the field of digital engineering for intelligent security and monitoring systems. A thorough analysis of the benefits and challenges of this system will be conducted to better understand how the technologies employed can enhance security and safeguard both data and valuable assets in various environments. Security aspects are central to this work, as the system aims to prevent unauthorized access to facilities and provide a rapid response mechanism to any suspicious intrusion.

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1.1. The Purpose of the Study

The purpose of this study is to develop a digital and intelligent system for ensuring high-security protection of facilities, leveraging IoT technology. The system integrates an ultrasonic sensor for distance measurement, a keypad for password management, a digital camera, the Arduino Uno ATMEGA328P module with Internet-IoT access, and Sketch programming code loaded into the microcontroller's memory. This digital system is designed to detect the presence of individuals near high-security facilities and activate alarms, thereby offering an additional layer of environmental security. The advanced system allows users to easily manage passwords for activating and deactivating the alarm, providing a simple yet effective mechanism to safeguard their property. Users can set and change passwords as needed, ensuring complete control over the intelligent security system. When the sensors detect an individual within a specified distance, the alarm is automatically triggered, initiating an immediate response. At the same time, a live video is captured to document events, providing valuable evidence in case of incidents. This helps owners and relevant authorities monitor and review any suspicious activities that may occur on the premises. Furthermore, the system is equipped with IoT-based communication technology to send email notifications. In case of alarm activation, an instant notification is sent to the user's email address, including a photo captured by the system's digital camera. This ensures the owner is immediately informed of any suspicious activity and enables timely action. Simultaneously, information can be relayed to security institutions, independent licensed agencies for securing high-security facilities, and local police authorities (Hernandez et al., 2024).

1.2. Objectives of the Study

The objectives of this study are clear and focused, aiming to develop an intelligent digital system that addresses users' needs for effective protection and surveillance of their facilities and spaces (Ibrahim, 2020). The key objectives are outlined as follows:

Development of the Security System - Create an integrated system incorporating ultrasonic sensors, a keypad, a digital camera, and IoT technologies connected to Arduino UNO and other devices for monitoring the environment and detecting the presence of moving individuals nearby.

Implementation of Password Management - Design a user interface that enables easy password management for activating and deactivating the alarm, providing a high level of security for users (Potortì et al., 2023).

Documentation and Study Significance - Produce comprehensive documentation detailing the development process, the technological solutions employed, and the significance of this system for users and society at large.

1.3. The Significance of the Study

This study holds particular importance in the context of security and surveillance in both residential and workplace environments. Some of the key aspects highlighting the significance of this project include:

Advancement of Intelligent Technologies. This study contributes to the advancement of surveillance technology by integrating sensors and applications that enable a new level of intelligence in security systems. This promotes innovation and improves traditional surveillance methods.

Simplification of Security Management. With a simple system for managing passwords and activating alarms, this study facilitates the security process for users, giving them greater control over protecting their property.

Education, Awareness and Integration of New Technologies. Through the documentation and promotion of this work, it provides an opportunity to educate users and society about the importance of technology in personal security and environmental surveillance through IoT. This system not only serves as a security solution but also as a platform to integrate new technologies such as video surveillance, intelligent sensors, and real-time IoT communication, creating opportunities for future developments.

Contribution to the Health and Well-being of the Community A safe environment is essential for the health and well-being of the community. By offering such a solution, this project helps create a safer environment for everyone, contributing to a more peaceful and protected society (Potortì et al., 2023).

2. INTEGRATION OF ULTRASONIC SENSORS AND MICROCONTROLLER COMPONENTS IN AUTOMATED SECURITY SYSTEMS

2.1. Ultrasonic Sensors

Ultrasonic sensors operate by emitting high-frequency sound waves, which are reflected by moving objects in proximity. When a person enters the detection range, the reflected waves return to the sensor, which interprets this as movement by measuring the distance from the sensor. The sensor then triggers the alarm system. This technology is highly effective for detecting motion in various security applications due to its ability to cover a wide area and accurately detect even slight movements (Gavali et al., 2024).

The use of ultrasonic sensors in security systems offers several benefits:

– Accuracy: They can detect movement with high precision by measuring the time it takes for sound waves to travel to an object and return.
– Non-Intrusiveness: Since ultrasonic sensors rely on sound waves rather than light or cameras, they can function effectively in low-light conditions or through obstacles such as walls.

The use of microcontrollers in alarm systems enables advanced and automated management, enhancing the overall functionality and efficiency of security measures. By integrating microcontrollers with ultrasonic sensors and other components, systems can perform tasks that go beyond simple detection, such as triggering alarms, sending real-time notifications, and even providing remote monitoring.

Alarm system and Buzzer: When the sensors detect movement, the system immediately triggers an alarm to warn of potential danger. This rapid activation ensures that any unauthorized access or intrusion is detected in real time, allowing for a quick response.

Arduino Uno ATmega328P+ESP8266: It is an open-source microcontroller that is easily programmable in C or C++ and has access to the Wi-Fi Internet network. The Arduino Uno has 14 digital input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, a serial port (UART), a 16 MHz crystal oscillator, a USB connection for connecting to a computer and uploading programs or sketches, and a 5 VDC power supply. Arduino Uno is ideal for both simple and advanced projects, offering an easy-to-use platform for developing various electronic and robotic applications within the IoT environment.

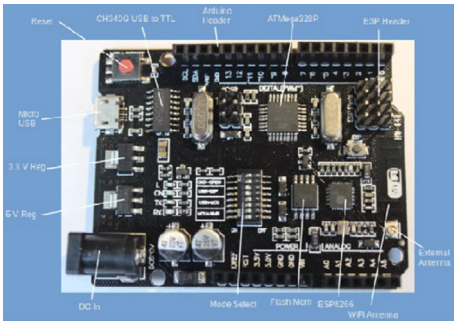

Figure 1. Arduino Uno ATmega328p + ESP8266 WIFI tutorial
Source: Arduino Uno ATmega328P + ESP8266 tutorial (n.d.)

2.2. 4X4 Matrix Keyboard

A 4x4 keypad is an essential component in electronics and robotics systems, providing a simple way to input commands and information. It is designed to facilitate communication between the user and electronic devices, being widely used in hobby projects and professional applications. The keypad consists of a cluster of buttons arranged in a 4x4 matrix, which includes a total of 16 buttons. This structure allows users to make selections and send commands through a simple and intuitive system. When a button is pressed, it generates a signal that determines the row and column combination, enabling accurate recognition of the command (Figure 2).

Figure 2. 4X4 Matrix Keyboard device
Source: Parallax (n.d.)

The 4X4 keypad is a powerful tool for any project that requires simple user interaction. It provides an effective and functional solution for a wide range of applications, making it a popular choice in the field of electronics and robotics. A 4x4 keypad consists of 16 keys arranged in a matrix of 4 rows and 4 columns. Each key press connects a specific row with a specific column.

Pin Summary: – Total Pins: 8 (4 for rows and 4 for columns). – Row Pins: Connected to the input pins of the microcontroller. – Column Pins: Connected to the output pins of the microcontroller. – Row Pins: Column Pins: – Row 1 (R1) Column 1 (C1) – Row 2 (R2) Column 3 (C3) – Row 3 (R3) Column 4 (C4) – Row 4 (R4)	Key Press Detection Process Scanning Process: – Set all column pins to LOW (ground). – Set one row pin to HIGH at a time (R1, R2, R3, R4). – Check the column pins to see which ones are LOW.

If a column pin reads LOW while a row pin is HIGH, the corresponding key has been pressed (Figure 3).

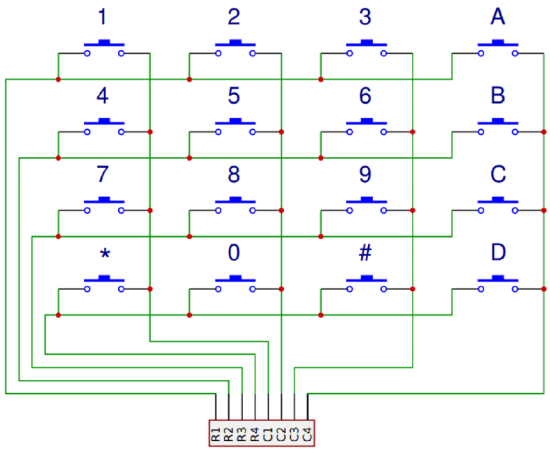

Figure 3. 4X4 Matrix Keyboard pins
Source: Components101 (2018)

Ultrasonic Sensors are widely used in applications for distance measurement and object detection (Jonathan et al., 2022). They operate by emitting ultrasonic waves and measuring the time it takes for the wave to be reflected off an object and return to the sensor. This information allows for the calculation of the distance between the sensor and the object (Figure 4). Key characteristics of ultrasonic sensors include:

- Operating Mode: They use ultrasonic waves to measure the distance from an object.
- Distance Range: They can measure distances from a few centimeters to several meters, depending on the model.
- Pulse Duration: Fast measurement speed, often achievable within a few milliseconds.
- Wave Emission: The sensor sends out an ultrasonic pulse.
- Reflection: The pulse hits the object and reflects back to the sensor.
- Time Measurement: The sensor measures the time it takes for the pulse to return.
- Distance Calculation: Knowing the speed of ultrasonic waves, the distance can be calculated using the formula:

$$d = t \cdot v/2 \quad (1)$$

d – The distance of the unauthorized person from the object, as measured by the sensor.
t – The time taken for the reflected wave to return to the sensor from the object.
v – The speed of sound in air, which is:

$$v = 343 \text{ m/s} \quad (2)$$

Figure 4. UltraSonic Sensor device
Source: AliExpress (n.d.)

Ultrasonic sensors typically have four pins:

- VCC: This pin connects to the power supply (usually 5V). Trig: This pin is used to send the signal to activate the sensor. A pulse of at least 10 microseconds on this pin will trigger the

sensor to emit ultrasonic waves. Echo: This pin returns the time of the reflected ultrasonic wave. It will provide a high signal for the duration of the round-trip time. GND: This pin connects to the ground (GND) of the system.

Ultrasonic sensors are widely used in:
- Robotics: For navigation and obstacle avoidance.
- Autonomous vehicles: For object detection and distance measurement.
- Security systems: As motion detectors.
- Parking systems: To assist with vehicle parking.

Ultrasonic sensors are an efficient and reliable solution for distance measurement, offering high accuracy and performance across many applications (Khaleel et al., 2024).

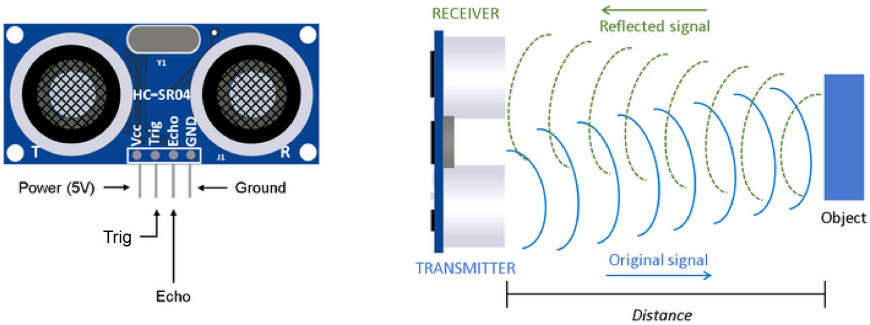

Figure 5. UltraSonic Sensor pins
Source: Nerokas (n.d.)

This pin configuration of ultrasonic sensors facilitates easy connection and communication with microprocessors, enabling them to perform accurate distance measurements for various applications.

2.3. Led, Resistor and Buzzer

Resistors: These electrical components are essential for managing the current flowing through the LED diodes and the buzzer, preventing damage from currents with higher intensity than they can handle (What is resistor, 2020). Red LED**:** This LED emits red light and serves as a visual signaling indicator (The Light Emitting Diode, 2024). It is suitable for situations where a specific state needs to be indicated, such as the activation of an alarm or the operational status of a device. (Pandini et al., 2024).

Buzzer: This component has the ability to produce sound and is suitable for acoustic signaling. It is often used to draw the user's attention in various situations, such as security alarms or special notifications. The buzzer provides a loud and clear signal that is easy to hear, making it useful in noisy environments, as shown in Figure 6.

Figure 6. Led devices, Resistor dhe Buzzer
Source: Activate Buzzer and LED using LDR and Arduino (n.d.)

The OV7670 digital camera module takes photographs when a moving person is detected within the ultrasonic sensor's monitoring perimeter. The captured photo is stored in the system's memory and sent to the email address.

Figure 7. Digital camera module OV7670

Source: Arducam (n.d.)

A diagram of the electronic circuit construction for connecting the Arduino Uno module and the OV7670 digital camera module is shown in Figure 8.

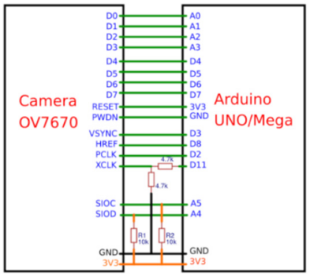

Figure 8. The diagram of the electronic circuit construction Arduino+Camera OV7670

Source: Pandit (2019)

3. THE ELECTRONIC SCHEMATIC OF THE CONNECTIONS OF OTHER ELECTRONIC COMPONENTS

This electronic schematic illustrates the connection of a smart alarm system, which uses an Arduino Uno R3 module with IoT internet access. The main components used in this system include an ultrasonic sensor for measuring distance, a buzzer for acoustic signaling, a keypad that allows the user to input a code to change the password, as well as to stop or activate the alarm system, and resistors that are used to protect the LEDs by limiting the current flowing through them and preventing LED damage (Mustafa et al., 2023).

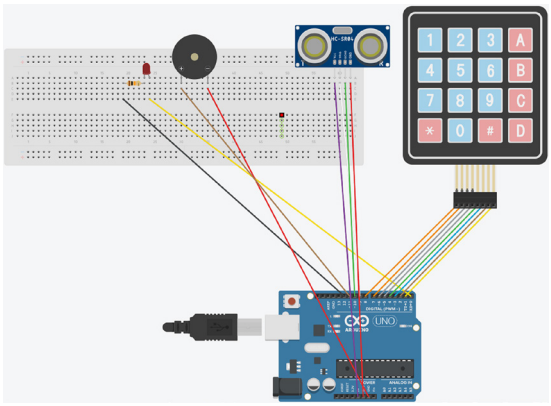

Figure 9. Diagram of the alarm system based on distance during movement

Source: Diagram drawn by the authors of the paper

In the case where the sensors detect the presence of a person, the system not only activates the alarm but also sends a notification email and saves an image to document the event. This solution provides an intuitive interface with visual and acoustic signals to inform the user about the system's status, while simultaneously sending a message and photo to an official email address defined in the program code written in C++, referred to as the Sketch Figure 9.

The complete implementation code:

```
#include <ESP8266WiFi.h> //WiFi.h for ESP32
#include <NewPing.h> //sensor HC-SR04
#include <keypad.h> //Keyboard 4X4
#include <EEPROM.h> //For saving passwords
#include <OV7670.h> //Digital camera OV7670
#include <SMTPClient.h> //Sending emails
// Definitions for ultrasonic sensor
#define TRIG _ PIN 9
#define ECHO _ PIN 10
#define MAX _ DISTANCE 200
NewPing sonar(TRIG _ PIN, ECHO _ PIN, MAX _ DISTANCE);
//Definitions for LED and Buzzer
#define LED _ PIN 11
#define BUZZER _ PIN 12
// Keyboard 4X4
const byte ROWS = 4;
const byte ROWS = 4;
char keys[ROWS][COLS] = {
{'1', '2', '3', 'A'},
{'4', '5', '6', 'B'},
{'7', '8', '9', 'C'},
{'*'', '0', '#'', 'D'}, };
byte rowPins[RROWS] = {1, 2, 3, 4};
byte colPins[COLS] = {5, 6, 7, 8};
Keypad keypad = Keypad(makeKeymap(keys), rowPins, cplPins, ROWS, COLS);
// Wi-Fi dhe e-mail
Const char* ssid = "SSID _ YOUR _ WIFI";
Const char* password = "PASSWORD _ your _ wifi";
SMTPClient emailClient;
Void sendEmail(){
emailClient.setServer("smtp.gmail.com", 465);
emailClient.setLogin(your _ email@gmail.com"), "your _ email _ password");
emailClient.setSender("Arduino", "your _ email@gmail.com);
emailClient.setRecipient("Ragmi Mustafa",
"ragmi.mustafa@uni-gjilan.net");
emailClient.setSubject("Someone is in front of the door");
emailClient.setMessage("Someone is in front of the door. Check camera
for details.");
emailClient.send();}
void setup(){
serial.begin(9600); // Configuration for electronic components
pinMode(LED _ PIN, OUTPUT);
pinMode(BUZZER _ PIN, OUTPUT);
// Lidhja me Wi-Fi
WiFi.begin(ssid, password);
```

```
    While(WiFi.status()!=WL _ CONNECTED)
{
    Delay(500);
    Serial.print(“.”);
}
Serial.println(“\Wi-Fi u lidh”);
    }
    Void loop(){
    // Reading the distance of a person from the sensor
    int distance = sonar.ping _ cm();
    if(distance > 0 && distance <= 50) {
    // Ndriço Led dhe aktivizo Buzzer
    digitalWrite(LED _ PIN, HIGH);
    digitalWritr(BUZZER _ PIN,HIGH);
    delay(500);
    digitalWrite(LED _ PIN, LOW);
    digitalWritr(BUZZER _ PIN,LOW);
    // Photo attached and sending email
    sendEmail();
    delay(5000); //Waot 5 seconds before repeating
    }
}
```

This program code or sketch develops an integrated security monitoring system that utilizes face detection near the sensor, communication with Arduino, and sends notifications via email, backed by the robust support of IoT. It also stores the captured images locally in memory and includes functionality for changing the password and disabling the alarm through the password.

- Initialization: Connecting to the Arduino board on COM3 port with a baud rate of 9600 and starting video capture with a resolution of 640x480 pixels. Setting the initial background size and color.
- Main loop**:** Reading the current frame from the camera and checking the alarm status and distance from the object. The background changes based on the activation of the alarm or low distance. A radar is drawn to display the different distances, and the dot’s position is drawn based on the angle and distance (Kamelia et al., 2018).
- Unauthorized Person Detection**:** When the distance is less than or equal to 50 [cm], the alarm is triggered, and a message “INTRUDER” is displayed. A photo is taken and saved to a folder in memory every time an unauthorized person is detected. (Verma, 2021).
- Sending E-mail**:** An email is automatically sent with a notification when the alarm is active. The captured photo is stored in memory. The email contains information about the intrusion event. (JFT Atmaja, MW Sari, 2021).
- Password management and Resource management: The old and new passwords are displayed on the screen and updated according to the data from Arduino. When the user stops the program, all resources (camera and video files) are released to ensure that no resource remains active Figure 10.

Additional Features:

- Visualization: A grid design is integrated into the background to enhance the visual aesthetics.
- Alarm Shutdown: The alarm is reset after a specified period if no other intruders are detected.
- Image Capture**:** The save Image function handles saving images to a specific folder, with filenames based on the capture time.

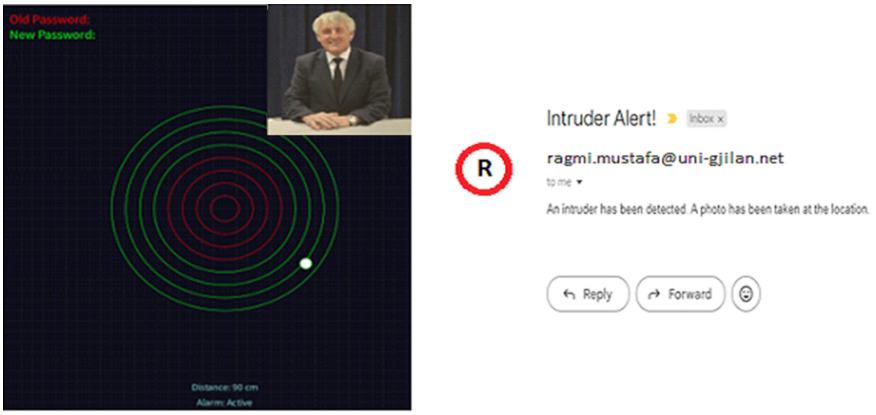

Figure 10. Visual View and Real-time Notification Sending
Source: Figure extracted from the built intelligent digital system

Simple control via a keypad provides the ability to manage passwords and easily activate or deactivate the alarm. Specifically, sending messages to an email address using IoT enhances this responsiveness.

Challenges and Opportunities for Improvement**:** Correction of False Alarms: Sensors can be sensitive to small movements or external conditions. Proper calibration is necessary to minimize unnecessary alarms. Integration with Other Technologies: The ability to connect with cameras or other sensors would enhance the system, providing a more comprehensive approach to security. In conclusion, this alarm system offers an innovative and reliable solution for security monitoring, significantly enhancing the protection of spaces. Its implementation can provide peace of mind and security for users, creating a safer environment.

Definitions of the paper. The preparation of this paper has been challenged by the lack of literature in the field of intelligent access systems and security technologies, particularly in the context of facial recognition and other technological advancements. Essential information for a deeper understanding of these topics is often scarce in local sources. The limitation of information, caused by the confidentiality policies of companies providing equipment and services for such systems, has made it difficult to gather detailed and reliable data. To ensure a comprehensive and sustainable analysis, attention has been focused on reputable scientific sources and globally available data (Pawar et al., 2023).

4. CONCLUSION

In conclusion, this paper presents an innovative solution for security management through an advanced alarm system that incorporates sensors, cameras, buzzers, and keypads. The system is designed to provide a high level of security by identifying and responding to unauthorized activities in real time, thereby eliminating delays that can occur during access control. The proposed system integrates various components, such as ultrasonic sensors for distance measurement, buzzers for audible alerts, digital cameras for capturing images, and keypads for password entry, ensuring an efficient and user-friendly operation. This integration of technologies offers a clear and intuitive interface, enabling users to manage the alarm and control access with ease. The implementation of algorithms for password verification and alarm activation ensures reliable protection for sensitive environments (Mustafa et al., 2021). This paper contributes to the advancement of security technologies by offering a comprehensive and tested model for alarm systems, ensuring that environments are continuously protected and monitored.

5. RECOMMENDATIONS

This paper provides a strong foundation for improving security systems in sensitive environments such as banks, hospitals, government institutions, warehouses with hazardous explosive materials, and businesses requiring high levels of security. By carefully analyzing the advantages and limitations of this system, it contributes to the development of more efficient and reliable security technologies. Such scientific work serves as a tool to raise user awareness about the benefits and challenges of new security technologies. When used ethically and responsibly, these technologies can significantly enhance the security and functionality of security systems across a wide range of applications and environments. In conclusion, this paper not only offers a practical model for advanced security systems but also opens opportunities for further research in this field, contributing to continuous innovation and the improvement of security standards for all.

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Cooperation of the Visegrad Group Countries in Disaster Management

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Abstract: *The study focuses on the Visegrad Four countries, which form the core of Central Europe. The V4 countries share certain common characteristics that naturally lead them to cooperate. They have the unique potential to be more than just a formal cooperation of four states with shared values and similar histories. Environmental issues are, by their very nature non-local, so they transcend the territory of a single country and affect large regions, often on a global scale. The alliance of the four states that make up the Visegrad Group allows them to coordinate their actions within the EU and NATO. This study aims to map and analyse the environmental situation of the V4 countries and their management of disaster situations, paying attention to the cooperation, or lack of it, that applies in disaster situations between the V4 countries.*

1. INTRODUCTION

The Visegrad Cooperation is a form of political and economic cooperation between the Czech Republic, Poland, Hungary, and Slovakia. The Visegrad Cooperation was established in 1991 on the basis of a declaration adopted in the city of Visegrad. It aims to promote economic development, political stability and cooperation in the region.

Cooperation between the V4 countries provides an opportunity to share experience, information and resources in dealing with disaster situations. Through dialogue and regular meetings between member countries, cooperation allows for the sharing of disaster prevention, preparedness and response measures. In addition, joint exercises and training can help improve disaster preparedness and response.

It is important to note that disaster management may also require international cooperation, especially when an event occurs at or near a border. In this case, cooperation between the Visegrad countries can allow for a more effective and coordinated response in the affected areas.

The study focuses on the Visegrad Four countries, which form the core of Central Europe, the study examines the legal, political and practical aspects of their cooperation, highlighting its strengths and limitations. Through this analysis, the paper aims to provide insights into how the Visegrad countries are addressing their common challenges, balancing national sovereignty with regional cooperation in the face of emerging threats. The study seeks to answer the question of whether there is sustainable cooperation between the Visegrad countries in the field of disaster prevention and management, and whether they can be expected to develop and operate such a system of cooperation.

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2. THE VISEGRAD COOPERATION

The first diplomatic event in the history of Visegrad cooperation was the 1335 Visegrad Council, which not only settled the previously tense relations between the countries, but also laid the foundations for joint economic action against Vienna's role in the market. This historic event became symbolic after the change of regime when Czechoslovakia, Poland and Hungary signed the Visegrad Declaration (Declaration on Cooperation between the Czech and Slovak Federal Republic, the Republic of Poland and the Republic of Hungary in Striving for European Integration 1991. February 15.) on 15 February 1991, establishing new cooperation between the then three and later, after the break-up of Czechoslovakia, three countries. The Visegrád Cooperation is a political grouping in the Central and Eastern European region, comprising the Czech Republic, Poland, Hungary and Slovakia (Szakálné Szabó, 2021).

The Visegrad countries share common characteristics, similar cultural and political backgrounds and traditions, and as a result, they deal with security issues in a similar way, which leads them to cooperate (Cabada, 2018). The Visegrad countries share a history of centralised and exploitative decision-making, with a focus on heavy machinery, mining and intensive, centralised agriculture. All four states can be considered post-communist, with a troubled history with the Soviet Union, and all are confident that they can become highly developed countries in the short term (Frankland, 2016). The recent migrant crisis is a case in point, to which their governments have responded in a demonstrative manner, and their actions show the V4's ability to act together and pursue their common interests. Unfortunately, however, there is still a prevailing view that Visegrad cooperation can only be understood as a theoretical alliance, as the V4 states often tend to seek the solution that suits them best, ignoring the common interests of the V4 (Klinovský & Goda, 2015).

Visegrad cooperation is characterised by a low level of institutionalisation, the absence of a common policy-making body and a lack of legal regulation. V4 cooperation is characterised by the formulation of cooperation as a common goal, which is also reflected in possible disaster diplomacy processes (Waisová, 2018). At the same time, there is a fear of sovereignty, as the Central European states have not been willing to give up even the slightest part of their sovereignty, which has been an obstacle to closer cooperation. However, the fear of sovereignty is changing, as it is much less pronounced among the states of the region than in the past (Balogh-Békési, 2014/57).

The Visegrad cooperation is a loose cooperation limited to annual meetings, without a well-developed institutional system, but with the aim of cooperation and community maintenance (Cabada, 2018). However, it can be said that despite recurrent crises and loss of cohesion due to various factors, the Visegrad Group is still the most significant form of regional cooperation in Central Europe.

3. DISASTER VULNERABILITY OF THE REGION

Looking at the disaster vulnerability of Central Eu (Declaration on Cooperation between the Czech and Slovak Federal Republic, the Republic of Poland and the Republic of Hungary in Striving for European Integration 1991. February 15.), i.e. the V4 region, the vast majority of disaster types are not prevalent in this area and the risk factors are therefore much lower. The natural geography of the Visegrad Four countries is quite favourable, so the region is also less exposed to disaster risks. Due to the geographical and natural conditions of the region, the number of earthquakes is low and the occurrence of a volcanic eruption or even a tsunami is excluded. Floods, storm-related disasters, and extreme weather events are considered to be the main hazards in the region, which could create opportunities for cooperation among the Visegrad Four in disaster management. It is important to note, however, that the threat of these disasters is relatively low by global standards (Papp, 2022).

4. DISASTER MANAGEMENT COOPERATION IN THE VISEGRAD COUNTRIES

I examine V4 cooperation in disaster management at the legal, political and practical levels. The analysis aims to show whether the legal, political and practical frameworks of the Visegrad countries allow them to focus their cooperation in the event of a disaster or its prevention exclusively on their respective regions.

4.1. Legal Level

The legal basis for regional disaster management in Central Europe is limited to a few documents. These include the UN (UNISDR, 2015), EU (2001/792/EC,Euratom: Council Decision of 23 October 2001 establishing a Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions) and NATO disaster management frameworks (Kopcsó & Balázs, 2016), which, as supranational organisations larger than the V4, only provide guidelines (Waisová, 2018).

The Sendai Framework, adopted by the UN General Assembly in 2015, is one of the most important foundational documents in the field of disaster risk reduction and prevention. As the most recent document of the international disaster risk reduction system, it sets global targets for the period 2015-2030. It aims to reduce the number of disaster-related deaths and the number of people affected by disasters (Kopcsó & Balázs, 2016). It aims to promote international cooperation, assist developing countries in implementing the framework at the country level, and improve public access to multi-functional warning systems and disaster risk information. In addition to the objectives, the Convention also sets out priorities for action by participating States, including understanding disaster risk, effective preparedness for a given disaster event, or resilience to disaster risk (UNISDR, 2015). It is a defining document in the field of international disaster management and can be seen as a charter for global emergency response.

Within NATO's disaster management framework, the Civil Emergency Planning (CEP) programme, in which both member and partner nations participate, should be highlighted. It aims to help countries prepare for disasters by coordinating emergency planning activities and facilitating an effective international response (Muhoray, 2020). However, it is important to stress that the project is not a legal document, but a very important forum for mediation between Member States.

In the European Union, the foundations for civil protection cooperation were laid at the meeting of Prime Ministers in Rome in May 1985. Following the implementation of the six decisions on cooperation adopted between 1985 and 1994, the EU called for the creation of operational instruments to prepare for the tasks of organising and managing any intervention, in addition to the training of civil protection experts. Following the terrorist attacks of 11 September 2001, the members of the Community agreed to set up a common mechanism (Matzén et al., 2006). The Union Civil Protection Mechanism (UCPM) was thus established in 2001 by the Council based on a Commission proposal (2001/792/EC,Euratom: Council Decision of 23 October 2001 establishing a Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions).

The main elements of the EU Civil Protection Mechanism, such as prevention *(preventive measures)*, preparedness *(planning of operations, management of response capacity gaps, training, exercises, lessons learned and dissemination of knowledge)* and response *(notification of disasters within the EU, response to disasters inside and outside the EU, transport and equipment)* are declared in Decision 1313/2013/EU of the European Parliament and of the Council on the EU Civil Protection Mechanism (Decision No 1313/2013/EU of the European Parliament and of

the Council of 17 December 2013 on a Union Civil Protection Mechanism, II-IV. chapter). The mechanism covers both natural and civil disasters, including marine pollution, environmental risks and health emergencies.

The objective of the Civil Protection Mechanism is to coordinate the actions of Member States in the event of man-made or natural disasters inside or outside the EU by pooling the resources of the States participating in the EU Civil Protection Mechanism. Other key objectives are to prevent disasters through effective and rapid response, to reduce the damage caused by disasters, to coordinate and reinforce national civil protection systems, and to inform, prepare for and assist the public (Teknős, 2018).

A specific document related to cooperation is the Visegrad Declaration, which mentions disaster management and environmental issues as objectives of cooperation, but does not give details.

It can therefore be seen that disaster management in the V4 countries is regulated by supranational organisations that define the emergency management system globally. In the Visegrad Group Conventions, disaster management is only mentioned in passing, so that the individual elements, norms and detailed rules for the prevention and management of disaster situations are not spelled out. In the absence of detailed rules, the practical implementation and enforcement of cooperation are compromised.

4.2. Political Level

Visegrad cooperation is characterised by a low level of institutionalisation and is therefore limited in terms of its institutional system, as it has no supranational institutions. The only framework for V4 cooperation in disaster situations is the Visegrad Fund, which is limited both financially and organisationally and cannot effectively support such efforts (Szakálné Szabó, 2021).

The lack of an institutional system also means that there is no regional political actor with responsibility for disaster management. The ministerial meetings, which bring together the ministers of the V4 Member States, are a particular highlight. It is also worth mentioning the meetings at the level of the Directors General of the Member States, which are organised by the Presidency of the Visegrad Four. These meetings are important as they deal with issues such as flood protection, fire protection, industrial safety and civil protection (Muhoray & Becze, 2013). It is important to note, however, that in the absence of a regulatory document, it is always up to the Presidency to organise which topics will be addressed by the states and in what depth.

The analysis at the political level therefore, shows that the lack of an institutional structure for Visegrad cooperation is an obstacle to more effective cooperation in the field of disaster management.

4.3. Practical Level

Another problem is the practical implementation of disaster management. The Visegrad Co-operation does not have an executive organisation for disaster management to ensure disaster management on a practical level.

However, some organisations have a wider remit and operate in the V4 region, such as the Organisation for Security and Cooperation in Europe (OSCE) and the Voluntary Humanitarian Aid Corps.

I would like to highlight the EU's civil protection operations centre, the Emergency Response Coordination Centre (ERCC), which is on standby in Brussels 24 hours a day, 7 days a week. It

is in constant contact with all EU countries participating in the European Union Civil Protection Mechanism, with the country affected by the emergency and with international organisations. As a coordination centre, it assists at the request of national authorities or the UN. In addition to the ERCC, the European Emergency Response Capacity (EERC) plays a key role in the Civil Protection Mechanism. The EERC is designed to make resources and assets available in advance voluntarily, and its priorities include the rapid and efficient flow of information between Member States in the event of a disaster (Zellei, 2005).

5. CONCLUSION

An analysis of the legal level shows that the basic framework for environmental issues in the V4 countries today consists of national laws, EU policies and joint programmes, international agreements and bilateral agreements. The political level is practically absent, as the V4 countries have no supranational institutions and disaster management issues are not discussed in political meetings. The lack of an institutional structure for Visegrad cooperation is an obstacle to more effective cooperation in the field of disaster management. At the practical level, the V4 countries do not have their own regional disaster management executive bodies to prevent and manage disasters at the operational level.

The levels examined show that the regional disaster management system in Central Europe does not have elements that are specific to the region, but rather is linked to other organisations at different levels. Therefore, the Visegrad countries do not have a permanent system of cooperation for disaster prevention and management. In my opinion, for effective disaster management in the region, efforts should not be limited to the Visegrad countries, but rather a cooperative, cross-border, Europe-wide approach is needed, and therefore, I think it would be a mistake to expect increased environmental cooperation among the Visegrad countries.

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The Impacts of US-China Semiconductor Decoupling

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Abstract: *The global semiconductor industry, projected to reach $588 billion in sales revenue in 2024, is at the forefront of a growing technological and economic rivalry between the US and China. As the US tightens export controls and licensing policies towards China, concerns arise about the potential decoupling of the industry between these two nations. This paper investigates the potential impacts of a complete decoupling of the semiconductor industry between the US and China on global economic growth, considering the extensive integration and complementary positions of these nations within the global semiconductor value chain. The findings suggest that a complete decoupling of the semiconductor industry between the US and China could have significant economic and innovative costs and a multilateral approach between nations is recommended to foster international collaboration, driving innovation and economic growth in the semiconductor ecosystem.*

1. INTRODUCTION

The global semiconductor industry is a complex, interconnected web of knowledge-intensive activities and manufacturing processes that are an essential element that drives economic growth and enhances security, and technological innovation. Semiconductor chips are having a bigger impact on global development than the Industrial Revolution did. They are found in many everyday devices like smartphones, computers, medical devices, and in complex systems like the internet, electric vehicles, airplanes, and advanced weapons. However, the industry faces both challenges and opportunities as new technologies emerge, including generative artificial intelligence (AI), quantum computing, the Internet of Things (IoT), and advanced wireless communications, particularly 5G and advances into 6G (Foreign Policy, 2021). All of these technologies rely on the latest semiconductor-enabled devices. Sales are projected to reach USD 520 billion in 2023, with an expected increase in 2024 to USD 588 billion. This marks a 13% improvement over 2023 and is 2.5% higher than the record revenue of USD 574 billion achieved in 2022. The stock market often serves as a leading indicator of industry performance, and as of mid-December 2023, the combined market capitalization of the top 10 global chip companies reached USD 3.4 trillion. This represents a 74% increase from USD 1.9 trillion in November 2022 and is 17% higher than the USD 2.9 trillion recorded in November 2021 (Deloitte, 2024).

For decades, the U.S. has led the semiconductor industry, controlling 48% of the market share in revenue, which amounted to $193 billion in 2020. Eight of the 15 largest semiconductor firms in the world are based in the U.S., with Intel holding the top position in sales, followed by TSMC from Taiwan. China, on the other hand, is a net importer of semiconductors and heavily relies on foreign manufacturers, particularly those in the U.S., to support most of its technology needs. In 2020, China imported $350 billion worth of chips, marking a 14.6 percent increase from the previous year. Over the past years, through its Made in China 2025 initiative and the Guidelines to Promote National Integrated Circuit Industry Development, China has been actively working to boost its domestic semiconductor sector. The country is using financial incentives, intellectual property strategies, and antitrust standards

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to reduce its dependence on the U.S. and position itself as a global technology leader. Conversely, Northeast Asia, particularly Taiwan and South Korea, has focused on advanced manufacturing and holds a significant share of global fabrication capacity in cutting-edge nodes (Foreign Policy, 2021).

As competition between the U.S. and China has intensified—especially during the first Trump administration—the U.S. has moved toward partial decoupling with China by tightening semiconductor export controls and implementing stricter licensing policies, particularly toward Chinese entities. There are also ongoing concerns about China's ability to acquire American technology through civilian supply chains and how this may integrate with Chinese military and surveillance capabilities (Poitiers & Sekut, 2024).

This research paper aims to investigate the potential impacts on global economic growth if the semiconductor industry becomes fully decoupled between the U.S. and China. The analysis will consider the extensive integration and complementary positions of these nations within the global semiconductor value chain, as well as the potential economic and innovative costs associated with a complete decoupling.

2. THE SEMICONDUCTOR INDUSTRY VALUE CHAIN

Semiconductors, commonly known as "chips", are essential components that allow electronic devices to operate. They serve both civilian and military purposes and are found in a wide variety of products, including computers, mobile phones, vehicles, and household appliances. The semiconductor industry is among the most critical sectors of the global economy. In 2023, despite experiencing a cyclical market downturn that lingered early in the year, global sales rebounded in the second half of the year to reach $527 billion. Nearly 1 trillion semiconductors were sold globally, more than 100 chips for every person on earth (SIA, 2024). The production of semiconductors is closely connected to the global value chain (GVC), meaning that their manufacturing takes place in various locations around the world and specilised in different categories. Semiconductor companies can be categorized mainly into three different types. First, Integrated Device Manufacturers (IDMs) are companies that own and operate their manufacturing facilities, and they design and produce their own semiconductor products (e.g., Intel, Samsung, Texas Instruments). IDMs handle both product intellectual property (IP) and manufacturing assets. Second, Fabless Chip Companies (FCCs) are entities that do not have their own manufacturing facilities. Instead, they focus on designing semiconductor products and selling the IP. They outsource the manufacturing to other companies. This model is referred to as "fabless." (e.g., AMD, Nvidia, Qualcomm, and Zhaoxin). Third, Pure Play Foundries are manufacturing-focused companies (e.g., TSMC, GlobalFoundries, and UMC). They specialize in semiconductor manufacturing, using their own facilities. They tend not to design their own Integrated Circuits (IC) but instead manufacture products for various companies, including fabless design firms and other IDMs (Chang & Matsumoto, 2022). Since 2003, fabless semiconductor companies have generally shown higher operating profit margins and returns on equity compared to IDMs and foundries. This could be attributed to their focus on design and IP, which may be more profitable than direct manufacturing (Shin et al., 2017). However, it's important to note that each type has its advantages and disadvantages, and the optimal choice depends on a company's specific goals, resources, and market position. Today, all types of chipmakers—IDMs, foundries, and fabless companies—rely on a highly specialized GVC and open trade to move around various chip components. Each region has different strengths in different areas. For instance, the U.S. leads the world in most knowledge-intensive activities along the semiconductor value chain, such as chip design, electronic design automation (EDA), semiconductor manufacturing equipment (SME), and core IP (Table 1).

Table 1. Main Segments of the Global Semiconductor Value Chain

	Design	Wafer Fabrication	Assembly, Testing, and Packaging
Intensive Input(s)	Knowledge	Capital and Labor	Labor
Value Added to End Product	29.8%	38.4%	9.6%
Primary Activities	Schematic models and physical layouts of chip designs are created in specialized labs.	Nanometer-scale integrated circuits from chip designs are printed onto silicon wafers.	Silicon wafers are sliced into individual chips, packaged, tested, and sent to end-use producers.
Foundry/Fabless Model	Fabless Designers	Foundries, or "Fabs"	OSATs
Foundry/Fabless Model Firms	Qualcomm (USA), Nvidia (USA), MediaTek (Taiwan), HiSilicon (China)	TSMC (Taiwan), UMC (Taiwan), SMIC (China), Hua Hong (China), Global Foundries (USA)	JCET (China), ASE (Taiwan), SPIL (Taiwan), Amkor (USA)
Integrated Device Manufacturers (IDMs)	Samsung (South Korea), SK Hynix (South Korea), Intel (USA), Micron (USA), Texas Instruments (USA), NXP (Netherlands), Tsinghua Unigroup (China)		
Market Share Leader	USA	Taiwan	China

Source: CSIS, 2022

The US, EU, and Japan jointly lead in the manufacturing of specialized equipment; China, Japan, Taiwan, and South Korea lead in materials; South Korea and Taiwan lead in advanced node fabrication (sub-10 nanometer chips which are typically used for manufacturing high-performance computing (HPC), AI, and other demanding applications. The assembly, test, and packaging (ATP) footprint is concentrated in China and Taiwan (BCG & SIA, 2024). Additionally, the fastest-growing segment in semiconductors is projected to be chips designed to accelerate generative AI workloads. According to a study from Deloitte (2024), this market is expected to exceed $50 billion in 2024, constituting nearly 10% of all global chip sales, compared to virtually zero in 2022.

Aside from the market value of semiconductor chips, both the semiconductor sector and the broader technology sector hold significant strategic value for any country seeking to enhance its industrial production and economic development. Scholars, such as Etzkowitz and Gulbrandsen (1999), have highlighted the increasing dependence of businesses on technological advancements and the growing role of government in supporting these developments for various purposes. The US CHIPS Act, signed into law in August 2022, allocated US$39 billion in grants and loans for semiconductor manufacturing have formed a network of industrial policies, domestically and internationally. Similarly, the European Union introduced the European CHIPS Act, and China launched the third round of its IC Industry Investment Fund. Additionally, various other incentive programs have emerged across Asia and other regions. As a result, over 100 new semiconductor manufacturing investments have been announced to meet the growing market demand, with these investments spread across every major region worldwide (BCG & SIA, 2024).

3. THE U.S. IN THE SEMICONDUCTOR VALUE CHAIN

In the United States, the semiconductor market directly represents only 0.3% of GDP but it's crucial for other sectors that jointly make up 12% of GDP. The recent semiconductor shortage had significant economic impacts, costing an estimated $240 billion in 2021 and leading to the production of 7.7 million fewer cars. This shortage caused U.S. GDP to be 1% lower than it could have been, compared to an average annual growth rate of 2% over the past decade. The U.S. dominates the semiconductor design sector, holding over 40% of the global IC design market and more than half of the 2019 market share in core IP. In 2021, the global EDA market was valued at $8.27 billion, with U.S. firms—Cadence,

Synopsys, and Mentor Graphics—accounting for 70% of this market. The U.S. also leads in advanced EDA software, which is crucial for designing state-of-the-art chips. In contrast, China's EDA industry is less advanced but growing, now holding only 2% of the global market. U.S. restrictions on EDA exports to China push Chinese firms to lower their prices to close the technology gap. Despite these challenges, companies like Empyrean are forming partnerships with major Southeast Asian manufacturers like Samsung, leading to stock price increases. The U.S. is also a leader in producing and licensing core IP, with major firms, including Intel and ARM at the forefront (CSIS, 2023). Additionally, since the start of the CHIPS Acts in 2020, the initiative has driven significant investment in the US semiconductor industry, with over $450 billion in private investments, 90 projects, and 17 preliminary agreements worth $60 billion, expected to create over 176,000 new jobs. This growth is forecasted to increase US fab capacity by 203% by 2032, with the US securing 28% of global capital expenditures and increasing its share of global fab capacity from 10% to 14% (SIA, 2024).

Since 2022, generative AI has transformed industries, driving demand for AI chips. American FCCs such as NVIDIA dominate the GenAI hardware segment with a 94% market share and saw a 427% YoY revenue increase in early 2024. AMD is catching up, launching its MI325X chip that has shown comparable compute results to Nvidia's newest Blackwell chips (Deloitte, 2024). However, in January 2025, a Chinese company called DeepSeek AI announced models that rival those from the top US firms like OpenAI and Meta, while claiming to have developed for under $6M, and using only legacy (previous generation) Nvidia chips. This achievement has raised concerns among US tech firms and led to significant market reactions including a sharp decline in AI-associated stocks such as NVIDIA and Broadcom (Reuters, 2025).

4. NORTHEAST ASIA ROLES

Taiwan and South Korea have emerged as global leaders in advanced semiconductor manufacturing, particularly in the production of chips using 7 and 5 nanometer (nm) processing nodes. This prominence is largely due to the strength of their semiconductor industries, which are deeply integrated into their respective economies and supported by robust government policies.

Taiwan's semiconductor industry is dominated by TSMC, which is also the world's largest dedicated independent semiconductor foundry. TSMC has been at the forefront of technology development, pioneering the production of 7nm and 5nm chips. These advanced nodes are critical for manufacturing the most cutting-edge processors, which are found in HPC, GenAI, and 5G technology. TSMC's lead in these nodes gives it a significant advantage in attracting customers like Apple, Qualcomm, and Nvidia, which rely on their fabrication services to produce their chips. In 2020, the Taiwanese federal government provided an additional $260 million in subsidies for the development of its domestic semiconductor industry. According to the MOEA, Taiwan's semiconductor sector is estimated to grow to $169.76 billion by 2030 (Foreign Policy, 2021). Taiwan has also become a geopolitical focal point because the Trump administration's moves to strengthen American-Taiwanese relations heightened tensions in the Taiwan Strait and increased China's military activity in the region, testing the US administration's resolve. Together, these factors present significant risks to a critical manufacturing node for the global semiconductor industry. Taiwan represents one part of the industry's complex ecosystem and shows more broadly the increasing difficulty for companies and countries to remain insulated from geopolitics—particularly amid pressures contributing to U.S. and China decoupling. As geopolitical, trade, and technology disputes mount and the resulting uncertainty continues to harm the global semiconductor and broader technology supply and value chains, semiconductor firms are trying to secure their manufacturing processes by stockpiling supplies or relocating production facilities—disrupting the industry at large and leading to significant investments without a clear view on returns (Yeung, 2022).

South Korea's prominence is driven by companies like Samsung, which is another major player in advanced semiconductor manufacturing. Samsung has also developed capabilities to produce chips on 7nm and 5nm nodes. Samsung's Foundry business unit competes directly with TSMC, offering fabrication services to companies such as AMD and Google. Both TSMC and Samsung have invested heavily in research and development to maintain their technological edge and continue to push the boundaries of semiconductor manufacturing. The control of global fabrication capacity in these advanced nodes is a reflection of both countries' success in merging technological innovation with economies of scale. Their dominance in these areas has significant implications for global supply chains and the competitiveness of products ranging from smartphones to supercomputers. Both Taiwan and South Korea have also been proactive in addressing the challenges associated with scaling down to finer process nodes, including lithography, materials science, and process control. Their continued investment in R&D and manufacturing infrastructure positions them to maintain their leadership in advanced semiconductor manufacturing, even as the industry evolves to 3nm and beyond (Yeung et al., 2023).

5. CHINA'S POSITION

China's electronics industry is evolving significantly, mirroring global trends. The industry is transitioning from a vertical, static model to a more dynamic and disaggregated structure, similar to global practices. This shift involves operating businesses in a network model, enhancing visibility across the value chain, and establishing a dispersed supply chain due to China's role as a global manufacturing base. In terms of semiconductor manufacturing, China's backend activities are growing. Foreign investment plays a crucial role in China's electronics industry, with Taiwan being a significant contributor. In 2004, Taiwan's approved investment in China's electronics industry surpassed $4 billion, representing 15% of the total foreign direct investment (FDI). This investment is driven by factors such as competitive manufacturing costs, relocation of value chain partners to China, and the burgeoning domestic market demand fueled by China's economic growth. As for market share, China is expanding its presence in the semiconductor industry, with backend manufacturing becoming an increasingly important aspect of its electronics sector. The country's efforts to attract foreign investment and its focus on developing domestic capabilities in semiconductor manufacturing suggest a strategic intent to increase its global market share over time. China has emerged as a key player in the global semiconductor ecosystem, not only as a major consumer but also as a manufacturer (Mainly in the systems integration and previous-gen fabrication space). While it still relies heavily on foreign technology for cutting-edge chip design and fabrication, its government has aggressively invested in domestic semiconductor capabilities under initiatives like the "Made in China 2025" plan. China imports over $300 billion worth of semiconductors annually, SMIC is China's leading foundry but lags behind Taiwan's TSMC and South Korea's Samsung in advanced node manufacturing. Moreover, major US tech companies, including Apple, Qualcomm, and NVIDIA, rely on China for assembly and testing (CSIS, 2022, 2023).

The US has implemented export controls on advanced semiconductors and manufacturing technologies to China, citing concerns over military applications and human rights violations. These restrictions, which have been followed by other countries such as the EU and Britain, aim to limit China's access to cutting-edge chip production capabilities, particularly in advanced node manufacturing (10 nm and below) and specialized AI-accelerating chips. As a result, many companies have been navigating the complexities of regulatory compliance while anticipating future rules and restrictions that arise from the ebbs and flows of geopolitics. China responded with retaliatory measures and imposed export restrictions on critical semiconductor materials, including germanium and gallium, in response to U.S.-led controls on advanced chip sales. This move has

caused prices of these minerals to surge nearly twofold in Europe. China produces 98% of the world's supply of gallium and 60% of germanium has exacerbated global supply concerns. The export requirements, necessitating individual approval and taking 30 to 80 days, have rendered long-term supply contracts unfeasible (Financial Times, 2024).

The tit-for-tat move of ratcheting sanctions may have unintended consequences, such as driving China to develop its own domestic solutions and become self-sufficient in chip production, potentially altering the global semiconductor landscape. The growing market for general AI chips, expected to reach $50 billion in 2024, adds another layer of complexity to the evolving restrictions and their potential impact on the industry (Deloitte, 2024).

The U.S. Trade Representative (USTR) has commenced an investigation into China's alleged anti-competitive practices in the semiconductor sector, focusing on foundational semiconductors used in the automotive, healthcare, and defense sectors. This investigation, conducted under Section 301 of the U.S. Trade Act, could result in import restrictions or new tariffs on Chinese chip exports, particularly impacting chips used in cars, appliances, and consumer devices. China is accused of attempting to control the semiconductor market through non-market methods, including setting market share objectives and fostering indigenization and self-sufficiency. Despite restrictions on the sale of advanced chip manufacturing equipment to Chinese firms, China is rapidly increasing its capacity for legacy semiconductor production, potentially doubling it by the end of the decade, with government support. China has criticized the probe, raising concerns about potential supply chain disruptions and retaliatory measures. The critical role of legacy semiconductors was underscored during the COVID-19 pandemic when factory shutdowns caused shortages of electronic goods. Over two-thirds of U.S. companies' products incorporate chips manufactured in Chinese foundries. China's export controls appear motivated by retaliation against U.S. pressure on Chinese tech companies. Additionally, China may be using these controls to secure its own supply for industrial advancement and to compete with the U.S. in semiconductor technology. There is a growing risk of supply shortages for U.S. companies like Indium Corporation, with limited stocks of germanium and gallium on hand, posing significant challenges for their operations (Financial Times, 2024).

6. POTENTIAL IMPACTS ON DECOUPLING

As semiconductor chips become crucial to national security, The US and China need to assess the policy implications for the private sector. Scholars estimate that if the U.S. fully decouples and bans domestic semiconductor sales to China, U.S. companies could lose 18% of their global market share and up to 40,000 skilled jobs. While this scenario is unlikely in the short term, calls for stricter outbound investment and export controls are growing. Conversely, without expanding existing restrictions, the U.S. would only lose about 8% of its market share. Many U.S. allies are hesitant to cut trade ties with China. For instance, South Korea found a proposed semiconductor alliance with the U.S. "not fully acceptable." Achieving self-sufficient supply chains would require at least $1 trillion in investment, alongside significant operational costs and increased chip prices. China faces even higher costs due to its reliance on foreign electronic design automation and manufacturing tools. While it has made advancements, it lags behind global leaders like TSMC and Intel. U.S. export restrictions hinder China's efforts to become self-sufficient, causing complications for domestic automakers needing advanced chip production. Additionally, decoupling could stifle innovation across the semiconductor industry. Barriers to market access and technology transfers may disrupt the beneficial feedback loops established over 30 years, leading to two separate ecosystems with increased costs and diminished innovation for semiconductor users globally (CSIS, 2022, 2023).

Additionally, Chris Miller, the author of "Chip War", a best-selling book about the industry, notes that China has partially decoupled from Taiwan due to tech sanctions and export controls imposed by the West (sometimes enforced through Taiwanese firms, including TSMC). As a result Taiwanese chip exports to China fell by 18% in 2023, from $58bn to $47bn. Chinese firms do not yet pose a technological threat to TSMC, but they do pose a financial one: other Taiwanese firms in less advanced areas may be undercut. China's share of global capacity for making logic chips at 10-22 nanometres is expected to jump from 6% to 19% by 2032. This output will compete with TSMC's older facilities, which are still profitable for the firm, and those of other Taiwanese chipmakers. If China decouples further, the silicon shield could become less effective at deterring a Chinese invasion of Taiwan, because China would be disrupting infrastructure that it no longer relies on (The Economist, 2024). Taiwan, by contrast, is America's ninth-largest trading partner and a semiconductor superpower at the heart of global supply chains. Taiwan has long been valued by the United States as an alternative political model to Communist-run China. The two countries had a mutual-defence treaty until 1979, when America supplied weaponry and said it would resist forcible attempts to change Taiwan's status as an independent nation in all but name. Taiwan also sits at the nub of the western Pacific's "first island chain" and, under friendly management, offers a crucial buffer to Japan, America's main ally in the region, from Chinese threats. Given these facts, American credibility is much more at stake in Asia over Taiwan than it is in Europe over Ukraine. Losing Taiwan would mean the end of a security order in the region that America has led since the second world war, and ceding to China the role of the region's uncontested power (The Economist, 2022).

7. OBSERVATIONS

The semiconductor industry is at a strategic crossroads as the U.S., EU, and China intensify efforts to reduce reliance on foreign technology and secure national semiconductor capabilities. However, given the deep interdependencies in the sector, as well as Taiwan and South Korea dominating advanced fabrication, the U.S. leads in chip design and EDA tools, and the feasibility of full decoupling remains highly questionable. Instead, the industry is likely to move forward; it is quite unclear whether a complete decoupling would allow a country to achieve self-sufficiency without sacrificing innovation and cost efficiency. Additionally, the protectionist policies create unintended vulnerabilities rather than enhancing resilience.

From the view of the author, decoupling between the US and China in the semiconductor industry may not be possible or may be very challenging for some reasons. First, in the semiconductor industry, the global value chain is complex, with multiple countries and companies involved in different stages of production, such as design, manufacturing, and assembly. Decoupling would require a significant restructuring of these global value chains, which could be difficult and costly. Second, the US has a comparative advantage in chip design and software development. Still, countries like Taiwan and South Korea also have a comparative advantage in manufacturing, and China is also leading the ATP footprint. Decoupling would require countries to develop new comparative advantages, which could be difficult and not economically viable. Third, the network effects are significant, with companies like Intel, TSMC, and Qualcomm developing ecosystems around their products. Decoupling would require the development of new networks and ecosystems, which could be challenging and impossible in the short term. Lastly, the US and China have a significant trade relationship, with the US being a major market for Chinese electronics products and China being a major supplier of components and assemblies to the US. Decoupling would require a significant reduction in trade between the two countries, which could have significant economic implications.

Instead, China and the US should consider a balanced approach as essential to avoid overregulation that could stifle innovation. Governments should prioritize investment in domestic semiconductor equipment manufacturing and scaling up production of essential chips, especially with the rise of AI, which further amplifies the need for strategic decision-making to ensure the industry's continued growth and innovation. Additionally, strengthening the talent pipeline will require expanded STEM education, tax incentives for semiconductor engineers, and fast-track visas to attract global talent. China has made significant strides in developing its STEM education sector and has been attracting talent from around the world. However, retaining top talent remains challenging, with many Chinese engineers and researchers opting to work abroad. Rather than relying on scattered investments, nations should develop semiconductor clusters—similar to Taiwan's Hsinchu Science Park—where fabs operate close to suppliers, packaging firms, and chip designers to maximize efficiency and innovation. The future of the semiconductor industry depends on how nations balance security with economic pragmatism. Will the push for self-sufficiency lead to sustainable technological advancements, or will fragmented supply chains result in inefficiencies and stagnation. Those who take a strategic, adaptive approach will emerge as the dominant players in the next era of semiconductor geopolitics.

8. CONCLUSION

In conclusion, China's semiconductor industry faces significant challenges in developing a self-sufficient and competitive domestic industry, and the country is likely to continue relying on foreign manufacturers for advanced semiconductors in the near future. If a complete decoupling were to happen, the U.S. and Chinese economies would suffer greatly, likely resulting in substantial economic and innovative costs for both nations. It could disrupt global supply chains, reduce competitiveness, and slow down technological advancements. The potential negative impacts on innovation and the economy underscore the complex interdependencies in the semiconductor industry and the challenges associated with decoupling. To enhance their domestic manufacturing and competitiveness in the semiconductor industry, both countries will need to address several key areas, including tax policies, permit processes, export controls, and supply chain risks, and to implement reforms and clarifications, such as defining foundational technologies and national security objectives and assessing the impact of export controls on industries. However, a multilateral approach between nations is recommended to foster international collaboration, driving innovation and economic growth in the semiconductor ecosystem because when consumer products made from innovative semiconductors are affordable to the public, technology would become truly transformative. As more companies embrace this shift, the World hopes to see a semiconductor industry that is both more powerful and accessible and can act as a positive global driver of prosperity.

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Modelling Inflationary Pressures Through Macroeconomic Indicators: An Applied Analysis Through Logistic Regression

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Abstract: *This study investigates the macroeconomic determinants of high inflation using unadjusted and adjusted logit and probit models, with validation tests confirming the robustness of the results. The findings highlight the output gap as a key predictor, with an odds ratio of 1.55 in the adjusted probit model, suggesting that a widening gap between actual and potential production significantly increases the likelihood of high inflation. The EUR/RON exchange rate emerges as another critical factor, with an inverse relationship to inflation (odds ratio ~0.88), emphasizing the importance of currency stability in mitigating inflationary pressures. Although less influential, the trade balance and unemployment rate also exhibit statistically significant effects, reflecting the role of external demand and labor market dynamics in shaping inflation trends. Model diagnostics, including the Hosmer-Lemeshow test and AUC, confirm a good fit and predictive accuracy. These findings provide actionable insights for policymakers to design coordinated fiscal and monetary strategies aimed at stabilizing inflation during economic instability.*

1. INTRODUCTION

The aim of this paper is to analyze the probability of high inflation occurrence, using logistic regression models. The main macroeconomic factors that directly influence the inflation level are the output gap (the difference between the real GDP and the potential level), trade balance, unemployment rate, and exchange rate. This article highlights that by applying a logit regression, it is possible to capture the relationship between these variables and inflationary outcomes, and even predict the probability of high inflation episodes. This binary outcome framework allows economists to adopt the appropriate fiscal and monetary policies to stabilize the price level and decrease inflationary pressures.

The structure of the article involves two main parts, covering both logit and probit regression models. These two models were used to demonstrate the accuracy and robustness of the estimated probabilities. The first part presents the logit regression results, which describe the relationship between the dependent variable (high inflation) and the independent variables—output gap, trade balance, unemployment rate, and exchange rate. The second part presents the probit methodology results and emphasizes the importance of using both approaches for robustness.

2. LITERATURE REVIEW

The study of inflation dynamics and the identification of its macroeconomic determinants represented a central concern in both theoretical and applied economics. Over the past decades, econometricians have employed a wide range of statistical and econometric models to capture

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the probability of inflationary surges and the likelihood of price instability. Among these, logistic regression and its related variants (logit and probit models) have become widely used tools in empirical research, owing to their ability to model binary outcomes such as the occurrence of high inflation episodes, financial crises, or recessions (Hosmer & Lemeshow, 2000; Wooldridge, 2016).

This methodological relevance extends beyond inflation itself. Comelli (2014), for example, explored the comparative performance of logit and probit models in early warning systems for currency crises. While the study's focus was on exchange market pressures, its insights illustrate how binary choice models can effectively capture macroeconomic instability, providing lessons directly transferable to inflation analysis. More recently, Kannan et al. (2023) broadened the scope of application by employing logistic regression to assess regulatory environments, thereby illustrating that institutional and external variables can be incorporated robustly into such frameworks. Together, these contributions demonstrate the adaptability of logistic regression for analyzing diverse forms of macroeconomic stress.

From the perspective of specific macroeconomic determinants, the output gap occurs as one of the most influential predictors of inflationary pressures. A series of studies emphasizes that positive output gaps, situations where actual GDP exceeds potential output, tend to be associated with economic overheating and subsequent inflation spikes (Gourinchas & Obstfeld, 2012; Blanchard & Galí, 2010). Logistic regression provides an effective tool for quantifying the probability of such outcomes, enabling the anticipation of inflation risks with greater accuracy than linear approaches.

Another inflation determinant identified in the literature is the exchange rate. Currency depreciation often transmits directly into higher import prices, amplifying inflationary pressures, particularly in open economies. Evidence from Comelli (2014) demonstrates the role of macroeconomic fundamentals in driving exchange market crises, while Frankel and Saravelos (2012) highlight that exchange rate stability is among the strongest predictors of resilience during episodes of global financial turbulence. These insights align with empirical research on inflation pass-through, which frequently employs logit or probit models to estimate the probability of price instability under varying exchange rate conditions (Choudhri & Hakura, 2006).

Labor market conditions further contribute to inflation dynamics and have also been analyzed using binary response models. According to the Phillips curve framework, lower unemployment rates tend to be associated with upward wage pressures, which in turn accelerate inflation. Logit and probit analyses allow researchers to test this relationship empirically by modeling the probability of inflationary outcomes conditional on labor market tightness. Ball and Mazumder (2011), for example, illustrate how changes in unemployment can shift the likelihood of entering high-inflation regimes, thereby reinforcing the role of labor market dynamics in shaping macroeconomic vulnerabilities.

All these mentioned studies highlight both the methodological suitability of logistic regression models and the substantive importance of key macroeconomic variables, output gaps, exchange rates, unemployment, and trade balances, in explaining inflationary risks. The convergence of methodological insights and empirical findings provides a strong foundation for the present paper, which applies logit and probit models to analyse the probability of high inflation in the Romanian economy.

3. DATA AND METHODOLOGY

Our dataset consisted of macroeconomic data, including output gap, trade balance, unemployment rate, and exchange rate, with quarterly frequency, spanning a period of 10 years.

The methodology is based on Logit and Probit models, that we implemented in STATA econometric soft. We used the Odds Ratio Logit/Probit Model to estimate the probability of an event occurring. In our case, this event is represented by high inflation *(Y=1)*:

$$P(Y=1) = \frac{1}{1+e^{-(\beta 0+\beta 1X1+\beta 2X2+\cdots+\beta kXk)}} \quad (1)$$

where:

P= probability of the event,

β_0= intercept,

$\beta_0, \beta_1, \ldots, \beta_k$ = the predictors for the independent variables $X_0, X_1, \ldots, X_k$

And the log-odds for expressing the chance logarithm is represented as:

$$\text{Ln}\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k \quad (2)$$

To express the measure of the increasing of chances, it is used Odds Ratio:

$$\text{OR} = e^{\beta} \quad (3)$$

- If OR > 1, the predictor increases the odds of the event,
- If OR < 1, the predictor decreases the odds of the event.

There are two types of models: Unadjusted Model (analyses the effect of each predictor separately) and Adjusted Model (controls for the effects of other predictors).

Another important aspect in these methods is the confidence interval (CI), which shows how precise the *OR* estimate is. If the range includes the value 1, the effect of the predictor can be considered statistically insignificant.

4. RESULTS AND DISCUSSIONS

In Table 1 are presented the results of our logit regression model analysing the odds of high inflation, both in the unadjusted model ("Unadjusted Model") and the adjusted model ("Adjusted Model"). For each predictor, the odds ratio, the 95% confidence interval (95% CI), and the probability (Prob.) are provided.

The unadjusted model indicates that the output gap has an odds ratio of 1.5462, suggesting a positive association with the likelihood of high inflation. However, the 95% confidence interval (-0.0521, 0.1043) highlights some uncertainty, even though the result is moderately statistically significant (p = 0.0239). The trade balance, with an odds ratio of 0.0076, appears to have a negligible effect in this specification, though it approaches marginal significance.

The unemployment rate emerges as a significant predictor, with an odds ratio of 0.0030 and a highly significant p-value (0.0030), indicating its critical role in explaining inflation dynamics. Additionally, the EUR/RON exchange rate exhibits a very low odds ratio (0.0006) but remains statistically significant (p = 0.0006), suggesting a potential inverse relationship between the exchange rate and the probability of high inflation.

In the adjusted model, the relationships become more nuanced. The output gap remains a key determinant of high inflation, with a slightly lower odds ratio (1.4302) and improved statistical significance (p = 0.0012). The confidence interval (0.0106, 0.1904) narrows, reinforcing the robustness of this predictor. Conversely, the trade balance demonstrates a reduced impact, with an odds ratio of 0.8732 and a p-value of 0.0051, indicating limited influence on inflation in this specification. The unemployment rate retains statistical significance (OR = 1.0234, p = 0.0004), albeit with a weak effect. Finally, EUR/RON continues to exhibit strong significance (OR = 0.8377, p = 0.0001), emphasizing its inverse relationship with inflation risk.

Table 1. Unadjusted and Adjusted Odds Ratio Logit Models for High Inflation

	Unadjusted Model			**Adjusted Model**		
Predictor	Odds Ratio	95%CI	Prob.	Odds Ratio	95% CI	Prob.
Output_gap	1.5462	(-0.0521 ,0.1043)	0.0239	1.4302	(0.0106, 0.1904)	0.0012
Trade_Balance			0.0076	0.8732	(-0.0011,0.0026)	0.0051
Unemployment_rate			0.0030	1.0234	(-0.0031,1.0021)	0.0004
EUR/RON			0.0006	0.8377	(-0.0205,1.1960)	0.0001
c			0.8520	1.4903	(-0.0987,1.0766)	0.5182

Source: Own calculations

To sum up the results of table 1, the adjusted model identifies the output gap and EUR/RON exchange rate as the most significant predictors of high inflation, with consistent statistical support, while the trade balance and unemployment rate show weaker yet notable contributions.

Table 2. Logit Regression coefficients

Log-Likelihood	**LR chi^2**	**Pseudo R^2**	**AUC**
-16.3675	22.9	0.4116	0.8750

Source: Own calculations

Table 2 shows metrics for assessing the performance and fit of the logit regression model. The Log-Likelihood value of -16.3675 reflects the model's goodness-of-fit, with lower values typically indicating a better fit to the observed data under this framework. The Likelihood Ratio Chi-Square (LR chi²) statistic is 22.9, which evaluates the overall significance of the model by comparing it to a null model with no predictors. This high value indicates that the inclusion of the explanatory variables improves the model's explanatory power significantly.

The Pseudo R², at 0.4116, offers a measure of the proportion of variance in the dependent variable explained by the predictors. While not directly comparable to traditional R² in linear regression, this value suggests that the model has moderate explanatory capacity. Lastly, the Area Under the Curve (AUC) of 0.8750 reflects the model's classification accuracy. An AUC close to 1 indicates excellent discriminative ability, meaning the model effectively differentiates between cases of high inflation and non-high inflation scenarios.

So, the reported metrics suggest that the logit regression model fits the data well, with strong explanatory power and robust predictive accuracy. The LR chi² and AUC values highlight the statistical and practical significance of the model, while the Pseudo R^2 underscores its ability to capture meaningful relationships between the predictors and the outcome.

Table 3. Adjusted Odds Ratio Probit Model for High Inflation

Predictor	Odds Ratio	95%CI	Coef.	Prob.
Output_gap	1.5517	(0.0050, 0.1200)	0.0235	0.0125
Trade_Balance	0.9033	(-0.0005, 0.0015)	-0.0039	0.0042
Unemployment_rate	1.1051	(-0.0020, 0.9000)	0.1584	0.0024
EUR/RON	0.8810	(-0.0100, 0.8000)	-0.5456	0.0012
c	1.5190	(-0.0500, 0.9500)	0.8694	0.6512

Source: Own calculations

Table 3 presents the results of an adjusted probit model for high inflation, focusing on the odds ratios, confidence intervals, coefficients, and associated probabilities of the predictors. The output gap has an odds ratio of 1.5517, indicating a significant positive effect on the likelihood of high inflation. The 95% confidence interval (0.0050, 0.1200) suggests robust statistical support, and the p-value (0.0125) confirms its significance. The coefficient (0.0235) further underscores the positive association between the output gap and inflation risk.

The trade balance, with an odds ratio of 0.9083, shows a slightly negative relationship with high inflation. Although the effect is modest, it is statistically significant, as evidenced by the confidence interval (-0.0005, 0.0015) and p-value (0.0042). The coefficient (-0.0039) aligns with this interpretation, suggesting a small but notable inverse effect.

The unemployment rate has an odds ratio of 1.1051, reflecting a weak but positive association with high inflation. Its statistical significance ($p = 0.0024$) is reinforced by a narrow confidence interval (-0.0020, 0.9000) and a coefficient of 0.1584, indicating that rising unemployment marginally increases the probability of inflationary pressures.

The EUR/RON exchange rate demonstrates an odds ratio of 0.8810, pointing to an inverse relationship with high inflation. Its significance ($p = 0.0012$) and a negative coefficient (-0.5456) highlight its critical role in mitigating inflation risk. The constant term (c), with an odds ratio of 1.5190 and a non-significant p-value (0.6512), suggests limited standalone explanatory power.

Overall, this adjusted probit model emphasizes the importance of the output gap and EUR/RON exchange rate as key determinants of inflation, with the trade balance and unemployment rate playing secondary yet statistically significant roles.

Table 4. Hosmer-Lemeshow Goodness-of-fit test

No. of observations	**No. of groups**	**Chi^2**	**Prob>Chi^2**
41	10	2.43	0.9647

Source: Own calculations

Table 4 reports the results of the Hosmer-Lemeshow goodness-of-fit test, which evaluates the adequacy of the probit model in explaining the observed data. The test is based on 41 observations grouped into 10 categories. The chi-square statistic (Chi²) is 2.43, with an associated p-value of 0.9647.

A high p-value, as observed here, indicates that the model fits the data well and that there is no significant difference between the predicted and observed probabilities of high inflation. The lack of evidence against the null hypothesis (that the model is a good fit) suggests that the model's predictions are consistent with the observed outcomes.

The Hosmer-Lemeshow test results confirm that the probit model provides an appropriate fit for the data, further validating the robustness of the model in explaining the factors associated with high inflation.

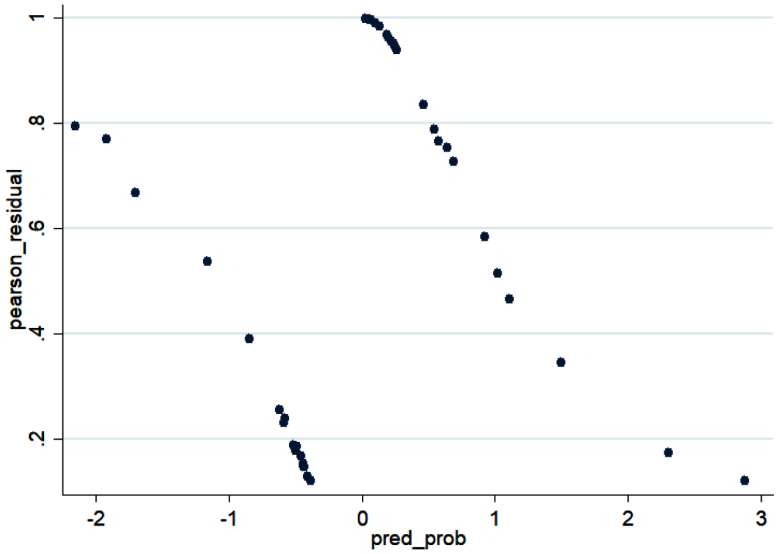

Figure 1. Residual plot from the adjusted model
Source: Own calculations

The residual plot displayed above illustrates the relationship between the Pearson residuals and the predicted probabilities from the adjusted probit model. The Pearson residuals measure the difference between observed and expected values, standardized to account for variability in the data. The predicted probabilities represent the likelihood of high inflation as estimated by the model. In this plot, residuals appear to be distributed without a clear pattern across the range of predicted probabilities. This lack of systematic structure suggests that the model captures the relationship between the predictors and the outcome variable well, without significant evidence of misspecification or omitted variable bias. However, the clustering of residuals at certain points could indicate a need for further investigation into specific predictors or observations to ensure model robustness.

Overall, the residual plot supports the conclusion that the adjusted model fits the data adequately. The distribution of residuals aligns with the assumption that errors are independent and randomly distributed, reinforcing the validity of the model for explaining high inflation. The adequacy of the model implies that policymakers can rely on its outputs to design targeted strategies. For instance, the validated relationship between the output gap and inflation can inform decisions on fiscal and monetary measures to avoid overheating the economy. The observed clustering in residuals suggests that certain economic phenomena or shocks (e.g., abrupt exchange rate movements, external supply chain disruptions) may not be fully captured by the existing predictors. For Romania, this could highlight the importance of integrating additional variables, such as energy price volatility or geopolitical risks, into the model to enhance predictive accuracy.

Given the importance of exchange rate stability highlighted by the model, understanding how external shocks influence residual clustering could guide interventions in the foreign exchange market. For instance, ensuring stability in the EUR/RON rate could mitigate unexpected inflationary

pressures. n conclusion, the residual plot confirms that the adjusted probit model provides a reliable framework for understanding high inflation in Romania. However, addressing potential clustering through the inclusion of additional predictors could further enhance its robustness, providing more comprehensive guidance for economic policy decisions in a volatile environment.

5. CONCLUSION

This paper has presented a analyze about the main macroeconomic determinants of inflation, using unadjusted and adjusted logit and probit models, including the statistics validation tests. The results suggest that the explanatory variables included in the model contribute significantly to the explanation of the inflationary phenomenon, and the models used have demonstrated a robust predictive capacity.

One of the most significant factors identified across all model specifications is the output gap, which reflects the difference between actual and potential output. The odds ratio of approximately 1.55 in the adjusted probit model indicates a strong relationship between an increasing output gap and a higher likelihood of high inflation. From a macroeconomic perspective, this result highlights the sensitivity of inflation to aggregate demand pressures. In the case of Romania, this suggests that periods of accelerated economic growth, often fueled by consumer spending, could lead to economic overheating and heightened inflation risks.

Also, The EUR/RON exchange rate stands out as a critical predictor, with a subunit odds ratio (around 0.88), indicating an inverse relationship with inflation. This finding underlines the impact of exchange rate fluctuations on price dynamics, likely through the channel of import costs. In Romania, where the economy is heavily reliant on imported goods and energy, maintaining exchange rate stability is crucial for controlling inflation. The high statistical significance of this variable suggests that monetary authorities should prioritize limiting excessive exchange rate volatility to safeguard domestic price stability.

The unemployment rate, although less influential than the output gap or exchange rate, plays a statistically significant role ($p < 0.0024$) in transmitting inflationary pressures. This result implies that labor market dynamics are indirectly linked to inflation. For Romania, low unemployment rates can create upward pressure on wages, particularly in sectors facing labor shortages, which in turn amplifies inflationary trends. The trade balance, while having a smaller impact, provides a significant marginal contribution (odds ratio – 0.90). A deterioration in the trade balance appears to slightly reduce the likelihood of high inflation, possibly due to weaker external demand. In the Romanian context, persistent trade deficits reflect structural vulnerabilities, but their effect on inflation may depend on the interplay between domestic and external demand dynamics.

From a political point of view, the results suggest that authorities should pay more attention to the management of the output gap and exchange rate stability. Fiscal and monetary policies should be coordinated to prevent the economy from overheating and limit exchange rate fluctuations, given their direct impact on inflation. Strategies that support a balanced trade balance and reduce labor market tensions could also help alleviate inflationary pressures in the long term.

By integrating a diverse range of explanatory variables and using rigorous testing and validation methods, the models presented provide a clear insight into the drivers of high inflation. The results underline the importance of the output gap and the EUR/RON exchange rate, while other factors, such as the unemployment rate and the trade balance, play a secondary but significant role. These findings have important implications for economic policies, providing clear directions for reducing inflationary risks in times of economic instability.

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Macroeconomy of the European Union and Financial Connectivity with Other Regional Economic Groupings

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Abstract: *The development of global economic activities is increasing multifold, leading to a rise in the complexity of managing and coordinating international capital flows. Also, the increasing instability of the world economy and finance creates the need for economic systems and companies to adapt to new business conditions in a very short period. At the same time, the deepening of geopolitical tensions and the reduction of correlations between countries led to very uneven global economic development, which particularly affected the interests of the national economies of developing countries. All this caused the establishment of an imbalance in the world market and the classification of countries into different supranational and regional groups.*

1. INTRODUCTION

Contemporary international economic relations are largely characterized by interdependence and very asymmetric relations between regional groups as important actors that make them up. Powerful states, primarily Western countries, continue to have a strong influence and play a decisive role in international relations. However, the very structure of those relations has become much more complex, given the large number of processes taking place on the world stage. That system of global governance, which consists of strong national states, international organizations, the non-governmental sector, as well as regional groupings of states such as the EU, BRICS, and the G20, is becoming increasingly multilateral. Their interaction leads to intertwined relationships, both at the local and global levels, with their actions taking on a multinational dimension, permeating the system of global governance across multiple levels.

2. REGIONAL RELATIONS

The beginning of the new century shows that states and their economies are becoming increasingly interdependent and connected almost like never before, leading to the point when individual governance in the era of globalization cannot ensure the effective functioning of national states. Furthermore, it has encouraged the creation of numerous supranational organizations and institutions, as well as bloc alliances of individual countries, which together shape a layered and highly complex management structure at the global level. They perform specific tasks in given circumstances, such as information exchange and creating negotiation sessions, increasing the number and speed of mutual integrations. In this way, they reduce international transaction costs and contribute to the improvement of economic well-being, both at the national and global levels.

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Taking into account all these tendencies and trends, the best example of inter-bloc interactions is represented by the European Union and the BRICS group. Although they are two very different actors, which have undergone more or less formal (European Union) and informal (BRICS) integration, their relationship is most visible in crises revealing that major political problems cannot resolve themselves. Despite the opportunities and limitations that exist for their cooperation in an asymmetrical international system, such relationships pose political challenges that are often redirected toward economic issues and technical coordination but rarely include matters of collective security. Moreover, annual high-level meetings, ministerial gatherings, and sectoral dialogues regularly held between EU officials and BRICS representatives contribute to establishing certain institutional frameworks. These frameworks partly determine the scope and understanding that cooperation can be mutually beneficial. However, the development of these relationships is simultaneously hindered by contradictory rules and regulations regarding the international order, leading to fundamental structural barriers.

However, the strategic partnership has not affected overcoming of their different interests and perspectives (Renard & Biscop, 2012). This especially refers to issues that are of fundamental importance for ideas such as the preservation of national sovereignty and international security which are reflected in the reality and discourse through which differences in the understanding of the international order are identified. Namely, some of the BRICS countries have been under significant pressure from Western countries for a long period, so they are skeptical of claims that national sovereignty can be overcome by imposing the so-called universal principles of freedom, humanity, justice and the promotion of diversity. These factors are precisely what determine the lack of a strategic partnership between these two blocs of countries. This means that their evolutionary relationship is to a greater extent limited by these reasons that prevent progress in practical matters, despite the significant strides made in the last decade. Therefore, in one way or another, strategic partnerships "represent mutual recognition of their relative power" (Gratius, 2013). A good example is international financing in which the BRICS group can provide substantial financial resources necessary to stimulate economic growth while simultaneously seeking to participate in shaping international rules and norms based on its financial strength.

The European Union's intention, in order to better position itself on the global economic map, is to pursue cooperation and strategic partnerships not only with traditional partners such as Japan and the United States but also with emerging economies. However, the expected results of deepening mutual relations have not been achieved, meaning that "the European Union has failed to use partnerships to elevate its relations with BRICS countries to a higher level or to prepare for changes in the balance of power in favor of the Global South and the Asia-Pacific region" (European Parliament, 2011).

Such an outcome has led to the declining influence of the EU in international relations, which, to the surprise of the world's leading actors, has enabled the BRICS group to develop its own agenda in order to achieve common interests and goals. In this sense, the rebalancing of global geo-economic relations has become a reality accepted by the countries of the European Union. This demonstrates the ability of the BRICS group to create new initiatives regarding the primary goals that are on the agenda (Cooper, 2016).

3. MACROECONOMIC PERSPECTIVE

The macroeconomic foundations of these groupings should be sought through a dynamic and somewhat qualitative analysis, particularly in sectors considered for financial investments. This is supported by the fact that many countries coped much better with the financial crisis of 2008-2012,

which significantly contributed to the dynamism of the global economy. Some of these countries are members of the BRICS group, which has managed to achieve high growth rates through their economic policies. Therefore, among other things, the countries of the European Union affected by periodic financial crises revised their perspective and reached an agreement to jointly analyze issues in global business governance with emerging countries. Likewise, the European Commission strongly advocated for even greater global cooperation, which contributed to eliminating obvious weaknesses in the international financial system in order to mitigate the impact of the crisis. In this regard, the economic foundation of cooperation between these groupings continues to play one of the key roles in the comprehensive agenda whose goal is to ensure strong, sustainable and balanced global economic growth, quality financial regulation and reform of international financial institutions (Larionova & Shelepov, 2015). However, this does not rule out the possibility of creating an economic-political balance, which is considered necessary to achieve a more rightful and equal international order.

The rebalancing of global economic-political relations only, which reflects the willingness to contribute to the improvement of the management of international business processes, has now become a reality accepted by Western countries. Although no European Union country is a member of the BRICS group, some countries from that group are very important for Europe because of their economic power, which also translates into the growing political influence these countries are gaining. This was contributed by the rapid growth of consumer markets in large emerging economies, which, combined with the material expansion of the middle class, provided new opportunities for Western corporations. This means that in the international management system, the European Union and the BRICS group acknowledge each other's relevance, but do not cooperate on some fundamental issues that are important for the global world order. However, despite the differences manifested in the relations between the European Union and the BRICS countries, there is a very significant mutual connection between these groupings, primarily tied to the economy, especially trade as well as other areas such as energy policy, global warming, foreign policy, and security. Additionally, it is important to highlight the growing continental interdependence between Europe and Asia, signaling that, due to their wealth, they cannot be viewed independently of each other in the future (Hwee & Turner, 2012). However, despite these realities, various groups of developing countries as well as multilateral organizations from this part of the world do not recognize the European Union as an indispensable and essential factor in the global economic and political process, primarily due to geographical distance. On the other hand, in the Asia-Pacific region, there is a significant number of multilateral institutions and smaller blocs of states gathered around the BRICS group, which, despite their competitive relationships, can also enhance their level of mutual complementarity.

Due to the permanent multi-year growth of economic and, consequently, political power, the BRICS countries perceive themselves as an equal factor on the global world stage, expecting it to be accepted and recognized. At the same time, their multilateral approach prioritizes economic growth and development without emphasizing environmental standards in the foreground, which are of exceptional importance for EU countries. In addition, they are very cautious about forming a formal grouping with extensive authority and rigid decision-making rules. Instead, they prefer coordination and consensus on strategic issues while respecting national sovereignty, a model that has proven highly successful.

Therefore, the European Union, as one of the most relevant blocs of countries at the global level, must acknowledge the interests of other country groups and their positions on various international issues, in order for the two-way process to spread international norms through bilateral and

multilateral agreements (Pu, 2012). In this context, Europe must be prepared to embrace heterogeneity, rather than presenting its cooperation model as the only viable option, given that a new world order is emerging at the dawn of the third millennium—one with new powers that recognize the Global South and its needs. In this context of the increasing complexity of the international global system and the evident emergence of new centers of influence, it becomes obvious that a shared change in approach could serve as a much stronger foundation for more dynamic and rapid development of relations between the EU and BRICS.

4. CONCLUSION

Finally, this dual mutual relationship of promoting mutual interaction on the one hand and creating an alternative global order on the other must consider finding a consensus while preserving the right to maintain sovereignty and the ability to make autonomous decisions on an equal basis. The agendas of both blocs have common goals related to accelerated development and the creation of a safer and more stable environment. Therefore, the European Union should engage in the development of a strategy that would enhance the greater cooperation with these countries, which would significantly ensure a greater affirmation of European values on the international level. In this context, the economic preconditions are crucial in achieving convergence in political approaches, serving as the foundation for cooperation between these groupings.

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Globalization and Inequality in Central, Eastern and South Eastern Europe

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Abstract: *The relationship between globalization and inequality has attracted considerable academic attention in recent decades. Despite the numerous attempts to theoretically distinguish the complex globalization-inequality linkages and assess them empirically, the academic literature is far from conclusive. Put differently, the apparent trend of rising income inequality may or may not be a by-product of the unprecedented degree of globalization. The goal of this paper is to examine the globalization-inequality relationship in Central, Eastern and South Eastern Europe. This important relationship is examined empirically through the use of panel data estimates and alternative measures of globalization and inequality. In the group of 16 countries and for the period 1990-2021, a positive impact of the overall KOF index of globalization on inequality is found, with the positive effects also found for economic and social globalization, while the effect of political globalization is not statistically significant.*

1. INTRODUCTION

The relationship between globalization and inequality has attracted considerable academic attention in recent decades. Despite the numerous attempts to theoretically distinguish and empirically assess the complex relationships between globalization and inequality, the academic literature is far from conclusive. In other words, the apparent trend towards rising income inequality may or may not be a by-product of unprecedented degree of globalization. The diversity of estimates can be attributed to inconsistencies in the underlying data, a variety of measures of globalization and economic inequality, different estimation methods, different time periods, etc. Given these different results, further studies are desirable to shed more light on this important relationship.

The aim of this paper is to empirically examine the relationship between globalization and inequality in Central, Eastern and South Eastern Europe. As in other regions of the world, recent decades have been characterized by a sharp rise in inequality, accompanied by increasing globalization tendencies, as former socialist countries decided to switch to a market economy and open up to globalization. By employing alternative measures of globalization and inequality, this paper estimates the relationship between inequality and globalization using panel data estimation techniques for the period 1990-2021 in 16 countries from Central, Eastern and South Eastern Europe.

This article is structured as follows. Section 2 briefly outlines the context of this research, together with the measurement of globalization and inequality. Section 3 is the central part of the paper and presents the results of the empirical analysis. Future research directions are discussed in Section 4, while Section 5 draws a conclusion.

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2. RESEARCH CONTEXT AND MEASUREMENT OF GLOBALIZATION AND INEQUALITY

Theoretical considerations about the relationship between globalization and inequality suggest both positive and negative effects. A natural starting point for exploring the impact of globalization on inequality is the Stolper-Samuelson theorem. Thus, standard trade theory assumes that increased trade, as one of the most important aspects of globalization, increases inequality in developed countries, while inequality in less developed countries might decrease. These distributional effects within countries are often related to the dynamics of the relative demand for skilled and unskilled labor. In particular, it was on these grounds during the 1990s that in developed countries the immiseration of less skilled workers was associated with imports from less developed countries (Freeman, 1995). On the other hand, the increase in exports from developed countries meant an increase in the demand for highly skilled labor, resulting in additional distributional effects and greater inequality. Thus, it appears that the impact of globalization on inequality may differ between developed and less developed countries. This trade channel is only one aspect of globalization. Other aspects relate to financial globalization, in particular foreign direct investment, which may increase the relative demand for skilled labor in both developed and less developed countries (see for example Feenstra and Gaston, 1997 and Gaston and Nelson, 2002). Dreher and Gaston (2008) also argue that as a result of outsourcing, the demand for unskilled labor decreases in developed countries, while the demand for skilled labor increases in less developed countries, as the outsourced activities are relatively skilled for the less developed economies. Eichengreen et al. (2021) also examine the potential impact of financial globalization on inequality and warn that capital inflows can be a double-edged sword, depending on the composition of capital flows, their interaction and overall economic and institutional conditions. These initial arguments suggest that it is necessary to consider different aspects of globalization. In the following we will explain why the recently revised KOF index of globalization (Gygli et al., 2019) will be particularly helpful in the empirical investigation. Since globalization is a complex and multi-layered phenomenon, it is necessary to specify carefully what is meant by globalization. We are interested in globalization and its effects from an economic perspective, and the theoretical channels through which globalization affects inequality are usually set up with trade and financial globalization in mind. In the older literature, traditional indicators of openness were used. These included trade (exports plus imports) as percentage of GDP or FDI flows. In the more recent literature the KOF index of globalization has been used (Dreher, 2006; Dreher and Gaston, 2008; Potrafke, 2015), in particular the revised version of this index due to Gygli et al. (2019). This is particularly convenient as the revised index is available not only as an overall KOF index of globalization, but also with subcomponents of economic, social and political globalization and also distinguishes between trade and financial globalization within economic globalization.

Inequality has also increased in recent decades, particularly in developed economies (see for example Cingano, 2014; Eichengreen et al., 2021). The Gini index is the typical measure of inequality used in empirical studies, and it will also be used in this paper. We use the Standardized World Income Inequality Database (SWIID) (n.d.) by Solt (2020). The Gini index in this database is calculated on the basis of disposable income (after taxes, after transfers), but it is also calculated on the basis of market income (before taxes, before transfers), which allows for a good robustness check, which we will also perform in this study. The SWIID provides comparable Gini indices for most countries in the world. As reported on the SWIID website (https://fsolt.org/swiid/) the SWIID includes data from the OECD Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean generated by CEDLAS and the World Bank, Eurostat, the World Bank's PovcalNet, the UN Economic Commission for Latin America and the Caribbean, national statistical offices around the world, and academic studies, thus providing a reliable source for conducting cross-country research on inequality.

The empirical modelling of the relationship between inequality and globalization in our study follows the previous empirical literature, which usually includes a measure of globalization and a set of control variables. A good example of this literature is the study by Dreher and Gaston (2008). The basic modelling strategy in this and other studies adds GDP per capita (and GDP per capita squared) and then allows for additional control variables such as the age dependency ratio, population, and government consumption. Since the theoretical channel briefly outlined above operates through the dynamics of the relative demand for skilled and unskilled labour, the impact of technological progress cannot be ignored. Indeed, the previous studies have reported that trade (globalization) has only a modest impact on inequality, while most of the increased inequality is due to technology (see, for example, Freeman, 1995 or Jaumotte et al., 2008). Consequently, a better theoretical specification should include an indicator that represents the impact of technology on inequality. Jaumotte et al. (2008) and Dorn et al. (2017) therefore include ICT capital in their empirical specifications, while Tabash et al. (2024) include R&D. These studies took into account additional variables in the form of domestic financial development, access to education or human capital and the employment shares in the industrial, services and agricultural sectors. In our empirical investigation in section 3, we will follow this broad empirical strategy and consider as many factors as possible.

3. EMPIRICAL ANALYSIS AND RESULTS

In this part of the paper, we report the details of the empirical methodology, the data and the results of the econometric estimations. Following some previous studies that have investigated the relationship between globalization and inequality (see e.g. Dreher and Gaston, 2008; Jaumotte et al., 2008; Dorn et al., 2017; Tabash et al., 2024), we set up our underlying model quite broadly. We start with a simple model that includes a globalization variable (KOF index of globalization) as the main variable of interest, along with GDP per capita and GDP per capita squared to account for the so-called Kuznets curve. Indeed, Kuznets (1955) long ago hypothesized that inequality increases in the early stages of industrialization and economic growth, but that at higher levels of development, further industrialization and economic growth lead to lower inequality. In addition to these variables, we extend our model and introduce additional control variables such as the age dependency ratio and population growth to account for demographic factors that can be seen as potentially important determinants of inequality. Next, we extend our model to include R&D, expressed as a percentage of GDP, and human capital. The model also includes government expenditure (as a percentage of GDP) and domestic credit to the private sector (as a percentage of GDP), as well as the employment share in industry and employment share in services. We experiment with different models to check the consistency of our results with respect to the main variable of interest, but along the way we also want to see how these additional variables affect inequality.

The data used in the econometric estimates come from the following sources. For the globalization variables (KOF index of globalization and its subcomponents – economic, social and political globalization), we used the Swiss Federal Institute of Technology and Gygli et al. (2019). For the inequality variables (Gini index of disposable income and Gini index of market income), we used Solt (2020). For the control variables, we used the World Bank's (n.d.) WDI (World Development Indicators) database and the Penn World Table (Version 10.0). (2023) due to Feenstra et al. (2015). Our empirical study focuses on 16 countries from Central, Eastern and South Eastern Europe. The following countries were included: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia and Slovenia for the period from 1990 to 2021. We collected annual data and in most of the models estimated and listed in Tables 1 to 4, we had a respectable number of observations,

with the highest number of observations being 451. In some models that include R&D and human capital, the number of observations drops to 220 due to unavailability of data for some countries or a smaller number of years covered. The number of countries and observations are reported at the end of each table. For our econometric estimates, we used panel data estimation techniques and specified the Hausman test for each model (at the end of each column in Tables 1 through 4) to decide whether to use the fixed-effects (FE) or random-effects (RE) model. The Hausman test favoured the use of a fixed-effects model for the vast majority of models.

We report our results in four tables. Since they contain a large number of models that were estimated, we provide a general guide here to make our results easier to follow and understand. The dependent variable in all models is inequality (as measured by the Gini index due to Solt (2020), which comes in two forms: the Gini index, which is calculated on disposable income and used in Tables 1 to 3, and the Gini index, which is calculated on market income and used in Table 4). Our main variable is globalization, and we are particularly interested in its effect on inequality. In Table 1 we use the overall KOF index of globalization, while in Table 2 we consider the impact of economic globalization on inequality by using the same models as in Table 1, but replacing the overall KOF index of globalization with the KOF index of economic globalization. In Table 3, we additionally consider other aspects of globalization: social, political, trade and financial globalization. Since we are mainly interested in the effects of globalization on inequality, we focus in particular on the signs and statistical significance of the coefficients associated with the globalization variables, but also provide general comments on the other control variables. The decision not to provide too many detailed comments on other variables seems rational for special reasons. After this introductory remark, we present our results, starting with the impact of the overall KOF index of globalization on inequality in Table 1.

Table 1 reports the impact of the overall KOF globalization index on inequality across ten different specifications (columns 1 – 10). The difference in the specifications results from the additional control variables added to the baseline model (column 1), which includes the KOF index of globalization, GDP per capita and GDP per capita squared. The additional control variables are added gradually so that a range of models can be estimated, which increases the consistency of our results with respect to the globalization variable, which is included in all models. In all ten specifications, the coefficient on the KOF index of globalization is positive and statistically significant, suggesting that globalization increases inequality in this sample of countries. GDP per capita is estimated to be positive and statistically significant, while GDP per capita squared is also statistically significant but negative. These effects are consistent across all estimated specifications and confirm the Kuznets hypothesis. The demographic variables (age dependency ratio and population growth) lack consistency with changing signs and statistical significance across different specifications. Among other interesting and consistent results, it is worth mentioning that human capital is estimated statistically significant and negative, suggesting that stronger human capital has the potential to reduce inequality. Domestic financial deepening is also statistically significant and negative, as is the employment share in industry. These results are consistent across the different models and it appears that financial development leads to lower inequality and that more employees in industry also leads to lower inequality. This effect related to the employment share in services is not confirmed by our results, as the coefficients are not statistically significant and change their sign. Without going into these results in more detail, the main finding from Table 1 is that globalization, as measured by the overall KOF index of globalization, has a positive and statistically significant impact on inequality. Next, we examine whether these effects are outweighed when we replace the overall KOF globalization index with the KOF indices of economic globalization (Table 2 below) and social, political and trade and financial globalization (Table 3 below).

Table 1. Globalization and inequality – KOF index of globalization (Gini index: disposable income)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
KOF index of globalization	0.134***	0.128***	0.125***	0.058***	0.119***	0.118***	0.108***	0.079***	0.036**	0.036**
	(0.013)	(0.013)	(0.013)	(0.017)	(0.023)	(0.023)	(0.025)	(0.024)	(0.018)	(0.018)
GDPpc	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$(GDPpc)^2$	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age dependency ratio		-0.044**	-0.047**	-0.006	0.017	0.017	0.025	-0.005	-0.065***	-0.068***
		(0.021)	(0.021)	(0.022)	(0.025)	(0.025)	(0.027)	(0.026)	(0.019)	(0.018)
Population growth			-0.207	-0.038	-0.232	-0.266	-0.033	-0.074	0.148	
			(0.136)	(0.139)	(0.170)	(0.170)	(0.211)	(0.198)	(0.135)	
R&D (% of GDP)				-0.749**	-0.364	-0.388	0.512	-0.159		
				(0.307)	(0.318)	(0.316)	(0.325)	(0.321)		
Human capital (PWT)					-3.960***	-4.007***	-6.838***	-8.636***		
					(0.980)	(0.974)	(1.248)	(1.178)		
Government expenditure (% of GDP)						0.095**	0.098**	-0.015	0.069*	0.069*
						(0.044)	(0.049)	(0.049)	(0.036)	(0.036)
Domestic credit to private sector (% of GDP)							-0.012	-0.016***	-0.019***	-0.019***
							(0.005)	(0.005)	(0.004)	(0.004)
Employment share in industry								-0.235***	-0.241***	-0.242***
								(0.048)	(0.035)	(0.035)
Employment share in services								0.081**	-0.003	-0.004
								(0.040)	(0.032)	(0.032)
No of countries	16	16	16	16	13	13	13	13	16	16
No of observations	451	451	451	353	285	285	285	220	315	315
Hausman test (test statistic and p value)	29.98 (0.00) FE	52.40 (0.00) FE	79.31 (0.00) FE	48.68 (0.00) FE	24.16 (0.00) FE	26.26 (0.00) FE	173.72 (0.00) FE	406.80 (0.00) FE	53.38 (0.00) FE	23.74 (0.00) FE

Standard errors in parentheses; *** significant at 1% level, ** significant at 5% level, * significant at 10% level

Source: Own calculations

Table 2 contains the same specifications as Table 1, but this time the globalization variable is the KOF index of economic globalization. Our results remain virtually unchanged, as the variables have the same sign and statistical significance as in Table 1. Of particular importance to us is that the coefficients for economic globalization are again consistently positive and statistically significant. However, it should be added that the estimated coefficients for the KOF index of economic globalization, while having the same sign and statistical significance, are somewhat lower. Nevertheless, they confirm the previous result that globalization increases inequality.

In Table 3 we experiment further with alternative KOF indices of globalization. In the first two columns, we repeat the already estimated specifications for the overall KOF index of globalization (column 1) and for the KOF index of economic globalization (column 2). They are included to allow a comparison with the models containing the KOF social globalization index (column 3),

the KOF political globalization index (column 4), the KOF trade globalization index (column 5) and the KOF financial globalization index (column 6). Again, we are primarily interested in the coefficients relating to the globalization variables. In all but one model (column 4, in which the KOF index of political globalization is the globalization variable), the coefficients on globalization are positive and statistically significant. The coefficient relating to political globalization is also positive, but not statistically significant. Taken together, the statistically significant coefficients for five of the six globalization variables support the conclusion that globalization increases inequality in the group of Central, Eastern and South Eastern European countries. As for the other variables estimated in Table 3, the Kuznets hypothesis is again confirmed, as well as the finding that human capital, financial deepening and employment in industry lead to lower inequality. Another aspect worth mentioning is the positive impact of the share of employment in the service sector on inequality (statistically significant in three out of six estimated models) suggesting that higher employment in the service sector leads to more inequality.

Table 2. Globalization and inequality – KOF index of economic globalization (Gini index: disposable income)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
KOF index of economic globalization	0.099***	0.093***	0.090***	0.038***	0.075***	0.071***	0.113***	0.111***	0.050***	0.048**
	(0.012)	(0.012)	(0.013)	(0.014)	(0.017)	(0.017)	(0.023)	(0.022)	(0.018)	(0.018)
GDPpc	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$(GDPpc)^2$	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age dependency ratio		-0.032	-0.036	-0.002	0.035	0.034	0.062**	0.044*	-0.044**	-0.047**
		(0.023)	(0.023)	(0.023)	(0.026)	(0.026)	(0.028)	(0.027)	(0.021)	(0.021)
Population growth			-0.252*	-0.061	-0.288*	-0.313*	0.073	-0.038	0.166	
			(0.141)	(0.139)	(0.173)	(0.173)	(0.210)	(0.192)	(0.135)	
R&D (% of GDP)				-0.722**	-0.280	-0.306	0.617*	-0.240		
				(0.310)	(0.324)	(0.323)	(0.324)	(0.309)		
Human capital (PWT)					-3.304***	-3.263***	-6.337***	-8.469***		
					(0.971)	(0.968)	(1.143)	(1.035)		
Government expenditure (% of GDP)						0.079*	0.114**	-0.012	0.078**	0.077**
						(0.045)	(0.048)	(0.048)	(0.036)	(0.036)
Domestic credit to private sector (% of GDP)							-0.013**	-0.015***	-0.019***	-0.020***
							(0.005)	(0.005)	(0.004)	(0.004)
Employment share in industry								-0.302***	-0.257***	-0.258***
								(0.043)	(0.035)	(0.035)
Employment share in services								0.027	-0.022	-0.023
								(0.040)	(0.034)	(0.034)
No of countries	16	16	16	16	13	13	13	13	16	16
No of observations	451	451	451	353	285	285	220	220	315	315
Hausman test (test statistic and p value)	43.66 (0.00) FE	68.42 (0.00) FE	114.43 (0.00) FE	64.83 (0.00) FE	31.35 (0.00) FE	31.28 (0.00) FE	40.48 (0.00) FE	19.00 (0.06) RE	44.02 (0.00) FE	19.61 (0.01) FE

Standard errors in parentheses; *** significant at 1% level, ** significant at 5% level, * significant at 10% level

Source: Own calculations

Table 3. Globalization and inequality – KOF index of social globalization (Gini index: disposable income)

VARIABLES	(1) KOFGI	(2) KOFECGI	(3) KOFSOGI	(4) KOFPOGI	(5) KOFTRGI	(6) KOFFIGI
KOF index of globalization (different indices)	0.079***	0.111***	0.110***	0.015	0.112***	0.056***
	(0.024)	(0.022)	(0.031)	(0.011)	(0.026)	(0.017)
GDPpc	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$(GDPpc)^2$	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age dependency ratio	-0.005	0.044*	0.003	-0.018	0.003	0.031
	(0.026)	(0.027)	(0.026)	(0.027)	(0.026)	(0.029)
Population growth	-0.074	-0.038	-0.094	-0.067	0.055	-0.069
	(0.198)	(0.192)	(0.192)	(0.202)	(0.196)	(0.198)
R&D (% of GDP)	-0.159	-0.240	-0.378	-0.269	-0.115	-0.166
	(0.321)	(0.309)	(0.316)	(0.328)	(0.316)	(0.321)
Human capital (PWT)	-8.636***	-8.469***	-6.137***	-7.650***	-8.705***	-7.623***
	(1.178)	(1.035)	(1.053)	(1.247)	(1.117)	(1.071)
Government expenditure (% of GDP)	-0.015	-0.012	-0.012	-0.033	0.003	-0.003
	(0.049)	(0.048)	(0.049)	(0.050)	(0.049)	(0.050)
Domestic credit to private sector (% of GDP)	-0.016***	-0.015***	-0.018***	-0.015***	-0.017***	-0.016***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Employment share in industry	-0.235***	-0.302***	-0.182***	-0.237***	-0.263***	-0.248***
	(0.048)	(0.043)	(0.050)	(0.050)	(0.048)	(0.049)
Employment share in services	0.081**	0.027	0.026	0.123***	0.037	0.076*
	(0.040)	(0.040)	(0.047)	(0.040)	(0.043)	(0.041)
No of countries	13	13	13	13	13	13
No of observations	220	220	220	220	220	220
Hausman test (test statistic and p value)	406.80 (0.00) FE	19.00 (0.06) RE	29.01 (0.00) FE	85.05 (0.00) FE	29.36 (0.00) FE	23.35 (0.02) FE

Standard errors in parentheses; *** significant at 1% level, ** significant at 5% level, * significant at 10% level

Source: Own calculations

To finally check the consistency and robustness of our results, we experiment with an alternative dependent variable in Table 4. Instead of the Gini index based on disposable income, we include the Gini index based on market income. For this purpose, we estimate the same specifications as in Table 3, but the dependent variable is the Gini index based on market income.

Table 4 confirms our previously reported results. It shows that with the sole exception of political globalization, which is estimated to be statistically insignificant, the coefficients for all other globalization variables (the overall KOF index of globalization and the KOF indices of economic, social, trade and financial globalization) are positive and statistically significant. This additional evidence based on the Gini index, which is based on market income, thus confirms that globalization increases inequality. The Kuznets hypothesis is also reconfirmed, as is the finding that human capital, financial deepening and employment in industry lead to lower inequality. With this alternative dependent variable, we also notice that with respect to the age dependency ratio it is more often statistically significant (in four out of six specifications) and the impact is negative on inequality. The employment share in the service sector is found to be statistically significant and positive in all models suggesting that more employment in the service sector increases inequality.

Table 4. Globalization and inequality – KOF indices of globalization (Gini index: market income)

VARIABLES	(1) KOFGI	(2) KOFECGI	(3) KOFSOGI	(4) KOFPOGI	(5) KOFTRGI	(6) KOFFIGI
KOF index of globalization (different indices)	0.106***	0.150***	0.172***	0.013	0.133***	0.102***
	(0.025)	(0.023)	(0.032)	(0.012)	(0.028)	(0.017)
GDPpc	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$(GDPpc)^2$	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age dependency ratio	-0.060**	-0.001	-0.046*	-0.076***	-0.052*	0.010
	(0.028)	(0.028)	(0.027)	(0.029)	(0.027)	(0.030)
Population growth	-0.337	-0.255	-0.371*	-0.323	-0.182	-0.336*
	(0.209)	(0.199)	(0.204)	(0.218)	(0.208)	(0.201)
R&D (% of GDP)	-0.023	0.161	-0.281	-0.155	0.047	0.098
	(0.340)	(0.324)	(0.327)	(0.353)	(0.336)	(0.325)
Human capital (PWT)	-9.273***	-9.219***	-5.782***	-7.564***	-9.075***	-8.329***
	(1.245)	(1.112)	(1.090)	(1.342)	(1.188)	(1.087)
Government expenditure (% of GDP)	-0.003	-0.039	0.006	-0.027	0.016	0.029
	(0.052)	(0.050)	(0.051)	(0.054)	(0.052)	(0.050)
Domestic credit to private sector (% of GDP)	-0.022***	-0.024***	-0.026***	-0.021***	-0.024***	-0.023***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Employment share in industry	-0.145***	-0.182***	-0.063	-0.145***	-0.177***	-0.169***
	(0.051)	(0.0049)	(0.052)	(0.053)	(0.051)	(0.049)
Employment share in services	0.287***	0.223***	0.193***	0.343***	0.241***	0.257***
	(0.043)	(0.043)	(0.048)	(0.042)	(0.045)	(0.041)
No of countries	13	13	13	13	13	13
No of observations	220	220	220	220	220	220
Hausman test (test statistic and p value)	406.80 (0.00) FE	100.65 (0.00) FE	41.40 (0.00) FE	267.92 (0.00) FE	53.46 (0.00) FE	237.38 (0.00) FE

Standard errors in parentheses; *** significant at 1% level, ** significant at 5% level, * significant at 10% level

Source: Own calculations

The evidence presented in Tables 1 to 4 can be summarized as strongly supporting the view that globalization increases inequality in the countries of Central, Eastern and South Eastern Europe. This result is consistent with the various models that have been estimated and with alternative globalization and inequality indicators that have been used.

4. FUTURE RESEARCH DIRECTIONS

As globalization has increased dramatically over the last four or five decades, empirical studies examining the consequences of this phenomenon are highly desirable. While this empirical study examines an important effect on inequality and provides consistent evidence that globalization increases inequality in the countries of Central, Eastern and South Eastern Europe, further research may be needed to shed additional light on this important relationship. In particular, this research could become more relevant by broadening the sample of countries included. Including as many of the world economies as possible would provide a more solid basis for drawing conclusions about the relationship between globalization and inequality. Extending the study period could also be a desirable step, especially if all countries are included. In the present study, the choice of the period from 1990 onwards was dictated by the particular aspect of the countries involved that these

countries have transitioned to capitalism. The inclusion of more economies and the extension of the study period therefore offer promising opportunities for further research on the relationship between globalization and inequality.

5. CONCLUSION

This paper examines the impact of globalization on inequality in a group of 16 countries from Central, Eastern and South Eastern Europe. The paper contributes to the empirical literature on the impact of gloablization on inequality. A particularly valuable contribution comes from the use of the recently revised KOF index of globalization, which distinguishes between different aspects of globalization, economic, social and political globalization. Since the theoretical literature explains the relationship between inequality and globalization from an economic perspective, identifying two main channels of influence operating through trade and financial globalization, the KOF index, which distinguishes between trade and financial globalization within economic globalization, is particularly useful for empirical studies. Using panel data estimation techniques, this paper finds a positive impact of the overall KOF index of globalization on inequality, with the positive effects also found for economic and social globalization, while the effect of political globalization is not statistically significant. In addition, the results obtained also support the statistically significant and positive effects of trade and financial globalization.

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Comparison of European Union Countries Based on Selected Indicators of Poverty and Social Exclusion

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Abstract: *The paper deals with the comparison of European Union countries. The aim of the paper is to evaluate these countries based on their ranking positions in terms of poverty and social exclusion in the year before the outbreak of the COVID-19 pandemic (year 2019) and after (year 2023). The countries are compared using three indicators – the percentage of the population severely socially and materially deprived, the percentage of the population living in households with very low work intensity and the percentage of the population unable to face unexpected financial expenses. The ranking of countries is based on the use of one of simple methods of multivariate comparison, namely the distance from a fictitious object method.*

1. INTRODUCTION

Poverty is understood as the inability to meet basic life needs (especially in the areas of nutrition, safe drinking water, clothing, housing, education, etc.).

The aim of the paper is to evaluate European Union countries based on their ranking positions in terms of poverty and social exclusion indicators in the year before the COVID-19 pandemic (2019) and after (2023).

We have established the hypothesis that the level of poverty and social exclusion in EU countries was worse in 2023 (post-COVID-19) compared to 2019 (pre-COVID-19).

European Union countries are compared using three indicators: severe material and social deprivation rate, people living in households with very low work intensity, and inability to face unexpected financial expenses. The ranking of countries is based on the use of one of the simple methods of multivariate comparison – the distance from a fictitious object method.

Basic indicators of poverty and social exclusion monitored according to Eurostat methodology include the following indicators (Vlačuha & Kubala, 2024, pp. 6-7):

- the at-risk-of-poverty or social exclusion rate,
- the at-risk-of-income-poverty rate,
- the severe material and social deprivation rate,
- the very low work intensity rate.

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The at-risk-of-poverty or social exclusion rate (AROPE) is the main indicator for monitoring the EU 2030 goal in the area of poverty and social exclusion. It represents the share of people at risk of poverty or social exclusion. Social exclusion means unequal access to basic societal resources (employment, education, housing, healthcare, social protection) and the inability to engage in normal relationships and activities that the majority of people in society participate in (economic, social, cultural, or political relations), which ensure integration into society. For an individual, this means that basic goods and services are not normally available to them, their basic life needs are not covered, and they are simultaneously excluded from the events and relationships that the majority of people in their surroundings are engaged in. This indicator consists of the at-risk-of-income-poverty rate, the severe material and social deprivation rate, and the very low work intensity rate.

The at-risk-of-poverty rate expresses the share of individuals in the total population whose equivalent disposable income is below the poverty risk threshold. The poverty risk threshold is set at 60% of the national median equivalent disposable income. According to the Statistical Office of the Slovak Republic (2023), the equivalent disposable income of households is the disposable income of the household divided by the household's equivalent size. For the calculation of the equivalent size of a household, the EU-SILC survey uses the so-called modified OECD scale, where each first adult household member is assigned a coefficient of 1, each additional member aged 14 years or older is assigned a coefficient of 0,5, and each person younger than 14 years is assigned a coefficient of 0,3.

The severe material and social deprivation rate expresses the proportion of the population experiencing an enforced lack of at least 7 out of 13 deprivation items (6 related to the individual and 7 related to the household).

The items of material and social deprivation at the household level are:
- ability to face unexpected expenses,
- ability to afford a one-week holiday away from home,
- ability to pay for arrears related to mortgages, rent, utility bills, instalment payments for purchases, and other loans,
- ability to afford meat, chicken, fish, or a vegetarian equivalent every other day,
- ability to maintain adequate heating at home,
- own a personal car,
- replace worn-out furniture.

The items of material and social deprivation at the individual level are:
- have an internet connection,
- replace worn-out clothing with new items,
- have two pairs of shoes in the right size (including a pair suitable for all weather conditions),
- spend a small amount of money on oneself each week,
- have regular leisure activities,
- meet with friends/family for a meal and drinks at least once a month.

People living in households with very low work intensity express the percentage of people aged 0-64 living in households where the adults (aged 18-64) worked less than 20% of their total work potential during the past year. The reference population was adjusted to exclude retirees and students.

The measurement of poverty and social exclusion in the EU is primarily carried out in the context of the Europe 2030 strategy. According to United Nations Special Rapporteur Olivier De Schutter, poverty reduction must be one of the main priorities of the European Commission's action plan for

implementing the European Pillar of Social Rights. He stated that poverty in the EU increasingly affects women and single-parent households.

According to De Schutter, the action plan for the implementation of the European Pillar of Social Rights should include three ambitious goals:

- A poverty reduction strategy for 2030, which should set an ambitious target of reducing the share of people at risk of poverty by 50%.
- A child guarantee covering five main areas: access to education, early childhood care, nutrition, housing, and healthcare. This would also include supporting families by providing a decent income, employment, and access to benefits.
- A new legally binding tool for minimum income systems to ensure that such schemes in the EU are adequate and that member states follow a common methodology.

Christa Schweng stated that even before COVID-19, one in five people in the EU was at risk of poverty and social exclusion, which she considers a failure of our developed European societies. One of the best ways to lift people out of poverty and prevent it is to build social and individual resilience (Hajnoš, 2021).

According to Crettaz (2015), indicators of material deprivation are especially useful in situations where other indicators, such as income poverty, may not fully reflect the living conditions of the population during economic crises. Material deprivation is an important complement to traditional poverty indicators, as it reacts more sensitively to economic cycles and changes in social policies. Research shows that material deprivation indicators are much more sensitive to economic cycles and unemployment than income poverty indicators, and therefore, they should be systematically used in analyses of working poverty.

Dudek (2019) states that the rate of severe material deprivation in the EU is influenced by factors such as median disposable income, unemployment, GDP per capita, and social protection expenditures. Using the GEE methodology, it was shown that the high disparities in deprivation rates between countries can be explained by differences in these factors, with countries like Scandinavia and Luxembourg showing low levels of deprivation, while Bulgaria has the highest values. The findings suggest that increasing incomes alone is not enough to reduce deprivation, and it is necessary to also improve the effectiveness of social protection.

Similar to Łuczak and Kalinowski (2020), who focus on the level of material deprivation in EU countries in 2016, they use the TOPSIS method to assess severe material and social deprivation in EU countries. According to the findings of the mentioned study, there are five main types of countries with different levels of material deprivation, with the older EU member states showing a lower level of deprivation compared to the new members. This approach can serve as a tool for analyzing changes in the level of material deprivation in different years and for comparing countries across various time periods.

Currently, the issues of poverty, inequality, and social exclusion are inextricably linked to global challenges such as inflation, the energy crisis, the pandemic, and the war. Halkos and Aslanidis (2023) highlight the complexity and interconnection of these phenomena, which negatively affect the ability to achieve sustainable development goals. While inequalities are decreasing between countries, internal disparities within countries are growing. The authors emphasize the need for a comprehensive approach to measuring poverty, including multidimensional indicators, as well as the creation of a unified poverty index.

Fabrizi et al. (2023) compare the standard indicator of material deprivation and the new indicator of material and social deprivation in the EU. They found that although these indicators identify partially overlapping groups of people, the new indicator also includes personal and social deprivation, which was not included in the original material deprivation indicator. While material deprivation focuses on household-level material deprivation, the new indicator takes into account both individual and social aspects.

2. METHODOLOGY

To rank European Union countries based on selected poverty and social exclusion indicators, one of the simple multi-dimensional comparison methods will be used. The goal of those methods is to replace the indicators on which the countries are to be ranked with a single quantitatively expressed integral indicator.

Two types of variables are distinguished: stimulants (where a positive growth of values is desirable) and destimulants (where a positive decrease in values is desirable). In our case, all three indicators are destimulants.

The method used for the analysis will be the distance from a fictitious object. In addition to this method, we are also familiar with the ranking method, the scoring method, and the standardized variable method.

The essence of the distance from a fictitious object method is the creation of a fictitious (optimal) object O_0, where all destimulants take the minimum value. The values of all indicators are first expressed in a normalized (standardized) form. For destimulants, we will use the formula (Pažitná & Labudová, 2007):

$$z_{ij} = \frac{\overline{x}_j - x_{ij}}{s_j} \tag{1}$$

where:

z_{ij} are normalized values of individual indicators,
$\overline{x}_j$ are average values of individual indicators,
x_{ij} are original values of individual indicators,
s_j are standard deviations of individual indicators.

Normalized variables have a mean of 0 and a standard deviation of 1.

For each country, the average distance from this fictitious object is calculated. The most commonly used is the Euclidean distance, the values of which serve as the integral indicator (Vojtková & Stankovičová, 2020):

$$d_i = \sqrt{\frac{1}{k}\sum_{j=1}^{k}\left(z_{ij} - z_{0j}\right)^2} \tag{2}$$

where:
d_i is the integral indicator,
k is the number of indicators,
z_{0j} is the fictitious object.

The closer a country is to the fictitious object, the smaller its distance is from it. The lowest achievable value of the integral indicator (0) would be reached by a country that has the best values in all

indicators. The final ranking of the countries will be determined by assigning rank 1 to the country with the smallest distance from the fictitious object, and rank 27 to the country with the largest distance.

In the literature, this method is also known as TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution). It is a multi-criteria decision-making method developed by Yoon and Hwang, which is frequently used at various decision-making levels. The fundamental principle of TOPSIS is to identify the best alternative based on its distance from the ideal solution (positive ideal) while also being as far as possible from the negative ideal. Alternatives are evaluated based on their similarity to the ideal solution – the closer an alternative is to the ideal, the higher it is ranked (Thakkar, 2021).

The method's procedure includes:
1. Determining criteria and their weights – each criterion is assigned importance based on its influence on the decision-making process.
2. Normalizing the values of the criteria – results are recalculated to a comparable scale.
3. Calculating the distances from the ideal and anti-ideal solutions – using geometric distances, the alternative closest to the ideal and furthest from the anti-ideal is identified.

TOPSIS provides an effective way of evaluating alternatives and allows decision-makers to select the one that best meets the established criteria.

One of the main advantages of TOPSIS is quick identification of the best alternative from the available options. The calculations are simple and easily understandable even for managers in practice.

The TOPSIS method is used in various fields. For example, Masca (2017) applied the TOPSIS method to evaluate the economic performance of European Union countries using six macroeconomic indicators for 2015. Bhutia and Phipon (2012) used the TOPSIS method for supplier selection, which is a key activity for effective supply chain management and represents a multi-criteria decision-making problem. Rahim et al. (2018) applied the TOPSIS method to support management decision-making in selecting the best employees, enabling managers to objectively, quickly, and efficiently assess employees based on established criteria.

3. RESULTS AND DISCUSSION

Data for the analysis of selected indicators of poverty and social exclusion in European Union countries were obtained from the website of Eurostat.

The following charts illustrate the values of the analyzed indicators in individual countries. In all three charts, the countries are arranged based on the values from 2023. The lowest and highest values for 2023 are highlighted, as well as the value for the EU 27.

Figure 1 provides data on the percentage of the population severely socially and materially deprived in the EU countries in 2019 and 2023. It is evident that in 2023, 11,0% of population in the EU 27 was at risk of poverty and social exclusion. The lowest percentage of people affected by this phenomenon was in the Czech Republic (4,3%) and the highest percentage was in Romania (28,4%). In most countries, a decrease of this indicator was recorded. Compared to year 2019, the largest decrease of this indicator was recorded in Lithuania by 37,57% and the largest increase was recorded in Sweden by 103,03%. In the EU 27, the value of this indicator decreased by 4,35%.

Figure 2 provides the percentage of people living in households with very low work intensity in the EU countries in 2019 and 2023. It is evident that in 2023, 8% of the population in the EU

27 lived in households with very low work intensity. The lowest share of people living in such households was recorded in Malta (3,6%) and the highest share was recorded in Belgium (10,5%). Compared to the year 2019, the largest decrease of this indicator was recorded in Luxembourg by 43,48% and the largest increase was recorded in Germany by 30,26%. In the EU 27, the value of this indicator remained unchanged.

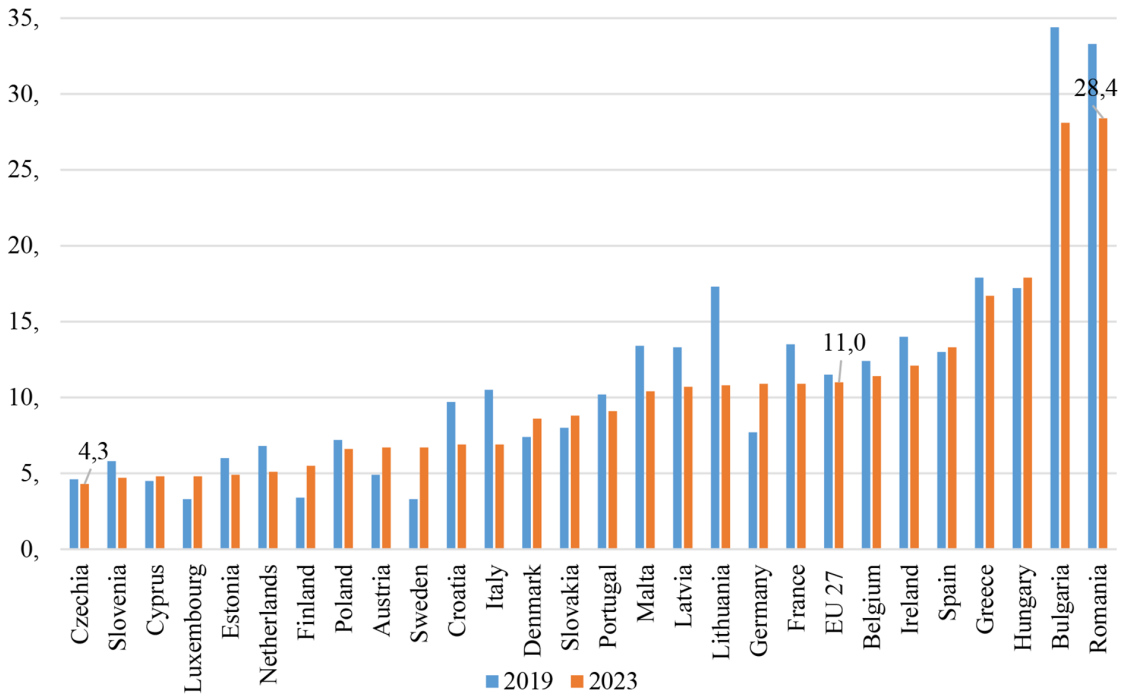

Figure 1. Severe material and social deprivation rates in European Union countries in 2019 and 2023

Source: Eurostat (2024); Own processing

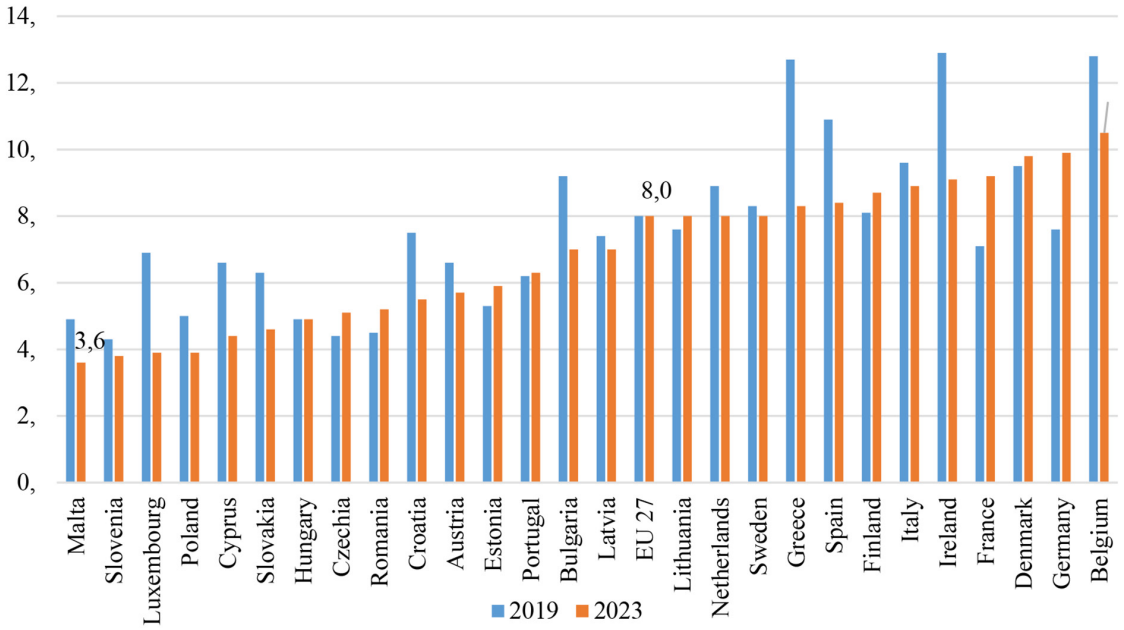

Figure 2. People living in households with very low work intensity in European Union countries in 2019 and 2023

Source: Eurostat (2024); Own processing

Figure 3 provides data on the percentage of individuals unable to cope with unexpected financial expenses across EU countries in 2019 and 2023. It is evident that in 2023, 31,2% of the population in the EU 27 faced this challenge. The lowest share of people unable to face unexpected financial expenses was recorded in Malta and the Netherlands (15,9%) and the highest share was in Bulgaria (46,7%). Compared to year 2019, the largest increase of this indicator was recorded in Luxembourg by 44,31% and the largest decrease was recorded in Slovenia by 31,21%. In the EU 27 was recorded increase of this share by 0,97%.

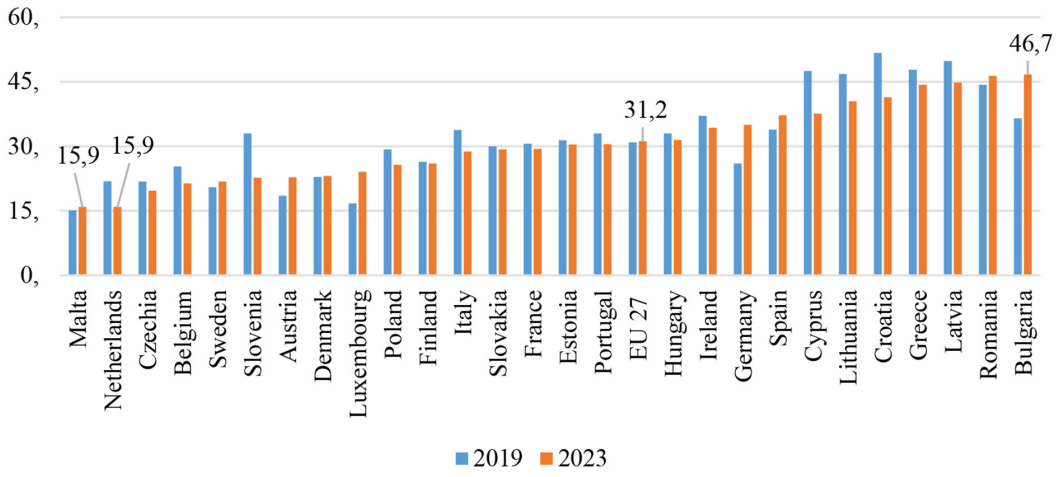

Figure 3. Inability to face unexpected financial expenses in European Union countries in 2019 and 2023

Source: Eurostat (2024); Own processing

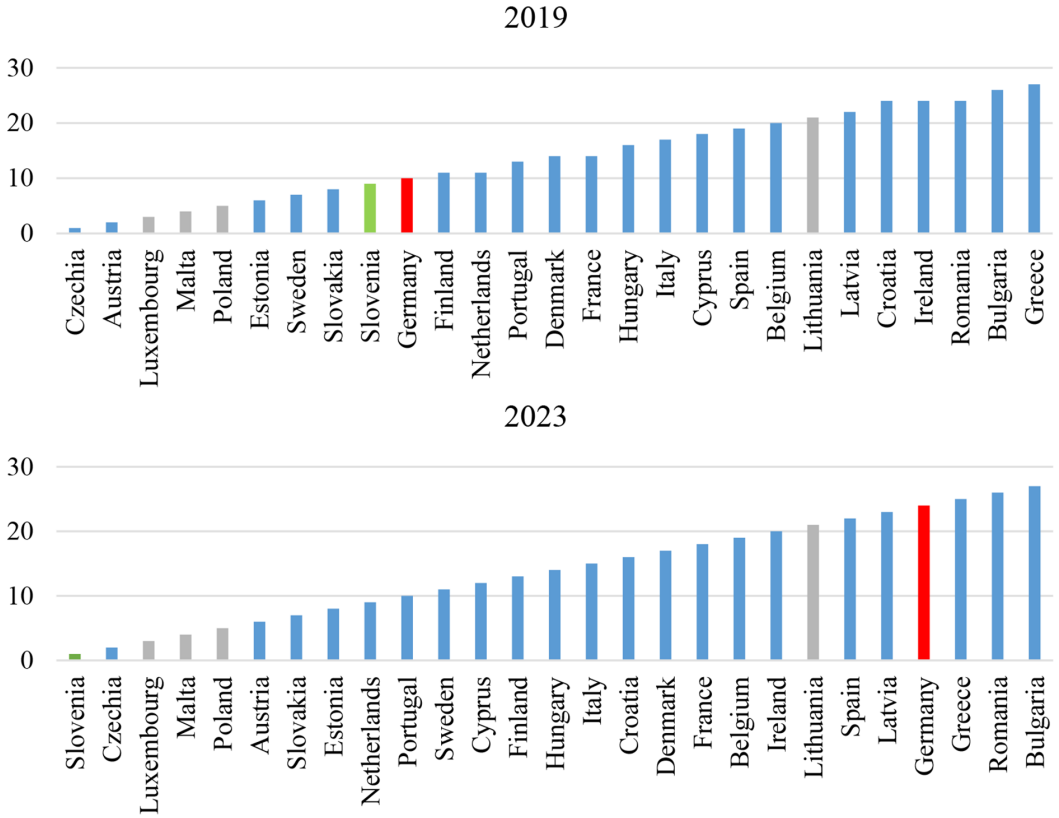

Figure 4. Countries' order using the distance from a fictitious object method in 2019 and 2023

Source: Own processing

Figure 4 presents the ranking of European Union countries based on the calculated values of the integral indicator for the years 2019 and 2023. In 2019, the top positions were occupied by the Czech Republic, Austria and Luxembourg, while the lowest-ranked countries were Greece, Bulgaria and Romania. By 2023, the leading position was held by Slovenia, followed by the Czech Republic and Luxembourg, with the bottom positions occupied by Bulgaria, Romania and Greece.

Table 1. Change in order in 2023 compared to 2019

Country	Change	Country	Change	Country	Change
Slovenia	-8	Belgium	-1	Romania	1
Croatia	-7	Slovakia	-1	Estonia	2
Cyprus	-6	Lithuania	0	Finland	2
Ireland	-4	Luxembourg	0	Denmark	3
Netherlands	-3	Malta	0	Spain	3
Portugal	-3	Poland	0	France	3
Greece	-2	Bulgaria	1	Austria	4
Italy	-2	Czechia	1	Sweden	4
Hungary	-2	Latvia	1	Germany	14

Source: Own processing

A comparison of the rankings (Table 1) revealed that the order remained unchanged for Luxembourg, Malta, Poland and Lithuania. Negative values in this table indicate an improvement in ranking, positive values indicate a decline. The largest decline in ranking was recorded in Germany, which dropped by 14 places, possibly indicating a worsening ability to address social and economic challenges. Conversely, Slovenia improved by 8 places, suggesting positive progress in addressing socio-economic issues.

4. FUTURE RESEARCH DIRECTIONS

Future research could focus on a more detailed analysis of the factors influencing changes in the rankings of countries, as well as an exploration of regional disparities within individual EU states. Another potential direction is to expand the evaluation by incorporating additional indicators.

5. CONCLUSION

The paper focused on comparing European Union countries based on three indicators related to poverty and social exclusion (the percentage of the population severely socially and materially deprived, the percentage of the population living in households with very low work intensity and the percentage of the population unable to face unexpected financial expenses) in the years 2019 and 2023.

The results of our analysis confirmed the hypothesis that the level of poverty and social exclusion in EU countries was worse in 2023 (post-COVID-19) compared to 2019 (pre-COVID-19).

When evaluating EU countries using the distance from a fictitious object method, which considers analyzed indicators, we observed significant changes in the ranking of European Union countries between 2019 and 2023. The most significant decline in ranking was observed in Germany, whereas Slovenia achieved the greatest improvement.

Findings in this paper highlight the differing dynamics of socio-economic conditions across EU countries, which may be the result of varying policies, economic stability, or responses to crises.

The results also emphasize the need to focus on identifying factors that contribute to the improvement or deterioration of indicators in individual countries and to encourage the exchange of best practices among member states.

This study was limited by the availability of data for European Union countries. The main contribution of the study is the ranking of European Union countries based on poverty and social exclusion indicators for the years 2019 and 2023, using the integral indicator calculated through the distance from a fictitious object method.

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Regional Inequality Through Income Disparities and Migration Patterns: Systematic Literature Review

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Abstract: *Regional inequality nowadays represents a big issue when it comes to economic and social growth. This inequality is present in internal migration patterns and in income distribution as well. In order to be able to find the relationships between these variables and to investigate how do they or whether they affect regional disparities, this paper uses a systematic literature review (SLR). This research examines 101 papers published between 2014 and 2024. The methodology of the paper is PRISMA and PEO frameworks, with these methods, the scientific papers are researched in a transparent and reproducible manner. The results show that regional disparities are mostly researched in a quantitative way, using mostly economic and demographic data. Next to this, most of the papers conclude that there is a need for a better policy intervention from the government's side. This study contributes to the existing body of knowledge by identifying gaps in current research and suggesting pathways for future inquiry.*

1. INTRODUCTION

Regional disparities become ever more relevant as economic, social, and demographic divides deepen between areas. Investment and growth tend to flow to urban areas, while rural or former industrial regions are left with population decline, unemployment, and income inequality. These divides were further exposed (Leach et al., 2020) during the COVID-19 pandemic, with differences in healthcare, digital access, and economic resilience laid bare.

This research aims to study existing literature concerning regional inequality, internal migration, and income inequality, and their connection as contributing factors to, and effects of, regional inequality. Through a research of academic discourse on these interlinked variables, the present study aspires to determine major trends, motivations, and consequences of regional disparity. To align with this aim, three research questions (RQs) have been generated: RQ1: What role do economic and demographic indicators play in shaping regional inequalities? RQ2: What are the most common methodologies used in the regional inequity related papers? RQ3: To what extent has the focus on economic data in regional inequality studies overshadowed the consideration of environmental and social factors in policymaking?

The literature on economic growth and inequality highlights the complex relationship between regional disparities, economic development, and spatial dynamics. Barro and Sala-i-Martin (1991, 1995) provide foundational insights into regional convergence, where poorer economies grow faster than richer ones, reducing income disparities over time. Their analysis of U.S. states and global data reveals conditional convergence, influenced by factors such as education and government

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policies. The inverted-U Kuznets curve (Kuznets, 1955) complements this discussion by suggesting that inequality initially rises during industrialization but declines as economic growth becomes more widespread, a framework widely debated and expanded upon by subsequent studies.

Krugman's (1991) core-periphery model and theories of economic geography further emphasize spatial dynamics, showing how increasing returns to scale, transportation costs, and market demand concentrate economic activity in core regions, often at the expense of peripheral areas. Brülhart and Sbergami (2009) extend this work by examining agglomeration's role in economic growth, supporting the Williamson hypothesis that agglomeration drives growth in early development stages but can lead to diminishing returns in mature economies due to congestion effects. They also stress the varying impact of agglomeration in open versus closed economies.

With conflicting empirical results influenced by methodologies, research periods, and geographic location, the argument over regional convergence versus divergence is still ongoing (Armstrong, 1995; Marques & Soukiazis, 1998). Theoretical and empirical contributions highlight the necessity of complex strategies that take into account trade dynamics, economic development phases, and regional differences in order to successfully reduce inequality.

The structure of this paper is as follows: it begins with a literature review, providing an overview of key concepts and previous research on regional inequality, income disparities, and internal migration. This is followed by a detailed methodology section, outlining the research design and data collection approach. This paper employs a Systematic Literature Review (SLR) methodology, incorporating both the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) and PEO (Population, Exposure, Outcome) frameworks, to ensure a comprehensive and structured examination of the relevant literature. Additionally, a mapping study was conducted to analyze and outline the current academic landscape within this field, providing a broad overview of existing research trends and gaps. Next, the results are presented and analyzed to highlight significant findings related to regional disparities. Finally, the paper concludes with a discussion of the implications of the findings and a conclusion summarizing the study's contributions and suggestions for future research.

2. METHODOLOGY

This article uses a systematic literature review method on the topic of regional inequality. Systematic literature reviews vary from further literature reviews in their method to reducing bias and providing a complete analysis of research. While traditional literature reviews, often found in research introductions and discussions, may be influenced by selection bias—favoring major studies and those aligning with the authors' opinions—systematic reviews seek to identify all relevant studies addressing a specific question. This includes both positive and negative findings, even those published in lower-impact journals. The methodologies for selecting studies in systematic reviews are designed to ensure a balanced and unbiased summary of the literature, thereby improving the overall quality and reliability of the findings (Kitchenham et al., 2009; Bartucz et al., 2023). The research questions of the paper are:

R1: What role do economic and demographic indicators play in shaping regional inequalities?

R2: What are the most common methodologies used in the regional inequity related papers?

R3: To what extent has the focus on economic data in regional inequality studies overshadowed the consideration of environmental and social factors in policymaking?

For preparing a methodological and transparent SLR, the Preferred Reporting Items for Systematic Reviews (PRISMA) recommendations were used in this review (Denyer & Tranfield, 2009). Using the PRISMA method, the paper ensured a consistent, peer-accepted methodology that employs a guideline checklist, which was used during the preparation of this paper (Briner & Denyer, 2012). This method improves the quality assurance of the analysis process and guarantees its replicability.

In order to be able to find an answer to the above-mentioned research questions, the research used the SLR method. The data, which in this case were the related articles, were collected from the Scopus database. During the keyword selection process, the research took into consideration the most predominant synonyms and substitutes for regional inequality-related terms. These keywords were subsequently arranged according to the Population, Exposure, and Outcome (PEO) framework (Mammun et al., 2021). Although this model is frequently used in health disciplines (Moola et al., 2015), it provided a qualitative framework for planning and carrying out this study's keyword search (Buics et al., 2024). Following this approach, the keywords listed below were identified and utilized in the study.

Table 1. Keywords according to the PEO framework

Population	Exposure	Outcomes
regional inequality	income inequality	regional policy
regional development	demographic differencies	economics
regional disparities	population movement	development
	internal migration	

Source: Own research

Keyword combinations were utilized in the Scopus database with the aid of Boolean operators to produce more complex and effective search results. These combinations were structured according to the developed PEO model. The following inclusion and exclusion criteria were applied:

In order to receive more complex types of effective search results, Boolean operators were used in the Scopus database, with keyword combinations. Combined these according to the developed PEO model. The below presented inclusion and exclusion criteria was used:

1. Only articles should be included as documents.
2. The articles must pertain to the fields of social, environmental, economics, business and management sciences.
3. The articles do not need to be freely accessible.
4. The articles must be written in English.
5. The articles must have been published between 2014 and 2024.
6. The source type should exclusively be journals.
7. Only articles that are in the final stage of publication should be considered.
8. The articles must be relevant to the research question.

The initial keyword search yielded 357 articles, which were subsequently narrowed down to 130 articles. In the following chapter, the specific steps and processes employed to implement these criteria, including the screening and eligibility assessment, will be discussed in detail.

3. RESULTS

The following section presents the results, divided into two main subsections: the first is the bibliometric analysis, which provides a statistical overview of the research, while the second focuses on the content analysis.

3.1. Bibliometric Analysis

Following the final keyword selection using the PEO framework, the next step involves searching databases for high-quality and relevant papers using the proposed source. Boolean expressions are utilized to combine multiple Boolean values and logical operators (AND, OR, parentheses) to construct more refined search conditions. The initial search in Scopus yielded a significant number of 357 articles based on the following keyword combination: ("regional inequality" OR "regional development" OR "regional disparities") AND ("income inequality" OR "demographic differences" OR "population movement" OR "internal migration") AND ("regional policy" OR economics OR development). These steps ensured a rigorous and systematic approach to identifying and selecting studies for the review.

The following figure (Figure 1) illustrates the steps of the aforementioned PRISMA process, which was conducted during the systematic review of the literature. In the initial stage, 357 studies were identified from the Scopus database. Following the application of inclusion and exclusion criteria, 227 records were excluded. Subsequently, 130 studies were screened, out of which 20 additional records were excluded. The remaining 110 studies were assessed for retrieval, but 5 reports could not be obtained. As a result, 105 studies were evaluated for eligibility, during which 4 reports were excluded. Ultimately, 101 studies were included in the final review. The figure clearly demonstrates the entire process, highlighting the number of records excluded at each stage to ensure transparency.

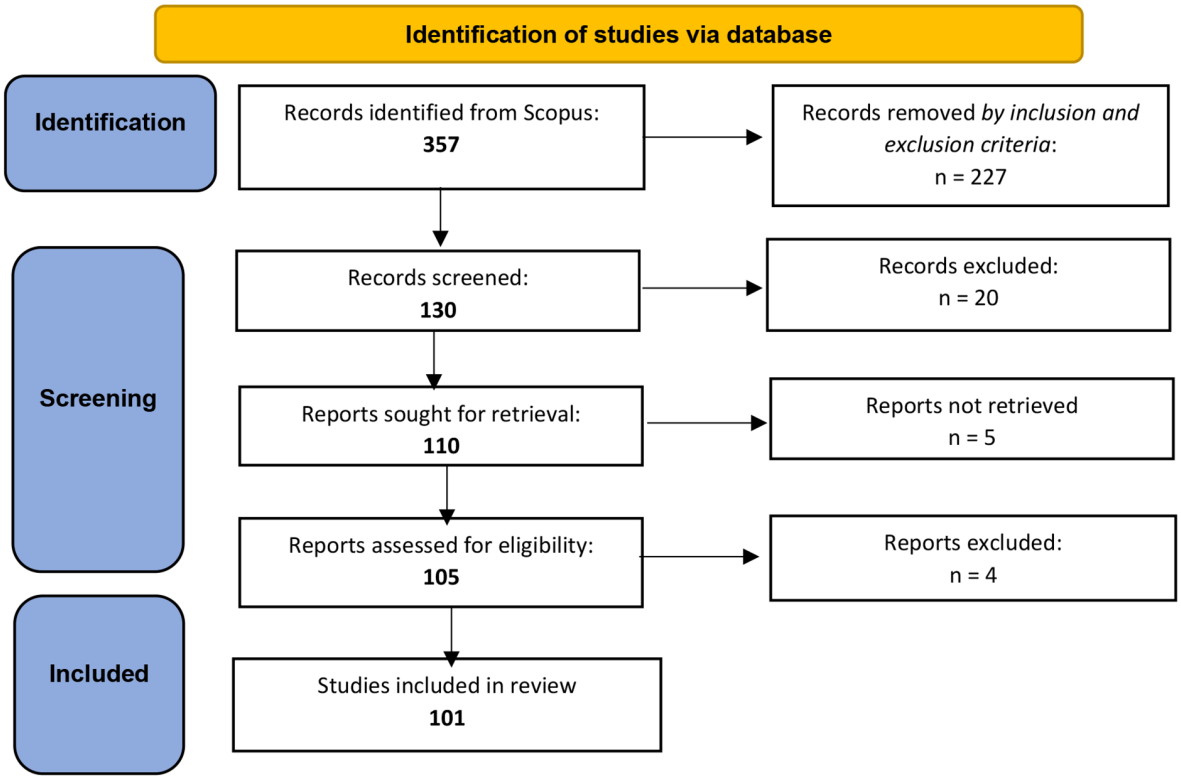

Figure 1. SLR selection criteria based on the PRISMA method

Source: Qwn research

As it can be seen in Figure 2, the chart provides a comparative overview of the examined research outputs indexed in Scopus from various countries. It highlights significant disparities in the number of documents produced by different nations. Of the total 357 papers, nearly 19% originated from China. Following closely is the United States, which underscores its long-standing position as

a leader in academia and innovation. European countries, such as Spain, and Italy, make up the next tier with notable contributions. At the lower end of the chart, Turkey and Australia also make contributions, while Hungary ranks last among the listed countries, indicating comparatively lower research output. Overall, this chart illustrates the uneven distribution of research contributions globally, with clear dominance by China and the United States, while European countries and emerging nations show varying but growing levels of academic engagement.

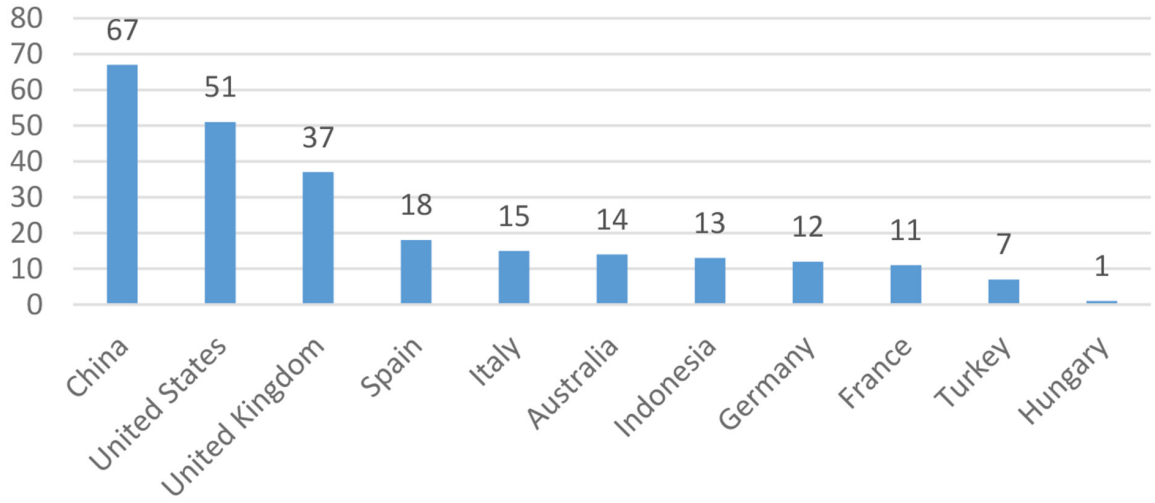

Figure 2. Examined papers by country or territory

Source: Scopus

Figure 3 shows the annual publication trends of examined papers from 2014 to 2024, highlighting significant fluctuations in research output over the years. Starting at a low point in 2014, the number of publications increased sharply in 2015, reaching its first peak. However, a decline follows between 2016 and 2018, with 2017 showing the lowest number of documents. The trend recovers after 2018, with a substantial increase leading to a peak in 2020, which might be associated with the outbreak of the COVID-19 pandemic, driving heightened research activity and a focus on global challenges. A sharp drop is observed in 2021, possibly reflecting the shifting priorities or delays in academic production caused by the ongoing effects of the pandemic. This chart reflects irregular patterns in research output, possibly influenced by external factors like funding, global priorities, or academic focus shifts. The overall trend demonstrates periods of both growth and decline in publication activity.

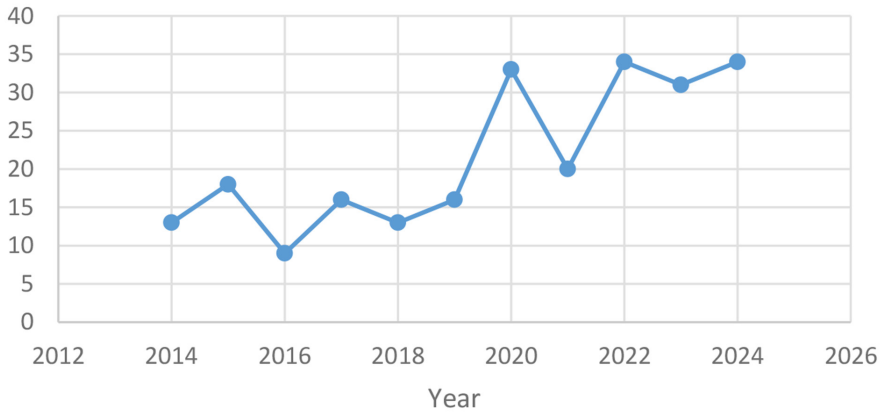

Figure 3. Examined papers by Year

Source: Scopus

The distribution of 101 articles in the field of regional studies based on their Q classification and the average H-index of the journals they were published in was analysed in depth. The majority of the articles (56) fall into the Q1 category, with an impressive average H-index, indicating publication in highly impactful journals. Q2 journals follow with 27 articles and an average H-index of 34.85. Q3 contains 13 articles and Q4, the least represented category, has 3 articles. Notably, 2 articles did not have a Q classification. To determine the quality classification of the filtered articles, they were compared with the SCImago database, which provided the Q rankings for each journal. This analysis highlights the prevalence of high-quality publications (Q1) within the examined dataset and offers an overview of the corresponding journal impact through their H-index averages.

3.2. Content Analysis

This chapter presents the analysis of the research content. The methodologies of 101 articles were analyzed and categorized into five groups: quantitative, theoretical, mixed, qualitative, and comparative. According to the results, it is clear that the topic of regional inequalities is predominantly approached using quantitative methodologies, which account for a significant 81% of the articles. In contrast, theoretical methods constitute 9%, while mixed methods are employed in 5% of the articles. Comparative approaches represent 4% and qualitative methodologies just 1% of the analyzed works. These findings underline the predominance of quantitative approaches in the field, indicating these are the most appropriate when it comes to research on regional inequality. The following five categories of data were identified from the articles: Economic Indicators, Demographic Data, Geographic Data, Social Indicators, and Environmental Data. Because the studies were diverse, some papers used more than one data type. Economic data is used the most frequently in the researched articles, apparently in 94 articles (93%). After the economic indicators, the next in frequency line is demographic data, which can be found in 69 articles. Geographic data appears in 61% of the researched articles, while social indicators appear in 47 articles (46%). The least used data is environmental data, appearing in only 4 articles (4%). This distribution is characteristic of a body of literature centered on economics and is to be expected for a subject concerned with inequalities in economic development. Similarly, demographic and geographic data are also very important as population data and spatial data both influence inequality. Unlike, as a regional dimension, environmental issues have played a lesser role in the reviewed research, indicating a potential need for environmental factor integration into regional disparity studies.

Almost half of the analyzed articles, 49 of them had the conclusion that outlined the need for better policy interventions from the government side. These conclusions emphasized the need for state involvement in designing targeted and effective policy remedies to promote equitable regional development and, at the same time, reduce the aforementioned imbalances.

The analysis of articles published between 2014 and 2024 reveals a recurring conclusion: the need for improved policy interventions. Studies from both the beginning (2014) and end (2024) of this period consistently highlight the need for more operative regional policies, specifying that even after a decade of research and discussion, these challenges continue largely unresolved. The persistence of this recommendation gives emphasis to the persistent nature of regional disparities and suggests that current policy measures have yet to produce significant progress in addressing these challenges.

Out of 101 articles that were analyzed more in-depth, 55 were missing a research question or hypothesis, and 4 of them did not include a research goal. More than a few patterns and similarities can be found in the research objectives of the analyzed articles. Many articles cover the related topics of income inequality, regional disparities, and migration patterns; thus, these topics are

characterized as issues of central importance to regional studies and have gathered high interest in policy. One of the most noticeable themes is income inequality, covered in roughly 25–30 studies where the focus is on this issue specifically. These articles are actually trying to find the causes of income differences between all the regions, like Brazil, China, the USA, and Europe. E.g., "Regional income inequality in Brazil" (Bhering, 2024) and "What has caused regional income inequality in China?" (Li et al., 2021) examine the socio-economic and structural influences on income inequality in these settings. Another common focus is on regional disparities, with around 15–20 studies on this topic. These articles aim to find the differences between regions in terms of demographic changes, socio-economic data and economic development. Another common theme is migration, identified in approximately 15 studies, mainly the emergence of migration as a factor influencing regional development and income inequalities. A number of publications touch on the socio-economic implications of internal and inter-regional migration. These studies highlight how migration patterns influence regional economies and contribute to inequalities.

Many studies concentrate on specific countries or regions, including China, the United States, and European nations, while others provide global or multi-country analyses. Numerous articles examine the connection between economic policies, government interventions, and regional inequalities, such as "Development Policy Implications for Growth and Regional Inequality in India" (Barua & Sawhney, 2015). Several studies adopt a historical perspective to trace long-term trends in inequality and regional development. The year 2020 was analyzed in this section, as it had an exceptionally high number of published articles compared to the other years examined between 2014 and 2024. The comparison of the articles (there were 17 articles from 2020) based on their author keywords, methodologies, data types, conclusions, and methodology categories reveals both similarities and differences across the studies. Among the 17 articles, 5 articles share a focus on income inequality and its regional determinants. Out of the 17 articles, 14 studies employ quantitative methodologies, relying on techniques such as regression analysis, panel data models, and spatial econometric methods. The geographic coverage of these studies also varies significantly. Six articles focus on Asian countries, reflecting a strong emphasis on this region. Five studies examine European regions, such as Turkey, Spain, and the EU, while four articles analyze regions in the Americas, specifically the United States, Canada, and Argentina. Additionally, two studies adopt a global perspective, analyzing trends across multiple countries or regions. This diverse geographic focus highlights the global relevance of the issues discussed, such as income inequality and regional disparities, while also addressing region-specific challenges.

The conclusion part of the above-mentioned 17 papers shows both frequent themes and unique results. Seven articles conclude a persistence of regional income inequalities. Furthermore, five articles lay emphasis on the critical role of policy interventions in addressing these inequalities. In summary, the research objectives of the analyzed studies from 2020 converge around three key topics: income inequality, regional disparities, and migration. Income inequality is the most frequently addressed theme, followed closely by regional disparities and migration. While each study provides unique insights into these issues, the overarching themes reflect their significance in understanding and addressing regional inequalities worldwide.

The other year, which had an exceptionally high number of published articles compared to the other years examined between 2014 and 2024, was 2022. The author's keywords from 2022 reveal both similarities and differences in the focus of the 14 articles. Six articles share a central focus on income inequality, exploring its causes, implications, and patterns across different regions. In addition, four articles emphasize regional development and disparities. These studies analyze economic and social differences between regions. Another three articles focus on migration

dynamics, addressing how migration patterns shape and are shaped by regional and economic factors. The methodologies employed in the 14 articles reveal both shared approaches and unique strategies. A significant similarity is that 12 articles rely on quantitative methodologies, utilizing techniques such as regression models (e.g., pooled OLS, logistic regression) and spatial econometrics (e.g., Moran's I, spatial filtering). These quantitative methods allow for precise analysis of regional disparities, income inequality, and migration patterns.

4. DISCUSSION

The study addressed three research questions (RQs), providing insights based on the systematic literature review. The goal of this section is to answer them. RQ1: What role do economic and demographic indicators play in shaping regional inequalities? Economic and demographic indicators appear as vital drivers of regional inequalities across the analyzed articles. Economic factors, such as income levels, GDP per capita, and employment opportunities, are repeatedly identified as critical factors of regional disparities. The studies highlight how agglomeration effects in urban areas focus wealth and resources, repeatedly leaving rural and peripheral regions last. Demographic indicators, like population density, migration patterns, and age distribution, also play a fundamental role in influencing regional inequalities by shaping labor market dynamics and access to services. To create fair policies, the findings indicate that interventions should be tailored to specific regions. Initiatives that promote balanced economic development by investing in infrastructure, education, and healthcare in less developed areas may help reduce inequalities. Additionally, tackling demographic issues, including an aging population and outmigration, necessitates focused efforts such as workforce development programs and incentives for companies to establish operations in these underserved regions.

RQ2: What are the most common methodologies used in the regional inequity related papers? The results evidence that quantitative methodologies lead the field, with 81% of the analyzed articles using statistical models, spatial econometrics, and regression analyses to identify patterns and test hypotheses. Quantitative methods offer data-driven visions, such as the relationship between income inequality and migration or the effects of government policies on regional development. However, depending heavily on quantitative methods could restrict the comprehension of the contextual and qualitative dimensions of regional inequalities. On the other hand, qualitative and mixed-method research, although not as common, provides significant insights by examining the lived experiences and social interactions that contribute to regional disparities. The variant methodologies significantly influence policy recommendations. Quantitative studies are inclined to support broad, data-driven policy interventions, while qualitative research highlights contextualized and community-specific solutions.

RQ3: To what extent has the focus on economic data in regional inequality studies overshadowed the consideration of environmental and social factors in policymaking? The analysis highlights a significant focus on economic metrics, as 93% of the reviewed articles include indicators like GDP, income levels, and employment rates. Although these measures deliver essential insights into regional inequalities, the insufficient attention to environmental and social aspects represents a considerable shortcoming. Merely 4% of the studies directly consider environmental factors, including pollution levels or sustainability practices, despite their increasing importance in the context of regional development discussions.

In the same way, social indicators (e.g. trust, social cohesion, cultural identity) are underrepresented, appearing in just 46% of the articles. This disparity indicates that contemporary policy decisions might neglect significant non-economic elements that affect regional inequality.

To bridge this gap, subsequent studies ought to embrace a more comprehensive approach that combines environmental and social factors with economic assessment. It is crucial for policymakers to acknowledge the interconnections among these aspects to create well-rounded strategies that tackle the complex nature of regional disparities.

5. CONCLUSION

This study offers a systematic literature review discovering the main drivers and implications of regional inequalities, with a specific focus on income disparities and internal migration patterns. Guided by three research questions, the analysis gives valuable insights into the factors shaping regional inequalities, the influence of methodologies on research findings, and the role of environmental and social considerations in policymaking.

RQ1: Economic and demographic indicators play a pivotal role in shaping regional inequalities. Economic factors, such as income levels, employment opportunities, and GDP per capita, are central to understanding disparities, while demographic shifts significantly influence regional dynamics. Policies aimed at addressing these issues must prioritize balanced economic growth for underdeveloped regions to reduce disparities. RQ2: The review evidence that quantitative methodologies lead the field, with 81% of the analyzed articles using statistical models, spatial econometrics, and regression analyses to identify patterns and test hypotheses. However, depending heavily on quantitative methods could restrict the comprehension of the contextual and qualitative dimensions of regional inequalities. RQ3: The review highlights an uneven focus on economic data, with limited attention given to environmental and social factors. This imbalance risks overlooking critical dimensions of inequality, such as environmental sustainability and social cohesion. Despite its contributions, the study has some limitations. First, the analysis took into consideration exclusively one database, Scopus, which may have excluded relevant articles from other sources. Second, the use of predefined keywords structured around the PEO framework may have constrained the scope of the literature search. Expanding the search to include different terms and additional databases could produce a more comprehensive understanding.

In conclusion, regional inequalities remain a pressing issue, requiring interdisciplinary approaches and targeted policies to promote equitable development. By integrating economic, demographic, environmental, and social perspectives, future research and policymaking can address the complex challenges of regional disparities more effectively. This study contributes to the existing body of knowledge by identifying gaps and suggesting pathways for more holistic and impactful research in the field.

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Assessing Competitiveness in the Visegrad and Baltic Countries: Insights from Recent Changes

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WCI;
BCI;
RCA

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Abstract: *The dynamic global economic landscape, influenced by geopolitical upheavals, demands a re-evaluation of regional competitiveness. This study revisits the competitiveness of Central and Eastern European regions, focusing on the Visegrad Four and the Baltic Group States, using the latest data and integrating the impacts of recent global events. By employing multi-criteria indicators such as the Global Competitiveness Index, World Competitiveness Index, Business Confidence Index, and single-criteria measures like Revealed Comparative Advantage, the research offers a nuanced understanding of regional strengths and vulnerabilities. Additionally, a composite competitiveness index is introduced, reflecting the interplay of innovation, governance, and external trade dependencies. The findings reveal how regional and global challenges redefine the competitive landscape, highlighting policy imperatives for enhancing resilience.*

1. INTRODUCTION

The global economic landscape has experienced profound disruptions in recent years, notably due to the COVID-19 pandemic and the war in Ukraine. These events have exposed vulnerabilities in global supply chains, intensified deglobalization trends, and reshaped the geopolitical dynamics in Central and Eastern Europe. Countries of the Visegrad Four (V4) -Czech Republic, Hungary, Poland and Slovakia and the Baltic States (Estonia, Latvia and Lithuania) have been particularly affected, prompting a strategic reevaluation of trade relations, energy dependencies and investment policies.

In this context, competitiveness has emerged as a key lens for assessing national resilience. Beyond traditional indicators like GDP or trade volumes, modern competitiveness includes innovation capacity, governance quality, sustainability and regional integration. While globalization supported these countries' integration into the EU and global markets, deglobalization calls for increased economic diversification and institutional adaptability.

This study evaluates how the V4 and Baltic countries are responding to recent global challenges. Using a multi-dimensional framework comprising the Global Competitiveness Index (GCI), World Competitiveness Index (WCI), Business Confidence Index (BCI) and Revealed Comparative Advantage (RCA), it explores both common regional patterns and country-specific strategies, offering insights into how small, open economies can enhance their competitiveness in an era of geopolitical and economic uncertainty.

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2. LITERATURE REVIEW

Competitiveness is a crucial concept frequently analyzed to understand success rates in the international business arena. Despite its widespread use in economic discourse, the term "competitiveness" lacks a universally accepted definition, making it somewhat ambiguous (Siudek & Zawojska, 2014). Although classical and neoclassical economics did not use the term directly, its roots are often traced to A. Smith, D. Ricardo and even mercantilist thought (Baláž & Bayer, 2019; Baláž, 1996).

It is important to distinguish between broad and narrow definitions of competitiveness, and between macroeconomic and microeconomic perspectives. Broadly, it refers to the ability of firms within a country to achieve high productivity and cost efficiency in production and exports. According to DTI (1994), competitiveness means producing the right goods at the right price and quality, while the OECD stresses the role of technology and product quality (WIFO, 2017).

Modern views on competitiveness have evolved into multidimensional frameworks that integrate innovation, governance and trade. At the macro level, it reflects the capacity for sustained growth and investment attraction. Indices like the GCI and WCI capture key dimensions such as institutional quality and innovation (Ružeková & Kašťáková, 2018). Kresl and Sinkienė, as well as Gaidelys and Benetyte (2021), underline the role of cities, infrastructure and labor market efficiency in shaping regional competitiveness.

Competitiveness operates at national, sectoral and corporate levels. While narrow definitions focus on outperforming imports domestically, broader ones relate to success in global markets (Zábojník et al., 2021).

In line with these works, assessing competitiveness in the Visegrad and Baltic countries requires examining regional economic dynamics, integration and sustainability. It is a multifaceted concept encompassing innovation, economic growth and business environment quality.

The V4 countries and the Baltic States have undergone significant economic transformation since joining the EU. Hajduova et al. (2021) highlight that economies with efficient business environments, such as Estonia and Slovenia, achieved notable improvements in competitiveness. Although the V4 share historical and geographic similarities, their competitive trajectories differ. Foreign direct investment (FDI) played a pivotal role in economic transformation, contributing to technology transfer but also exposing vulnerabilities, as shown by Novák et al. (2024). Bacik et al. (2019) emphasize institutional reforms, particularly noting the Czech Republic's stronger GCI performance.

The Baltic States, while benefiting from EU integration, face challenges due to small domestic markets and reliance on external trade. Falkowski (2018) reports limited comparative advantages in high-tech goods, though Estonia performs relatively better than Latvia and Lithuania. Remeikiene et al. (2018) demonstrate the agri-food sector's relevance for regional competitiveness.

Adaptation strategies in the Baltics include leveraging ports as key East–West trade corridors (Gaidelys & Benetyte, 2021) and aligning urban competitiveness with sustainability goals (Činčikaitė & Meidutė-Kavaliauskienė, 2021). Trade openness and FDI remain crucial, with vertical FDI driven by factor endowments (Cieślik & Gurshev, 2021). Khan (2020) quantifies trade shock spillovers, reflecting regional interconnectedness. Nordic investments support technology transfer, especially in Estonia while Falkowski (2018) again notes Estonia's lead in improving RCA in high-tech exports.

Sustainable development is increasingly integrated into competitiveness frameworks in both regions. Gaidelys and Benetyte (2021) stress the economic sustainability of ports, while Činčikaitė and Meidutė-Kavaliauskienė (2021) underline the role of capital cities in fostering sustainability-oriented competitiveness.

While the integration into the EU and global markets has enhanced the competitiveness of these regions, challenges remain. Economic vulnerabilities, such as dependency on external markets, trade shocks, and disparities in innovation capacity, require strategic policy interventions.

3. METODOLOGY

This study aims to assess the competitiveness of the Visegrad and Baltic countries by employing a combination of multi-criteria and single-criteria indicators. The selected indicators include GCI, WCI, BCI, and a single-criteria, RCA. These indicators provide a comprehensive framework for evaluating the economic, institutional, and trade-related dimensions of competitiveness. Table 1 provides a detailed description.

Table 1. Research Design and Indicators

Indicator	Description	Key Metrics	Relevance to Study
GCI	Measures competitiveness across 12 pillars, including institutions, innovation, and infrastructure.	Rankings and scores for the 12 pillars.	Evaluates the ability of Visegrad and Baltic countries to utilize resources efficiently for long-term economic growth.
WCI	Assesses performance across four factors: economic performance, government efficiency, business efficiency, and infrastructure.	Composite rankings and sub-factor scores.	Highlights the macroeconomic and microeconomic strengths influencing competitiveness.
BCI	Captures business perceptions and expectations regarding economic conditions.	Survey-based scores reflecting business optimism or pessimism.	Offers insights into business sentiment and its potential impact on investment and economic dynamics.
RCA	Analyzes export specialization by comparing the share of a commodity in national and global exports.	RCA index values > 1 (comparative advantage), = 1 (neutral), < 1 (disadvantage).	Identifies export strengths in specific sectors, emphasizing trade-related competitiveness.

Source: Own processing

The selected indicators, particularly the GCI, WCI, and BCI, offer a balanced perspective on macroeconomic performance, business environment quality, and market confidence. The integration of RCA adds a trade-specific dimension, crucial for understanding the external competitiveness of these export-driven economies. Together, these methods provide a robust framework for assessing regional competitiveness in a dynamic global context.

Developed by Liesner (1958) and popularized by Balassa (1965), the idea of the "revealed" comparative advantage (RCA) — also referred to as the "Balassa index"—is frequently employed empirically to determine a nation's strong and weak export industries. Amiti (1998) examines the specialization patterns in Europe, while Porter (1991) uses it to pinpoint strong sectoral clusters (Proudman & Redding, 2000). The first way of identifying comparative advantage is to use a logarithm calculating the share of exports and imports in a country's various goods categories compared to all countries. RCA is calculated as follows:

$$RCA1 = (X_{ij} / X_i) / (M_{ij} / M_j) \quad (1)$$

Where: X_{ij} is the export of product *i* by country *j*, X_i is the total export of product *i* by all countries, *Mij* is the import of product *i* by country *j*, and M_j is the total import of all products by country *j*.

When a country's export ratio of product *i* to its total exports of all goods surpasses the same ratio for the product's part in global trade, that country is said to have a disclosed comparative advantage in product *j* (UNCTADStat, n.d.). The obtained value of the index determines how the outcome is formulated. A country has a demonstrated comparative advantage in product *j* if RCA > 1. A country is found to be at a comparative disadvantage in product *i* if RCA is less than 1 (Obadi & Korček, 2016). It shows that, for each product, the nation exports less than the average of the reference group.

The study relies on secondary data from authoritative sources such as the World Economic Forum (WEF), Institute for Management Development (IMD), International Trade Center (ITC), OECD, and World Bank (WB). The data span multiple years, enabling a longitudinal analysis of trends in competitiveness.

4. RESULTS AND DISCUSSION

4.1. The Global Competitiveness Index

The GCI, developed by the WEF, serves as a comprehensive framework for evaluating the factors that drive productivity and long-term economic growth. The GCI 4.0, introduced in 2019, measures competitiveness across 12 pillars, including institutions, infrastructure, macroeconomic stability, health, skills, product and labor markets, financial systems, market size, business dynamism, and innovation capability (WEF, 2020). These pillars are evaluated using over 100 indicators derived from global statistics and executive surveys, and scores are presented on a 0-to-100 scale, where 100 represents an ideal competitive state. These trends are illustrated in Figure 1.

In 2019, the V4 and Baltic States displayed varying degrees of competitiveness, offering a benchmark of their economic status before global disruptions such as the COVID-19 pandemic, the war in Ukraine, and the resulting geopolitical and economic realignments. Among the V4 countries, the Czech Republic and Poland ranked highest with GCI scores of 70.9 and 68.9, respectively, followed by Hungary at 65.1 and Slovakia at 66.8. The Baltic States showed comparable or higher performance, with Estonia leading at 70.9, Lithuania at 68.4, and Latvia at 67 (figure 1).

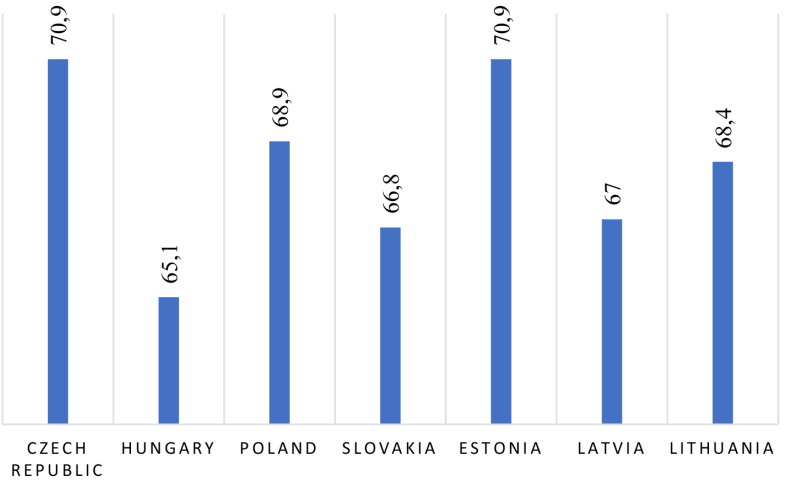

Figure 1. Global Competitiveness Index in 2019

Source: WEF (2023)

These scores reflected the regions' strong foundations in infrastructure, skilled labor, and access to European markets, but they also highlighted areas requiring improvement, such as innovation and labor market flexibility. The Czech Republic and Estonia benefited from their advanced institutional frameworks and digital readiness, while Poland and Lithuania demonstrated growing market sizes and steady improvements in macroeconomic stability.

4.2. The World Competitiveness Index

The WCI, developed by IMD, assesses a country's capacity to support a competitive business environment across four dimensions: economic performance, government efficiency, business efficiency and infrastructure. It uses statistical data and executive surveys to provide annual rankings that reflect countries' responses to global challenges (IMD, 2023).

WCI scores for the Visegrad and Baltic countries between 2018 and 2023 reveal notable shifts, influenced by disruptions such as the COVID-19 pandemic, the war in Ukraine, and sanctions on Russia. In 2018, the V4 showed varied competitiveness, led by the Czech Republic, followed by Poland, Hungary and Slovakia. The Baltic States also scored well, particularly Estonia, ahead of Lithuania and Latvia. These results indicated strong governance and growing global integration. These trends are illustrated in Figure 2. By 2023, declines were observed across both regions, with the V4 facing more severe setbacks. Slovakia dropped sharply from 60.04 to 46.94, reflecting vulnerability to energy shocks and supply chain disruptions. Hungary fell from 65.98 to 52.1 due to energy dependence on Russia and difficulty adjusting to EU sanctions. Poland and the Czech Republic declined to 61.65 and 70.21, respectively, but maintained relative stability thanks to industrial strength and diversification efforts.

The Baltic States performed comparatively better. Estonia remained the regional leader, falling from 78.46 to 68.17, supported by its digital infrastructure and innovation. Lithuania showed resilience, decreasing moderately to 69.89, while Latvia declined to 59.13, exposing its economic fragility.

Overall, the Baltic States have been more agile in managing global disruptions. Estonia and Lithuania illustrate the value of innovation and diversification. In contrast, the V4, particularly Slovakia and Hungary, face structural constraints such as energy dependency and low innovation capacity. Strengthening EU integration and modernizing industry and energy systems are vital for improving competitiveness. These results underscore the importance of resilience, adaptability, and strategic policymaking in navigating current and future economic uncertainties.

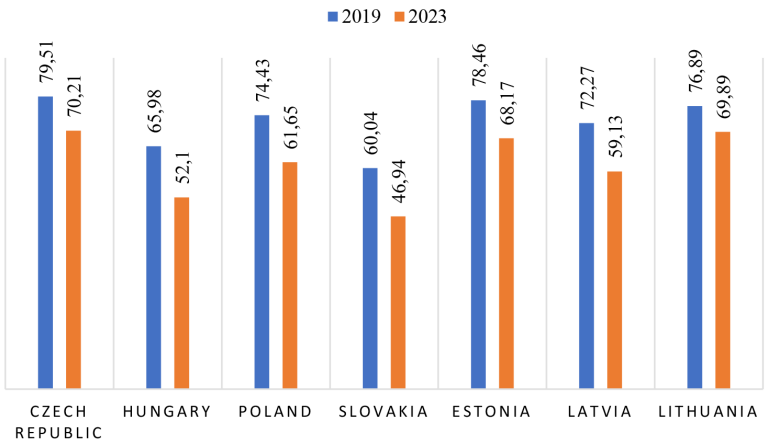

Figure 2. World Competitiveness Index in 2019 and 2023

Source: IMD (2023)

4.3. Business Confidence Index

The BCI tracks expected manufacturing activity by surveying production, orders and inventories; 100 is the long-run average, values > 100 signal optimism and < 100 pessimism.

In 2019, business sentiment was broadly positive. Hungary topped the group (103.75) on the back of strong pre-pandemic industrial growth and FDI in automotive production. Latvia (102.89), Lithuania (102.04) and Poland (101.69) also exceeded 100, buoyed by EU funding, export demand, and low unemployment. Slovakia, however, registered only 91.71, reflecting its heavy reliance on a single sector (automotive) and limited diversification. These trends are illustrated in Figure 3. By 2023, every country's score had fallen amid the COVID-19 shock and the Ukraine war. Hungary plunged to 98.31 as inflation spiked and Russian gas dependence and EU rule-of-law frictions dented investor confidence. Estonia slid from 100.8 to 93.26, hit by disrupted Nordic-Eastern trade links and softer global demand for digital exports. Poland's drop to 99.25 was mild thanks to solid domestic demand, although refugee inflows and inflation strained public finances. Latvia and Lithuania slipped to 99.62 and 100.24, respectively, cushioned partly by a rapid energy pivot away from Russia. Slovakia inched up to 98.29 but still lagged, its auto sector grappling with supply-chain and semiconductor shortages, compounded by higher energy costs and political instability.

Overall, the pattern underscores how energy dependence, industrial concentration and geopolitical exposure shape business confidence across Central and Eastern Europe.

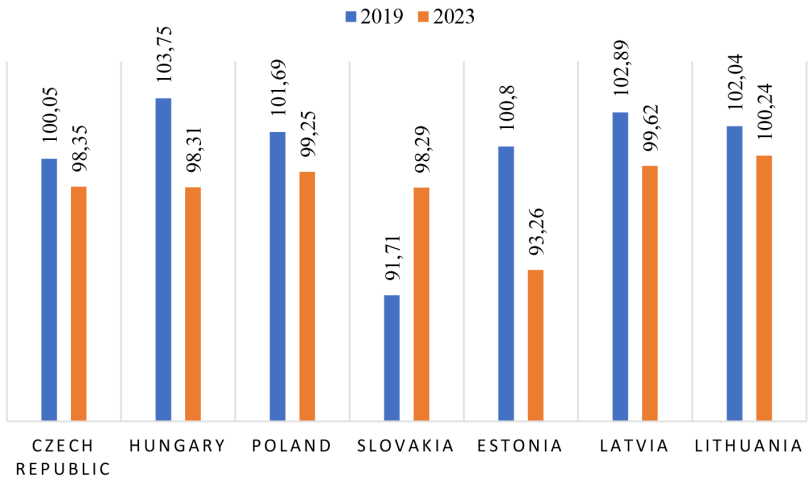

Figure 3. Business Confidence Index in the years 2019 and 2023
Source: OECD (n.d.)

4.4. Comparison According to Selected Single-Factorial Criteria

To evaluate and compare the competitiveness of the selected countries, their export specialization in 2023 was analyzed using the RCA index. The data in Table 2 highlights how recent global events, such as the war in Ukraine, energy disruptions, and supply chain challenges, have influenced the export dynamics of these nations.

The Czech Republic shows strong RCA in explosives (5.05), arms (3.45), and railway equipment (3.04), reflecting its industrial and defense manufacturing strengths amid increased demand for arms in the context of European security concerns. Hungary's leading RCA is in live animals (3.52), followed by residential goods and rubber, indicating a mixed reliance on agriculture and manufacturing.

Poland excels in tobacco (6.83) and arms (4.02), sectors that have likely benefited from global shifts in trade and defense supply chains. In Slovakia, railway equipment (5.50) and arms (4.65) dominate, showing a focus on heavy industry, but its reliance on these sectors leaves it vulnerable to supply chain disruptions. The Baltic States show a clear specialization in natural resource-based exports. Estonia (16.35) and Latvia (26.91) lead in wood products, which have seen steady demand in the EU, while Lithuania stands out in tobacco (7.91) and textiles. These patterns reflect how current geopolitical and economic disruptions, including shifts in energy trade and increased focus on European self-reliance, have shaped the export competitiveness of the V4 and Baltic States. The Baltic States have leaned on natural resources and agriculture, while the V4, particularly Slovakia and the Czech Republic, are more exposed to industrial supply chain risks.

Table 2. RCA index of the top 5 export commodity groups of V4 and the Baltic group in 2023

Czech Republic		**Hungary**		**Poland**	
[36] Explosives; pyrotechnic products; matches…	5,05	[01] Live animals	3,52	[24] Tobacco and manufactured tobacco substitutes...	6,83
[93] Arms and ammunition…	3,45	[23] Residues and waste from the food industries…	2,35	[93] Arms and ammunition; parts and accessories thereof	4,02
[86] Railway or tramway locomotives...	3,04	[40] Rubber and articles thereof	2,2	[49] Printed books, newspapers, pictures...	3,63
[96] Miscellaneous manufactured articles	2,96	[87] Vehicles other than railway or tramway rolling stock…	2,17	[16] Preparations of meat, of fish…	3,59
[51] Wool, fine or coarse animal hair…	2,84	[85] Electrical machinery and equipment and parts thereof...	1,73	[02] Meat and edible meat offal	3,31
Slovak Republic		**Estonia**		**Latvia**	
[86] Railway or tramway locomotives...	5,5	[44] Wood and articles of wood; wood charcoal	16,35	[44] Wood and articles of wood; wood charcoal	26,91
[93] Arms and ammunition; parts and accessories thereof	4,65	[94] Furniture; bedding, mattresses...	4,6	[10] Cereals	6,62
[87] Vehicles other than railway or tramway rolling stock…	4,39	[15] Animal, vegetable or microbial fats and oils...	4,35	[49] Printed books, newspapers, pictures...	6,09
[40] Rubber and articles thereof	2,74	[18] Cocoa and cocoa preparations	3,73	[04] Dairy produce; birds' eggs; natural honey…	5,34
[72] Iron and steel	1,95	[04] Dairy produce; birds' eggs; natural honey…	3,6	[22] Beverages, spirits and vinegar	4,74
		Lithuania			
		[24] Tobacco and manufactured tobacco substitutes...	7,91		
		[53] Other vegetable textile fibres…	7,36		
		[56] Wadding, felt and nonwovens; special yarns…	5,97		
		[94] Furniture; bedding, mattresses…	5,86		
		[51] Wool, fine or coarse animal hair…	5,73		

Source: Own calculations based on ITC (n.d.)

In addition to the RCA index, the competitiveness of the V4 countries and the Baltic States is compared using several single-factor indicators, which provide insights into broader economic and structural aspects of their economies given in Table 3. Among the V4, the Czech Republic had the highest GDP per capita (€18,480) in 2023, backed by strong R&D investment (1.89 percent of GDP) and moderate export dependence (69 percent). Its openness index (138.9) reflects solid global integration, while a 23 percent tax burden suggests balanced fiscal policy.

Table 3. Comparison of the V4 and Baltic States Based on selected single-factor criteria

	CZ	HU	PL	SR	EE	LV	LT
GDP per capita (2023)	18 480 €	14 430 €	14 880 €	16 710 €	15 250 €	13 300 €	15 330 €
Exports of goods and services in 2023 (% of GDP)	69.0 %	81.2 %	58. 1 %	91. 9 %	77.9 %	67.0 %	76. 5 %
Openness of economy (2023)	138.9	157.3	109.5	181.5	156.2	132	153.1
R&D expenditures (% of GDP) in 2022	1.89 %	1.39 %	1.45 %	0.98 %	1.78 %	0.76 %	1.05 %
Education expenditures in 2022 (% of GDP)	4.9 %	5.1%	4.6 %	4.5 %	5.8 %	5.3 %	4.9 %
Hourly labour costs (2023)	18.0 €	12.8 €	14.5 €	17.2 €	18.3 €	13.5 €	14.7 €
Tax burden (2024)	23%	15%	36%	25%	20%	31%	32%

Source: EUROSTAT (n.d.); Tax Foundation (2024) and WB (n.d.)

Slovakia followed with slightly lower GDP per capita (€16,710) but had the highest export dependency (91.9 percent) and openness (181.5), showing strong reliance on external markets, especially in the automotive sector. However, low R&D (0.98 percent) and education spending (4.5 percent) may weaken long-term innovation. Poland had the lowest export dependency (58.1 percent) and openness index (109.5), reflecting a more domestic focus. Its R&D (1.45 percent) and education investment (4.6 percent) were modest, and a high tax burden (36 percent) may hinder competitiveness. Hungary had the lowest GDP per capita (€14,430) but high export dependency (81.2 percent) and openness (157.3). R&D (1.39 percent) and education (5.1 percent) spending were moderate, while low labor costs (€12.8) indicated a cost-based competitive model.

In the Baltic States, Estonia had the highest GDP per capita (€15,250) and strong openness (156.2). It invested significantly in education (5.8 percent) and R&D (1.78 percent), showing a clear focus on innovation. Latvia, with the lowest GDP per capita (€13,300), had moderate export dependency (67 percent) and openness (132), but the lowest R&D spending (0.76 percent), which may affect future competitiveness. Lithuania, with GDP per capita of €15,330, maintained balanced export dependency (76.5 percent), openness (153.1), and mid-level R&D investment (1.05 percent). Its tax burden (32 percent) was higher than in Latvia (31 percent) and Estonia (20 percent). Hourly labor costs also varied: Estonia (€18.3) and the Czech Republic (€18.0) had the highest, reflecting more advanced economies, while Hungary (€12.8) and Latvia (€13.5) had the lowest, suggesting reliance on labor-intensive sectors. These indicators show key structural differences. Slovakia and Hungary depend on exports and low labor costs but lag in R&D and education. In contrast, the Baltics, especially Estonia, invest more in innovation and human capital. Latvia's weak R&D remains a concern. These diverse approaches reflect how each region addresses competitiveness under global pressure.

5. CONCLUSION

This study provides a detailed analysis of the competitiveness of the V4 and Baltic States, examining their responses to recent global challenges through a multi-dimensional framework that includes the Global Competitiveness Index, World Competitiveness Index, Business Confidence Index, and Revealed Comparative Advantage. The findings reveal distinct patterns of competitiveness

between the two regions. While the Baltic States have effectively leveraged digital innovation and trade diversification, the V4 countries remain heavily reliant on industrial exports, exposing them to supply chain and energy vulnerabilities. The COVID-19 pandemic (deglobalization trends) and the war in Ukraine have underscored the need for enhanced resilience and adaptability. The Baltic States, particularly Estonia and Lithuania, have shown greater agility due to their focus on digital transformation and regional cooperation. In contrast, the V4 countries, especially Slovakia and Hungary, face structural challenges related to energy dependencies and limited innovation capacity. We propose the following recommendations:

For V4 Countries:
- Invest in R&D and education, especially in Hungary and Slovakia, to strengthen innovation capacity.
- Reduce energy dependence on Russia by accelerating the shift to renewable sources.
- Modernize key industries (e.g. automotive) through digitalization and green technologies aligned with EU goals.

For Baltic States:
- Boost digital infrastructure and innovation, particularly in Latvia, to maintain competitiveness.
- Diversify exports by shifting from natural resources to high-tech and value-added sectors.
- Increase R&D spending in Latvia to close the innovation gap within the region.

Future Research Directions:
- Assess the impact of the EU Green Deal on competitiveness, focusing on energy transition and circular economy.
- Study sectoral transformations, such as automotive in V4 and forestry in the Baltics, in response to global shifts.
- Explore the role of emerging technologies (e.g. AI, blockchain) in enhancing competitiveness in smaller economies.

By addressing these recommendations and research priorities, the V4 and Baltic States can build on their strengths, mitigate vulnerabilities, and better position themselves in a dynamic and uncertain global economic landscape.

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Determinants of the Portuguese Current Account Balance

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Abstract: *The economic and financial crisis forced Portugal to adjust its external deficit, which had accumulated over almost two decades. This paper aimed to identify empirically the determinants of the Portuguese current account balance to understand the accumulation of the external deficit. For this purpose, several econometric estimations with the ARDL model and Granger causality tests were applied to quarterly macroeconomic data from 1999 to 2017. The results show that GDP per capita and the budget balance are the variables that most influence the formation of the current account balance.*

1. INTRODUCTION

Many southern European countries, including Portugal, have been confronted in recent years with adjustments to the Current Account (CA) balance, which in the Portuguese case has been persistently in deficit since the 1990s. These persistently negative CA balances led to the accumulation of high external deficits. However, several authors such as Milesi-Ferrett and Razin (1996) and Edwards (2006) argue that high external deficits alone do not force abrupt adjustments, as countries can sustain these deficits under certain conditions. In the case of Portugal, the large external deficit was accompanied by high government debt due to Gross Domestic Product (GDP), a trade deficit, and anemic economic growth. The recent financial crisis affecting the Western economies would eventually cause a sudden stop in Portugal in 2010, which, without access to financial markets, made the balance of payments adjustment inevitable.

This paper aims to study the evolution of the CA balance in Portugal, as well as to identify its main determinants, from 1999 to 2017, empirically. Identifying the main determinants of the CA allows us to conclude the role of European integration in the accumulation of the Portuguese external deficit, as well as to understand if the type of adjustment that occurred was the most appropriate. This study contributes to improving economic knowledge within the theme under study and as well as the economic literature. This contribution partly results from applying the more recently used econometric methods in CA studies, but in the present case, focusing on Portugal, as most recent studies apply these methods in more general cases as the CA in southern European countries or the Eurozone.

After this introduction, a literature review is presented in Chapter 2, which exposes works on sustainability, determinants, and adjustments of the CA balance. Then, in Chapter 3, the data and methodologies applied in the empirical part of the study are presented. In Chapter 4, the results are discussed. Chapter 5 presents the general conclusions of the study, as well as limitations and suggestions for future research.

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2. LITERATURE REVIEW

In an increasingly globalized world, the CA has increasingly assumed itself as a fundamental variable for understanding the sustainability and competitiveness of economies. In the Portuguese case, there was an accumulation of CA deficits for almost 20 years until the most recent financial and economic crisis forced a balance adjustment.

Frasquilho (2013) argues that this accumulation of external deficits reflects the lack of competitiveness in the Portuguese economy and that these problems of competitiveness increased with the adhesion to the single currency, the Euro. On the other hand, Baer et al. (2013) carried out a historical review of the last 25 years of the Portuguese economy, from joining the then European Economic Community (EEC) to the most recent financial and economic crisis. Baer et al. (2013) explain that in the Portuguese economy, there was a growth of nominal wages above productivity, because a high investment growth was expected, which in turn would contribute to high rates of economic growth, and productivity would eventually reach the existing wage level in the economy. These expectations were not met, economic growth was anemic from 2000, net exports deteriorated, unemployment increased and the CA was persistently negative. All these factors have accentuated the financial crisis, making it an economic crisis.

Algieri and Bracke (2007) sought to clarify the CA adjustment process using a range of 71 past episodes for 45 countries between 1973 and 2006. These authors combined an analysis with event study methodology and logit regressions. The results show that, on average, the CA adjustment brings a reduction in economic growth and a depreciation of the real exchange rate, but the effects of both differ greatly for the different types of adjustment. A cluster analysis was also applied, showing that there are three types of adjustments: i) internal adjustment, external adjustment, and mixed adjustment. Internal adjustment is very much at the expense of slowing economic growth, with little change in the real exchange rate. In this case, the adjustment is due to the reduction in domestic demand, which in turn leads to a reduction in the weight of imports. This type of adjustment seems typical when the deficit is strongly influenced by very intense domestic demand. ii) the so-called external adjustment occurs when the CA adjustment process takes place mainly at the expense of real exchange rate depreciation, which increases the economy's competitiveness and favors the increase in net exports. This type of adjustment usually occurs in economies with persistently poor export performance. iii) and the third type, the mixed adjustment, which is characterized by a significant reduction in economic growth accompanied by a significant depreciation of the real exchange rate; in this case, the CA is moving towards equilibrium thanks to the simultaneous effect of lower domestic demand and increased competitiveness. Usually, this type of adjustment is preceded by a period of overheating of the economy and overvaluation of the nominal exchange rate. This means that the type of adjustment depends on the type of economic problem and not on the size of the country or the degree of openness.

Brissimis et al. (2012) aimed to explain the evolution of the Greek CA based on the data chosen for the period from 1960 to 2007. For most of this period, the Greek CA recorded a small or medium deficit in the 1999 sub-period. 2007 saw a huge increase in this deficit. The Ordinary Least Squares (OLS) estimate for the long-term specification of the Greek CA revealed that there is a positive relationship between real Gross Domestic Product (GDP) per capita and CA, implying that the CA deficit narrows as Greek GDP per capita approaches the GDP per capita of Germany. The real effective exchange rate (REER) has a negative coefficient, i.e., an appreciation of this index negatively influences the CA. The budget balance coefficient is between 0 and 1, confirming the double deficit assumption. Private investment is also positively related to the current account. It

has been confirmed that easing restrictions on access to credit in the private sector has a negative effect on the CA, in other words, financial sector liberalization undermines the CA balance. Finally, the uncertainty of the macroeconomic scenario, which in this study was measured by inflation volatility, also has a negative relationship with the current account.

Belke and Dreger (2013) explored the determinants of external imbalances using panel data econometric techniques. Since deteriorating competitiveness is not viable for surplus countries, an asymmetric response is needed to reduce imbalances. Data from this study were taken from the Annual Macroeconomic database provided by the European Commission (AMECO). The annual time series is available for eleven Euro Area member states (Austria, Belgium, Luxembourg, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal and Spain), and covers the period 1982-2011. The results show that relative public debt and competitiveness are more relevant for capturing CA developments, especially in countries with deficits, and the catching-up effect as an explanation for the formation of these deficits is not confirmed.

Gossé and Serranito (2014) studied the long-term determinants of CA balance in twenty-one OECD countries. In addition, they also studied the speed of CA deficit and surplus adjustments. Data for these twenty-one countries are for annual frequency for the 1974 to 2009 time period. OLS and Vector Error Correction Model (VECM) models were used to analyze the data. The results show that in the long run, the CA is influenced by the budget balance, real exchange rate, GDP per capita, credit-to-GDP ratio, and the price of oil. However, the short-term results show different relationships. In the short term, competitiveness, oil price, and productivity are the main determinants of the current account. On the speed of convergence, the results suggest that convergence to the long-term reference value is much higher for deficit countries than for those with surpluses. Using a similar methodology, Unger (2017) sought to study the relationship between domestic credit and CA. For this purpose, annual data were collected from the founding countries of the Euro Zone, plus Greece, from 1999 to 2013, and Luxembourg was excluded due to a lack of data. The sample consisted of 165 observations. Several estimates were made, with the error correction model to be used for the main indicators. Empirical results confirm that domestic credit pull factors are relevant to the CA balance. Also, competitiveness, fiscal balance, and long-term interest rates are important for the formation of the CA balance in euro-area countries. The idea that changes in the CA balance in the euro area are the result of a process of convergence of lower-income countries is rejected by the results. A breakdown of the contribution of these variables revealed that changes in domestic credit flows to the non-financial private sector, together with competitiveness, are the most important factors in CA imbalances in deficit countries. In other words, the credit boom accelerated domestic demand above potential output, creating a CA deficit. In addition, the collapse in access to credit as a result of the financial crisis led to a depression in domestic demand, which led to the correction of CA imbalances. The results also reveal that fiscal policy can play an important role in stabilizing the current account, and budget surpluses can curb the boom in demand when there is excess credit to the nonfinancial private sector.

Comunale (2018) assessed the CA and price competitiveness of the central and eastern European countries that joined the European Union. The data used to estimate OLS models cover the period from 1994 to 2016 with an annual frequency of eleven new member states of the European Union (including Croatia). Estimates show that foreign capital flows, budget balance, and relative output growth play a crucial role in explaining the current account. In addition, while a decrease in oil import values and/or quantities may have had a positive effect on the CA balance, some global factors, such as oil price or supply shocks, may have played a role in the opposite direction, worsening the CA balance.

In short, there is no CA balance limit, as a percentage of GDP, for which external deficits are unsustainable. Expansionary monetary policy, trade deficit and high public debt are some of the factors that make high external deficits unsustainable. The most cited determinants of the CA balance are the budget balance, the effective real exchange rate, the dependency rate, relative income, and the oil price. However, in recent years other factors have been highlighted as determinants of the current account. Access to credit, inequality in income distribution, openness to international trade, the housing market, and the volatility of the macroeconomic scenario are some examples of possible determinants of the CA balance that have been mentioned in recent studies. Also, the types of CA deficit adjustment have received some attention from the economic literature. Several studies show that there are three types of CA balance adjustment and that the type of adjustment depends on the factors that led to this external deficit accumulation. That is, no kind of adjustment solves all external deficits.

3. DATA AND EMPIRICAL STRATEGY

The data applied in the empirical part of the study are related to the Portuguese economy, for the period considered 1999-2017, with quarterly frequency, and constitute a sample with 76 observations. These data were collected from four separate databases: the Organization for Economic Co-operation and Development (OECD), Eurostat, the St. Louis Federal Reserve (FRED), and the Bank of Portugal (BdP). Table 1 shows the variables used, their meaning and their source.

Table 1. Macroeconomic Variables

acronymous	**Description**	**Source**	**Period**
ca	CA balance in % of the GDP	OCDE	1999 Q1 – 2017 Q4
reer_ic	Real effective Exchange rate	Eurostat	1999 Q1 – 2017 Q4
npii	Net position of international investment in % of the GDP	Eurostat	1999 Q1 – 2017 Q4
s_o	Budget balance in % of the GDP	Eurostat	1999 Q1 – 2017 Q4
pt_gdppc	GDP per capita of Portugal	Eurostat	1999 Q1 – 2017 Q4
oil	Brent oil price	FRED	1999 Q1 – 2017 Q4
age	Activity rate of the population	BdP	1999 Q1 – 2017 Q4
exports	Exports of the Portuguese economy	BdP	1999 Q1 – 2017 Q4

Source: Own research

The first step was to perform Unit Root Tests for each of the variables. The tests used for this purpose were two: Dickey-Fuller Augmented (ADF) and Phillips-Perron (PP). Table 2 presents the p-value for both tests and shows that only two variables (s_o and npii) are level integrated, and the others are integrated of order one.

Table 2. Results for the unit root tests

	Teste ADF	Teste Phillips-Perron
	P-value	*P-value*
ca	0,887	0,899
age	0,411	0,418
s_o	0,000	0,000
pt_gdppc	0,319	0,404
exports	0,987	0,989
oil	0,283	0,296
npii	0,006	0,044
reer_ic	0,365	0,494

Source: Own calculations

Then it was necessary to assess the existence, or not, of a long-term relationship between variables, and the Bounds test was performed in that regard. This test was developed by Pesaran et al. (2001) and has the null hypothesis that there is no long-term relationship between the dependent variable and the explanatory variables. The Bounds test revealed the presence of co-integration in the sample and to deal with that, the empirical approach chosen was similar to the one used by Gossé and Serranito (2014), and Unger (2017) among others. That approach consists of using the Auto Regressive Distributed Lag (ARDL) model with error correction. More specifically, equation (1) describes the model:

$$\Delta ca_t = \beta_0 + \beta' X_{t-i} + EC_{t-1} + u_t \quad (1)$$

Where, X_{t-i} is a vector of explanatory variables with i the maximum lag for each variable. The term EC_{t-1} refers to a co-integration equation with one lag and u_t is the error term.

4. EMPIRICAL RESULTS

Table 3 shows the results of the ARDL estimation and some robustness tests like heterogeneity and autocorrelation. As for the overall significance of the model, an adjusted R^2 of 0.761 is a good indicator of the quality of the adjustment. To assess the robustness of the estimation, autocorrelation, heteroscedasticity, and stability tests were performed. The Breusch-Godfrey test has the null hypothesis that there is no autocorrelation. The p-value presented in Table 3 is enough to not reject the null hypothesis for conventional levels of significance. The Breusch-Pagan-Godfrey test, in turn, tests whether or not heteroscedasticity exists. The null hypothesis is that there is no heteroscedasticity in the series, and as can be seen in Table 3, this hypothesis isn't rejected for conventional levels of significance. Analyzing the results, two variables stand out: s_o and GDPpc. The variable s_o, which represents the budget balance, is significant for three levels of lag and has a positive sign at all levels. These results confirm the twin deficits hypothesis, i.e., the CA balance and the budget balance move in the same direction, and are in line with the results obtained by Unger (2017). About GDPpc the signal is negative and statistically significant, i.e., an increase in GDP per capita is a negative stimulus for the CA balance. This result is in line with the results obtained by Gossé and Serranito (2014) and Belke and Dreger (2013), noting that in this last paper, the authors separate the sample into eurozone countries with deficit and surplus CA balances and conclude whereas in countries with deficit CA balances there is a negative relationship between this variable and GDP per capita, but in countries with a surplus balance the ratio is positive.

The oil price, reflected by the oil variable, has a positive sign and is statistically significant, although the coefficient is relatively small, which is in line with the results of Algieri and Bracke (2007), which show a positive and small-scale relationship between oil prices and the CA balance for oil-importing countries. It should also be noted that the coefficient obtained is almost equal to the reference given by these authors to importing countries. Gossé and Serranito (2014) also obtained in their results a positive and statistically significant sign for the price of oil. As for the npii variable, it is positive until the first lag and statistically significant, this result is by Chinn and Prasad (2003), which establishes a robust and positive relationship between the initial international position and the CA balance. The export volume variable, in millions of euros, has a positive sign and is statistically significant as expected, as more exports contribute to a positive trade balance.

At least two variables weren't statistically significant: age and reer_ic. Regarding demographic factors, Chinn and Prasad (2003) and Unger (2017) show that there is a negative relationship between population aging and the CA balance. The age variable reflects the activity rate between

15 and 65 years, that is, it is expected that this variable has a positive relationship with the CA balance, which is verified in both models, although not statistically significant. A higher activity rate means that there is a larger portion of the working-age population, which favors saving and consequently the CA balance. External competitiveness, measured by the real effective exchange rate, although not statistically significant, has the negative sign that would be expected based on the work of Gossé and Serranito (2014) and Unger (2017).

Table 3. ARDL estimation results

ca_{t-1}	0,023
c	0,004
age	0,371
s_o	0,043
$c_{o_{t-1}}$	0,139***
$s_{o_{t-2}}$	0,151***
$s_{o_{t-3}}$	0,121***
$npii$	0,041
$npii_{t-1}$	0,158**
$npii_{t-2}$	–0,043
$npii_{t-3}$	–0,145**
oil	0,015**
GDPpc	–0,699***
reer_ic	–0,105
exports	0,001***
ECM_{t-1}	–1,456***
R^2–ajustado	0,761
Breusch– Godfrey Test	0,776
Breusch–Pagan–Godfrey Test	0,632

Note: *, ** and *** represent, respectively, that the variables are significant for significance levels of 10%, 5% and 1%.

Source: Own calculations

The results of the Granger causality test are shown in Table 4. In the Granger causality test, the criterion for rejecting the null hypothesis that there is no Granger causality between the variables is that the p-value is below the 10% significance level. In this case, the variables representing per capita GDP, exports, international net investment position, and oil quotation have Granger causality on the CA balance. In the opposite direction, the CA balance has Granger causality on the population activity rate.

Table 4. Results of the Granger causality test

Null Hypothesis	**P-value**
ca doesn't grande cause age	0,04
age doesn't grande cause ca	0,40
ca doesn't grande cause s_o	0,119
s_o doesn't grande cause ca	0,138
ca doesn't grande cause exports	0,200
exports doesn't grande cause ca	0,015
ca doesn't grande cause npii	0,551

npii doesn't grande cause ca	0,086
ca doesn't grande cause oil	0,144
oil doesn't grande cause ca	0,005
ca doesn't grande cause gdppc	0,266
gdppc doesn't grande cause ca	0,009
ca doesn't grande cause reer_ic	0,995
reer_ic doesn't grande cause ca	0,784

Source: Own calculations

5. CONCLUSION

The results show that fiscal policy and GDP per capita are the most important factors in the formation of the CA balance in Portugal. The budget balance is statistically significant and, with a positive sign, is in line with the twin deficit theory established by the Keynesian theory. This positive and significant relationship between budget balance and CA balance has also been confirmed empirically by works such as (Unger, 2017; Comunale, 2018).

The effect on GDP per capita is also interesting. Belke and Dreger (2013) showed a negative relationship for Eurozone countries with CA deficits but a positive in the opposite case. Portugal, in the studied time interval, had a mostly deficit CA balance, and therefore, the negative relationship makes sense. The explanation for this relationship may lie in the fact that the trade balance was also persistently deficient over the same period, ie domestic consumption is heavily dependent on imports and a relative income increase, leading to increased consumption and in this case imports which have negative effects on the CA through the deterioration of the trade balance. Another explanation for the negative relationship between income and CA balance may be access to credit. The period under review was marked by the deregulation of the financial markets and, consequently, low interest rates, which usually undermine the household savings rate and thus negatively affect the CA balance, as the increase in income is largely channeled for consumption. That is, in this context, the increase in per capita GDP may damage the CA balance through the trade balance and/or savings. Algieri and Bracke (2007) define three types of CA deficit adjustment: internal, external, and mixed. Based on these results, only one internal adjustment is possible in the Portuguese case, because the effective real exchange rate, which is very important in the other two types of adjustment, has no significant influence on the CA in Portugal. Internal adjustment is mainly at the expense of slowing economic growth by reducing domestic demand and imports.

These results show that entry into the single currency and European integration were not directly responsible for the accumulation of the external deficit. That is the argument that, above all, the single currency caused a fall in external competitiveness and that this led to deficit accumulation is not confirmed by this study. The descriptive analysis shows that between 2002 and 2004, coinciding with the adhesion to the single currency in physical terms, there was a significant drop in external competitiveness, however, this indicator remained more or less stable in the subsequent period and the empirical analysis confirms that this variable is not statistically significant in the formation of the CA balance. It is also clear from these results and the results of Algieri and Bracke (2007) that the adjustment imposed by external intervention between 2011 and 2014 could not have followed a different path.

So, the results suggest that the fiscal policy in Portugal is crucial for keeping the CA stable, since GDP per capita growth has negative effects on the CA balance, and a positive budget balance may offset this negative effect in times of economic growth. For this to happen, economic growth must be driven more by the exporting sector, as this study also reveals a positive impact on the CA balance, rather than domestic demand.

Despite the robustness of these results, the study has some limitations. The sample is not as large as one would like, because some variables only present data available from the 1990s onwards. To mitigate this factor, quarterly data were used, but this brought a second limitation that some data could not be used, variables such as technological exports and the degree of openness of the economy, because they are only available at an annual frequency. A third limitation has to do with easy access to credit and financial deregulation proxies that are only available after the introduction of the single currency, which would further reduce the sample. The role of financial deregulation and economic specialization, as measured by proxies such as technological exports, in shaping the CA balance should continue to receive attention in future studies. For future studies, it is also interesting to explore the influence of various types of globalization on the formation of the CA balance, using their KOF index as a proxy for each type of globalization.

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Financial Sustainability in Bulgaria`s Healthcare: Challenges and Strategic Imperatives

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Abstract: *The healthcare expenditures in Bulgaria have been constantly growing since the beginning of healthcare reform which was set at the end of 20th century. However, this did not lead to more effective and more affordable treatment for patients or to financial sustainability of the industry. A quarter of a century later, the healthcare system continues to be characterized by constant underfunding. The primary objective of this study is to examine the key challenges affecting healthcare financing in Bulgaria. For the purposes of the study, data from the Ministry of Finance of Bulgaria, Eurostat, as well as a number of studies on the topic were analyzed. The main conclusion is that a systematic state policy is needed to increase social security payments by increasing citizens` incomes, increasing fairness in the distribution of public funds, increasing the efficiency with which public funds are spent, as well as developing measures addressing the main factors for the emergence and development of the shadow economy in the country.*

1. INTRODUCTION

The beginning of the healthcare reform in Bulgaria was set at the end of the 20th century, shortly after the beginning of the transition to a market economy. The healthcare system in Bulgaria, before the transition to a market economy was financed entirely by the state and the private sector has been completely absent. In order to respond to the new conditions in the country, many new elements typical for the market economy are introduced into the healthcare system – decentralization of pre-hospital and hospital care, freedom of choice, competition, private property, etc. More attention is being paid to the patient`s rights.

Since the beginning of the processes of transformation of the economy, healthcare expenditures have been constantly growing. There is a steady increase both in terms of health insurance payments and in terms of funds allocated from the state budget for healthcare. However, this did not lead to more effective and more affordable treatment for patients. Moreover, over the years, the amount of direct payments for healthcare services from patients has increased. Thus, a quarter of a century later, the healthcare system continues to be characterized by constant underfunding.

The primary objective of this study is to examine the key challenges affecting healthcare financing in Bulgaria. To achieve the objective the following research tasks were addressed: to present the different models for financing health systems, to outline the elements and specifics of financing the healthcare system in Bulgaria and to identify the most significant obstacles to ensuring effective financing of the healthcare system. For the purposes of the study, data from the Ministry of Finance of Bulgaria, statistical office of the European Union Eurostat, as well as a number of studies on the topic were analyzed. On the basis of the data collected, a descriptive analysis was used to derive the current status and outline the main challenges to the financing of the healthcare system in Bulgaria.

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2. HEALTHCARE FINANCING SYSTEMS

There is a number of studies on the world's health systems and their financing. According to Alqurafi et al. (2024) healthcare has transformed in answering demographic necessities, technological development, and economic shifts (p. 4101). Worldwide, there are different systems for financing the healthcare system, depending on the established socio-economic relations. In general, they can be divided into three large groups, each of which has its own specifics at the national level.

The first is tax-based, in which individuals participate in financing the healthcare system through taxes from their income (Beveridge model). According to Wang (2024) "Structurally, most of the public healthcare systems are highly centralised" (p. 48). There are a number of advantages to this system. One of them is related to the fact that the risk is distributed over the maximum number of citizens. Disadvantages in health insurance, such as the high contributions of high-risk patients, which become unaffordable for citizens with lower incomes, are avoided. This funding model is preferred by professionals who believe that access to healthcare is a human right, regardless of the financial contribution of the citizens. According to Staykov and Georgieva (2018) "in tax-based systems, it is considered that the responsibility to one`s own health is weaker, and the responsibility of health care providers to consumers is lower" (p. 5).

At the heart of the second group are models based on social health insurance, where the financing and management of health costs is based on health insurance contributions by individuals (Bismarck model). These models aim to avoid the financial risk of costly treatment, which may be unaffordable for a large part of the population, as well as to ensure wider access to health services. According to a sectoral analysis of the Ministry of Finance (2004) "one of the most significant objective defects of social health insurance, due to the financial mechanism for ensuring the principle of solidarity, is the lack of a direct link between the patient's cost of receiving medical care and the quality of the specific health service and the inability of the patient to control this relationship" (p. 176).

The third group includes models based on risk insurance (market-based). In them, each individual decides whether to be insured for health, as well as for what package of services. One of the weaknesses of these models is that it may turn out that an individual who has fallen (temporarily or for a longer period of time) into a deteriorating financial situation cannot afford the necessary medical care in terms of quantity and quality. Among the advantages of health insurance is that there is a clear link between the contribution to the healthcare system and the services used, which stimulates individuals to insure themselves rather than stay in the informal sector. This type of system is almost nowhere found in its pure form, and often the state provides a basic package for its citizens.

Each of the models has its advantages and disadvantages. According to Ivankova et al. (2019) "where one system proves to be ineffective (or its effectiveness is questionable), another system(s) appears to be effective" (p. 17). For this reason, in many countries, elements of each of the models are used simultaneously. In European countries, voluntary health insurance coverage is in many cases used as a supplement or replacement for social health insurance. When health insurance coverage is used as a supplement, persons are insured for a package of services or a specific risk that is not covered by the health insurance system or for additional payments to medical care providers regulated by the legislation.

3. FINANCING OF THE HEALTHCARE SYSTEM IN BULGARIA

Healthcare in Bulgaria is financed through a combination of several elements. Social health insurance is the main funding model. Under it, employers and employees make mandatory contributions, which go to the National Health Insurance Fund (NHIF). With the collected funds, the fund pays for expenses incurred for health services provided to the citizens of the country. NHIF is the only health insurance fund in the country.

The second element is related to state funding, which includes funds from the state budget used to finance the healthcare system. The state funds are for provision of emergency medical care to patients, provision of medical activities for patients with infectious diseases, subsidization of oncology centers for medical expertise, subsidization of medical institutions and mental health centers, subsidies to medical institutions for hospital care for their activities at addresses in settlements in hard-to-reach and/or remote areas, etc. Funds from the European Structural and Investment Funds, as well as from other international financial institutions and donors, can also be added to this group.

The third element of financing the healthcare system in Bulgaria includes voluntary health insurance where the medical expenses of the citizens are covered by insurance policies. According to Article 3 of the Health Insurance Act (1998), "voluntary health insurance is the activity of taking risks related to the financial provision of certain health services and goods in return for payment of premiums, on the basis of insurance contracts". At this stage, insurance companies in the country are focused on offering group health insurance, and the supply of individual health insurance is limited. Thus, in the majority case, these insurances are made by employers in favor of their employees, as part of the social benefits package that they provide.

The last element of financing the healthcare system is related to direct payments from patients. Such expenses are incurred by uninsured persons or by insured persons, but for services that are not covered by the NHIF (selection of a team for medical surgery, choice of a private room, etc.). This group also includes all patients` expenses for medicines, medical supplies, etc.

These four elements are the basis for the formation of the total healthcare expenditures in Bulgaria. In recent years, the level of total healthcare expenditures in Bulgaria has been steadily increasing. According to Eurostat (2024a), in 2012 they were 3186 MEUR, and in 2022 they reached 6575 MEUR. In terms of total healthcare expenditures, the country ranks 19th in the EU, ahead of eight countries (Slovenia, Croatia, Lithuania, Luxembourg, Latvia, Estonia, Cyprus and Malta).

Despite the constant growth of the total healthcare expenditures in Bulgaria, some negative facts should be noted. According to Eurostat (2024a), in 2022, an average of €990 was allocated per inhabitant (Figure 1). According to this indicator, Bulgaria ranks penultimate in the EU, managing to overtake only Romania. Moreover, healthcare expenditure per inhabitant in Bulgaria in 2022 was only 27% of the European average. Low levels are also a prerequisite for a lower level of health services, as well as for more difficult access to quality healthcare for part of the country's population.

The current healthcare expenditures as a percentage of gross domestic product (GDP) in Bulgaria in 2022 were 7.66%, which is significantly lower than the average European levels, which were 10.36%. According to this indicator, the country ranks 18th in the EU, ahead of nine countries (Latvia, Lithuania, Croatia, Estonia, Hungary, Poland, Ireland, Romania, Luxembourg): see Figure 1.

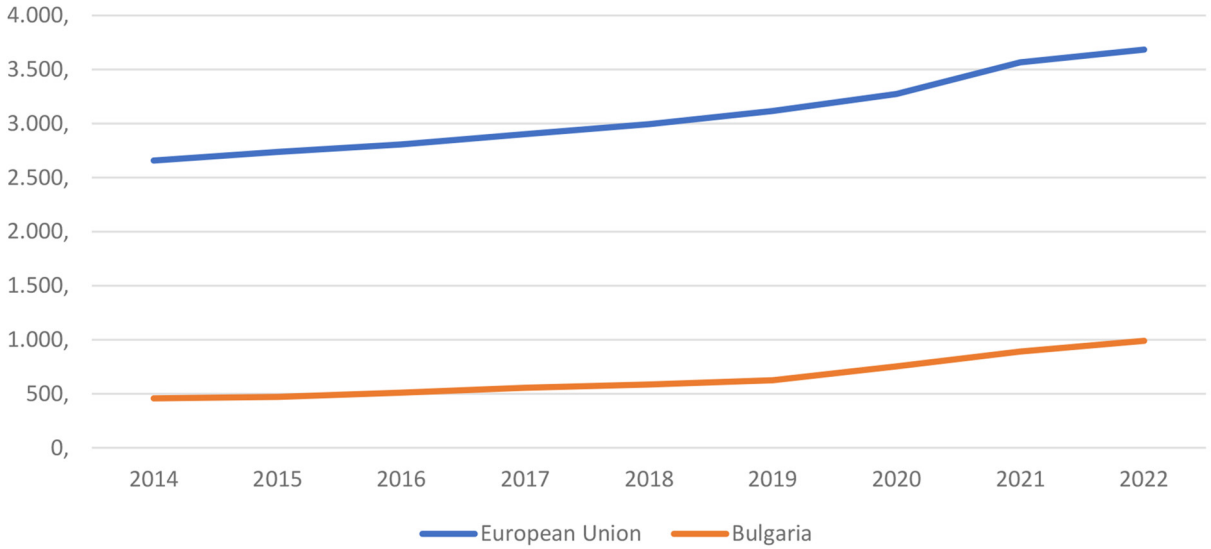

Figure 1: Current healthcare expenditures (euro per inhabitant) for 2014-2022 period
Source: Eurostat (2024a)

The highest values of the indicator for Bulgaria were reported in 2020 – 8.48% and 2021 – 8.62%, which can be explained by the global COVID-19 pandemic, which imposed a sharp increase in healthcare expenditures not only in Bulgaria, but also around the world. If these two years are excluded, the current healthcare expenditures as a percentage of GDP are relatively stable and range between 7.09% reported in 2019 and 7.68% reported in 2014.

4. MAIN CHALLENGES TO THE FINANCING OF THE HEALTHCARE SYSTEM IN BULGARIA

The healthcare system in Bulgaria is financed by many sources, including mandatory social health insurance contributions, taxes, health insurance, donations, and direct payments from patients. The main share of financial resources in the sector is due to the social health insurance contributions paid by the health insured persons and employers in the country. Under this source of funding, there are several main problems.

The first is related to the low level of income in the country. According to Schieber and Maeda (1997) "low-income countries and regions can raise less than half the revenues that high-income countries can raise" (p. 15). Kwilinski and Vysochyna (2024) state that "there is an assumption that in high-, upper-middle-, and middle-income countries, the increase in healthcare expenditures is not a necessity but a "tradition" or "habit", which is possible due to the existence of a reserve of financial resources" (p. 11). According to Eurostat (2024b), over the past 10 years, there has been a constant, positive trend of growth of annual net earnings (single person without children earning 100% of the average earnings) in the country. Moreover, there is (albeit too slowly) a reduction in the lag compared to the average European levels. Despite these positive trends, the income situation in Bulgaria continues to be unfavorable, with the country's lagging behind the rest of the European Union is still too large. In 2023, annual net earnings in Bulgaria are the lowest in the entire European Union, lagging behind the average European levels by 3 times, and by more than 5 times compared to the country with the highest earnings (Luxembourg). Moreover, the lag compared to Romania, which is in penultimate place, is already significant. Annual net earnings in Bulgaria are 16% lower than in Romania, largely due to the higher income growth in Romania compared to the growth in Bulgaria.

Along with the low level of income in the country, the unequal distribution of income also has a negative impact. According to Peshev et al. (2022) Bulgaria is the country with the highest income inequality in the EU, and the trend is mostly upward (p. 301). The unequal distribution of income makes it difficult for a large part of the country`s population to financially pay for health services and medicines that are not covered by the NHIF. This also greatly affects the quality of the health service they receive. Mihaylova and Bratoeva-Manoleva (2017) state that "the social and economic costs of high income inequality are largely recognized and there is a widespread view that a certain level of government intervention is needed to tackle extreme income disparities, poverty and social exclusion" (p. 38).

In addition to the low level of incomes in the country and their unequal distribution, the deteriorating demographic structure in the country also has a negative impact on the financing of the healthcare system. According to Eurostat (2024c), for the period from 2007 (the year in which Bulgaria joined the EU) to 2023, the median age of population increased by approximately five years - from 41.7 to 46.8. The main factors for this are the reduced birth rate and the emigration of the working-age population. In 2023, the age structure in the country is one of the most unfavorable in the entire EU. Only Italy and Portugal have a higher median age of the population.

The demographic processes in the country also lead to a decrease in the relative share of people of working age. According to Eurostat (2024c), for the period 2013-2023, the proportion of the population aged 20-64 years in the country decreased from 62% to 57.7% (Figure 2). According to this indicator, in 2023, only France, Finland, and Sweden have lower values than Bulgaria. The decreasing relative share of the working-age population puts additional pressure on the financing of the healthcare system, as one worker has to provide for more people of non-working age.

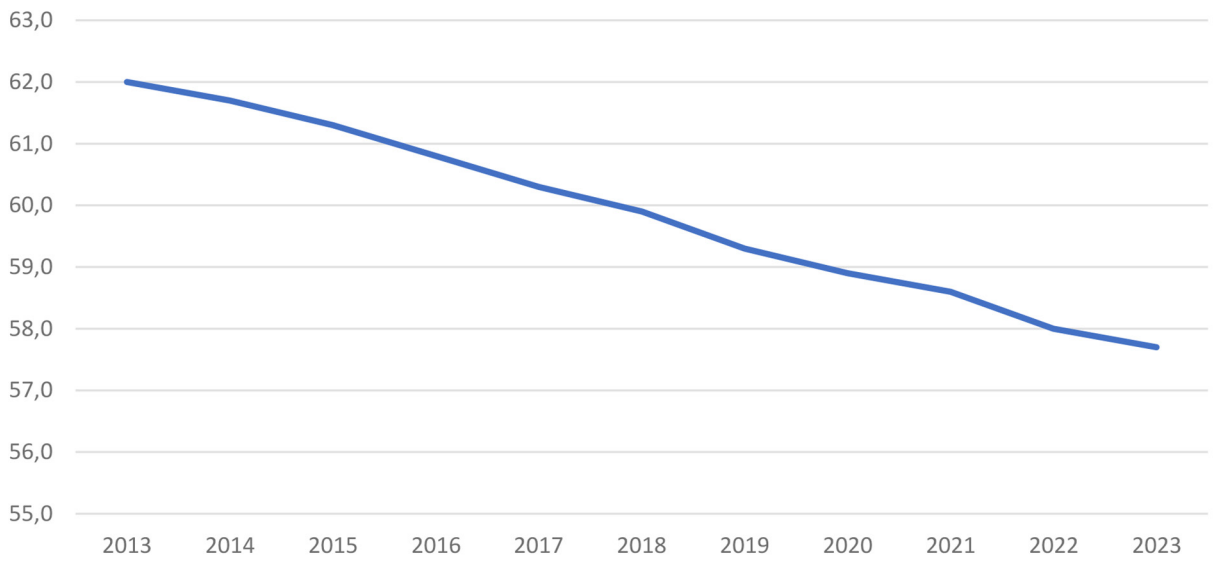

Figure 2: Proportion of population 20-64 years in Bulgaria for 2013-2023 period
Source: Eurostat (2024c)

The next main problem is related to the fact that although in the country health insurance is mandatory for all citizens, a large part of them are practically not insured. According to the Ministry of Finance (2018), their number in 2017 amounted to 719 thousand persons, which is more than 10% of the country's population. According to Ivanova (2020) the patient`s payment of health insurance does not guarantee the receiving of medical service in full scope or quality (p. 461). In many cases, patients have to pay extra for various medical services despite being insured. It is a common practice for patients

to voluntarily choose to pay extra for various medical consumables (those of higher quality) than to use those secured by health insurance. Thus, according to Eurostat (2024d) out of pocket payments of households in Bulgaria reach 35% of total current health expenditure for 2022, the highest among all EU member states. Reducing the relative share of out of pocket payments can lead to an improvement in the functioning of the healthcare system. According to Gabani et al. (2023) "transitions from out-of-pocket - to both government-predominant and social health insurance - predominant health financing systems are both expected to deliver health system outcomes improvements via increased public health expenditure" (p. 588).

The lack of a strong relationship between the amount of the social security contribution paid and the amount and quality of the health service received is among the reasons why many people do not get social insurance and accept to work in the shadow economy. According to Bulgarian Industrial Capital Association (2021) a number of international studies identify Bulgaria as the country with the highest share of the informal economy of all countries in the European Union (p. 9). Some of those who take into account the need to be insured do not find an incentive to insure themselves on the remuneration they actually receive. The social dimension of the system makes it so that people with different social security contributions should receive the same volume and quality of health service. This encourages many people not to be insured or to be insured at the legal minimum threshold instead of being insured at the actual remuneration. Two years later, the conclusions about the shadow economy remain unchanged. In its annual study, which examines the processes related to the shadow economy, the Bulgarian Industrial Capital Association (2024) concludes that "there is a delay in the processes of lighting of the Bulgarian economy and the share of the shadow economy in it remains high" (p. 19).

Schneider and Asllani (2022) stated that "the eastern or central and southern European countries, such as Bulgaria, Cyprus, the Czech Republic, Latvia, Lithuania and Poland have higher shadow economies than the "old" western European Union countries, like Austria, Germany, France and the Netherlands" (p. 8). According to the study, in 2022 Bulgaria had the highest share of the shadow economy – 33% among all EU countries, with Croatia ranking second with 29.7%. The country with the lowest share is Austria with 6.6%, followed by the Netherlands – 8.2%, Luxembourg – 8.3%, etc.

A necessary condition for the reduction of the shadow economy is taking measures to stimulate the official economy with strong GDP growth and reduce unemployment. In addition, the implementation of specific measures is necessary. Experience in Bulgaria shows that dealing with the problem will not be done with partial and isolated measures. A systematic approach is needed in the development of measures addressing the main factors for the emergence and development of the shadow economy in the country. Measures can range from regulatory and institutional reforms to tax policies and changes in administration.

5. FROM CHALLENGES TO STRATEGIC SOLUTIONS

The identified challenges to the healthcare financing system in Bulgaria require a number of actions. From a strategic perspective, issues related to the low level of income in the country and the deteriorating demographic picture should be addressed. In recent years, politicians in the country have united in their efforts for a higher degree of European integration. Thus, the country was included in the Schengen area in 2025 and is expected to be a member of the euro area from 2026. The Schengen area and the Eurozone are prerequisites for social and economic development, but whether these prerequisites will materialize depends on the country's government. The achievement of socio-economic development and the increased incomes of the population from this development will also lead to higher contributions to the health system and thus its finances will be stabilized.

Another strategic aspect is related to the demographic trends in the country. Measures are needed to increase the birth rate in the country, such as expanded maternity benefits, free childcare access, subsidies and incentives for young families to settle and raise children in depopulated areas, tax breaks for families with more than two children, etc. These measures would have an effect in the long run, when an increased population and increased incomes would lead to a larger volume of monetary contributions to the financial system.

Another important issue, such as the large size of the shadow economy, also negatively affects the volume of financial flows that flow into the healthcare system. Measures to reduce the shadow economy, such as improving tax compliance, reducing the regulatory and administrative burden, improving the efficiency of governance, automating and digitizing procedures, promoting electronic payments, etc., have led to positive results in a number of developing countries. Increasing social justice and linking the contribution to the health system with the services received can also lead to a reduction in the informal sector.

Measures such as reorienting part of the European funds towards the development of the health system and improving the efficiency with which these funds are used will directly affect the available resources in the system. The introduction of wage harmonization and retention incentives will lead to mitigation of brain drain and will ensure coverage of the health service in underserved areas.

6. FUTURE RESEARCH DIRECTIONS

The present study is focused mainly on the problems related to the financing of the healthcare system in Bulgaria through social security, which is the main source of funding. In recent years, the volume of health risk insurance as a source of financing health services has been increasing. Further research on the topic can focus on health insurance and its impact on the quality of health services that are provided in the country. Another aspect that could be covered in future studies is the effectiveness of the use of European Union funds for the development of the healthcare system in Bulgaria.

7. CONCLUSION

This study has explored the different models for financing health systems and outlined the elements and specifics of financing the healthcare system in Bulgaria. The low level of incomes in the country, the deteriorating demographic picture and the high level of shadow economy are identified as key challenges for achieving financial sustainability in Bulgaria`s healthcare sector. They also lead to a more limited opportunity to allocate funds to finance healthcare in the country. This fact brings to the fore the issue of the effective use of limited resources, compared to the other countries in the European Union. According to Kalinkova (2022), "after the transition to a market economy, there is a lack of solutions to important economic issues at the level of the national economy, and in most economic studies the issue of efficiency remains in the background" (p. 527). A systematic state policy is needed to increase social security payments by increasing citizens` incomes, increasing fairness in the distribution of public funds, increasing the efficiency with which public funds are spent, and developing measures addressing the main factors for the emergence and development of the shadow economy in the country.

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Propensity of Government Expenditure Composition During Shocks: Comparison Between Albania and Other Balkan Countries

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Abstract: *The paper examines the effect of the composition of public expenditure during the diverse shocks, particularly the global financial crisis of 2008 and the global pandemic of COVID-19, in Albania and several Balkan countries. The fiscal policy focuses on the composition of public expenditure to provide sustainable development in order to stimulate the growth-maximizing composition of public expenditure. Meanwhile, the use of fiscal instruments should contribute to the economic stabilization and promotion of economic growth, particularly during the diverse internal and external shocks. However, the effects of the composition of public expenditure are investigated through the analysis of comparative statics, particularly in Albania and several Balkan countries. We examined the allocation of government expenditures during adverse shocks, mostly the 2008 crisis and COVID-19, through the exploration of changes in the fiscal priorities amongst Albania and Balkan countries. The empirical results demonstrated the priority of government spending for financial stabilization and economic stimulus during the crisis of 2008 and for economic support during COVID-19 in these countries. Also, the outcomes of differences in government expenditure allocations amongst Balkan countries are mostly significant according to the responsiveness towards the 2008 crisis and COVID-19.*

1. INTRODUCTION

The literature underscores that variations in spending strategies reflect the institutional and fiscal capacities of Balkan countries. Research on the effectiveness of fiscal policies during crises shows that outcomes depend on the design of measures and governments' capacities to implement them. Blanchard and Leigh (2013) highlight that public spending measures are more effective when combined with structural reforms that enhance economic resilience. One of the main barriers is the low quality of institutions in the Western Balkan countries, which often limits the effectiveness of government spending (EBRD, 2020).

Empirical estimates proved that the higher current expenses referring to the preferred dynamic retort had no impact on the great economic declines compared to the impact of government investments. The damage consequences are more significant in the case of governments with higher levels of public debt, limiting their ability to respond during ensuing recessions. These results are demonstrated by investigating the impact of fiscal policy for 26 OECD countries, considering 14 EU countries since 1970. It is concluded that it is so difficult for the fiscal policymakers to reconcile the appropriate fiscal expansion at the proper time during the economic depressions in order to justify the short-term economic stability due to the convergence of fiscal consolidation (Larch et al., 2022).

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The examination related to the size of fiscal multipliers reveals the significant differences among them during economic recessions and economic expansions. It was concluded that the fiscal policy was significantly more effective during recessions compared to economic expansions. Meanwhile, it is demonstrated that the multipliers of government spending divided into the government spending groups have different sizes during the economic shocks, where specifically the multiplier of government military spending has the highest value. However, it is evident that monitoring of expected components of fiscal shocks inclines towards the increased size of fiscal multipliers during recessions (Auerbach & Gorodnichenko, 2012).

Empirical estimations on Southeast European countries, including the Western Balkan countries, demonstrated that governments in the region mostly focused on social spending and support for vulnerable sectors such as infrastructure and agriculture (IMF, 2014).

The paper will be organized into five sections. Section 2 examines theoretical and empirical research about the government expenditure composition, particularly during the diverse shocks. The third section will demonstrate the propensity of government expenditure composition amongst Western Balkan countries during the Global Financial Crisis of 2008, data the Global Pandemic COVID-19. The fourth section provides the empirical estimations related to the difference in government expenditure composition during the two shocks. The concluding remarks sections finalize the paper's findings.

2. LITERATURE REVIEW

Impact of fiscal policies during the Global Financial Crisis of 2008 and the Global Pandemic COVID–19 has increased the examination of government spending due to the economic and social consequences, particularly in developing countries. These investigations highlight the concerns about the effectiveness of government spending during diverse shocks.

Krajišnik et al. (2019) investigated the effect of fiscal consolidation on the economic growth related to the Western Balkan countries during 2004-2016. The authors examined the positive effect of fiscal consolidation on real economic growth using the dynamic panel of six Western Balkan Countries. Meanwhile, they concluded the effectiveness of fiscal adjustment according to the spending reduction compared to the tax increases. Otherwise, authors have emphasized the fruitful implementation of fiscal consolidation in Western Balkan countries during the given period, except Montenegro and North Macedonia.

Semmler et al. (2007) investigated the effect of the composition of public expenditure on economic growth. The authors argued that it was not easy to identify the composition of public expenditure that maximizes economic growth. However, they explored the effects of fiscal policy on economic growth, using a time series approach related to the composition of public expenditure. While the authors developed the model by considering the public expenditure on (i) education and health; (ii) public infrastructure; (iii) public administration; (iv) transfers and public consumption; (v) public debt service. They use the model to explore the impact of changes in the composition of government expenditure related to the income per capita in the long run and other macroeconomic variables.

Larch et al. (2022) examined the role of fiscal policy during shocks, considering 26 OECD countries since 1970. The authors found that the higher current spending, as an appropriate active response, has not shrunk the persistent impact of large economic downturns on real GDP. They highlighted that the enlarged government investment would be more effective, but it has mostly received little consideration.

Also, authors concluded that the damage effects were more significant for governments with higher levels of public debt, due to the limited operational space for the fiscal policy during the subsequent shocks. They emphasized that the fiscal policymakers have faced two difficulties during a large economic downturn: (i) adopting the appropriate type of fiscal expansion and (ii) ensuring the proper time to converge from short-term stabilization to fiscal consolidation, giving priority to investment.

Gemmelli et al. (2015) investigated the long-run effects of GDP due to the changes in total government spending and the ratios of diverse spending groups related to the OECD countries after the 1970s, using approaches of financing fluctuations in the government spending and probable endogenous links. The authors demonstrated the consistent empirical proves that the redistribution of total government spending according to the infrastructure and education expenditure has a positive outcome related to the output levels in long-run. Meanwhile, they emphasized that the redistribution of government spending according to social welfare may demonstrate the diffident negative effects related to the output levels in the long run.

Agénor and Neanidis (2011) examined the optimal distribution of government spending amongst the health, education, and infrastructure spending related to the endogenous economic growth. Authors highlighted the impact of infrastructure not only on the goods' production, meanwhile it has affected the provision of health and education services. However, they emphasized that the supply of health (education) services is closely related to the capacity of human resources (health services). Also, the authors examined the temporary dynamics connected with the unbiased fluctuations of the budget, referring to the structure of spending, and they have resulted in and compared the allocation rules that maximize the growth and welfare. However, they emphasized the role of externalities associated with the three types of public services on health, human capital, and technologies. Meanwhile, authors confirmed that it would be more useful in practice to use the proposed model in order to evaluate how the current programs of public spending distribution diverged from the optimality in several deprived countries and to use the perfect plans as a robust root to advise the policies.

Referring to the literature review, we highlight that the diverse shocks often test the governments' capacity to manage financial resources and prioritize economic sectors through requiring crucial effectiveness by governmental intervention.

3. AN OVERVIEW OF FISCAL RESPONSES DURING TWO SHOCKS: 2008 CRISIS VS. COVID–19

During 2008, the allocation of government spending was oriented towards handling the financial crisis of 2008, in order to bolster against its shock wave in all Balkan countries, particularly Western Balkan countries. Initially, the Western Balkan countries were knocked out indirectly due to the limited integration of their markets into the global markets. In this case, the exception is Greece, which was hit by 2008's crisis directly, with severe economic consequences for a long time. To demonstrate the effect of 2008's financial crisis, Figure 1 shows the arrangement of government spending during the crisis in the Balkan countries, specifically for Albania, Greece, Montenegro, North Macedonia, Serbia, and Bosnia and Herzegovina. The classification of government spending is divided into three groups for each country, precisely: (i) spending on the stabilization of the financial sector, (ii) spending on the economic stimulus, (iii) spending on the infrastructure and other areas. Referring to figure 1, it demonstrates that Greece has the highest ratio of expenditures towards the financial sector stabilization to total government expenses compared to other Balkan countries, precisely 50%, and the average of Balkan countries, exactly around 37%, due to the huge shock throughout the global financial crisis of 2008. The Greek government was challenged

by the high levels of public debt, and it was forced to cut government spending through the rigid austerity measures. Meanwhile, Albania and Bosnia and Herzegovina confirmed the smallest proportion, specifically 30%, related to the allocated spending of financial sector stabilization over total expenditures, relatively to other Balkan countries. However, Greece evidenced the lowest percentage, accurately 30%, according to the expenditures of economic stimulus towards the total government spending between other Balkan countries and compared to the Balkans' average, specifically near 37%. Otherwise, Albania, North Macedonia, and Montenegro proved the highest ratio, precisely 40%, related to the spending of economic stimulus amid to other Balkan countries. At the same time, Greece demonstrated the lowest percentage, 20%, correlated to the spending of infrastructure and other sectors, relatively to other Balkan countries and Balkan's average, correctly almost 27%, referring to Figure 1. In contrast to other evidence, Bosnia and Herzegovina resulted in the highest ratio, exactly 35%, referring to the spending on the infrastructure and other sectors, compared to other Balkan countries, according to the following figure.

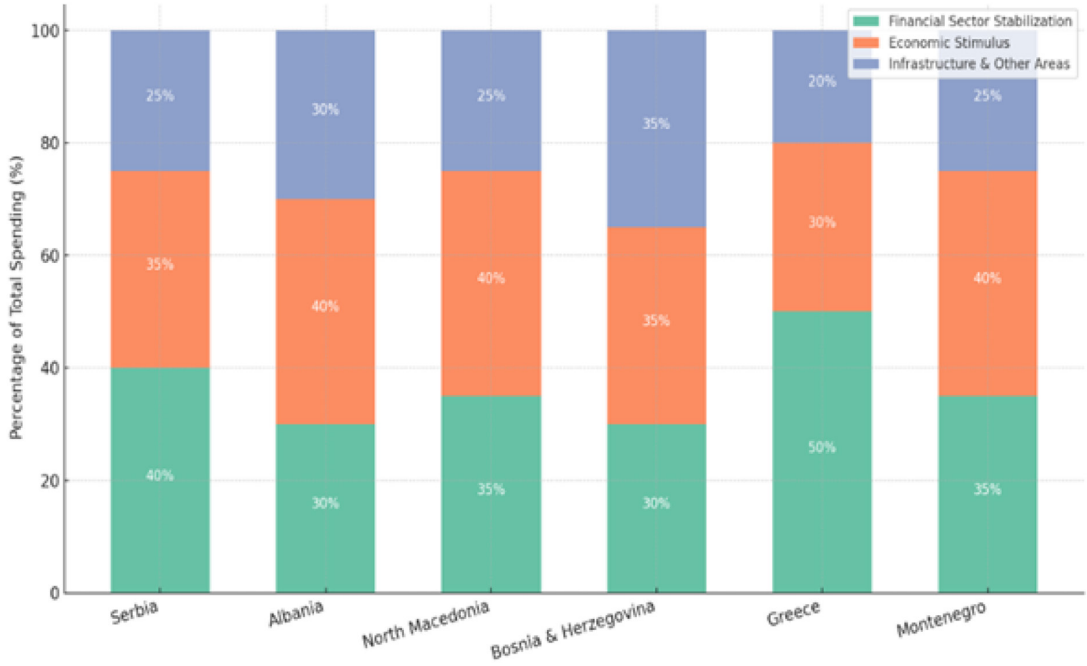

Figure 1. Allocation of Spending by Balkan countries during the 2008 Financial Crisis
Source: IMF (2014)

According to the above results, it confirmed the restrictive fiscal policy implemented by the Balkan countries in the convergence of fiscal consolidation to avoid the economic consequences of 2008's crisis. Meanwhile, a substantial increase resulted in the government spending on the health sector, referring to the distribution of government expenses during the global pandemic, COVID-19. COVID-19 was a health crisis associated with severe economic and social consequences, where the fiscal response of Balkan countries should have been immediate within the health sector, and also towards the population and businesses. The allocation of government expenditure according to three core groups is demonstrated in Figure 2, precisely: (i) spending on the health sector, (ii) spending on the economic support, (iii) spending on the other areas; during COVID-19 in Balkan countries. The results of Figure 2 illustrated that Albania, Bosnia and Herzegovina, and Greece demonstrated the highest ratio of expenditure in the health sector to total government expenditure, relatively to the Balkans' average, exactly near 27%. While the other countries incurred the smallest percentage of expenses related to the health sector, compared to the Balkans' average. Otherwise, the government spending focused on the economic support in the Balkan countries, resulting in the

highest ratio of these expenses towards the total expenditure. Also, it resulted that the proportion of government expenditure related to the economic support was above the Balkan's average, closely about 47%, for the entire Balkan countries, except Albania and Bosnia and Herzegovina, which provided the lowest ratio, exactly 40%. Meanwhile, the ratio of government spending correlated to other areas has almost the same convergence in the Balkan countries, excluding Greece, which confirmed the lowest proportion according to these expenditures, mostly 17%, and the largest gap related to the average of these countries, typically around 26.2%.

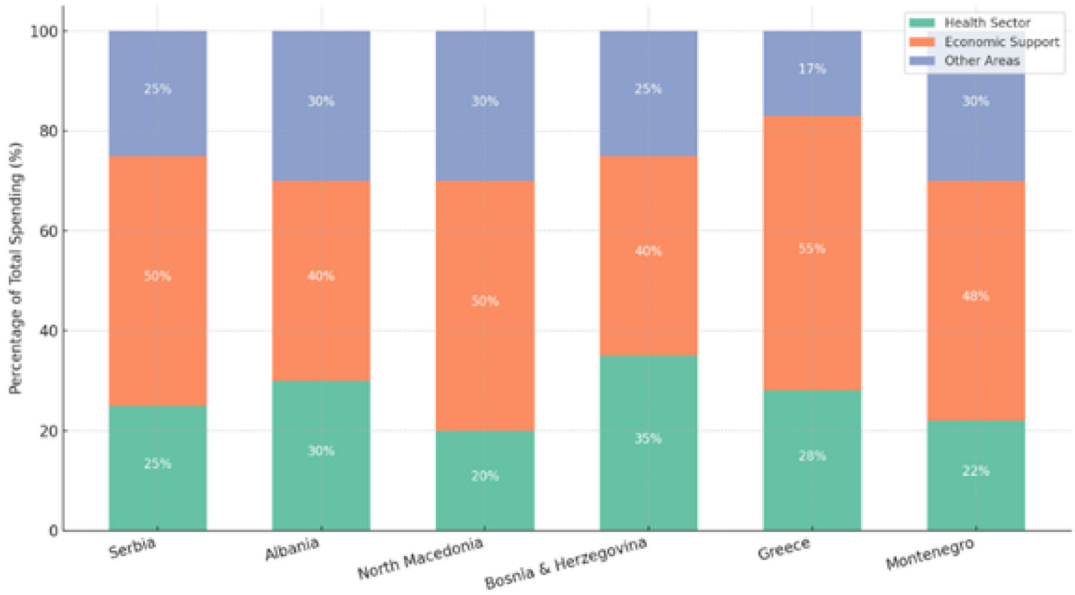

Figure 2. Allocation of COVID-19 Spending by Balkan countries
Source: IMF (2021)

Taking into consideration the above results, it is proven that the allocation of government spending related to the effective priorities towards the convergence of dual shocks: the global financial crisis of 2008 and the global pandemic, COVID-19, in the Balkan countries has significant divergences; nevertheless, the origin of the specific shock. In this context, it should be noted that the timely effectiveness of the implementation of fiscal measures in these countries, despite the composition of allocated priorities.

4. METHODOLOGY AND EMPIRICAL RESULTS

Referring to the changes in the composition of government spending in the Balkan countries, explicitly, Albania, Greece, Montenegro, Bosnia and Herzegovina, North Macedonia, Serbia, we assessed the difference to their average, using Paired t-Test, according to the time before and after the global financial crisis, 2008, and before and after the global pandemic, COVID-19, 2020. Although we examined the significance of differences towards the allocation of government spending over to real Gross Domestic Product (real GDP), respectively, (i) the government spending on healthcare; (ii) government spending on education; (iii) government spending on agriculture; (iv) government spending on infrastructure; (v) government spending on social protection; for each country, due to two shocks, referring to the secondary data of the International Monetary Fund during the period: 2005 – 2023.

Table 1 presents the results of the assessment related to the differences in the allocation of government spending of the Balkan countries, taking into consideration the time before and after 2008's crisis, specifically the period 2005 – 2019, in order to avoid the effect of COVID-19.

Table 1. Empirical results of the difference in governmental expenditure allocations amongst Balkan countries referring to the financial crisis of 2008

Target	Statistic	Before	After	Diff.	p-value
Healthcare	5.01	4.894%	5.476%	0.581%	0.00406
Education	9.68	3.500%	3.847%	0.347%	0.00020
Agriculture	7.05	1.867%	2.044%	0.177%	0.00089
Infrastructure	0.808	4.711%	4.811%	0.099%	0.45563
Social Protection	5.54	13.739%	14.905%	1.166%	0.00263

Note: Average percentage difference before and after Financial Crisis (Y = 2008; Up to 2019)

Source: Own research

Considering the results of Table 1, it is evident that the largest difference results to the government spending on social protection, but this difference is statistically significant ($p<0.05$). Also, the government expenditure on healthcare, education, and agriculture illustrates statistically significant differences. Meanwhile, it demonstrates that the slightest difference marks towards the government spending related to the infrastructure, but this difference is not statistically significant ($p>0.05$).

Although Table 2 presents the results of the assessment of differences according to the allocation of government spending in the Balkan countries, referring to the time before and after COVID-19 during the period 2005 – 2023.

Table 2. Empirical results of the difference in governmental expenditure allocations amongst Balkan countries referring to COVID-19

Target	Statistic	Before	After	Diff.	p-value
Healthcare	13.14803	2.607%	3.650%	1.210%	0.00005
Education	11.09521	3.427%	4.250%	0.648%	0.00010
Agriculture	7.527268	1.740%	2.150%	0.390%	0.00066
Infrastructure	4.227371	5.647%	5.975%	0.461%	0.00827
Social Protection	12.45959	6.000%	8.875%	2.556%	0.00006

Note: Average percentage difference before and after COVID-19 (Y = 2020)

Source: Own research

Referring to the results of Table 2, it is obviously confirmed that the largest difference is provided by the government expenditure on social protection, but this difference is statistically significant ($p<0.05$). Meanwhile, the government expenses related to healthcare demonstrate the substantial and statistically significant differences, but also the allocation of other expenses taken into consideration proves statistically significant differences.

The significance of the differences illustrated by tables 1 and 2 highlights the appropriate fiscal responses as a counter-reaction to the specific shock in the Balkan countries, according to the convergence of current prioritization and fiscal consolidation.

5. CONCLUSION

The convergence of propensity related to the allocation of government spending during the shocks of the global financial crisis of 2008 and the global pandemic, COVID-19, is similar between Albania and other Balkan countries, taking into consideration that the size of these fiscal stimuli is diverse. Referring to the estimated results, the trend of government spending was focused on

the spending linked to the financial stability and economic stimulus during the 2008 crisis, as a counter-reaction to the nature of shock, within Albania and other Balkan countries.

During COVID-19, it is proven that the propensity of government expenditures was prioritized towards the spending correlated to the economic support and healthcare in Albania and other Balkan countries, converging to the shock's nature.

Controlling for the difference to the average, referring to the time before and after the global financial crisis, 2008, and before and after the global pandemic, COVID-19, 2020, the government spending related to the social protection demonstrated the largest difference, but statistically significant, during the two shocks. Also, the government expenses for healthcare demonstrated substantial and statistically significant increases, precisely during COVID-19, due to the nature of the shock. Meanwhile, it is confirmed that the difference according to the government expenditure focusing on infrastructure was statistically insignificant only during the 2008 crisis. Meanwhile, the government spending correlated to education and agriculture demonstrates the significant differences during the two shocks.

Referring to the estimated results, we highlight that the allocation of government expenditure according to the effective priorities towards the convergence of 2008's crisis and COVID-19 demonstrates the significant divergences amongst the Balkan countries. In this context, the fiscal policymakers should investigate these divergences to guide the optimal allocation of fiscal priorities across the diverse shocks according to the most effective implementations.

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The Impact of Inflation and Gross Domestic Product on Eurozone Investment Funds

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Abstract: *This paper analyses the effect of inflation and GDP on Eurozone investment funds. It centres on the responsibilities of investment funds, exploring the impact of external, internal, and economic factors on investor capital. The obligations of investment funds represent the shares purchased by investors with the shared currency, the euro. The paper compares the value of investment funds over time, aiming to demonstrate their dependence on macroeconomic policy. The analysis is supported by data on annual inflation rates and annual GDP values within the Eurozone and how these economic variables affect the annual obligations and shares of investment funds. Results from linear regression analysis indicate that investment in these funds decreases as GDP and inflation rates increase, with comparative analysis further supporting this claim. The study is also underpinned by significant factors related to the European Central Bank's (ECB) policy management, illustrating how the ECB's monetary policy directs investments toward other financial assets.*

1. INTRODUCTION

The financial investment market has always been dynamic, but in the last few years, its nature has become significantly unpredictable. The world has witnessed various geopolitical and economic crises that required adaptation and mitigation. Their impact was also visible on investments, specifically on the investment fund market.

Investment funds began to develop in the 19th century in the Netherlands due to the desire of Abraham van Ketwich to include citizens with limited capital for investment and thereby reduce investment risks. The concept itself was later popularized in other European countries and shortly after, even in the USA. According to Chen (2025), investment in investment funds from the 1970s until 2019 grew optimally, but in the last five years, the rate of investment in investment funds has been declining.

This paper aims to analyse the effects of inflation and GDP on the rate of investment in investment funds in the Eurozone and whether the restrictive macroeconomic policy pursued by the European Central Bank affects the rate of investment in investment funds.

The research hypothesis is:

H1: Based on scientific and empirical knowledge about inflation and GDP in the euro area, it is possible to prove that annual inflation rates and annual GDP growth rates significantly affect the value of the investment rate in investment funds.

p1.1: As the value of GDP increases, the rate of investment in investment funds decreases.

p1.2: Increasing inflation reduces investment in investment funds.

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2. INVESTMENT FUNDS

According to Fuchit and Litan (2008), one should not put all their investment "eggs" in one basket because investors have the ability to reduce the risk they are exposed to in order to be able to achieve a satisfactory return. Unlike other financial investments, mutual funds are primarily designed for smaller investors and offer the diversification of risks at a relatively low cost. According to Rouwenhorst (2004), open-end investment funds began to develop in the early 19th century, and as early as 1774, the Dutch merchant and broker Abraham van Ketwich invited smaller investors to pay into a foundation called "Unity Creates Strength", with which he wanted to provide investors with limited funds with an opportunity to invest, i.e. give them a "head start" as well as the wealthy. Later, the fund trend spread to other European countries such as Austria, Denmark, Sweden, Spain, Germany, and various colonial countries in Central and South America. Most of the trading was in bonds issued by the Netherlands and foreign governments that had access to the Dutch market, thus taking advantage of the low interest rates. It was precisely because of this expansion of Dutch capital that today's closed-end mutual funds were introduced.

Funds are divided into two types, namely open-end and closed-end. While closed-end funds hold a fixed number of shares and securities and trade on the secondary market, investors in open-end funds have the freedom to sell shares directly from the funds at any time and the size of the fund can also increase or decrease depending on the inflow or outflow of capital and are not listed on the stock exchange. Open-end investment funds are more popular than closed-end funds due to their free nature of investment.

According to Fernando et al. (2003), investment funds experienced rapid growth in the 1920s, but after a few years, they suffered a major setback due to poor management and the stock market crash. After World War II, funds began to grow again in order to recover from the war crisis, which increased income for citizens in developed economies, which increased investment and thus increased stock prices, on which open-end investment funds were based. Fernando et al. (2003) point out that in the 1960s, investment funds grew rapidly, but with the advent of the oil crisis, the capital market shrank, and numerous groups of funds collapsed. The stated authors (Fernando et al., 2003) emphasize that during the 1970s, groups came up with an innovative method in which investment was based on money market instruments. With such an innovation, they began to compete with banks by offering lower margins and good market returns, and became a response to regulatory restrictions that prohibited banks from paying market interest on deposits to their citizens during times of high inflation. This development of investment funds is important to note because the trend of investing in funds in the 1970s returned to European countries, especially to the current members of the Eurozone. The funds met the demand of sophisticated investors who used them as a safe haven for liquid investments (Fernando et al., 2003).

Investment in funds became explosive in the 1990s, and this trend continued until 2008. And in 2010, the rate of investment in investment funds in the Eurozone increased again (Trinth, 2017).

According to Basinger (2023), the last quarter from 2008 until 2023 shows an optimal growth and a high decline in the rate of investment in investment funds. With the onset of a major crisis, investments decrease, and during recovery, they increase optimally. Only during periods of increasing GDP and decreasing inflation do investments begin to decline. Table 1 shows the growth and decline in recent quarters.

Over the years, it has been evident that, regardless of economic crises and obstacles, the rate of investment in mutual funds always grows optimally, and this scientific paper aims to investigate why the

trend of investment in funds has been declining in the last few years. Although the development of investment funds is associated with higher GDP per capita and lower interest rates, this research aims to prove whether the value of the Eurozone's GDP and the inflation rate itself affect the declining rate of investment in investment funds in the last 5 years.

Table 1. Table with years and the rate of investment in investment funds

Years	Investment
2008	-8.4
2009	9.8
2010	7.5
2011	0.6
2012	5.7
2013	7.1
2014	8.9
2015	7.7
2016	4.3
2017	8.8
2018	3.4
2019	5.7
2020	4.4
2021	8.4
2022	-0.4
2023	0.8

Source: European Central Bank (2024)

2.1. Types of investment funds

Depending on accessibility, funds are divided into open and closed. While the liquidity of closed-end funds depends on trading on the stock exchange, closed-end funds have high liquidity, and the price of shares is determined by the net asset value of the fund. Open-end funds include equity funds, mixed and bond funds.

As the name suggests, equity funds primarily invest in shares that are issued on the stock exchange, and the goal is to generate profit or dividends. You can invest in overvalued shares, shares that regularly pay dividends, and shares for which potential growth is predicted. It is important to emphasize that their value depends on inflation because increasing inflation can lead to a restrictive monetary policy that increases interest rates and, with them, increases the costs of companies and reduces the profits of their investors.

Bond funds invest in bonds, which are considered the safest investments because they benefit from inflation, which contributes to their value through higher interest rates. They are divided into short-term funds and long-term funds.

Mixed funds combine investments in stocks and bonds, and sometimes they can also invest in cash instruments. Such funds are suitable for conservative investors, i.e. investors who do not want to be exposed to high risk. They provide security and gradual growth. One of the funds that also neutralize a good part of the price increase is real estate funds (Graham, 2003). Their investment is based on investments such as commercial premises, residential complexes, hotels, or shopping centres, and such investments provide investors with returns through dividends, while the value of the fund can also grow. The positive thing about a REIT fund is that at least 90% of the income generated must be paid to investors, which guarantees regular income (EPRA, 2023). Although

they are used as a protection of purchasing power without reduced returns, there is still sensitivity to interest rates that increase the cost of borrowing.

Exchange-traded funds trade on the stock exchange and are considered a closed type of fund that invests in a variety of investments. They do not have high management costs and have very high liquidity. One of the risk funds is a hedging fund, where aggressive investment methods such as short selling and market neutral are used. They are reserved for wealthy and experienced investors, and if the management invests the funds properly, the income can be significant (Haslem, 2010).

3. MONETARY POLICY

The Eurozone is a monetary union of all 20 members that share the euro currency and thus have a common monetary policy led by the European Central Bank (Frieden & Walter, 2017). Depending on the current level of macroeconomic factors, the ECB adjusts monetary policy, which is considered a set of measures to control the amount of money in circulation, interest rates and reserves of the national banks of other members. The policy can be a direct response to worsening economic conditions such as reduced investment, rising prices, increased inflation and job losses, which are also contributed to by uncertainty itself.

Expansionary monetary policy is ideal for growth and investment in investment funds. The very goal of such a policy is to increase total consumption so that the amount of money in the market increases, and the circulation of money increases by reducing bank reserve requirements and thereby reducing interest rates. Expansionary policy is applied in times of recession or high unemployment because it provides citizens with greater purchasing power with which they can invest in stock, bond, or mixed funds. In the case of stock funds, share prices increase, which gives companies access to easy capital, which stimulates the growth of the value of their shares. The price of bond funds also increases due to existing bonds. Expansionary policy increases market liquidity, which creates a favorable environment for investment and profit.

According to Bernanke (2022), an expansive and stable monetary policy is good for investing because there is moderate inflation of 2%, interest rates are moderate, and the money supply can be predicted, where uncertainty and anticipation do not have a major impact on the growth of macroeconomic factors such as inflation and GDP. Due to its predictability, a stable policy gives investors the freedom to plan long-term investment plans. However, a restrictive monetary policy can be challenging for investing because of the increase in interest rates and the decrease in money supply due to the suppression of inflation. It was implemented after the COVID-19 crisis and partly reduced the investment rate in the Eurozone. Such a policy reduces the attractiveness of equity funds because higher interest rates increase costs for companies, while in the case of bond funds, increased interest rates reduce the value of issued bonds, which reduces profits for investors (Rostagno et al., 2021).

According to Hauzenberger et al. (2021), a contractionary target shock reinforces the positive association between income and net wealth that can be found in all countries in the sample but does not appear in a common dynamic. With this, the central bank itself can influence wealth and income, which automatically affects the distribution of capital by investment. For the most profitable investment, it is important to carefully monitor the monetary policy implemented by the central bank and the macroeconomic factors that influence the policy itself.

4. REGRESSION ANALYSIS

According to Hardy and Bryman (2004), regression analysis is a common statistical method in the social sciences. Multiple regression analysis is used to test hypotheses where independent variables are causally related to dependent variables. The variable that this research paper aims to predict is the investment rate in mutual funds.

Multiple linear regression analysis is represented by the basic formula $\hat{y} = \beta_0+\beta_1 x_1+\beta_2 x_2+\varepsilon$. y represents the dependent variable; investments in Eurozone investment funds, while x_1 the inflation rate and x_2 the value of GDP in the Eurozone, are the independent variables. This regression analysis aims to assess how selected macroeconomic factors affect the selected investment.

Table 2. Results of multiple regression analysis

	OLS Regression Results				
Dep. Variable:	**Investing in investment funds (%)**		**R-squared:**		0.076
Model:	**OLS**		**Adj. R-squared:**		-0.847
Method:	**Least Squares**		**F-statistic:**		0.08264
No. Observations:	5		**Prob (F-statistic):**		0.924
Df Residuals:	2		**Log-Likelihood:**		-11.699
Df Model:	2		**AIC:**		29.40
Covariance Type:	**nonrobust**		**BIC:**		28.23
	coef	**std err**	**P>|t|**	**[0.025**	**0.975]**
const	23.7854	50.708	0.685	-194.391	241.962
Inflation rate (%)	0.7180	2.713	0.816	-10.956	12.392
GDP value	-0.0018	0.005	0.736	-0.021	0.018
Omnibus:	**nan**		2.112		
Prob (Omnibus):	nan		1.162		
Skew:	1.177		0.559		
Kurtosis:	2.813		3.45e+05		

Source: Own research

In this case, the formula is $\hat{y} = 23.7854 + 0.7180x_1\text{-}0.0018x_2$ and the regression coefficient $b_1 = 0.7180$ is the inflation rate and $b_2 = -0.0018$ is the GDP value. If the annual inflation rate and GDP were equal to zero, the expected rate of investment in investment funds would be 23.7854%, provided that the independent macroeconomic variables remain unchanged. If the annual inflation rate increases by 1%, the annual rate of investment in funds is expected to increase by 0.7180%, provided that the value of GDP, i.e. the variable x_2, remains unchanged. If by any chance GDP increases by 1 EUR, the annual rate of investment in funds will decrease by 0.0018%, provided that the inflation rate remains unchanged.

Table 2 shows the above results. 7.6% of the variation was explained by this regression model, and 92.4% remained unstudied. This regression model is not reliable.

The set hypotheses are as follows:

$$H_0 : \beta_1 = \beta_2 = 0$$

$$H_1 : \exists \beta_j \neq 0$$

Significance F is 0.08264 and is greater than alpha, 0.08264 > 0.05, which accepts the null hypothesis. At the significance level of 0.05, we accept the null hypothesis that the independent variables;

inflation rate and GDP value do not contribute significantly to this regression model, which is shown in Table 3. This regression analysis has proven that there is a positive relationship between the inflation rate and the rate of investment in Eurozone investment funds; however, there is a negative relationship between the value of GDP and investment in funds, which proves that less is invested in mutual funds when gross domestic product grows.

Table 3. Results of multiple regression analysis

Basic information about the data	Years	Inflation rate (%)	GDP value (EUR)
count	5.000000	5.000000	5.000000
mean	2021.000000	2.960000	12062.690000
std	1.581139	3.295907	832.985358
min	2019.000000	-0.300000	11132.450000
25%	2020.000000	1.200000	11406.150000
50%	2021.000000	2.600000	12088.700000
75%	2022.000000	2.900000	12482.250000
max	2023.000000	8.400000	13203.900000

Basic information about the data	Investing in investment funds (%)
count	5.000000
mean	3.869000
std	2.921396
min	0.400000
25%	2.825000
50%	3.720000
75%	3.950000
max	8.450000

Correlations between different variables

	Years	Inflation rate (%)
Years	1.000000	0.580471
Inflation rate (%)	0.580471	1.000000
GDP value (EUR)	0.863995	0.374263
Investing in investment funds (%)	-0.420263	-0.184922

	GDP value (EUR)
Years	0.863995
Inflation rate (%)	0.374263
GDP value (EUR)	1.000000
Investing in investment funds (%)	-0.209734

	Investing in investment funds (%)
Years	-0.420263
Inflation rate (%)	-0.184922
GDP value (EUR)	-0.209734
Investing in investment funds (%)	1.000000

Source: Own research

Table 3 shows the correlation coefficient between the rate of inflation and the rate of investment in investment funds, which is 0.2897, and indicates that there is a small positive correlation between the rate of inflation and the rate of investment in funds. The correlation coefficient between the value of GDP and the rate of investment in funds is 0.1849, indicating a weak positive correlation where the connection is almost non-existent. However, there is a moderately significant positive correlation between the GDP value and the annual inflation rate.

With 95% confidence, the regression parameter of the rate of investment in investment funds β ranges between 0.40 and 8.45.

Figure 1 shows how an increase in inflation increases investment and an increase in GDP decreases investment in investment funds.

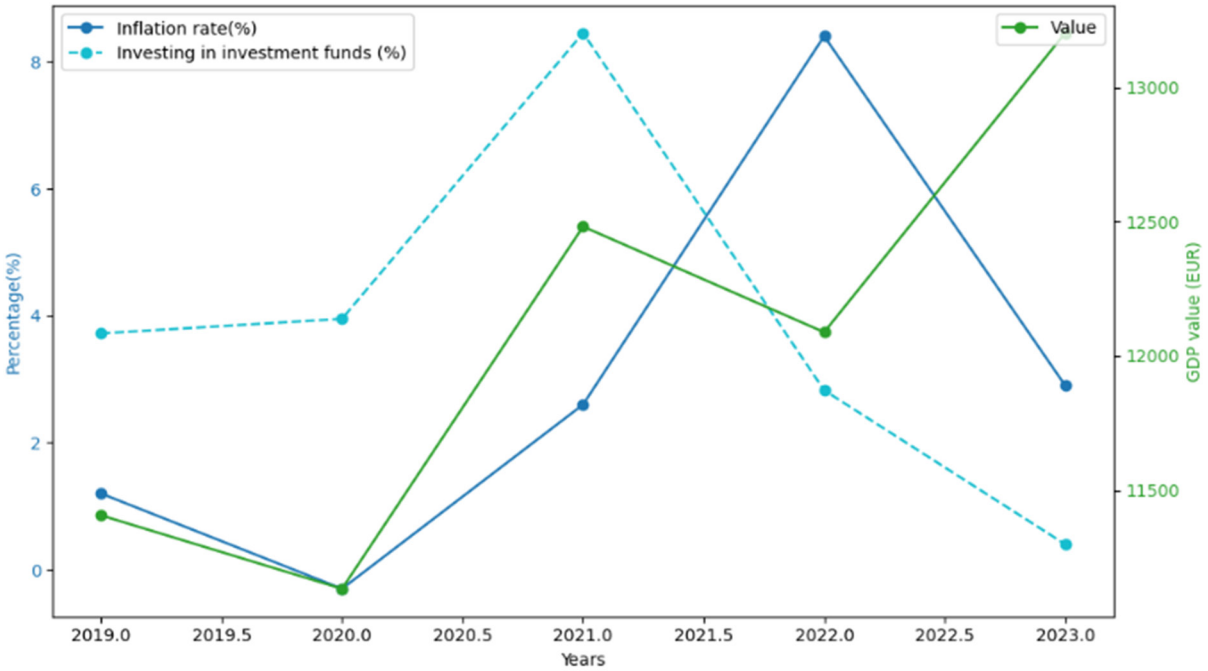

Figure 1. The impact of macroeconomic factors on investment funds 2019-2023

Source: Own research

The regression analysis used the average rate of investment funds, which was calculated by adding up all quarters in each year from 2019 to 2023 and dividing by 4. The value of gross domestic product and the inflation rate were taken from the European Central Bank (2024) and Eurostat (2024).

5. CONCLUSION

The period from 2019 to 2023 can be considered one of the most challenging periods for the global economy. The COVID-19 crisis, which caused a decrease in the circulation of money and its recovery, was accompanied by high inflation rates, then the war in the East, which resulted in higher energy prices and the need to find new logistics routes, and therefore a restrictive monetary policy that tried to mitigate the consequences of the aforementioned factors.

The value of GDP increased between 2020 and 2023, except for a decline in 2022, while investment rates in investment funds were highest in 2021 after the COVID-19 crisis, when the inflation rate started to increase, and the value of GDP started to decrease. This proved the hypothesis that when the value of the gross domestic product increases, investment in investment funds decreases, while inflation increases investment in investment funds, which suggests that the population of the Eurozone invests mostly in mixed or bond funds. Inflation has a favourable effect on the bond market due to interest rates, but it therefore takes away the value of stocks, which does not prove the hypothesis that the rate of investment in investment funds increases with a fall in inflation.

When investing in funds, it is important to analyze the market together with monetary policy and macroeconomic factors, because it is important to emphasize that as long as the costs of the funds are higher, the returns are lower. Decisions based on investing in a specific fund due to past results, in most cases, do not bring positive returns.

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Are Fiscal Rules Mitigating the Political Budget Cycle? – Case of Albania

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Abstract: *Theoretical and empirical background highlighted the effectiveness of fiscal rules related to their types and institutional strategies through the implementation of state fiscal standards. Effective fiscal policy requires countercyclical actions to sustain policy outcomes. The paper examines the impact of fiscal rules on the political budget cycles, particularly in developing countries like Albania. The adoption of weak fiscal rules has caused the political budget cycle despite other determinants through using data related to the Albanian case. Empirical studies showed that strong fiscal rules produced budgetary discipline and reduced political budget cycles. The qualitative and quantitative effects of appropriate fiscal rules should facilitate the adherence to European Union fiscal standards necessary for accessing the European Union. Albania shall adopt and adhere to the European Union's fiscal rules upon its accession to the European Union. This full context should be considered by fiscal policymakers, free from distortions caused by political pressure.*

1. INTRODUCTION

Politicians used fiscal policy to enhance their re-election prospects by manipulating economic policy during electoral years, making countercyclical fiscal policy among European countries a topic of considerable current debate. This cyclical behavior destabilizes the national economy, making the oversight of government fiscal situations a critical policy challenge. In reaction to fiscal management challenges, a group of predominantly European countries demonstrated their dedication to robust fiscal rules in the early 1990s. Interest in the efficacy of formal rules for budgetary balance has emerged from multiple empirical assessments that consider various rule types and utilize diverse cross-country populations. Empirical studies on the impact of fiscal rules on fiscal performance show mixed results depending on the models employed and the countries in which the analyses were performed. The overall data about the impact of fiscal policy guidelines on fiscal decisions and sustainability remains ambiguous.

The fiscal rules framework aims to prevent or mitigate temporary fiscal imbalances by avoiding the use of increasing debt or by promoting the buildup of large surpluses during periods outside of economic booms. Although there is a lack of overall empirical evidence supporting the political budget cycle hypothesis, in a country such as Albania, the absence of supportive results does not definitively indicate that the political budget cycle is nonexistent. In this context, this paper examines the impact of fiscal rules on mitigating the political budget cycle within the Albanian context. The research question is: Do Albania's fiscal rules mitigate the negative impacts of the political budget cycle? The objectives of this research are: to investigate fiscal indicators in electoral years to assess the extent of the political budget cycle in Albania; to present an overview of fiscal rules in Albania and their adherence; and to evaluate whether these rules have mitigated political budget cycles.

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The paper will be organized into six sections. Section 2 examines theoretical and empirical research about the impact of fiscal rules on the political budget cycle. The third section will explain the data and methodology used. The fourth section provides an overview of Albania's fiscal rules and their compliance, along with an analysis and discussion of the impact of these rules on the political budget cycle. The concluding sections finalize the paper's findings, along with future research directions.

2. LITERATURE REVIEW

The political budget cycle has consistently been a topic of interest in both theoretical and empirical studies. Numerous empirical studies have demonstrated a link between political cycles and budgetary outcomes across various countries, including developing and transitional economies across different eras. Evidence suggests that certain rules may influence the fiscal cycle, including its timing and amplitude, and could serve as effective alternative instruments for governments aiming to mitigate allocative and distributive inefficiencies. The IMF defines a fiscal rule as a long-term constraint on fiscal policy, enforced through numerical limitations on budgetary aggregates. Fiscal rules are often designed to mitigate deficit tendencies and control expenditure pressures, particularly during wealthy periods, to guarantee fiscal prudence and debt sustainability. The IMF (2024) identifies four categories of fiscal rules: budget balance rules, debt rules, expenditure rules, and revenue rules, applicable to the central or general government or public sector.

The majority of the literature indicates a positive correlation between fiscal rules and fiscal outcomes, as confirmed as well by Potrafke (2023) and Brändle and Elsener (2024). In addition, Gootjes et al. (2021) found that strong fiscal rules limit political budget cycles. Furthermore, they stated that fiscal laws generally enhance government budget balances. The results appear to be predominantly influenced by EU member states, which often implemented more rigorous fiscal rules than other countries. Nonetheless, robust fiscal rules also limit political budget cycles in non-EU countries. Fiscal rules not only strengthen public budget discipline but also mitigate fiscal manipulations for electoral objectives, thereby providing significant support for the reinforcement of fiscal regulations. Adhering to fiscal rules that restrict government debt growth or maintain stability among cyclical fluctuations facilitates counter-cyclical fiscal policymaking (Larch et al., 2021). Caselli and Reynaud (2019) discovered that the presence of fiscal rules is associated with reduced deficits; however, this correlation vanishes when endogeneity is appropriately accounted for. Nevertheless, by evaluating the robustness of regulations via a continuous index of fiscal rule design, they demonstrated that effectively structured rules exert a statistically significant impact on fiscal balances. Ardanaz et al. (2021) indicate that in countries lacking a fiscal rule or adhering to a stringent fiscal rule, a fiscal consolidation of at least 2 percent of GDP correlates with an average decrease of 10 percent in public investment. Andrián et al. (2024) concluded that fiscal rules are more effective in mitigating debt during favorable economic cycles, with design and institutional support being important. According to Bonfatti and Forni (2019), municipalities governed by the fiscal rule have more constrained political budget cycles compared to those not governed by the rule. The main conclusion of Bergman et al. (2015) was that more robust national fiscal rules correlate with more sustainable fiscal policies, and this relationship persists over a wide range of government efficiency attributes. Burret and Feld (2018) examined the fiscal implications of Swiss cantonal debt brakes, considering the rules' scope, and found that fiscal rules reduce budget deficits. Muja (2023) identified a negative relationship between fiscal rules and the fiscal deficit for Albania. This research analyzed the empirical correlation between these two variables, using data from 2000 to 2022, and determined that the presence of fiscal rules decreases the fiscal deficit by 0.011 percentage points, although this relationship is statistically insignificant.

Simultaneously, some researchers have examined the correlation between fiscal rules and their effect on capital expenditure in election years. Bostashvili and Ujhelyi (2019) observe that capital expenditure on road is 12% greater during election years and 9% greater in the pre-election year under patronage conditions. Ardanaz et al. (2021) found that in countries with flexible fiscal rules, the opposing impact of budgetary adjustments on public investment disappears, indicating that flexible rules safeguard public investment throughout consolidation periods. Bonfatti and Forni (2019) found that the political budget cycle increases real capital expenditure by approximately 10–20 percent on average in the municipal pre-election years, while municipalities governed by the domestic stability pact (Italian sub-national fiscal rule) show a pre-electoral rise in capital spending that is merely a quarter of the one of municipalities not subject to the rule.

However, several studies have found no correlation between fiscal laws and the political budget cycle. Analyzing a sample of Spain's major municipalities from 1994 to 2009, Benito et al. (2013) conclude that the balanced budget law has not mitigated the political budget cycle associated with budget deficits. Consequently, their findings suggest that despite being limited by such rules, governments partake in fiscally manipulative practices driven by electoral considerations. In non-electoral years, they facilitate the implementation of expansionary budgetary policies during electoral years. Jung and Kim (2024) indicated that fiscal rules, designed to mitigate political influence, are nonetheless influenced by the political process.

3. DATA AND METHODOLOGY

This paper uses qualitative and quantitative methods to evaluate the impact of fiscal policy and fiscal rules on mitigating the political budget cycle. Two research methodologies are employed to answer the research questions. The qualitative method examines the existence of the political budget cycle in Albania and the compliance with the fiscal rules introduced in 2016 in the Organic Budget Law. The quantitative method assesses the magnitude of the political budget cycle and the correlation between fiscal rules and fiscal outcomes during the election years. The data for the period 1993-2023 were sourced from the Ministry of Finance of Albania and the World Bank (2024). This analysis will investigate the presence of a political budget cycle in Albania by examining fiscal variables, including government revenues, expenditures, budget balance, and public debt as a percentage of GDP.

The research has some limitations: it solely examines public debt and fiscal deficit as a percentage of GDP, neglecting specific expenditure or revenue components that could significantly influence political budget cycles; furthermore, it does not empirically evaluate the impact of fiscal rules on the political budget cycles.

4. RESULTS AND DISCUSSIONS

The fiscal rule in Albania pertains to the public debt level. The sole fiscal rule was introduced in the 2008 Organic Budget Law, stipulating that total public debt, inclusive of guarantees, could not exceed 60 percent of GDP. In 2013, this principle was redefined and referred to as the 'golden rule'. The revised regulation stipulates that borrowing for operational expenses is forbidden, necessitating that such expenses be financed through revenues, with borrowing exclusively allocated for capital investments. In 2016[3], the Albanian Government established several fiscal principles and rules to ensure the stability and sustainability of public debt. One such principle mandates that in each annual budget law, whether initial or revised, as well as in medium-term budget planning,

[3] Article 4/1 of the OBL

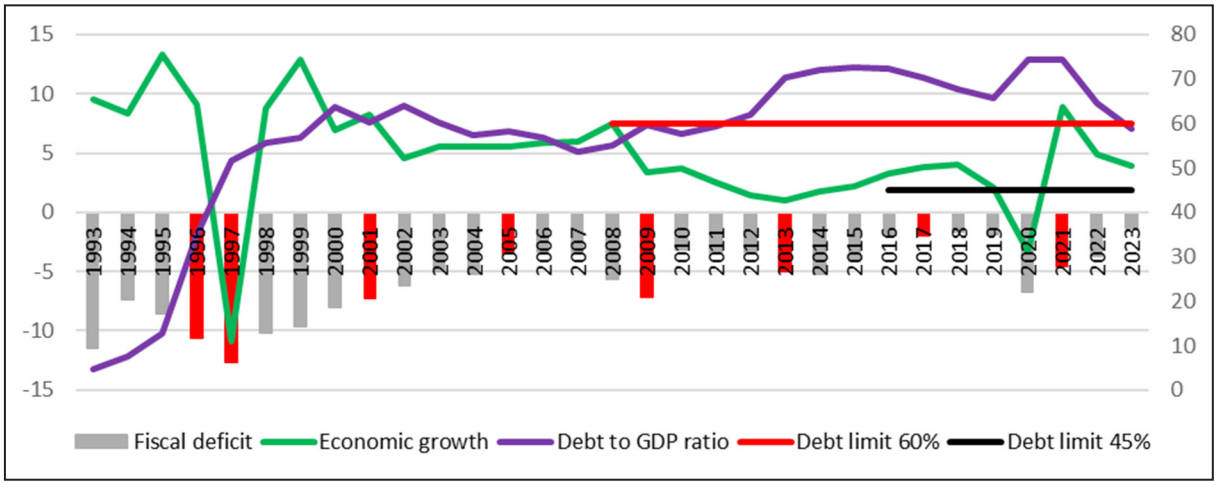
the ratio of public debt to GDP must be projected to be lower than the level estimated for the preceding year until the debt level attains and remains below 45 percent of GDP. Albania's debt rule is augmented by various additional principles. If the projected annual rate of real economic growth exceeds 5 percent, the general government's cash deficit must be below 2 percent of GDP (article 4/1). The government is required to maintain 0.7 percent of anticipated expenditures in reserve to address unforeseen circumstances (article 4/1). Rules exist that restrict the rate at which deficits may accumulate during an election year; specifically, the actual expenditure for the first quarter may not surpass 30 percent of the projected annual expenditures (article 4/3). In addition, a new fiscal rule concerning the Primary Balance started to be implemented in 2024, mandated to be no less than zero. This indicator is measured as the difference between the government's net borrowing, excluding interest payments on the consolidated government statement. In each annual budget law commencing in 2024 and thereafter, the real primary balance shall not be negative.

The Albanian Public Finance Management Monitoring Reports of 2016 and 2017 indicated that excessively optimistic projections were a primary policy bias identified in previous assessments. The fiscal rules introduced in the OBL in 2016 initially mitigated this bias and subsequently produced a predictable decline in public debt. By the conclusion of 2016, the anticipated nominal GDP was lower than that forecast in the World Economic Outlook, and the debt-to-GDP ratio for 2016 was reduced compared to 2015. The 2017 Annual Budget preparation considered several significant efforts, including the broadening and rationalization of the tax base, the reduction of structural change costs, and further measures aimed at further decreasing the public debt-to-GDP ratio. The Ministry of Finance must report to the Assembly and the Council of Ministers regarding the adherence to the fiscal rules established in the OBL to guarantee that fiscal consolidation progresses appropriately and that debt is reduced as outlined in the same legislation. These rules have been included into the public financial management strategy to enhance and ensure their adherence. Conversely, the Ministry of Finance of Albania annually prepares the Macroeconomic Fiscal Framework, which outlines the government's objectives concerning key fiscal policy indicators, including the overall fiscal deficit, borrowing, public debt, and both primary and current fiscal balances. Based on this framework, ceilings for Medium-Term Budget Planning are also set at the ministerial level. Additionally, a specific section is included for adherence to these rules.

As previously said, the literature indicates that governments frequently augment expenditures in election years and reduce revenues through tax reductions to influence voting choices. In Albania, parliamentary elections take place every four years. Between 1993 and 2023, elections occurred as scheduled, notwithstanding the early elections held in 1997. The graph below presents how public debt and economic growth performed in election years[4] before and after fiscal rules.

The graph shows that public debt and economic growth fluctuate throughout time. A fiscal rule of 60% of GDP was needed due to high public debt in 2000–2003. Despite this rule, public debt exceeded this level from 2012 to 2022 and dropped below 60% in 2023. If we analyze debt course direction in election years, the paper indicates that before the establishment of fiscal rules, public debt changed more annually than after. Except for 2001, public debt increased in all election years before fiscal rules were established. After that, public debt ration dropped by 2.2 percentage points in 2017, and in 2021, it rose by 0.2 percentage points. According to data, after the establishment of fiscal rules, economic growth increased in both the 2017 and 2021 elections, with 2021's growth rate being much quicker due to economic policies and regulatory actions.

[4] Election years are coloured in red on each graph.

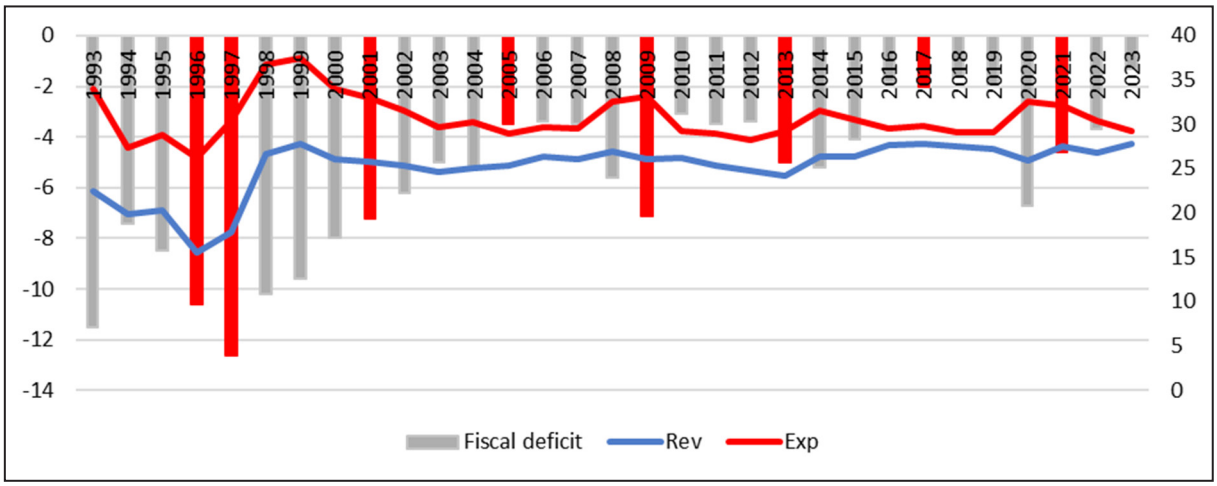


Graph 1. Public debt and economic growth performance before and after fiscal rules

Source: Ministry of Finance and Economy (2023)

In the following, the paper will examine the political budget cycle by analyzing the fiscal balance (fiscal deficit), alongside the performance of revenues and expenditures. The aim is to assess whether fiscal rules have influenced the fluctuations resulting from elections and how these indicators fluctuated in election years prior to and after the implementation of fiscal rules? The information is presented in the graph below for all election years at the central level from 1993 to 2023.

According to the data, Albania experienced a budgetary deficit throughout this period, marked by considerable volatility in revenues, expenditures, and, consequently, the fiscal deficit. In 1997, there was a significant escalation in the budget deficit, attaining the peak amount for the analyzed period. The peak fiscal deficit occurred prior to the implementation of the first fiscal rule in 2008. Conversely, following the introduction of fiscal principles and regulations in 2016, the fiscal deficit exhibited a consistent decline, except for the years 2020 and 2021, which were adversely affected by the earthquakes in Albania in 2019 and the Covid-19 pandemic in 2020. According to the research, budget deficits typically rise during election years, with the exceptions of 2001, 2005, and 2021. Nonetheless, there have not been consistent instances of revenue decline or expenditure increase concurrently during election years, and even when such occurrences have happened, the extent of the fluctuations in these indicators has varied.



Graph 2. Fiscal deficit, revenues and expenditure performance before and after fiscal rules

Source: Ministry of Finance and Economy (2023)

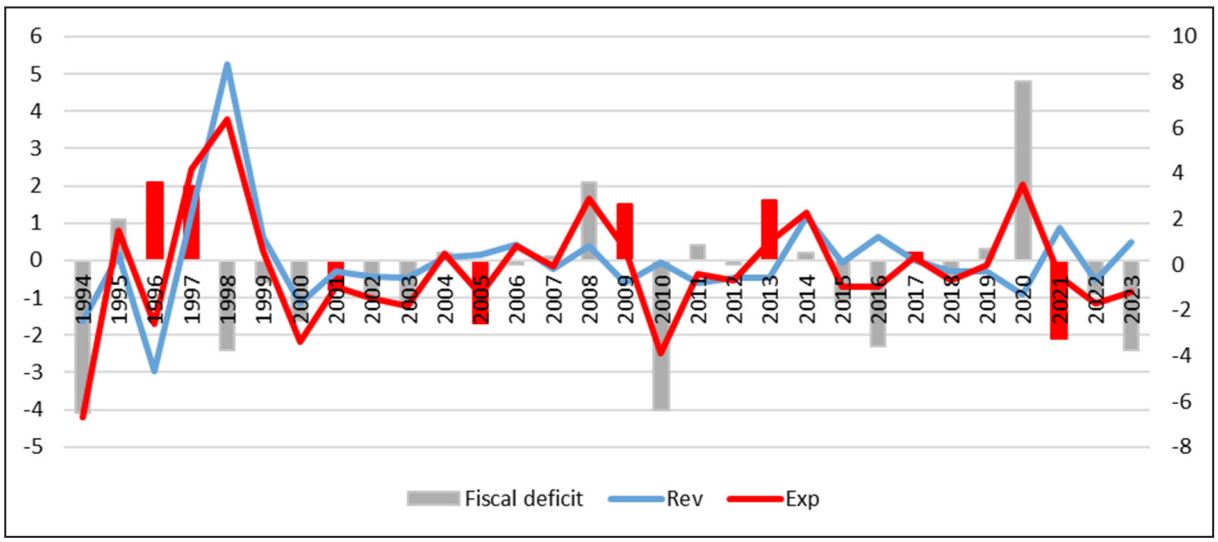
The table below encapsulates the course direction for each of the indicators.

Table 1. Fiscal indicators and their course direction during election years

Election year	*Revenue*	*Expenditure*	*Fiscal Deficit*
1996	Decrease	Decrease	Increase
1997	Increase	Increase	Increase
2001	Decrease	Decrease	Decrease
2005	Increase	Decrease	Decrease
2009	Decrease	Increase	Increase
2013	Decrease	Increase	Increase
2017	Increase	Increase	Increase
2021	Increase	Decrease	Decrease

Source: Own processing

What has been the year-over-year volatility of revenues and expenditures?

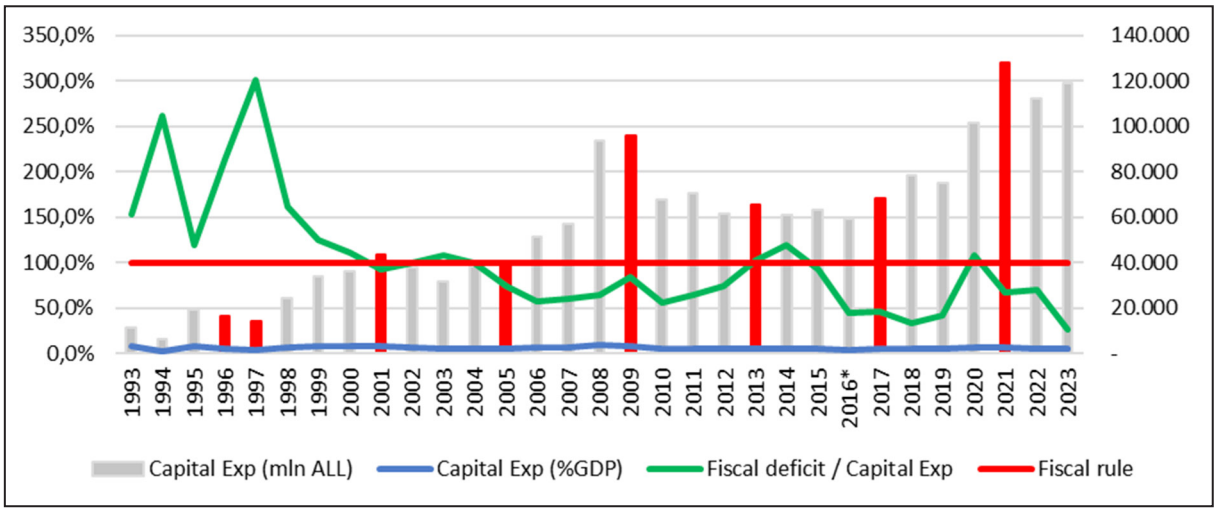


Graph 3. Annual change (in %) in revenues, expenditures and fiscal deficit
Source: Ministry of Finance and Economy (2023). Own processing

The graph above clearly indicates that spending experienced greater volatility over the analyzed period. The most significant increases occurred in 1998, 2008, 2014, and 2020, coinciding with the pre-election or post-election year. The revenues had the most significant decrease in 1996, 2000 and 2020, coinciding with the election and pre-election year. The increased volatility of spending has influenced the volatility of the fiscal deficit concurrently. The average budget balance of extended political budget cycles resulting from 'no rules' cycles is roughly 0.07 percentage points of GDP. The average expenditure in election years prior to fiscal rules is 0.01 percentage points of GDP higher than that of pre-election years, meanwhile, after fiscal rules, this average is 0.003 percentage points lower. On the revenue side, these percentages are respectively 0.023 lower and 0.035 higher. The political budget cycle's magnitude is less pronounced after the establishment of the fiscal rule, with average fiscal deficit in the last two elections decreasing by 0.1 percentage points of GDP compared to the pre-election years. In contrast, prior to the fiscal rule's establishment, this average was 0.13 percentage points higher than that of the pre-election years. Nevertheless, we cannot ascertain if the fiscal rules have ameliorated the budget deficit or mitigated the government's behavior during election years. This is due to the fact that following the establishment of fiscal rules and principles in 2016, only two parliamentary elections have occurred, specifically in 2017 and 2021. Despite a

modest increase in the fiscal deficit in 2017 (0.11 percentage points), the reduction in the deficit in 2021 may be more attributable to the recovery from the earthquake and Covid-19 pandemic crises, thereby 'distorting' the data regarding the absence of a political budget cycle.

Capital expenditures are often considered the main 'manipulator' of voter behavior. A wide range of research supports the hypothesis that governments often increase capital expenditures during election years to guarantee re-election. Does this phenomenon also occur in Albania, and what implications do the fiscal rules established in 2016 consist of?



Graph 4. Political budget cycle in capital expenditure and adherence to fiscal rule

Source: Ministry of Finance and Economy (2023), Own processing

The graph indicates significant variability in capital expenditures in absolute terms throughout the years. Except for the election years 1996 and 1997 (the latter being untimely), an increase in capital expenditures is observed in election years relative to pre-election years in all other cases. This has also occurred in election years after the implementation of the fiscal rules. The political budget cycle's magnitude is more pronounced following the implementation of the fiscal rule, with average capital expenditures in the last two elections rising by 20% (or 0.1 percentage point of GDP) compared to the pre-election years. In contrast, prior to the fiscal rule's establishment, this average was 0.2% (or 0.07 percentage points of GDP) lower than that of the pre-election years. Concerning adherence to this regulation, a 9% deviance was observed in 2020, followed by a notable reduction in the subsequent years.

5. FUTURE RESEARCH DIRECTIONS

This paper examines the extent to which fiscal rules in Albania mitigate the political budget cycle, including fiscal indicators such as public debt, fiscal deficit, total revenues, and total expenditures. However, specific concerns may be investigated in subsequent papers within this area in Albania. The analysis could be improved by examining the composition of revenues and expenditures to identify areas with bigger variations during election years. Another avenue for research could involve examining variations between actual and estimated revenue and spending realizations, as well as identifying normative budgetary acts, particularly in election years, and the precise changes enacted. An empirical evaluation of the impact of fiscal rules on the political budget cycle in Albania may be of greater significance. Another research direction could involve a comparative analysis with several other Southeast European countries and/or Western Balkan countries. This may establish a basis for

assessing how regional and diverse political or economic aspects influence the interest in and advocacy for political budget cycle reduction via fiscal rules. The role and impact of international institutions in the enforcement of fiscal rules is another relevant topic. Fiscal rules during European integration and enlargement may necessitate that Western Balkan countries adopt similar strategies for fiscal policy.

6 CONCLUSION

The paper demonstrates the presence of pre-electoral and electoral political budget cycles from 1993-2023. The research findings indicate that Albanian politicians pursue fiscal expansion before elections to improve their chances of re-election. The average budget balance of extended political budget cycles resulting from 'no rules' cycles is roughly 0.07 percentage points of GDP. The average budget balance during election years, after setting fiscal rules, results in a surplus of 0.1 percentage point of GDP. A noticeable reduction in the budget deficit occurs after each electoral year, except for 2013, which had a subsequent increase in the fiscal deficit. This may pertain to the diverse policies and commitments adopted by the newly governing party, wherein one of the issues requiring action was the arrears accumulated until 2013.

In addition, the expenditure approach demonstrates the existence of a political budget cycle, marked by increased budgets during pre-election and election years. The influence of elections is more pronounced in the early years of the electoral cycle, in which the average expenditure with 'no rules' cycle is 0.01 percentage point of GDP higher than in pre-election years. Concerning capital expenditure, there is 0.1 percentage point GDP increase in average capital expenditures in the last two elections compared to pre-election years, amplifying the political budget cycle, and 0.2 percentage point GDP decrease in elections before the fiscal rules.

Given that expenditure fluctuations influence the magnitude of the political budget cycle in Albania, it is recommended that the Ministry of Finance reassess fiscal rules and principles and consider the enactment of a fiscal rule on the expenditure side to achieve the essential effects in mitigating political budget cycles.

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Capital Gain Tax Impact on Affordable Housing. The Case of Albania

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Abstract: *Housing plays an important role in our lives. Access to shelter is a basic human right and a key determinant of individual welfare. Different factors such as high prices, level of income, construction costs, and supply shortages can restrict the ability to afford a house. Except for private sector development, affordable housing can often rely on public policies such as tax incentives or low-interest loans to developers. The authors focus on capital gain tax as an important instrument that can affect the supply of housing, especially when it comes to investment properties. If capital gains taxes are high, real estate investors may be less inclined to buy or sell properties, potentially limiting the availability of homes on the market and driving up prices.*

1. INTRODUCTION

The housing market in Albania is influenced by various factors that impact both demand and supply. These factors include economic, demographic, regulatory, and social dynamics, and they shape the overall trends in property prices, rental rates, and construction activity. In the last 10 years, substantial efforts have been made towards the formalization of this market. Incentives and fiscal interventions can contribute to solving the problems of this sector. Capital gain tax is considered important in the decisions of sellers of immovable properties in the real estate market. A fiscal incentive of lowering the tax from 15% to 3% has shown success in increasing the transactions in this market. The aim of the study is to investigate the impact of the reduction of capital gain tax on increasing transactions in the housing market. For this reason, every owner who can benefit from the positive developments in the housing market will have the opportunity to fully transfer the increased house value to the market, contributing to an increase in formalized transactions and money circulation.

Data collection involves a comprehensive review of secondary sources, including academic literature, policy documents, and reports from national and international organizations such as the OECD, IMF, INSTAT, NAREA, etc. Key focus areas include the impact of the capital gain tax on prices and transactions in the housing market. Data analysis follows a thematic approach, identifying the importance of the real estate market from a micro and macroeconomic perspective and trends of development in Albania in recent years. The study evaluates the initiative of lowering the capital gain tax based on criteria such as its impact on housing market transactions. This study is the first step in analyzing real estate dynamics by taking into consideration these two variables and the extension of the model with other factors will be subject to future work.

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2. THE IMPORTANCE OF THE HOUSING MARKET FROM A MACRO – AND MICROECONOMIC PERSPECTIVE

The housing market is an important instrument of economic development. From a macroeconomic perspective, it affects overall economic growth, inflation, employment, and financial stability. The housing market is significant from a microeconomic perspective, too. The housing market impacts a wide range of microeconomic factors, from consumer behavior and wealth distribution to producer decisions and labor market dynamics and externalities. Changes in the housing market can have significant ripple effects on economic stability, social equity, and individual well-being.

2.1. Macroeconomic Context

The housing market affects the aggregate demand and total production through different channels. If there is an increase in the demand for housing investments, this can lead to higher prices and an increase in employment in the construction sector. Other markets related to the construction sector, such as raw materials and distribution, home improvement, and insurance, will benefit. A stable or booming housing market can create jobs, stimulate income, and reduce unemployment. The increase in employment and the increase in aggregate demand through investments can positively contribute to economic growth. The increase in prices and profitability can attract more investors and boost the supply of housing, especially in the long run by increasing the availability of housing and reducing prices. This new situation can alleviate the consumption of households by reducing housing expenditures.

The housing market is deeply intertwined with the financial sector, particularly through mortgage lending. If there is a high offer for housing, banks may lend more, increasing leverage in the economy. The level of lending can also be influenced by the reduction of interest rates through Central Bank monetary policy. When central banks lower interest rates, mortgage rates typically decline, making housing more affordable, which can stimulate demand for homes and increase economic growth. The housing market serves as a key transmission mechanism for monetary policy. Changes in interest rates directly affect the affordability of borrowing, influencing both consumer demand for housing and the broader economy's investment decisions.

The housing market can also create risks to the economy. High prices and high rents in the housing market can lead to an increase in the Consumer Price Index, putting pressure on inflation. Higher inflation can decrease disposable income, reduce household consumption and economic growth and make it less affordable to buy houses. The instability of prices in the housing market can expose high levels of mortgage debt relative to income households to economic shocks. When housing prices fall, highly leveraged homeowners may face a situation of owing more on their mortgages than their homes are worth. Historically, housing market crashes have been a significant factor in financial crises. For example, the 2008 global financial crisis was triggered by a collapse in the housing market, which caused widespread defaults on subprime mortgages and led to the collapse of major financial institutions. Housing market developments can also create economic disparities between regions and contribute to migration and labor mobility.

Nevertheless, these theoretical considerations, according to OECD (2022) on average, spending on housing has increased in recent decades, though there are large differences across countries. There has been a gradual increase from 1995 to 2013 in OECD countries, from 20.7% in 1995 to 21.3% in 2007, on average and a more rapid increase from 2007 to 2009 and an increasing trend until 2013 (to 23.3%) (OECD, 2022). After that, a gradual decline until 2018 (22.4%), yet above the 1995 levels. Since 2019, the share of housing-related expenditure has again increased, with the

largest annual increase of 8%, reaching its peak in 2020 (24.4%). Housing investments can also be assumed to affect the production factors by improving housing conditions, which in turn has effects on human capital. The positive effects on human capital can increase the productivity of the economy. The increase in housing market transactions, at a certain level of capital gain tax, can increase government revenues and strengthen the fiscal balance.

2.2. Macroeconomic Context

Owning a house can also be seen as an investment from a household perspective. For many households, their home is their largest asset. They can sell the house and benefit from the capital gain from the difference between the sale and purchase price. Changes in housing prices affect household wealth and influence consumption behavior. They can increase their profits and create better conditions of living and higher welfare.

Profitability can be affected by the capital gain tax. High capital gains tax rates can discourage short-term transactions in real estate, and this can reduce market liquidity, as fewer investors are willing to sell properties quickly for a profit. These high taxes can also increase the prices of housing properties to compensate for the tax burden. This can potentially lead to pushing up property values, particularly in areas where demand is high. The higher the values of housing properties, the higher profits for the sellers, but less affordability for the buyers, creating discrepancies in the housing market. If fewer properties are bought and sold due to tax concerns, the reduced inventory could lead to higher prices, especially in popular areas. Capital gain tax structure can influence short-term and long-term relations between demand and supply in the housing market. Households will postpone selling properties if they have a tax exemption for living in a house for several years and then selling it.

The level of prices can influence household decisions in buying or renting properties. Rising housing prices can increase income inequality, as those who own homes may see their wealth grow, while renters may struggle with higher rents and buyers' interest rates and mortgage loans. This disparity can affect social mobility and contribute to economic inequality. When housing becomes too expensive for a significant portion of the population, it can lead to housing instability, higher demand for rental properties, and shifts in the local economy. The affordability of homes is also influenced by interest rates. When interest rates are low, mortgages are cheaper, which can stimulate demand for housing. Conversely, high interest rates can deter potential buyers, reducing demand and impacting housing prices. The ease with which individuals can access financing, through mortgages or other credit options, also plays a significant role. If banks tighten lending standards, fewer individuals may be able to buy homes, leading to a decrease in demand.

The housing market can also create externalities. For example, new housing developments can lead to improvements in local infrastructure, such as roads and schools (positive externalities). On the other hand, overdevelopment or poorly planned housing can result in overcrowding, environmental degradation, or reduced public service quality (negative externalities).

3. LITERATURE REVIEW

There are two ways to indirectly promote an increase in housing investments: either to directly increase the demand or to improve the profitability of the investments. The sale of the immovable property is generally subject to a capital gains tax, where the difference between the sale and the overall purchase price is taxed in most countries. The structure of capital gain taxes can increase prices or decrease the profits of individuals selling housing.

Fuest et al. (2004) have studied the effects of capital gains taxes on house price fluctuations and the user cost of housing by using an OLG model. The results of this paper suggest that capital gains taxes increase house price fluctuations and redistribute income from the poor to the rich unless extreme assumptions on the use of the revenue from the capital gains tax are made. When individuals buy houses in times of economic crisis, they can make a capital gain on their real estate investment. If a capital gains tax is introduced, it reduces the losses of the high-income earners and reduces the capital gains of low-income earners. Norregaard (2013) considers a positive aspect of property taxes, especially on efficiency and equity. The exemption from property taxes can increase the use of housing for living.

Gholizadeh (2014) suggests that capital gain taxation can be defensible if it can reduce price risk as well as increase investment growth. In his study, he found a significant negative effect of capital gain tax on the housing price bubble and real prices. He also concluded that the capital gain tax structure can contribute to more efficient results in property markets compared to countries that lack this structure. Another study that has found important effects of immovable property tax on prices is that of Oliviero et al. (2016). Their sample is compounded by 34 OECD countries. In their paper, they showed that countries that experienced an increase in the immovable property tax also experienced significant deflation in the national housing market. They do not take into consideration possible welfare effects associated with higher property taxation and lower house prices, but their cross-country evidence suggests that the possible distortionary effects of this tax for such an important market as the housing market should not be neglected.

Muli and Ombati (2020) have studied the relationship between capital gain tax and the performance of the real estate in a municipality in Kenya. The study established that there was a significant positive relationship between the reduction of capital gains and performance of the real estate market, identified through the Correlation Coefficient, which determined the strength and direction of the relationship between both variables. Diamond (2021) also analyzed the economic effects of the capital gain tax in his working paper. Among other effects, he identified that increased capital gain tax decreases the investment value, creating a misallocation of capital between owner-occupied and other assets, and the portfolio of investors.

The economic rationale for tax reforms in the real estate market is strong, according to Leodolter et al. (2022). A well-designed tax on immovable property should foster efficiency and reduce inequality, increase affordable housing, and improve the economic position of middle-income individuals. Prammer (2021) is in the same line of argument that shows that most EU countries use low-level taxation and generous exemptions for the main residence. Capital gains on the main residence are tax-exempt, subject to a minimum time of tenure (2-5 years) or provided that the capital gains are reinvested in the acquisition of a new main residence. If immovable property is transferred charge-free in the case of an inheritance or gift, the transfer is subject to inheritance/gift tax in about half of the EU member states.

4. DEVELOPMENTS IN THE HOUSING MARKET IN ALBANIA

The Real Estate sector, like many other sectors, started to develop in Albania 2 years after the fall of Communism and the introduction of the free economy model. The development model of this sector has been far from state regulation and generally chaotic. In its 30-year history, this sector has sometimes developed through the model of real estate offices and sometimes through individuals who simply conveyed information from the existing owner to the new one.

Despite the lack of regulation, the sector transactions increased from year to year, recognizing its lowest point during the Global Financial Crisis of 2008. In the last 15 years, the market has

grown steadily, about 5%/year, rising from 17 billion ALL/quarter to 30 billion ALL in the third quarter of 2024. It is estimated that there are about 37'000 Sales Contracts per year and during the periods of application of the corrected Capital Gain Tax, and revaluation campaign, this number goes over 39,000 (INSTAT 2024; NEREA, 2024).

According to INSTAT (2024), Real Estate Activities and the Construction Sector, after the construction moratorium between 2008-2015, almost a decade, have maintained a weight of 5% and 15%, respectively, without ever falling below the level of 19.5-20% of GDP. The real estate market in the last 8 years, starting the recovery in 2016, has seen a steady growth between 12%-15% year after year (INSTAT, 2024). During all these years, attempts have been made to formalize the real estate sector. Following its aspiration towards the European Union, Albania must present new legal initiatives, regulating this sector through a special law. Thus, from January 2022, through Law No. 9/2022, the Real Estate sector is regulated as an important public profession, a free and licensed profession. Currently, about 350 Offices and over 1,500 Real Estate Agents operate in this market.

In 2021, after the pandemic, the trinomial relation between construction - real estate - and tourism, are carrying the burden of 1/3 in GDP, increasing investment opportunities and challenges of sustainable housing. Property prices and rents, in recent years, have seen a steady increase, reaching the level of 55% for the period 2015-2024 (INSTAT, 2024). In the last 5 years, thanks to the promotion of Albania, Foreign Direct Investments in real estate have seen steady growth, reaching the level of 323 million EUR during 2023. The increase in demand from foreign buyers and visitors has been accompanied by an increase in the value of properties, especially in coastal areas.

The real estate industry, navigating between the regulations implemented in 2008 and then in 2022, is found today not only as a guiding pole for construction and tourism but also as the sector from which it is expected to address the housing challenges. To address this issue, the focus should be at least on two influential factors such as the formalization of transactions and capital gain tax.

Although a free but regulated profession, the sector faces many challenges in terms of formalization. From the official data of NAREA (2024), there are 1695 licensed entities in this profession, and the licensing process provides for a check of the purity of the image. Regardless, a rigorous licensing process and the lack of coordination between the Center for Registering Businesses and the Ministry of Justice have left the sector exposed to opportunities to operate in full or partial informality. Besides the attempts with the formalization of the transactions, the high rate of expansion of the sector, on average 5% year over 15 years (INSTAT, 2024), has left free space for the use of funds of a dubious nature. In the absence of an affordable Capital Gain Tax, currently at 15%, the incentives to lure sellers and carry out avoidance, and evasion, have been high. This has reduced the possibility of accessing the market from the middle class, those who use financial institutions, and who comprise about 60% of users of Real Estate services (NAREA, 2024).

5. HOUSING MARKET TRANSACTIONS AND CAPITAL GAIN TAX

During the last years, the real estate sector has expanded. Apart from the increase in demand because of the increase in tourism and the purchase of properties from abroad, fiscal incentives have also had an impact. Currently, since 2023, the general rate for capital gains tax on property transactions in Albania is 15%. This rate applies to profits made from selling real estate, with deductions allowed for the original purchase price and certain other costs (e.g., improvements made to the property). For some property investors, the 15% tax rate could significantly affect profitability, particularly if they are not planning to hold onto properties long-term.

From time to time, the government has undertaken policies to reduce the tax rate to 3% and reevaluate real estate. The most recent revaluation period was 2020-2022, where an increase in transactions in the real estate market was observed from 25,538 in 2019 to 37,900 in 2022 (NAREA, 2024). This is the highest value of transactions in the last 12 years. The graph below shows the trend of the volume of transactions in the real estate market and capital gain tax rates.

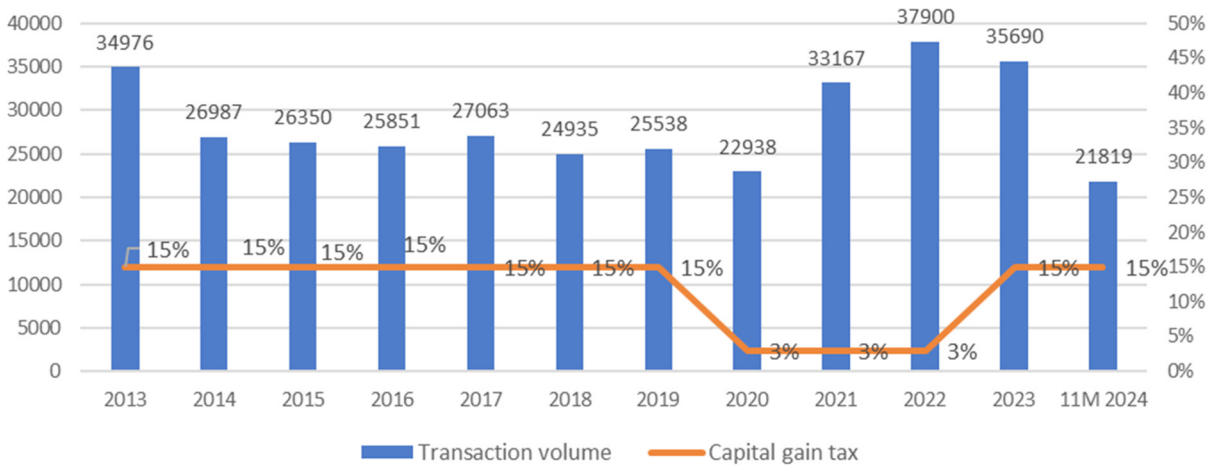

Figure 1. The trends of real estate transactions and the different levels of capital gain tax
Source: INSTAT (2024) and NAREA (2024)

According to the graph, during the period 2014 - 2019, the volume of transactions was at similar levels. During the year of the 2020 pandemic, there was a decrease, even though the rate of capital gain tax has been reduced with the aim of property revaluation, as there are many residential houses built before the 1990s that must be revalued to be part of the market. The increase in the tax rate can be considered one of the factors that influenced the drastic decrease of 38 percent of transactions until November 2024. This fact is also supported by the very low decrease of only 1 percent of total transactions involving construction NAREA (2024). So even though the construction sector shows stability, the real estate sector is suffering a noticeable decline.

This decline can be explained by the decrease in the number of transactions due to the increase in the fiscal burden, but also by an increase in informality, as people try to avoid taxes. The growth of informal transactions in the real estate market would be a step back towards formalization. According to NAREA (2024), in a cross-data reference between Real Estate Activity - Real Estate/ Housing Loans - FDI in Real Estate - Remittances - Building Permits (average lifespan 48-60 months) - Inflation Rate - Salary level, it turns out that about 12-15% of this sector is influenced by the gray economy. This harms investments and mainly the middle class, which uses the formal channels of the economy to buy or sell properties in the real estate market. Another potential explanation is the suspension of the transactions because of the government announcement for another revaluation campaign and a 3% capital gain tax in 2024. But still, nothing has started even at the beginning of 2025, distorting the real estate market.

The limitations are related to the number of observations and the relatively short time of the fiscal incentive application. The focus of future research would be the broadening of the model by including other factors that may have an impact on market transactions.

6. CONCLUSION

Housing market is an important sector of the economy. From a macroeconomic perspective, it affects overall economic growth, inflation, employment, and financial stability. The housing market is significant from a microeconomic perspective, too. The housing market impacts a wide range of microeconomic factors, from consumer behavior and wealth distribution to producer decisions and labor market dynamics and externalities.

The real estate market in Albania over the last 10 years has seen a steady growth of between 12%-15%. The sector has expanded more in recent years due to the increase in demand, tourism, and the reduction of capital gains tax. While the 15% tax rate, which is actually the tax in force, is relatively low compared to other countries, it can still impact market liquidity, pricing, and investment behavior. It may discourage short-term speculation but can promote long-term investment and stability in the housing market in the case of formalized markets. In the case of Albania, where the formalizing process of this market is still in place, the reduction of capital gain tax will have a positive contribution in expanding the sector. This was highlighted in the paper analysis. Another best practice from developed countries that can be taken into consideration is the exemptions for primary residences held for more than two years, which can incentivize homeowners to stay in their properties longer, reducing the frequency of sales, but making better use of the property. At the same time, high taxes can push some transactions into the informal market or deter foreign investors. Overall, the capital gains tax contributes to the dynamics of supply and demand in the Albanian housing market and influences both domestic and international investment trends.

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Analysis of Risk and Uncertainty in Oil Projects: The Case of Albpetrol

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Uncertainty

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Abstract: *The oil industry is among the oldest sectors in Albania. Due to the limited research conducted in the country, this study aims to contribute to expanding the existing literature and empirical insights. The goal of this research is to provide opportunities for better-informed decision-making. While understanding the past is relatively straightforward, forecasting the future is more challenging. This inherent uncertainty creates numerous issues when developing a financial plan for a company. This paper analyzes modeling and simulation techniques used in decision-making for petroleum projects. To achieve our objectives, we first examine the challenges of risk and uncertainty, as both significantly influence the decision-making process at the beginning of investment projects. Accurately predicting risk and uncertainty is essential for any company. To define and explore the concepts of "risk" and "uncertainty," we have applied qualitative and quantitative approaches, including Sensitivity Analysis and the Monte Carlo Method. Using these methods, we predict different scenarios for the Net Present Value and work towards optimizing the Net Present Value. As a result, we calculate the Net Present Value for petroleum production in each scenario.*

1. INTRODUCTION

Risk analysis is a crucial component in almost all enterprises, and many studies focus on it. In the oil sector, risk and uncertainty analysis requires expanded use of probabilistic methods to predict economic and financial data and a more profound evaluation to optimize results and minimize uncertainty. Like any other business, investing in the oil sector is based on assessing the project's profitability. But first of all, are the forecasted project's benefits certain? What happens if the costs exceed expectations during the implementation phase? And what if there are any delays? Can advanced models optimize financial results by managing risk and uncertainty? This paper aims to answer these questions by analyzing the company's management in the context of risk and uncertainty in oil projects and, at the same time, tries to improve the general performance of companies operating in the oil sector. The research focuses on the case of Albpetrol, a company operating in Albanian's oil sector for several years. Through simulation of risk analysis and the Monte Carlo method, we aim to optimize Albpetrol's various economic and financial indicators. The economic indicators analyzed include size, coverage, age, well drilling, minimum rate, facility costs, marginal oil price, coverage completion, evaluation rate, and well cost. Meanwhile, the financial data are found in the company's published financial statements, including the balance sheet, income statement, and cash flow statement. This study's innovative aspect lies in using risk analysis and simulation models to forecast Net Present Value using the Crystal Ball Program.

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2. RESEARCH METHODOLOGY

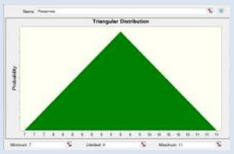
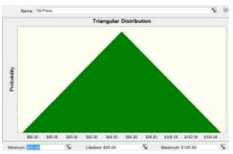
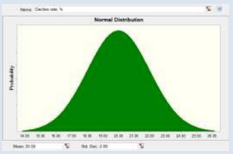
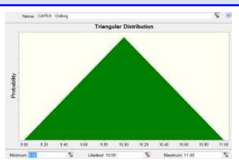
2.1. Risk Analysis Method

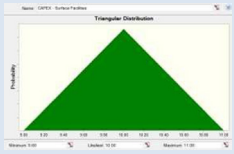
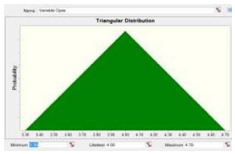
Risk analysis is essential for every organization during the decision-making process since it is present in all aspects of a company. Conducting a risk analysis can provide valuable insights, especially since companies always use the data to solve problems, make predictions, develop strategies, guide the decision-making process, etc. The main goal of the risk analysis method, in both qualitative and quantitative cases, is to help decision-makers choose the right action and simultaneously have a clear picture of the possible outcomes. Risk analysis comprises three components: assessment, management, and communication. Simulation as a tool for risk analysis in decision-making was first applied to oil exploration investments in the 1960s (Grayson, 1960). This method can be used for any type of calculation involving random variables. It can be used to answer technical questions such as "What is the volume of recoverable hydrocarbon reserves in an area?" or economic questions such as "What is the probability that the NPV of this expectation exceeds the target of $x million? (Bailey et al., 2000).

2.2. The Monte Carlo Simulation Method

The case of Albpetrol Company illustrates a reliability analysis aimed at maximizing Net Present Value (NPV). A direct analytical method can be used to address this problem. If the input variables follow a normal distribution, the production margin (oil) also follows a normal distribution, whereas the discount factor does not (Mjeda, 2018). Given that an exact solution to this problem exists, we compare it with the Monte Carlo simulation to validate it. For each trial, two random numbers, x, and y, are generated with a standard Normal distribution. The Monte Carlo simulation was performed for 100 and 1000 trials, producing results for both correlated and uncorrelated variables. The corresponding graphs illustrate the findings, showing that smoother graphs generally indicate more accurate results.

Table 1. Input variables and assumed distributions

Independent Variables	Distribution	Form	Input
Reserve	Triangular		**Minimum Possible Maximum**
Oil Price	Triangular		**Minimum Possible Maximum**
Discount Factor	Normal		**Average Standard Deviation**
Drilling Cost – CAPEX (investment)	Triangular		**Minimum Possible Maximum**

Surface facility cost – CAPEX (investment)	Triangular		**Minimum Possible Maximum**
Variable cost- OPEX	**Triangular**		**Minimum Possible Maximum**

Source: Bailey et al. (2000)

The simulation helps describe the risk and uncertainty associated with variables that influence project probability according to a probability distribution. In the NPV model, the uncertain variables that pose a risk in the calculation of the NPV are reserves, oil price, exponential decline rate, drilling costs - CAPEX, surface facilities cost - CAPEX, and the OPEX variable. The Monte Carlo method simulation has been conducted by using the Crystal Ball Program (Mjeda, 2018). The first step is to determine the assumptions about the distributions. The independent variables and their assumed probability distributions are defined in Table 1.

3. APPLICATION AND RESEARCH RESULTS

For 2023, we predict that "revenue" will be 4,152 million ALL and "expenses" will be 2,619 million ALL. Based on the projections, Albpetrol sh. a. 's "financial result" is expected to be 1,533 million ALL, indicating a potential profit of the same amount.

How sure are we that the profit will be 1,533 million ALL, or is there any possibility we will lose money in this forecast? Other questions can be challenging to answer without making a forecast or doing a simulation. We can make a representation as follows:

For "income," we have chosen a triangular distribution defined by its minimum, maximum, and most probable values, as shown in Figure 1. For "expenses" we have chosen a uniform distribution, as shown in Figure 2. In statistical and probability theory, the continuous uniform distribution, also known as the rectangular distribution, is a symmetric probability distribution where all intervals of the same length in the support of the distribution are equally likely.

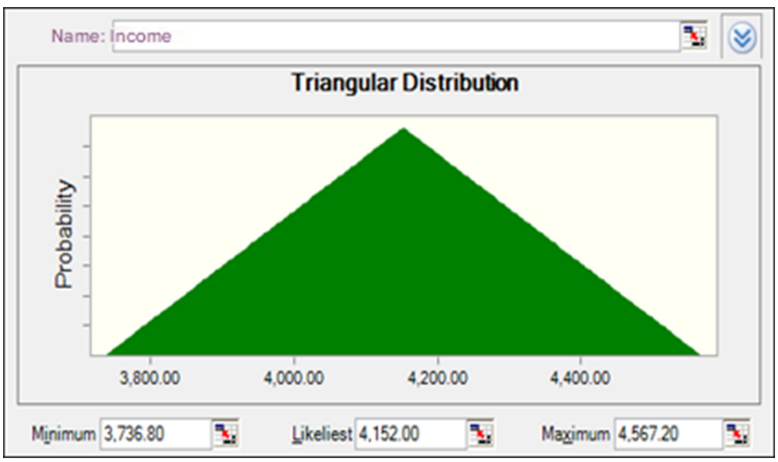


Figure 1. Triangular Distribution for Income

Source: Own processing

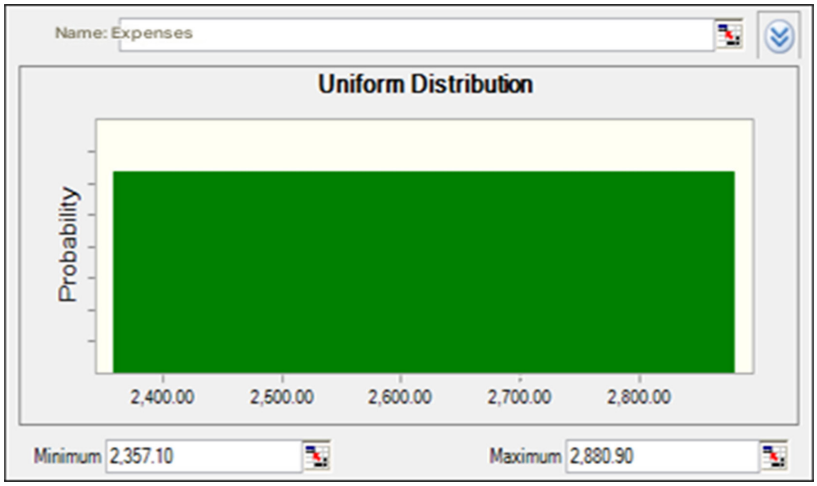


Figure 2. Uniform Distribution for Expenses
Source: Own processing

In the uniform distribution Figure 2, all values between the minimum and maximum are equally likely to occur, resulting in a spread probability distribution. The uniform distribution is defined by three parameters: the minimum, maximum, and possible values within this range. Three conditions underlie the uniform distribution: (1) the minimum value is fixed, (2) the maximum value is fixed, and (3) all values between the minimum and maximum are equally likely to occur.

In statistical and probability theory, the continuous uniform distribution, also known as rectangular distribution is a symmetric probability distribution in which all intervals of the same length in the support of the distribution are equally probable. In the continuous uniform distribution, all values between the minimum and maximum are equally likely to occur, resulting in a spread probability distribution. The continuous uniform distribution is defined by two parameters: the minimum value and the maximum value. Three conditions underlie the continuous uniform distribution: (1) the minimum value is fixed, (2) the maximum value is fixed, (3) all values between the minimum and maximum are equally likely to occur.

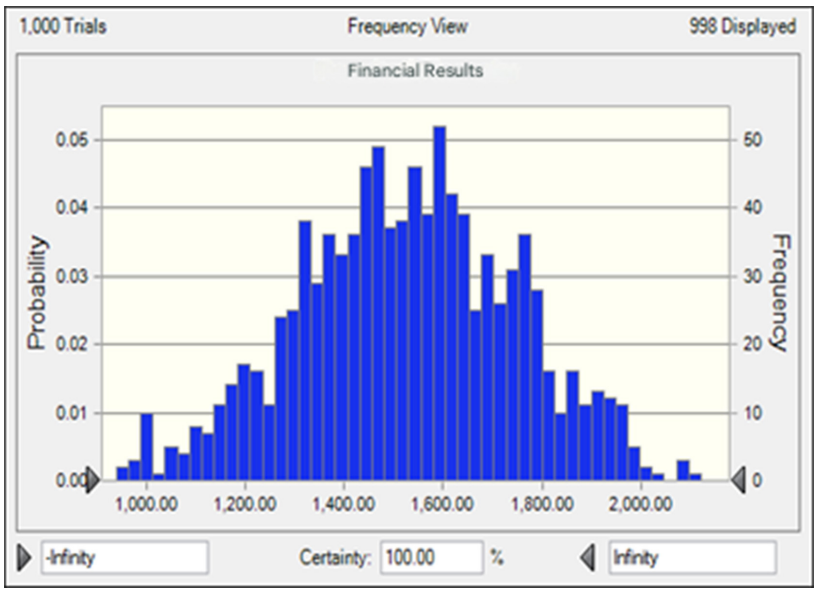


Figure 3. Financial Results with 100% certainty
Source: Own processing

The forecasted graph in Figure 3 shows the overall range of "financial results", representing the predicted outcomes for the scenario. Each histogram represents the likelihood, or probability, of earning income. The probability of a value falling within the negative and positive infinity range is 100 percent. We also see that 1000 trials are shown in the upper left corner of the table, but 998 appear in the upper right corner. The excluded values, if any, are called outliers. Outliers are extreme values included in the calculation but excluded from the forecasting scheme.

If we decide, as in Figure 4, that the profit result will be 1.533 million ALL, we are certain to make a profit of 50.84%.

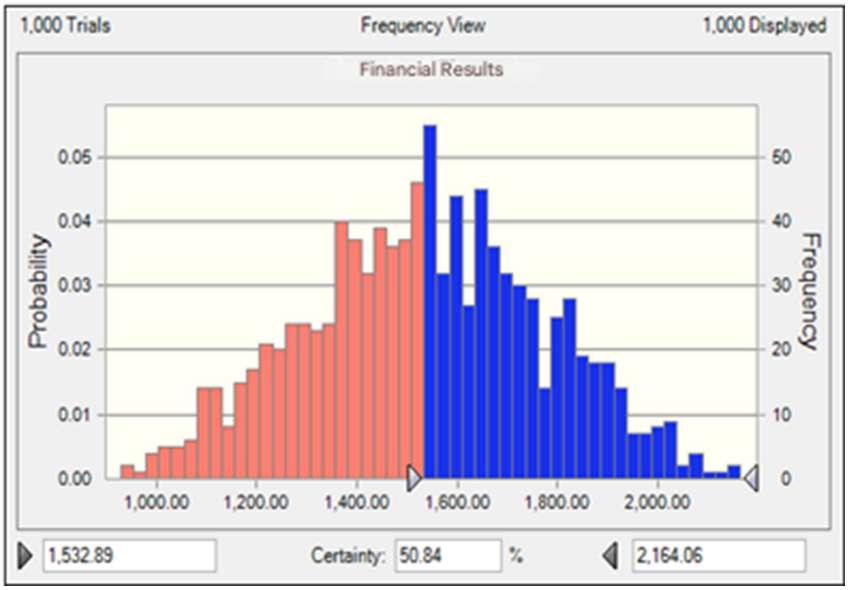


Figure 4. Financial Results 50% certainty

Source: Own processing

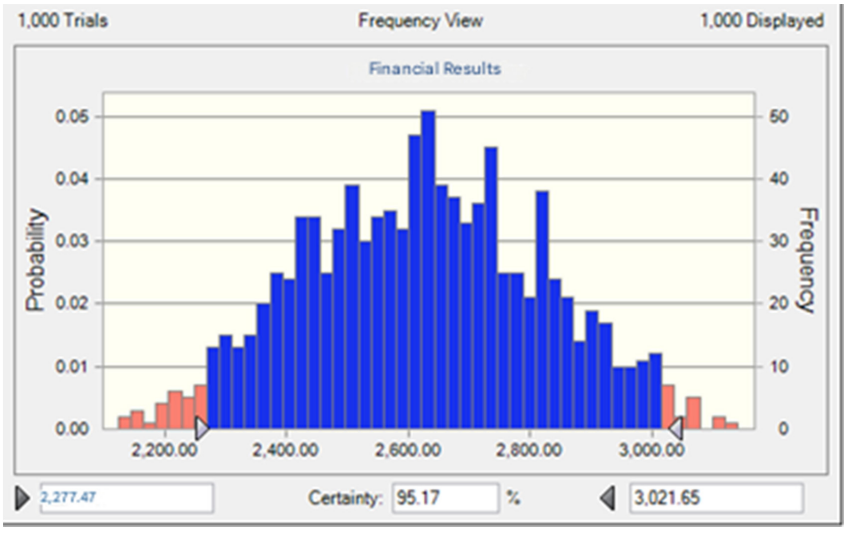


Figure 5. Financial Result with 95% certainty

Source: Own processing

Suppose we decide that our confidence is 95%, as shown in Figure 5. In that case, we have confidence that the company will generate money and profit with a minimum value of 2.277 million ALL and a maximum value of 3.022 million ALL.

The sensitivity graph is shown in Figure 6. The "income" variable has the most significant impact on the variability of the financial result, and the "expenses" variable has the least impact on the variability of the financial result, which means that we can actually control expenses better than we can control "revenue". If we can reduce the variability around expenses, we should be able to reduce the risk, the variability around profit, or the financial result. The "expenses" variable has a minus value and indicates a decrease in the financial result variable.

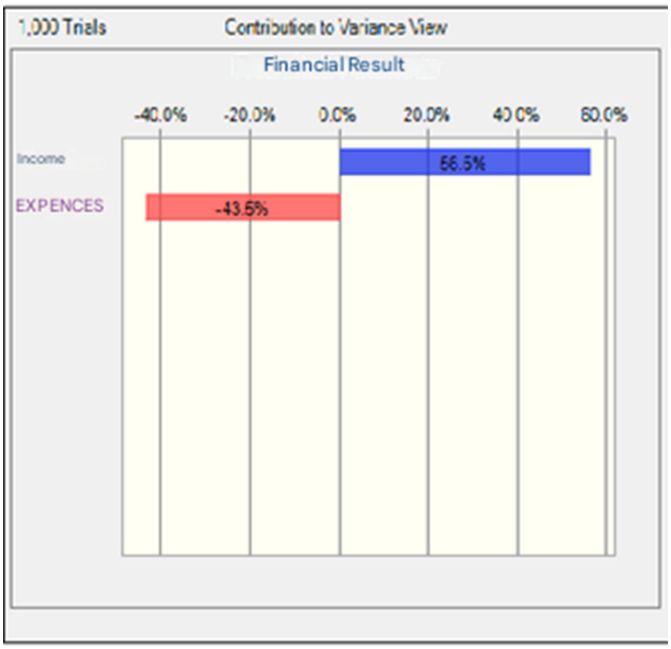


Figure 6. Tornado Chart, Financial Result
Source: Own processing

4. CONCLUSION

Finding optimal values for decision variables involves simulating a series of initial values, analyzing the results, changing one or more values, re-running the simulation, and repeating the process until we find a satisfactory solution. Specifically, simulation through the Monte Carlo method, with the Crystal Ball Program, is efficient and useful for making a better decision for oil development in Albpetrol Company. It can be said that the NPV (financial result) decreases with the increase in the number of iterations in the simulation. This is reasonable because when the number of interactions is higher, there is a convergence towards the average NPV (financial result). Using the simulation method has relative operational complexity and modeling difficulties, which cause concerns for users. In this regard, it is important to note that for specific real systems, due to the high costs involved, high complexity, maximizing NPV (financial result), or minimizing costs in the production of an oil field, this method can be applied and will reproduce with reasonable reliability in the reality of our subject. This paper presents an optimization scenario (by choosing decision variables, presenting objectives, and all constraints); OptQuest, through the Crystal Ball Program, evaluates the simulation model for different sets of decision variable values. OptQuest evaluates the statistical results from the simulation model, analyzes and integrates them with the results of the simulation flows, and determines a set of new values to evaluate. This is an iterative process that continuously generates new sets of values. Not all of these values improve the objective, but this process provides a very efficient trajectory for the best solutions over time. The search process continues until OptQuest reaches some termination criteria, either a limit on the amount of time devoted to the search or a maximum number of simulations.

Monte Carlo simulation is becoming the technology of choice for valuing and analyzing assets, whether financial derivatives or investments in real assets. Two of the main qualities of simulation are flexibility and simplicity. Simulation is also easy to implement, and models can be quickly built-in tabular formats. Many large firms, such as Wall Street, now use Monte Carlo simulation primarily when valuing assets, securities, etc. However, the Monte Carlo simulation benefits not only Wall Street but also professionals who analyze real investment problems. Simulation allows us to generate any number of possible predictions from a general specification of the cash flow distribution. Furthermore, we can create management policies that determine what should happen if the price, for example, increases (expanding the plant capacity) or what should happen if the R&D is successful (launching a new product). This paper shows the steps to follow to do a simulation project analysis. Most steps in such an analysis do not differ from those with a regular NPV (financial result) analysis. First, we create the cash flow model for the project. This step identifies all the relevant revenue and cost components, as well as planning life and the termination value. Second, we identify the cash flow components that are highly affected by uncertainty and choose mathematical models that reflect the case characteristics of the components. Third, we set the discount rates and the discounting method. The method and rates should reflect the types and forms of uncertainties.

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The Influence of the U.S. Presidential Elections over the American Stock Market Evolution

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Presidential elections;
Stock market;
Economic policies;
Investors

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Abstract: *Accounting for the relationship between the influence of politics over stock market evolutions, the present paper aims to take a snapshot on the recent presidential race in the United States of America and the progress of the stock market during the same overlapping period, comparing the two, in order to find an answer to the following question: how did the American presidential race influence the American stock market evolution in November 2024? Briefly, taking into consideration past presidential races, the paper searches for future potential developments based on the similarities between recent events and previous ones. In order to get to future possible scripts, the paper tries to find connections between American voters and investors on the American stock market based on their political preferences, gender and racial ethnicity in order to find future pathways of the development of the market.*

1. INTRODUCTION

Capital gains taxation represents an important economic leverage for governments in general, but the consequences of capital gains taxation on investors' behaviour and the capital market are complex. The present paper uses game theory in order to model the interaction between the U.S. administration and capital market investors based on data regarding the annual return of the S&P 500 index. The aim of the paper is to determine optimal strategies so that both parties can maximize their gains without generating significant economic conflicts.

In the 2024 run for the U.S. presidency, two candidates with different economic policies and different views over the future of the financial evolution of the U.S. ran for office.

Taking the close run into consideration, we ask ourselves how the investors on the U.S. stock market decided who to vote for when it comes to stock market returns and fiscal policies that influence their payoff as investors.

On one hand, we have the republican candidate, a person who already served a mandate as the president of the capitalist world, a successful business owner whose policies include ending inflation, tax cuts, and taking serious restrictive actions against lawful and unlawful immigrants. Not the least, Trump is an unpredictable person with great influence and his actions can cause reactions throughout the international community, for example his April Fool's Day joke and also let us not forget that according to Siganos (2024), "a politician's fake news temporarily impacts financial markets" (p. 13) and to Gori et al. (2024) "as markets have become more familiar with Trump's political strategy and communication style, their sensitivity to the emotional tone of Trump's tweets has evolved" (p. 474).

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On the other hand, we have the democrat who replaced Joe Biden in mid-campaign and whose policies consist of reducing food and housing costs for working families, raising taxes on big businesses and making abortion rights central to her campaign.

As we know, politics and financial markets are closely tied together and a political statement can influence investors and therefore influence the financial market. It is important for investors to know and understand the policies of the future president of the U.S. in order to identify possible scenarios of the future evolution of the stock market. When presenting their policies, we can predict shifts in investments, inflation and business approach.

The paper examines the response of the investors on the U.S. stock market, considering the policies presented by the two candidates and pays attention to Trump's fiscal policies.

In regard to Trump's climate policies, it is interesting to follow closely the evolution of Tesla Inc. since the two joined for the presidential run.

2. METHODOLOGY

In order to foresee the future evolution of the stock market under the Trump administration, the analysis uses a payoff matrix based on four possible scenarios determined by the tax rates and volume of investments. Data about the annual return of the S&P 500 index were included in order to calculate capital gains and taxes were applied to determine the Government's and investors' payoffs. The paper aims to identify the Nash equilibrium in which both parties maximize their benefits.

3. INVESTORS ON THE STOCK MARKET AND IMMIGRANTS

It is a well-known fact that Donald J. Trump has strong views regarding racial ethnicity and promoted his policies regarding immigrants during this presidential run and interestingly Sommer and Franco (2024), found that "the interaction between anti-immigration and perception of the economy is significant among Latino voters on election day" (p. 372).

His policies on immigrants talk about strengthening cross-border controls or even deportation.

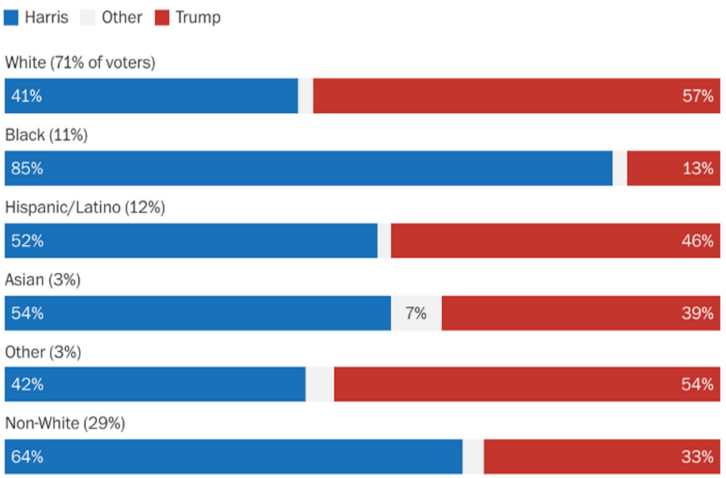

Figure 1. Presidential charts estimates for the state of Florida based on race and ethnicity
Source: The Washington Post (2024)

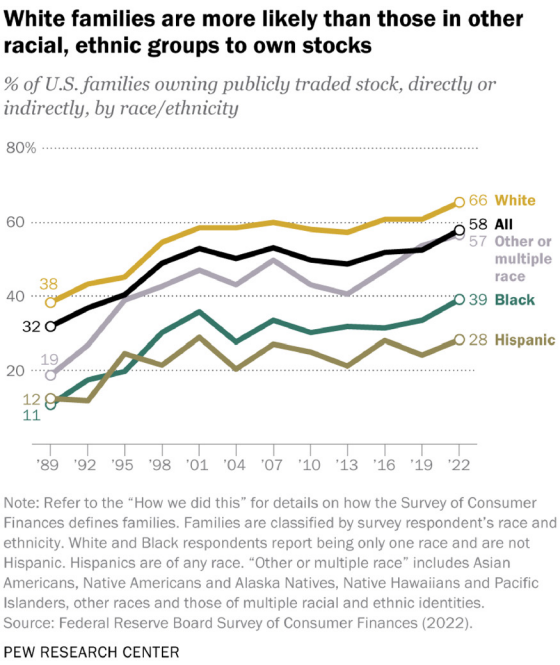

Figure 2. Percentage of the U.S. families owning publicly traded stock, directly or indirectly, by race/ethnicity

Source: Federal Reserve Board (2022) and Pew Research Center (2024)

As we can see from the two figures above, most voters of the republican president are white Americans, but also the ethnic group that owns the majority of stocks are white Americans. That is why Trump's policies and political statements influence the market's evolution, because he is supported by the majority of investors on the U.S. stock market.

As we will see later on, the stock market reacted to his win, as his policies on tax cuts and tariffs influenced the evolution of the American economy. The reaction of the stock market underlines that the return of Trump to the White House was something that the regular investor wished for. Also, from the charts above, we can identify the political preferences of the voters who can be identified as immigrants. Hispanics and black Americans identify themselves with the policies promoted by Kamala Harris.

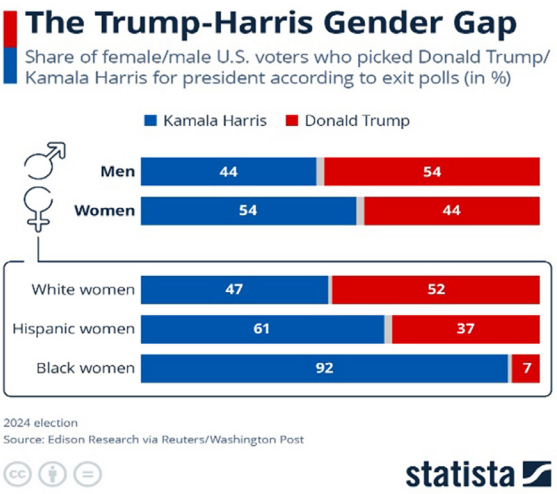

Figure 3. The Trump-Harris Gender Gap

Source: Statista & Edison Research (2024)

4. STOCK MARKET EVOLUTION IN PAST ADMINISTRATIONS

Based on past experiences of former administrations, we are trying to create a future scenario that can predict the behaviour of the investors and the evolution of the stock market.

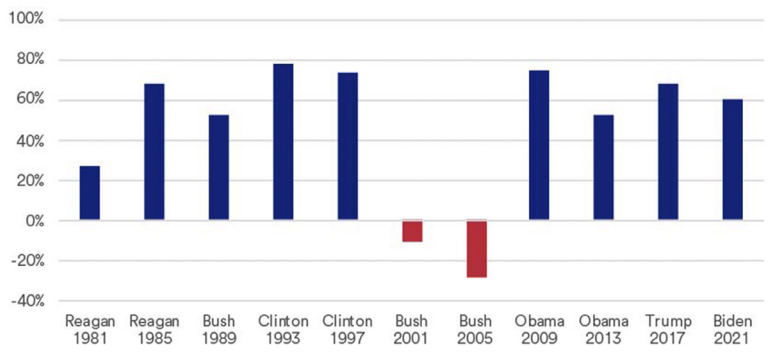

Figure 4. S&P 500 Price Return President since 1981
Source: U.S. Bank Asset Management Group (2024)

The S&P 500 index was taken into consideration in this analysis because it represents a benchmark of the U.S. stock market. As we can see from the figure above, the S&P 500 index registered negative returns during both of the Bush administrations. The reason for the negative returns was due to the 9/11 terrorist attack and the global financial crisis.

Comparing the evolution of the S&P 500 under the Trump and Biden administrations, we can notice an increased annual return during the republican administration, a factor that influenced the evolution of the market during the 2024 presidential run. The best price returns of the index were registered during the Clinton and Obama administrations.

To have a better overview of the stock market evolution, the Dow Jones index was also considered for an analysis.

Dow Returns Under Various Presidents

Inauguration Day	Final Day	President	Dow Total Return	Dow Annualized Return
3/4/1897	9/14/1901	William McKinley	62.7%	11.3%
9/14/1901	3/4/1909	Theodore Roosevelt	21.6%	2.7%
3/4/1909	3/4/1913	William Taft	-1.3%	-0.3%
3/4/1913	3/4/1921	Woodrow Wilson	-6.9%	-0.9%
3/4/1921	8/2/1923	Warren G. Harding	17.4%	6.9%
8/2/1923	3/4/1929	Calvin Coolidge	255.9%	25.5%
3/4/1929	3/4/1933	Herbert Hoover	-82.8%	-35.6%
3/4/1933	4/12/1945	Franklin Roosevelt	194.4%	9.3%
4/12/1945	1/20/1953	Harry Truman	81.7%	8.0%
1/20/1953	1/20/1961	Dwight D. Eisenhower	120.3%	10.4%
1/20/1961	11/22/1963	John F. Kennedy	12.2%	4.1%
11/22/1963	1/20/1969	Lyndon Johnson	30.9%	5.3%
1/20/1969	8/9/1974	Richard Nixon	-16.5%	-3.2%
8/9/1974	1/20/1977	Gerald Ford	23.4%	8.9%
1/20/1977	1/20/1981	Jimmy Carter	-0.9%	-0.2%
1/20/1981	1/20/1989	Ronald Reagan	135.1%	11.3%
1/20/1989	1/20/1993	George H.W. Bush	45.0%	9.7%
1/20/1993	1/20/2001	Bill Clinton	226.6%	15.9%
1/20/2001	1/20/2009	George W. Bush	-24.9%	-3.5%
1/20/2009	1/20/2017	Barack Obama	149.4%	12.1%
1/20/2017	1/19/2021	Donald Trump	56.0%	11.8%

Source: LPL Research, FactSet 01/19/21
All indexes are unmanaged and cannot be invested into directly. Past performance is no guarantee of future results.

Figure 5. How Stocks Did Under President Trump
Source: Market Insider (2021)

In the figure 5, we can see the evolution of the Dow Jones index during 21 administrations of republicans and democrats. The best total return during the period of an administration is registered during the republican administration of Calvin Coolidge, an administration which overlapped with the "Roaring Twenties", a period in which the U.S. economy registered rapid economic growth and prosperity. The lowest total return of the Dow Jones index in registered during the Hoover administration, which coincided with the Great Depression.

When it comes to the best performance of an annual return of the Dow Jones index still the republican administration of Coolidge is placed first, while the lowest performance is registered during the Hoover administration.

Donald J. Trump registered considerable total and annual returns of the Dow Jones during an administration that faced multiple challenges, such as the COVID-19 pandemic, the impeachment of Donald Trump, and the Capitol riot.

5. EVOLUTION OF THE S&P 500 DURING NOVEMBER AND DECEMBER 2024

Considering the tax system reform in 2017 under the Trump administration, known as the Tax Cuts and Jobs Act (TCJA), we are paying attention to the behaviour of the investors during the presidential run. Under the influence of the TCJA, investors anticipated the re-election of Donald J. Trump.

Figure 6. S&P 500 Nov. 5 to Dec. 6, 2024

Source: U.S. Bank Asset Management Group (2024)

As seen above, as a result of Trump's political statements, the S&P 500 index saw an increase during voting days and the day of the final results.

Figure 7. S&P 500 2024

Source: U.S. Bank Asset Management Group (2024)

Again, if we pay attention to the annual evolution of the index, we can see that the S&P 500 index registered the highest increase during the month of the election. The increase can be explained by the previous evolution of the S&P 500 index under the Trump administration. Looking back at Figure 7, we can see a visible difference between the evolution of the index under the republican administration of Donald Trump and the democratic administration of Joe Biden. The increase registered by the index might be due to the enthusiasm of the voters that compared and weighed the evolution of the index under both republican and democratic administrations, and took into consideration Trump's TCJA and also the evolution of the S&P during his first presidential term.

6. TESLA INC. EVOLUTION

We saw the performance of the S&P 500 index during republican and democratic administrations, and also the evolution of the index during the final period of the presidential race in November 2024. The index includes major tech companies known as the Magnificent 7, a group in which Tesla was included in 2020.

The evolution of Elon Musk's company is directly affected by the fiscal policies presented by President Donald Trump, especially now that Elon Musk is part of the Trump administration and leading the Department of Government Efficiency.

Before creating possible scenarios of the evolution of the U.S. stock market using game theory, we will have a look at the evolution of Tesla Inc. during November, when Donald Trump was elected as the 47th president of the United States of America.

Figure 8. Tesla price levels
Source: Investopedia (2025)

As we can see from the figure above, Tesla Inc. registered positive gains in the last months of 2024 after recording a negative evolution and even registered a record high in December 2024 as a result of Elon Musk's close ties with President Donald Trump.

At the beginning of 2025, Tesla couldn't keep up with the record set in December 2024, but considering the actual context, Tesla registers an upward trend.

The analysis in the next chapter, based on game theory, takes into consideration the future evolution of Elon Musk's company.

7. ANALYSIS BASED ON GAME THEORY AND DISCUSSION

The market capitalization of the S&P 500 index in 2024 was 50 trillion dollars, and the annual return of 23,3%. The tax system for short-term capital gains is progressive, and investors are taxed from 10% to 30%.

Starting from these real data, we create scenarios using game theory in order to identify a Nash equilibrium that offers both parties the possibility to maximize their gains.

The hypothetical scenarios are as follows:
- maintaining the 30% tax,
- a tax reduction of 5percentage points to 25%,
- a tax reduction of 10 percentage points to 20%.

In this paper, we propose the following non-cooperative Nash game to investigate the interaction between the Trump Administration and stock investors. In our scenarios, at the beginning of 2025, the administration can either maintain the capital gains tax at 30% or reduce it (to 25% or 20%).

Investors face two decisions in a Nash game framework:
i. To distribute dividends and invest less in the following year if they anticipate that the tax will remain at 30%,
ii. To withhold dividends and invest more if they expect the tax authority to reduce the capital gains tax.

In the scenario where taxes are reduced, productivity and, subsequently, the capital market are expected to grow. Estimates by Barro and Furman indicate that the 2017 tax reform, which lowered the capital gains tax from 35% to 21%, had a long-term effect of increasing corporate productivity by 4.8%. In order to implement the game, we define the following calibration: dividend yield was set to 1.27 % (according to Bloomberg), dividend tax to 15% and the market expectation for the growth of stock to 23.8% (like in 2024). In the first scenario, according to a reduction in the capital gain tax of 5 percentage points (to 25%), we obtain the following payoff matrix:

Table 1. Payoff matrix for the first scenario

		Investors	
		Keep the tax	Decrease the tax
Trump Administration	Keep the tax	7.37 17.19	7.65 17.86
	Decrease the tax	6.14 18.42	6.38 19.14

Source: Own calculations

The payoffs are expressed in percents having the following interpretation (for the first cell): from a gross return of 24.56% (7.37+17.19), 7.37% goes to the Government, and 17.19% is the net return for investors after taxes. From the matrix above, the Nash equilibrium consists of the following solutions: maintaining the capital gains tax at 30% for the administration and postponing dividend distribution for investors. Thus, for investors, it would be more beneficial if the administration reduced the capital gains tax to 25%. We observe that the payoffs for investors are very close, so different calibrations of the parameters could influence the conclusion regarding the best decision for them.

And for the scenario when the capital gains tax is reduced to 20%, the conclusions formulated before remain the same, as can be seen from the payoff matrix below:

Table 2. Payoff matrix for the second scenario

		Investors	
		Keep the tax	Decrease the tax
Trump Administration	Keep the tax	7.37 17.19	8.17 19.06
	Decrease the tax	4.91 19.65	5.45 21.78

Source: Own calculations

The results of the payoff matrix underline the following:
- high tax rates determine maximum administration funds in the scenario presenting high investments (30 bil. USD), but for investors, the payoff is limited;
- low tax rates encourage high investments, maximizing investors' payoff and generating a moderate income for the administration.

The Nash equilibrium shows that the optimal strategy for the Trump administration is the implementation of moderate taxes in order to encourage high investments and to generate enough income. Investors prefer low tax rates to maximize their gains.

8. CONCLUSION

Considering all the above, we can conclude that under republican administration, the American economy experienced considerable evolution of the stock market, but also registered the lowest returns. When it comes to Trump's first term, considering his statements and his unpredictability, but most importantly his fiscal policies, the stock market registered positive returns; nonetheless, the evolution of the S&P 500 index registered positive reactions to his re-election.

Elon Musk's company registered positive outcomes immediately after the win of Donald Trump, as his close ties with the president-elect directly influenced the evolution of his company.

When it comes to the future evolution of the stock market, the analysis based on game theory demonstrates that fiscal policy should be adjusted carefully for the purpose of maintaining a balance between encouraging investments and maximizing administrative income. The study underlines the importance of integrating real data and game theory in the decision-making process, while taking into consideration the influence of political statements and the importance of factors, such as ethnical race and gender, over the investors' behaviour.

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What Does Hide the Basket of West-Hungarians? – An Analysis of the Basket Composition of Different Households in West Hungary

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Abstract: *The economic changes of recent years have had a significant impact on household consumer behavior. Following the changes caused by the COVID-19 epidemic, consumers had to face high inflation. These macro-level changes significantly impacted households and made budget planning difficult. This study aims to prepare and validate the methodology aimed at the composition and sustainability analysis of consumer baskets in different regions of Hungary. As a pilot study, the Reference Budget is determined based on focus group discussions with family types specified by the statistical office of the Western Hungary region, which represents the threshold value that households need for subsistence. Using the Hypothetical Household Tool (HhoT), this value compares the after-tax income for each type of household and analyses whether there is overspending in the examined cases. After that, based on the research participants' answers, sustainability calculations are performed based on the consumer basket's composition, thus validating that overspending is not sustainable.*

1. INTRODUCTION

The Magyar Nemzeti Bank launched a campaign entitled Credit is not a Gift (Hungarian National Bank, 2024a) in November 2024, drawing the attention of households to consider spending even as Christmas approaches. Based on published data, household loans increased by 71% in the first quarter of 2024 compared to the value of a year ago. The value of housing loan contracts more than doubled, rising by 130% (Hungarian National Bank, 2024b). The rate of inflation published by the Central Statistical Office is 3.2% (Hungarian Central Statistical Office, 2024a). The Sustainable Development Goals (SDGs) published in Hungary include eradicating poverty and responsible consumption and production. The campaign against borrowing also aims to help people make responsible decisions and improve their economic and social well-being.

Munisamy et al. (2022) explain in their research how important it is to manage sustainability holistically and to approach it from an economic, social, and environmental point of view. Social sustainability (Maynard et al., 2020) aims for everyone to live with the same rights and opportunities and for the general standard of living to improve (Cirella et al., 2020). Economic sustainability includes increasing education, long-term financial stability, and moderation of economic inequalities. The environmental one involves reducing waste, mitigating harmful gas emissions caused by the food industry, and using renewable energy sources (Zhang et al., 2020). These areas must work in synergy since the depletion of environmental resources causes economic problems and threatens social well-being (Cirella et al., 2020).

Examining sustainability is not only a challenge at the macro level but also at the household level. Hämäläinen et al.'s (2020) research examines the sustainability of family life. Sustainability in family

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life means that the family can cope with everyday difficulties and develop routines that support the continuity of family life. Financial awareness enables households to make responsible decisions, build savings, and manage financial stress flexibly, contributing to sustainability and long-term economic stability. The income level of households significantly influences the type of financial decisions they make. Households with higher incomes are more likely to invest in long-term assets, while those with lower incomes are more likely to face short-term financial challenges such as paying bills (Kim et al., 2022). Previous research (Vastag & Eisinger-Balassa, 2024), which prioritized the examination of the budget of Hungarian households, concluded that the topic had been neglected in recent years, and no survey was carried out at the level of households, which would also have examined the sustainability family budget.

This research measures the expenses of different family types in the city of Győr, the center of the Western Hungary region, as well as their food consumption in terms of sustainability. The analysis serves as a pilot for validating the methodology, so a comparison covering several regions can be made later. As the macroeconomic indicators, such as the growth of the loan portfolio and the rate of inflation, prove, Hungarian society is not marching towards sustainability. However, it is moving further and further away from it. Examining consumption habits at the household level can explain why people turn to more and more loans, which has consequences not only from an economic point of view but also from a social and environmental point of view.

2. METHODOLOGY

The methodology can be divided into two main parts. First, the Reference Budget (Penne et al., 2020) was calculated, and then the basket contents of different household types were analyzed from a sustainability point of view.

The Reference Budget means the amount intended for items that are essential to life. The household segmentation used by the Central Statistical Office forms the basis of the research. This research selected five types of households in the city of Győr, the center of the Western Hungary region. In order to compare the consumption habits and expenses of people of active working age, households without children and households with children were the focus of the research. According to the research of Joronen and Rantanen (2024), having a child is a stage in the lives of families when their preferences change, and consumption habits also change significantly. The selected groups were Couples below 65 years, Couples below 65 years, Couples with one child, Couples with two children, and couples with children.

The items were defined as a result of in-depth interviews (Morris, 2015), with household types to determine the Reference Budget. The in-depth interviews revealed which types of households find which products and services essential for everyday life. The products and services were classified based on the COICOP structure. The Reference Budget for each type of household was calculated by considering the products and services that came up for each respondent. The resulting list formed the basis of the calculation, which contained the monthly quantity of the given product/service. Regarding utilities, telecommunications, and other services, the interviewees indicated how much they spend per month in order of magnitude. The price of food was calculated taking into account the lowest consumer prices of all time, which in the case of staple foods was done with the help of the website prices operated by the Hungarian Competition Authority, and in the case of non-staple foods by monitoring the prices of retailers. The resulting monthly amount required for essential maintenance, or the Reference Budget, was compared with incomes modeled by the publicly available Hypothetical Household Tool (HhoT) (Gasior & Recchia, 2020) provided by the EU. The HhoT shows the minimum wage for different types of families after taxes and considers social benefits for

children. Comparing it with the Reference Budget provides an opportunity to examine how much of the budget each type of family has available for all other activities after paying for the mandatory items essential for subsistence. Table 1 shows the amounts spent on different products and services per household every month, while Table 2 shows the incomes publicly available by HhoT.

$$RB_m = \sum(Q_i \cdot P_l) \quad (1)$$

Numbered Lists
1. Reference budget per month (RB_m):
   a. Q_i: quantity of the used product/service
   b. P_l: the lowest price of the product that is available on the market

Table 1. Reference budget in HUF of different households based on the spent monthly value in COICOP classification

	Single below 65 years	Couples below 65 years	Couples with one child	Couples with 2 children	Single with children
Food and non-alcoholic beverages	68222	136444	200000	200000	168000
Alcoholic beverages, tobacco products and drugs	none	none	none	none	none
Apparel and footwear	none	none	20000	40000	40000
Housing services, water, electricity, gas and other fuel	100000	80000	100000	120000	150000
Furnishing, household equipment, dwelling maintenance	none	none	none	none	none
Healthcare	15000	30000	40000	60000	60000
Travel and transport	10000	40000	40000	50000	25000
Communication	20000	25000	15000	25000	15000
Recreation and culture	25000	40000	20000	40000	30000
Education	none	none	25000	30000	30000
Hospitality and accommodation services	none	none	none	none	none
Social care	none	none	none	none	none
Other products and services	34000	50000	45000	45000	30000

Source: Own calculations

Table 2. Net disposable income in HUF after taxation in different household types

	Single below 65 years	Couples below 65 years	Couples with one child	Couples with 2 children	Single with children
Earnings	417 347	1 043 367	1 043 367	1 043 367	417 347
Non-means-tested benefits	none	none	26 600	26 600	29 600
Taxes	-62 602	-156 505	-116 506	-116 506	-22 603
SIC employees	-77 209	-193 023	-193 023	-193 023	-77 209
Disposable income	**277 536**	**693 839**	**760 438**	**760 438**	**347 135**
SIC employers	54 255	135 638	135 638	135 638	54 255

Source: Authors based on the data of the HHoT simulation

The second part of the research focused on the sustainability analysis of the food basket contents of the interviewees. The methodology was based on the study by Poore and Nemecek (2018). They identify different greenhouse gases, such as carbon dioxide, methane, nitrous oxide, and smaller amounts of gases that hurt the environment. These are collectively known as greenhouse gases. The CO2 equivalent (CO2eq) measure, based on the Life Cycle Assessment (LCA) of food, summarizes the effects of different gases on climate change. CO2eq shows the amount of greenhouse gases accumulated during the entire life cycle of a kilogram or liter of food.

Based on the interviews, the products found in the baskets of all types of families were selected. Table 3 presents the total greenhouse gases produced by the quantities consumed from the highest penetration products during the life cycle of the given food.

$$\sum CO_2eq_m = \sum (Q_i \cdot CO_2eq_{kg}) \quad (2)$$

Numbered Lists
2. Total monthly CO_2 equation of the household ($\sum CO_2eq_m$)
   a. Q_i: quantity of the used product/service
   b. CO_2eq_{kg}: CO_2 equation per kg

Table 3. CO_2eq in kg per product in different households

	Single below 65 years	Couples below 65 years	Couples with one child	Couples with 2 children	Single with children
	/kg CO_2eq	/kg CO_2eq	/kg CO_2eq	/kg CO_2eq	/kg CO_2eq $CO2_{eq}$
bread	1,8	3,6	5,4	9	3,15
milk, 2.8%	4	8	12	20	7
Trappist	21	42	63	105	36,75
natural buttercream	12	24	36	60	21
chicken breast	24	48	72	120	42
cut up	27	54	81	135	47,25
ground coffee	3,75	7,5	11,25	18,75	6,5625
oatmeal	0,35	0,7	1,05	1,75	0,6125
pasta	2,1	4,2	6,3	10,5	3,675
oil	3	6	9	15	5,25
banana	0,9	1,8	2,7	4,5	1,575
onion	0,3	0,6	0,9	1,5	0,525
potato	0,6	1,2	1,8	3	1,05

Source: Own calculations based on the data of the HHoT simulation

3. RESULTS

The present research compared the contents of the consumer basket of five different types of families in the city of Győr regarding spending and sustainability. The methodology was based on the calculation of the Reference Budget and the calculation of CO2eq. Figure 1 shows the amount of the Reference Budget calculated for different family types and the amount of disposable income. The blue columns indicate the number of products and services that, based on the results of the interviews with the families, are indispensable for their livelihood. In contrast, the green columns show the minimum income published in the publicly available HhoT tool.

The relative power gap in 2022 was 29.5% in Hungary. This indicator shows how much the income of those living in poverty falls short of the poverty threshold (Hungarian Central Statistical Office, 2022a). Based on the available data, the proportion of the population at risk of poverty and social exclusion was 19.4% in 2021, below the EU average, but still affected 1,883,740 people (Hungarian Central Statistical Office, 2022b). The exact number of people seeking the minimum and guaranteed minimum wage is not available in the databases published by the Hungarian Central Statistical Office. However, households' annual net per capita income was HUF 2,544,764 in 2023 (Hungarian Central Statistical Office, 2024b), which means a monthly net income of HUF 212,063. It is seen that the Reference Budget calculated based on the results of the in-depth interviews is higher than this, even in the case of one-person households.

Figure 2 shows the differences between the Reference Budget and the revenues. For single households below 65, it is HUF 5,314, which does not cover costs other than those necessary for subsistence. In

the case of couples below 65 years of age, the highest amount is left to cover unexpected expenses, recreation, health services, and savings. The amount remaining for couples with one child is just a little behind this, while this amount is significantly lower for couples with two-child households. Single households with children are in red monthly, calculated using the minimum wage. Based on this, the minimum wage not only covers the extra costs of raising children but also keeps those members of society who live on the minimum wage as singles on the edge of the subsistence minimum.

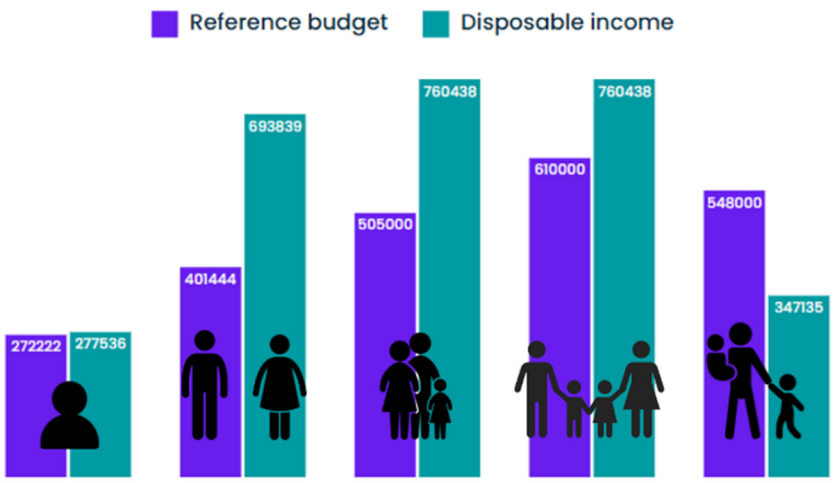

Figure 1. Comparison Reference budget to disposable income (in HUF) in different households
Source: Own processing

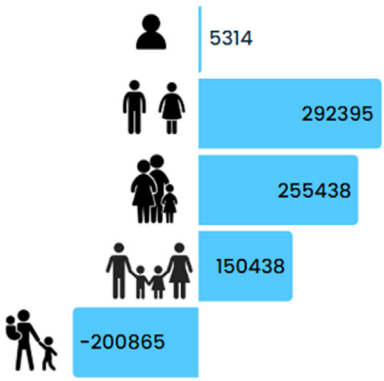

Figure 2. Amount of left budget (in HUF) in different households
Source: Own processing

There is a significant correlation between the management of sustainable household budgets and the production of greenhouse gases associated with food consumption. Households with lower incomes are forced to choose cheaper, processed foods, which leads to high CO2 eq emissions. Unfortunately, however, this is not so black and white either. Higher-income households can only buy organic products from local producers, avoiding the excessive consumption of meat and dairy products, the production and sale of which result in the production of large amounts of greenhouse gases.

In this research, only families with children were considered to be purchasing sustainable products among the surveyed households. They also only procured vegetables and fruits at farmers' markets. All interviewed household types referred to high food prices, and households with children explained their decision to choose sustainable products in a more significant proportion due to the

unexpected costs incurred during the upbringing of children. As Figure 3 shows, as the family size increases, so does the level of consumption and the emission of gases harmful to the environment per household. Households, where the parent raises the children alone, show a different trend; it is visible from the previous calculations that they strive to buy only essential products and services due to the shift in expenses and incomes.

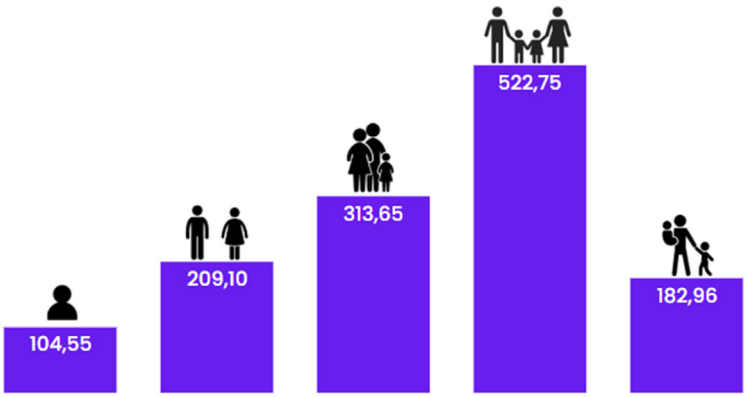

Figure 3. CO_2 eq in kg in different household types
Source: Own processing

4. FUTURE RESEARCH DIRECTIONS

This research concerns two critical but equally sensitive topics: spending and sustainability. Zholdubaeva et al. (2024) study that people see money as an economic tool with deep cultural and social significance. Discussing financial topics can be uncomfortable because it can reveal personal priorities and vulnerabilities and invite judgment from others. From an anthropological perspective, financial habits and spending patterns are highly personalized and shaped by cultural narratives, which makes discussing them openly even more complicated. Among other things, this is the reason for the limitation of this research since the accuracy of the data collected during the in-depth interviews depended on the honesty and openness of the interviewees. Another area for improvement is that the research only includes sustainability calculations for food consumption. In the future, it can be extended to other levels of the COICOP structure, such as transport, which significantly impacts all three sustainability pillars. A more in-depth analysis of the loan portfolio and its distribution among household types helps understand who and why are heavily in debt.

However, due to the constantly changing economic and social environment, it is essential to be aware of the preferences and everyday problems of the members of society to make Hungary sustainable and livable. The next step of the research is an analysis covering several Hungarian regions, which can provide a comprehensive picture of Hungarian consumption habits and their sustainability, thereby providing a basis for decision-makers and financial institutions to develop additional programs and educational plans that promote sustainability from all aspects.

5. CONCLUSION

This article approaches sustainability from two perspectives. On the one hand, from the point of view of spending, and on the other hand, from the point of view of consumption. Overspending is not sustainable; it only allows for financial planning and savings. This study examined five types of households in the city of Győr through in-depth interviews in search of the answer to the question of what products and services are essential for them in everyday life. Based on this, the Reference

Budget was calculated, which differs for each type of household. In the case of foodstuffs, the calculation was made using the lowest market prices of all time, while in the case of other products and services, the sums quoted by the respondents provided the basis. When defining the Reference Budget and comparing it with incomes, it was revealed that single households below 65 years old can hardly survive on the minimum wage, and single households with children cannot. The sustainability calculations for food consumption have shown that the emission of gases harmful to the environment increases with the size of the family and, at the same time, with the income.

For Hungary to be sustainable and livable, change must begin at the level of households. Increasing the minimum wage helps to raise the general standard of living; however, in this research, those living alone, those in a socially disadvantaged situation, and those raising children alone need additional support. As a result of the research, further education and the sale of sustainable products available to everyone would be very important to increase spending and consumer sustainability. This places social, economic, and ethical responsibility on the decision-makers. Overspending by households does not promote long-term financial savings and plans, nor provide stability and security. Social well-being and the reduction of environmental pollution go hand in hand; one cannot be achieved without the other.

The present research served as a pilot before being extended to several regions, which will provide insight into the consumption preferences of Hungarian households and their sustainability. The constantly changing world is a constant challenge for households, and understanding their decisions can provide a basis for developing a long-term strategy that can bring about more sustainable and better living conditions.

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Spending Versus Saving: COVID-19 Crisis Through the Lens of Consumers

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Consumer behavior;
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Savings;
Purchase;
Household income

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Abstract: *The COVID-19 pandemic showed that people significantly alter their consumer behavior during adverse events, with serious implications for their tendencies to create savings. A survey was conducted on a sample of 1172 Slovak consumers to collect data on consumers' experiences during various years of the pandemic. The findings of this research study show that the majority of consumers decreased their savings. This trend was observed especially in younger generations of consumers. The dependence between savings creation and fear of job loss was proven as medium. It was also discovered that older generations of consumers were spending more on daily consumption goods, especially in 2021. The finding that younger consumers spend less and buy fewer products could be an indication of a major turn towards sustainable consumption that will have positive implications on societies and the environment.*

1. INTRODUCTION

The COVID-19 pandemic significantly altered processes in societies. Consumer behavior observed various major changes that occurred either because consumers themselves chose to make alterations or because they were forced to make adjustments due to government restrictions, such as lockdowns. The research into consumer behavior changes during the pandemic is vast; however, it is still not a complex one. Niewczas-Dobrowolska et al. (2024) created a list of major changes that occurred during the pandemic. However, this list omits important factors such as saving creations.

Various research studies provided evidence that people significantly alter their consumer behavior during adverse events with serious implications for their tendencies to create savings, namely Barrafren et al. (2020), Kempson and Finney (2017), Li et al. (2020), Vanlaer et al. (2020), Waliszewski and Warchlewska (2021), Subova et al. (2022), or Kempson and Poppe (2024). Households' propensities to save depend on a range of socio-demographic and economic factors: living standards, household income, cultural habits, etc.

This evidence proves the relevance of the topic of savings creation during adverse events. Proper and detailed exploration of consumer behavior changes in terms of altered tendencies to increase or decrease the share of household income designated for savings can bring to light relevant findings that impact even post-pandemic societies. Therefore, this research study aims to fulfill this gap and consequently contribute to the current pool of knowledge.

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2. LITERATURE REVIEW

Researchers studying consumer behavior during a crisis or pandemic have focused mainly on consumer responses to the situation in terms of the structure and volume of purchases. They are less concerned with the relationship between consumer behavior and the creation of savings. These are primarily sociological and psychological studies with an interdisciplinary overlap into economics and finance.

The issue of savings creation and consumer behavior is addressed by authors and researchers worldwide. Relevant information is provided by the results of studies conducted across various continents, including those carried out by international research teams. Selected findings are presented below. Conditions most similar to ours are presumed to be in the countries of Central Europe, specifically within the V4 group.

Consumer behavior during the COVID-19 pandemic has been studied by authors in various countries around the world. Among the first were Kirk and Rifkin (2020), who report that consumers become less reactive and more resilient during times of crisis and examine the impact of the pandemic on consumer adaptive behavior in the U.S.A. Consumer behavior during pandemics typically begins with hoarding certain commodities. The authors, drawing on their own and other research, report that the onset of the pandemic was associated with extreme shopping. Household consumer spending increased by up to 845%. Suppliers were not prepared to meet expected deliveries, and some products were completely sold out. This was especially the case for stocks of goods: disinfectants, cleaning products, toilet paper, and bottled water. The above situation causes competitive behavior of consumers and establishes a demand and supply response in relation to the price they are ready or willing to pay for certain products. At the same time, it leads consumers to a certain resourcefulness. Compulsive shopping can also be mentioned. During the crisis, consumers correct their consumer behavior towards brands. According to their attitude to the crisis, they evaluate the attitude of brands and decide whether to buy them or not.

Khanna et al. (2023) studied the shopping and financial behavior of millennials aged 25 to 40 in selected regions of India due to the COVID-19 pandemic. They found that consumers are spending only on essentials during the COVID-19 pandemic, significantly reducing their spending on niceties and non-essentials (less necessary).

Prioritizing the purchase of sustainable products is associated with knowledge and awareness of the consumer's responsibility. Consumer behavior based on the pursuit of sustainability should be responsible. It can be responsible if it is based on relevant decisions based on truthful information. Therefore, consumers, absorbing a lot of information, sort and evaluate their needs according to the level of their knowledge. One of the essential components in the structure of household expenses is energy expenses. To reduce their housing costs and at the same time use sustainable resources, consumers choose from a number of alternatives and assess the effectiveness of their investments - accumulated savings - in a suitable energy source or in an energy-saving product from both an economic and ecological point of view. However, they must be cautious in their choice and avoid fraudulent energy-saving products (Li et al., 2024).

In general, income is a driving force for consumption: households with higher incomes usually buy larger homes, cars, appliances, and also in terms of quantity (they own more apartments or houses, more cars, etc.). On the other hand, German researchers Matthies and Merten (2022) found that the correlations between motivational factors and intentions to engage in political behavior are not affected by income. Consumers' decisions about sustainable behavior result from their attitudes and beliefs.

A strong correlation between the intention to isolate and the intention to make unusual purchases was also confirmed by a study in Finland (Laato et al., 2020). Here, an international team of researchers states that isolation leads to, in addition to excessive or unusual shopping, information overload and cyberchondria, too.

Household savings are considered key to the creation of the economy's GDP, as well as its further economic development.

Household savings represent the difference between a household's total disposable income and its consumption expenditures over a specific period. Statistical reporting of household savings tracks the so-called household saving rate, which is calculated using the formula (savings/income)×100 and is expressed as a percentage.

Vanlaer et al. (2020) found that households' propensity or willingness to save is closely linked to consumer confidence in the future (or concerns about the future). They conducted research in eighteen countries after the 2007–2009 crisis, and the results revealed that the impact of consumer confidence on savings increased even further after the crisis.

Pessimistic expectations of households regarding their future economic situation and financial ignorance are associated with reduced financial well-being. Li et al. (2020) found that China households' liquidity constraints became serious after the outbreak of COVID-19, and the deterioration of households' liquidity significantly increases their saving willingness and decreases their consumption.

An interesting perspective on savings concerning GDP is offered by an international team of researchers (Slovakia and the USA) on savings in Central Europe, which conducted research during the years 1996-2021. They consider the crises from 2007 to 2009 and the crisis caused by the COVID-19 pandemic to be significant milestones (Subova et al., 2022). They conducted the research in the V4 countries (in alphabetical order): the Czech Republic, Hungary, Poland, and Slovakia. Their results demonstrate short-run Granger causality from real GDP to the household savings rate and from the household savings rate to real GDP in both the Czech Republic and Hungary. They also report significant long-run relationships between the household savings rate and real GDP, especially in Hungary. According to Eurostat, savings in 2021 in the Central European countries (V4) represented different shares: the Czech Republic 21 %, Hungary 15 %, Poland 9 % and the Slovak Republic 11 %.

The household savings rate in the Czech Republic and Hungary is higher than the eurozone average (it was 14-15 % for 2023). Average savings in the eurozone were highest during the pandemic, when they reached more than 25 % in the second quarter of 2020 (Slovak Republic 15 % in 2020, 17 % in 2021), and there was a significant decline in the following years. Currently, experts expect further growth in savings due to the expected growth in household income. In the last two years, there has been a further decline in savings in Slovakia, also due to inflation. An improvement and therefore an increase in the savings share is expected.

Polish researchers Waliszewski and Warchlewska (2021) conducted a fairly extensive relevant analysis of consumer financial behavior in connection with the COVID-19 pandemic. They compared the findings in Poland with other countries (in alphabetical order: Belgium, the Czech Republic, France, the Netherlands, Luxembourg, Germany, Austria, Romania, the United Kingdom, Spain, Italy, Turkey, USA). They found that compared to the pre-pandemic period, there was a decrease

in spending, which could be caused by a temporary decrease in household income, a lack of opportunities to spend money, and fears of an uncertain future. When it comes to savings, not all consumers can afford to create savings. The level of household income is decisive.

3. METHODOLOGY

The main aim of this research was to examine consumer behavior changes that occurred during the COVID-19 pandemic, with special focus on exploring how consumers altered their tendencies to create savings. This research study was created as an empirical investigation. A sample of 1172 consumers in the Slovak Republic was utilized to examine the shifts in consumer behavior that transpired during the pandemic, to describe the changes in savings tendencies. The representativeness of this sample was validated based on the criterion of consumers' age. The base dataset comprised all Slovak citizens of legal age, who are over 18 years old. A Chi-square test was employed to compute and subsequently confirm the representativeness of the sample. The structure of the sample according to the criterion of consumers' age is presented in Figure 1.

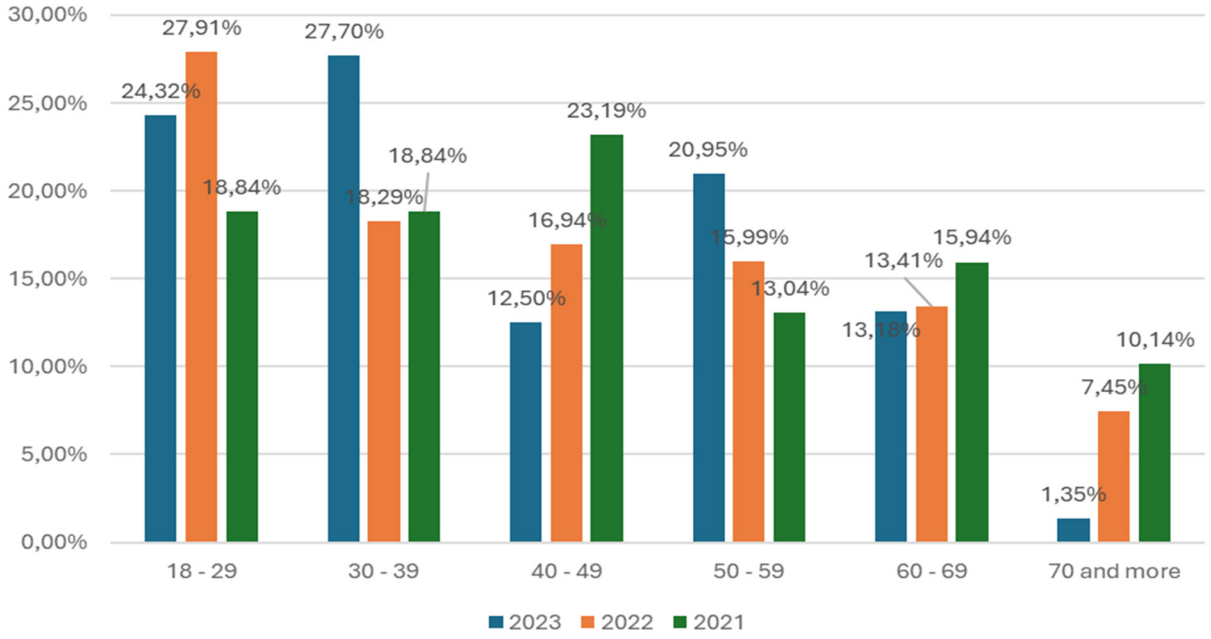

Figure 1. Sample file
Source: Own processing

Additionally, other social and economic attributes of consumers were gathered and subsequently utilized in the analysis of various phenomena related to changes in consumer behavior during the COVID-19 pandemic. This sample comprised 68.61% female consumers. The majority of consumers in the sample were employed (61.09%), and 22.69% were entrepreneurs. Up to 21.5% of consumers in the sample lived alone during the pandemic, 21.51% resided with their parents, 24.23% shared a household with a partner without children, and the remaining 32.78% lived in a household with a partner and at least one child.

4. RESULTS

This research focused on describing observed consumer behavior changes during the COVID-19 pandemic. The findings of this research study show that the majority of consumers decreased their savings. Figure 2 provides the corresponding evidence on the subject. The data in Figure

2 shows a trend of decreasing savings creation as the pandemic continued. The highest share of consumers was observed with savings creation in the range of 51-70% of their household income. However, in 2023, higher shares of consumers were observed in lower savings share categories.

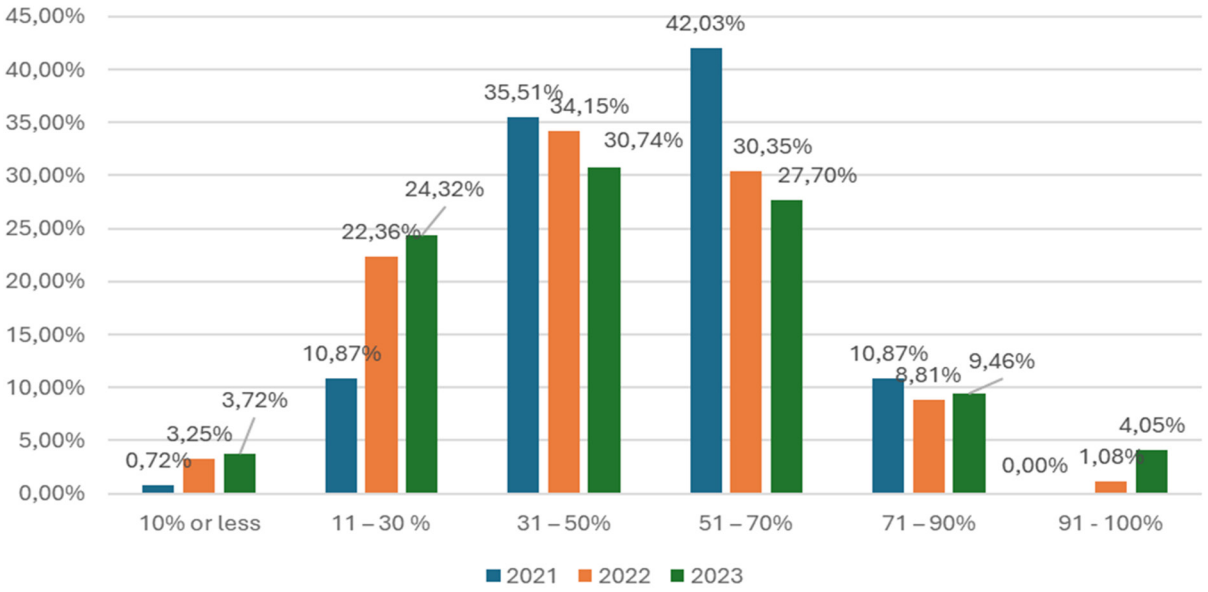

Figure 2. Changes in savings creation during the COVID-19 pandemic

Source: Own processing

The changes in savings creation were also observed in the context of the age of consumers. The trend of a decrease in savings creation was observed, especially high in younger generations of consumers. The data in Figure 3 shows the proportion of consumers who created savings at a given level. According to the data, the highest savings were created mostly by consumers older than 50 years old. On the other hand, consumers younger than 40 years did not designate more than 90% of their household income for savings. The biggest versatility was observed in the consumer age group 60 – 69 years old.

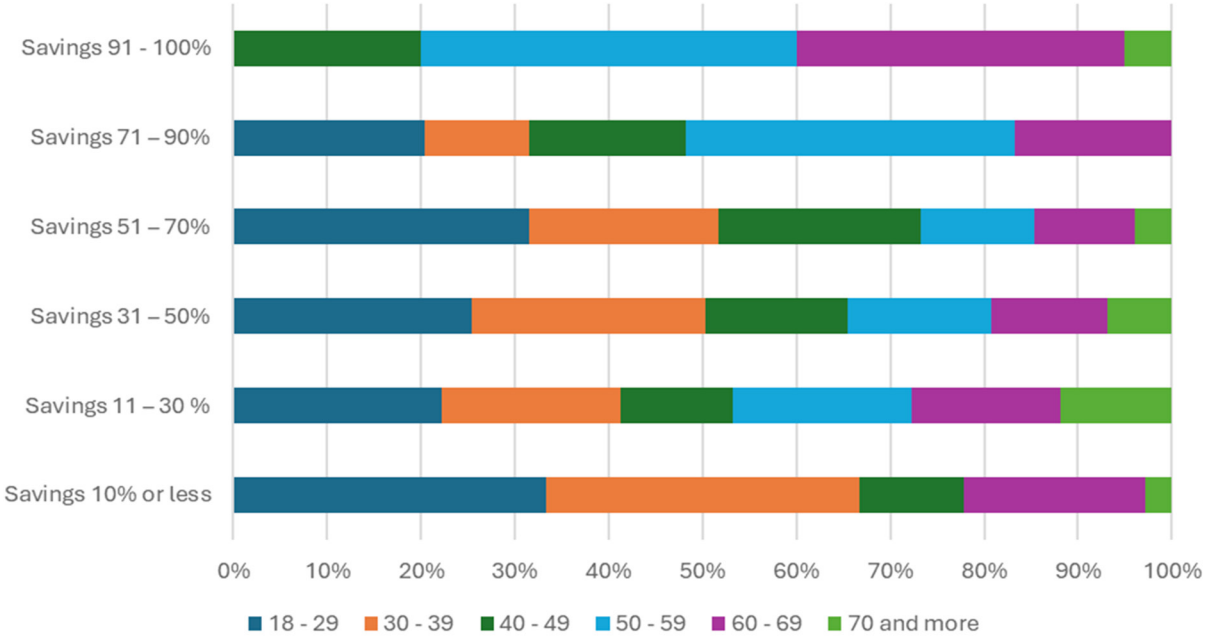

Figure 3. Changes in savings creation based on age of consumers

Source: Own processing

Furthermore, the possibility of fear affecting consumers' tendencies to create savings was also explored. The dependence between savings creation and fear of job loss was proven medium to medium-high. The correlation coefficient was calculated at level 0.482. Therefore, it is possible to conclude that this type of fear had impacted consumers during the COVID-19 pandemic to a small degree. No other significant dependency was discovered between various types of fear and the tendency of consumers to create savings.

Changes in savings creation during the pandemic were also explored in the context of the employment situation of consumers. The data shown in Figure 4 makes it obvious that the employment situation affects the amount of savings consumers created during the pandemic. Even the calculated correlation coefficient at level 0.848 proves that there exists a strong direct dependency between these factors. According to the data, the highest levels of savings were reached only by consumers who were employed during the pandemic. On the other hand, 21.88% of unemployed consumers only created savings of less than 10%. Only 14.07% of these consumers created savings at a level higher than 50% of their income.

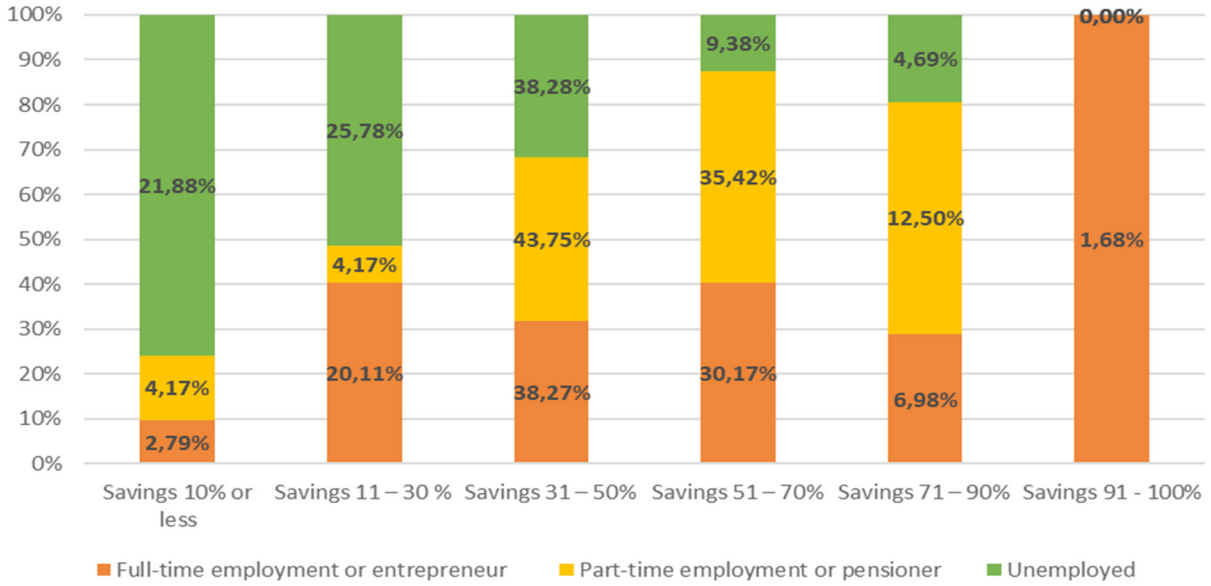

Figure 4. Changes in savings creation based on employment status during the pandemic
Source: Own processing

This research also explored the types of products consumers spend most of their income on. It was discovered that older generations of consumers were spending more on daily consumption goods, especially in 2021, while younger generations spent a significant portion of their income on leisure products. However, it was also discovered that younger consumers tended to buy fewer products by the end of the pandemic. This finding that younger generations of consumers buy fewer products could be an indication of a major turn towards sustainable consumption that will have positive implications on societies and the environment.

5. FUTURE RESEARCH DIRECTIONS

The findings of this research indicate various significant new trends that are emerging in the post-pandemic world. It is evident that societies have evolved, and consequently, consumers have also transformed as they have adjusted to these shifts. Information and communication technologies have made accessing news a very rapid and straightforward process. Hence, decisions

related to purchases can also be made considerably faster. This research study found that younger generations of consumers are more aware of the sustainable values of contemporary societies. Consequently, these generations are the consumer segments that should be targeted by developing new methods of creating more sustainable products. It was discovered that these younger generations of consumers represent the future of the markets. Therefore, further exploration into their needs and beliefs should be conducted in order to uncover the new ways of thinking that will soon become dominant.

Furthermore, this study explored how the savings creation changed during the COVID-19 pandemic. However, it would be beneficial to also explore the impacts of such changes on the economy. Consumption and savings are a delicate balance that, if changed, could destabilize investments and deteriorate the functioning of both public and private sectors. Therefore, exploring these consequences should be a logical next step in research into the post-pandemic world.

6. CONCLUSION

The above research findings demonstrate that consumers make decisions about their purchasing behavior and financial management in different ways. In various situations, they prioritize emotions or rational criteria to varying degrees when making decisions. It is likely impossible to accurately predict how consumers will behave during a crisis, what their purchasing behavior will be, or how they will make financial decisions. Differences in socio-demographic factors serve as the basis for varying reactions even under approximately similar or comparable conditions. It has been shown that a crisis can lead to consumer behavior characterized by both rational and irrational actions, such as unpredictable shopping patterns.

The willingness to save money before a crisis, in preparation for it, as well as the willingness to save during a crisis, depends on many factors. These include the level of household income, the standard of living (both of the household and the country), the cost of living, and consumer awareness regarding lifestyle choices, expectations, and cultural habits, including considerations related to the environment and sustainability. The mentioned disparities demonstrate the need for further investigation and the mutual sharing of acquired information.

The COVID-19 pandemic induced a significant socioeconomic shift that also influenced attitudes and beliefs. To comprehend the modern consumer, a more pronounced systemic approach that considers both the supply and demand sides is necessary. Therefore, it is necessary to make adjustments based on the research findings to fully understand how consumers will adjust their behavior in the near future.

The findings of the research indicate that even though savings play a major role in peoples´ lives, not all consumers pay attention to them during adverse events.

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Strategies for Digital Transformation in Banking

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Customer experience;
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Abstract: *Modern banking is facing challenges in business practices, service delivery, and client interactions due to the rise of digital technologies and artificial intelligence. In recent years, technologies such as artificial intelligence, mobile banking, and blockchain have not only been a source of support to human resources in banks but have also increasingly replaced them, enabling more efficient real-time banking services available 24/7. Digital innovations enhance the efficiency of banking operations through automation of routine tasks and archival of banking documentation and drive exponential growth in the volume of banking product and service sales, development of customized offerings, establishment of new communication forms, and, consequently, transformation of the customer experience. It is noted that the implementation of an innovative banking business model often encounters resistance from employees, which requires establishing a clear vision and strategy, continuous employee communication and training, analysis of leadership roles in change management, and fostering a culture of innovation within the bank. The focus of this paper is on presenting strategies that banks can implement using artificial intelligence, chatbots, and big data analytics to enhance client relations, improve competitiveness, increase brand recognition, and drive more profitable operations. Additionally, attention is drawn to the potential risks banks may face, including data privacy issues and regulatory compliance in order to underscore the advantages of digital banking while ensuring ethical, sustainable, and successful functioning of the banking sector. The aim of this research is to demonstrate a holistic approach to digital transformation in banking, based on the integration of digital technology, change management, and marketing strategies - essential prerequisites for competitiveness and long-term sustainability of banking operations in a dynamic business environment.*

1. INTRODUCTION

The development of information technologies, increasingly sophisticated banking service users, and intense competition have made digital transformation in the banking industry a necessity rather than a trend in modern banking. Digital transformation in the banking sector involves integrating new tools, platforms, and digital technologies with banking services, thereby redefining traditional banking operations. To enhance efficiency, improve user experience, create, communicate, and deliver new banking value, and increase competitiveness, banks are increasingly relying on artificial intelligence, blockchain, data analytics, mobile applications, and cloud computing.

Digital transformation relies on modern technology to enhance existing business processes, services, and models while developing strategies that align modern technologies with business goals and market needs. The financial services industry is undergoing a profound transformation driven by technological advances (Udeh et al., 2024). Integrating these technologies into business operations reduces operating costs, enhances transaction security, and delivers new banking value to consumers.

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Unlike traditional banking, modern banking in which new technologies are integrated ensures the provision of banking services 24 hours a day, 7 days a week. Due to the competitive market environment, it is imperative for banks to offer products and services such as remote account opening, chatbots, remote lending processes, and diversified functionalities in mobile/internet banking (Abuselidze & Zoidze, 2024). New technologies have not only transformed business models, but also redefined the banking profession as a whole. Implementing digital transformation requires an organizational culture that supports innovation. On the one hand, the development of digital technologies, and above all financial technologies better known as FinTech, imposed a digital transformation of the banking sector, while on the other hand, the need for continuous innovation, the transformation of banking products and the process of providing banking services, as well as the changed habits of users of banking services require continuous development of financial technologies. This evolution is not merely technological but also socio-economic, with significant implications for financial inclusion and the democratization of financial services, particularly in emerging markets where traditional banking infrastructure is less developed (Nnaomah et al., 2024). Financial inclusion refers to the availability and accessibility of financial services to all individuals, particularly those in underserved or remote regions who lack access to traditional banking infrastructure (Sanyaolu et al., 2024).

2. LITERATURE REVIEW

The term digital transformation denotes the thorough reorganization of conventional banking frameworks by incorporating digital tools throughout numerous business activities, operational systems, and methods of engaging clients (Raza et al., 2024). Digital transformation in the banking sector transcends mere technological upgrades, it fundamentally reshapes the relationship between banks and their customers, as well as the values and principles guiding their operations (Abuselidze & Zoidze, 2024).

The advent of Financial Technology (FinTech) represents a watershed moment in the evolution of the global financial sector, heralding significant shifts in the paradigms governing traditional banking operations and the advent of novel financial services (Nnaomah et al., 2024). Simply, it is the fusion of financial services with technological advancements (Dewasiri et al., 2023). As the banking industry moves forward, blockchain will undoubtedly play a pivotal role in defining the next generation of financial services, offering new pathways for growth, efficiency, and customer engagement (Sanyaolu et al., 2024). By adopting blockchain technology, banks can position themselves as leaders in innovation and provide their customers with a secure and transparent banking experience (Udeh et al., 2024).

The allure of AI lies in its inherent human-like intelligence, which, when properly harnessed, can significantly streamline banking processes, enable personalized customer interactions, and foster data-driven decision making (Shibin Tad et al., 2023). The developing adoption of AI vows to lastingly affect the banking industry (Jomon Jose & Aithal, 2023). AI-based systems have the potential to effectively identify and prevent fraudulent activities in real time, providing a significant advantage over traditional fraud detection methods. (Mytnyk et al., 2023). AI in banking apps can make keeping track of financial objectives and outgoings simple for customers (Noreen et al., 2023). The operational efficiency of banks and financial institutions is being significantly enhanced by the adoption of AI-enhanced communication tools like chatbots and natural language processing (NLP) (Udeh et al., 2024). Moreover, voice biometric systems are capable of handling a large volume of authentication requests simultaneously, minimizing waiting times for customers and thus enhancing the overall customer experience (Amjad Hassan Khan & Aithal, 2024). Finally, it is worth mentioning that artificial intelligence excels is situations where both the task and the rules that need to be applied in order to fulfil that task are clear (Grigorescu, 2024).

With increasing dependence on online banking and digital financial services, protecting customer data, financial assets, and critical systems from cyberattacks is crucial (Dawodu et al., 2023). Cybersecurity in banking has become a paramount concern, requiring a proactive and adaptive approach to protect sensitive data, maintain trust, and ensure the resilience of financial systems. (Hassan et al., 2024). By implementing robust security measures, staying informed about evolving threats, and collaborating with stakeholders, the banking industry can effectively protect itself from cyber threats and maintain a secure and trusted financial system for all (Dawodu et al., 2023). Only those banks that successfully integrate high-tech and innovative elements into their business strategy in the conditions of constant development of technology and changes in consumer preferences will have every chance not only to survive in the future, but also to actively develop (Hrytsenko et al., 2024).

3. DIGITAL TECHNOLOGIES IN BANKING

Cloud computing in banking enables the use of services and resources over the Internet, commonly referred to as "the cloud" by providing access to data and applications from anywhere, at any time. This reduces the need for significant investments in physical infrastructure while offering greater flexibility, efficiency, and agility in the provision of banking services. Cloud computing allows banks to avoid large expenditures on purchasing, maintaining, and upgrading physical servers and IT infrastructure. Consequently, this technology optimizes costs, increases profitability, and provides a high degree of flexibility in resource management based on the specific demands for banking products and services. Through the automation of business processes, it minimizes the risk of human error while accelerating service delivery. Cloud technology has also facilitated the creation and delivery of new banking products and services, such as mobile banking, instant payments, and personalized offerings. One of the primary challenges in cloud computing is establishing trust between cloud service providers and users (Oduri, 2024). Thanks to the use of sophisticated analytical tools, banks can better identify the needs of increasingly sophisticated clients and, in real time, create, communicate, and deliver services that enhance the customer experience. Additionally, user satisfaction is increased as this technology enhances security and protects user data from misuse through measures such as data encryption, multi-factor authentication, and threat detection. These technical activities are strictly monitored and regulated by banking operation standards.

Like cloud computing, artificial intelligence (AI) and machine learning (ML) facilitate the creation, communication, and delivery of new value in banking, enhancing customer satisfaction, optimizing business processes, and strengthening security against fraud and abuse. This is achieved through the analysis of vast amounts of data, automatic identification of user behavior patterns, learning from past experiences, predicting future behavior, and solving problems without employee involvement. These capabilities enhance competitiveness, efficiency, and innovation in banking operations. Using quantitative modeling, artificial intelligence and machine learning plays a crucial role in various aspects of banking, including creditworthiness assessment, personalized service provision, risk evaluation, cost reduction, fraud detection, and overall operational efficiency.

Artificial intelligence accelerates decision-making processes by automating and intelligently handling tasks, thereby advancing financial services development (Wu et al., 2024). One notable application is the automation of customer support through chatbots, which provide real-time communication and assistance to customers. Chatbots enable transactions such as transfers and payments, offer advice on banking products and services, and act as virtual assistants on bank websites and social media platforms like WhatsApp, Facebook, and Instagram. They understand,

interpret, and generate human language, offering immediate, 24/7 responses to customer inquiries. This eliminates wait times for banking support, enhancing customer satisfaction. Additionally, chatbots can simultaneously process a large volume of inquiries, boosting operational efficiency and reducing costs associated with traditional banking methods. Their speed and precision in service delivery help minimize errors. By analyzing consumers' financial behavior, artificial intelligence can predict future needs and create personalized offers, improving the user experience and fostering loyalty.

Chatbots also function as platforms for one-to-one communication, enhancing service personalization and building trust and satisfaction beyond what is achieved with other forms of digital or mobile banking. Furthermore, artificial intelligence plays a significant role in developing new banking products and services. Its importance is evident in detecting money laundering activities and identifying unusual or suspicious transactions. Robo-advisors, another application of artificial intelligence, provide investment advisory services based on advanced analytics, further showcasing AI's transformative impact on banking operations.

Big Data encompasses large and complex sets of demographic, geographic, economic, and behavioral data about users of banking products and services. Analyzing this data forms the foundation for strategic decision-making and increasingly critical tactical decisions. These include improving business processes, developing segmentation, targeting, and positioning strategies, creating marketing mix strategies, and enhancing investment and risk management. The primary advantage of using Big Data lies in its ability to analyze and identify key insights for risk assessment, more accurate market trend forecasting, and strategy optimization. Additionally, the analysis of vast amounts of data enables banks to accurately assess clients' creditworthiness and develop personalized banking products and services. This not only boosts customer satisfaction and loyalty but also provides banks with a competitive edge. Big Data also enhances financial security by enabling the rapid identification of potential abuses. Furthermore, data analysis facilitates the optimization of business operations and cost reduction, contributing to improved efficiency and profitability.

Unlike traditional technologies based on data centralization, modern technologies such as blockchain enable decentralized data access through a network of computers that share identical information. This decentralized structure ensures that all data is accessible to participants in real time, enhancing transaction transparency. Blockchain serves as a digital ledger ideal for storing critical data, as it is highly secure; once entered, the data is difficult to alter, reducing the risk of unauthorized access. Additionally, blockchain includes robust authentication and secure identity verification mechanisms, lowering the risk of identity theft and abuse. This fosters trust between banks and their stakeholders. By enhancing transparency and providing all participants with instant access to the same information, blockchain technology promotes reliability and reduces the likelihood of fraud (Raza et al., 2024).

The critical importance of blockchain in banking is evident in its ability to facilitate payments and international transfers, significantly reducing the time and costs associated with traditional banking. Direct exchanges via blockchain accelerate transactions, save time, and lower transaction fees. Blockchain has also improved banking operations through smart contracts and asset tokenization. Smart contracts automate and streamline various banking processes, enabling transactions to be executed based on predefined conditions. For example, when approving a loan, all approval conditions are automatically verified, ensuring compliance before generating a contract. Banks are also adopting tokenization, the digitization of physical and financial assets, which facilitates asset circulation while ensuring accessibility and liquidity. Moreover, blockchain technology has

paved the way for innovative applications in data sharing, data security, and commerce (Wu et al., 2024). Its potential to revolutionize the banking industry lies in its ability to provide a secure, transparent, and efficient platform for conducting transactions and facilitating communication (Udeh et al., 2024).

From the perspective of service users, mobile applications on smartphones and other mobile devices, as well as digital channels, represent the most visible and accessible aspects of digital transformation in the banking industry. Mobile applications enhance the user experience by enabling customers to access banking products and services quickly, simply, and efficiently. At the same time, this technology allows banks to optimize operations, reduce costs, and develop new banking products and services. A significant advantage of these technologies is their ability to increase the availability of services and enable transactions - such as checking account balances, making payments, reviewing transactions, and applying for loans - at any time and from any location. The increased accessibility of banking services is further supported by other digital channels, including online services via websites and portals, automated kiosks, social media platforms, chatbots, and other forms of digital communication and service delivery.

4. CONCLUSION

Digital transformation in the banking industry not only fosters the creation of new value for consumers but also reduces costs and increases profitability. With the advancement of modern information and communication technologies, banking product and service users are becoming increasingly sophisticated. This presents a significant challenge for banks to digitize their services, a process now central to any bank seeking to survive, grow, and evolve. The concept of digital transformation in the banking sector extends far beyond the application of information technology to improve operations. It fundamentally reshapes the business model, enabling the creation, communication, and delivery of new value to consumers. Traditional banking is undergoing radical changes to maintain competitiveness in the modern business landscape. Banks are tasked with developing digital products and services while enhancing the customer experience. Key trends in modern banking include the development of mobile banking and applications that provide access to services anytime and anywhere, the growth of online banking and digital payments, improved security and efficiency in transactions, and the integration of artificial intelligence and machine learning. These technologies drive business improvement, support fraud detection, enhance risk management, and enable the creation of personalized offers for consumers.

The continuous development of innovations will make banking services increasingly personalized, available on real-time platforms, efficient, and secure. Sophisticated tools analyze vast amounts of customer data, enabling the creation of detailed profiles of banking product and service users. Innovation drives not only the evolution of banking but also economic growth, relying on the synthesis of new technologies and human expertise. Basic banking transactions, such as opening accounts, transferring money, paying bills, applying for loans, and answering inquiries, will become fully digitized. Blockchain technologies will enhance transaction security, while tools, platforms, and digital technologies will deliver new value to consumers, creating unique and seamless experiences. However, despite these advancements, robots and automated systems lack the creativity and judgment required for certain tasks. The role of bank employees remains irreplaceable in areas demanding creativity and decision-making based on nuanced judgment. A fully robotic approach cannot entirely replace human involvement. The future lies in a hybrid model that integrates the efforts of employees and robots, where human knowledge expands and enhances artificial intelligence, driving further development and innovation.

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The Economic Impact of Cybercrime: A Literature Review of Regional and Global Drivers

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Abstract: *This paper examines the economic impact of cybercrime through a comprehensive literature review, analyzing its global and regional effects. Cybercrime imposes significant costs on businesses and governments, increasing cybersecurity expenditures, distorting markets, and eroding consumer trust. The study highlights the uneven distribution of cybercrime, with wealthier, digitally advanced regions facing greater risks. Special attention is given to European and Central European trends, particularly in Hungary, where cyber threats are rising. The analysis explores regulatory responses, international cooperation, and evolving cybercriminal tactics, including Artificial Intelligence driven fraud. Findings suggest that strengthening cybersecurity policies, enhancing public awareness, and fostering cross-border collaboration are crucial to mitigating economic damage. The paper aims to inform policy strategies that improve digital resilience and financial stability.*

1. INTRODUCTION

The extensive digital infrastructure provided by information technology and the internet has facilitated the emergence of a new form of criminal activity: cybercrime. Cybercrime has become one of the most significant challenges of the digital age and the 21st century. In practice, cybercrime can manifest in various forms, such as financial crimes or misuse of personal data. The techniques employed by offenders are diverse and multifaceted, including ransomware attacks or phishing activities. These forms of criminal activity impact a country's economy at both micro and macro levels, and collectively, we have observed regional and global effects. Numerous data points support the relevance and timeliness of this topic. According to estimates, victims suffered financial losses of $1 trillion in 2020, accounting for more than one percent of the world's GDP (Wright & Kumar, 2023, p. 2). Beyond economic impacts, cybercrime has numerous social consequences. Victims often experience emotional shock and a decrease in trust in digital systems. Research has shown that financial fraud can cause material damage, emotional trauma, and helplessness. Consequently, trust in digital infrastructure diminishes, eroding and hindering the broader acceptance of online services, which can lead to further economic damage.

This study examines the economic impacts of cybercrime over recent decades, identifies potential threats to consider for the future, and explores effective preventive strategies to counter these threats. Additionally, the study aims to analyze global and regional economic impacts, focusing on the effects in the Central European region. If specific regional patterns exist, we intend to uncover them. A separate chapter of the study addresses specifics related to Hungary. To conduct this research, we primarily employ a comprehensive literature review. Additionally, we examine statistical trends and the economic impacts of criminal techniques.

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In line with the above, the study follows the following structure: In the first analytical section, we review cybercrime's global and regional patterns. Subsequently, we examine the Hungarian experience, highlighting trends, vulnerabilities, and possible institutional and legal responses.

2. OVERVIEW OF THE GLOBAL IMPACT OF CYBERCRIME

In recent years, cybercrime has increasingly impacted the global economy. It affects not only individual companies but entire national economies, depending on the size and importance of the targeted sectors - many of which contribute significantly to a country's tax revenue. According to some research estimates, cybercrime causes between $1,000 billion and $5,000 billion (USD) in annual global economic damage (Wright & Kumar, 2023, p. 2; Smith, 2021, p. 45).

Cybercrime harms the economy in multiple ways. First, there are prevention costs, which include investments in cybersecurity systems, continuous employee training, and long-term compliance with various legal regulations (also known as compliance costs). While preventing crime is preferable to punishing it, these protective measures still represent a financial burden. They indirectly impact everyone, as they often drive up the costs of goods and services.

Additionally, we must consider the consequences and indirect costs of cybercrime. These can manifest in various ways, such as system downtime, revenue loss, and reduced productivity. If a cyberattack becomes public knowledge, it can also significantly damage consumer trust, leading to long-term financial losses for businesses.

Cybercrime also distorts competition and creates market imbalances. In 2014, the global software security market was valued at approximately €20 billion. If cybercrime did not exist, this vast amount could have been allocated to productivity-boosting or efficiency-enhancing investments, such as innovation and development (Gañán et al., 2017). These costs can also be seen as opportunity costs for the global economy.

Another significant economic burden is the cost of law enforcement efforts, which include police investigations, court proceedings, and other legal processes. Additionally, reparation expenses—which cover financial compensation for victims—place further strain on individuals, businesses, and national economies.

Finally, beyond direct financial losses, cybercrime also has psychological and emotional consequences for its victims. Experiencing a cyberattack can lead to stress, anxiety, and fear, affecting mental well-being and productivity (Wright & Kumar, 2023, p. 3).

The research by Wright and Kumar also examined extreme cyber incidents and their consequences. The financial damage caused by severe cyberattacks ranges from $0.7 billion to $35 billion, depending on the scale and nature of the attack. If criminals launch cyberattacks across multiple sectors, the economic damage can rival that of major natural disasters, such as the devastation caused by Hurricane Katrina.

The study also highlights uncertainties in damage estimates arising from differences in risk assessment models. For instance, cyberattacks targeting the healthcare sector could result in losses between $5 billion and $62 billion, depending on system failure and recovery time models. In some cases, estimates can vary by as much as 118%. The authors argue that a standardized risk assessment framework is needed, particularly for insurance purposes, to improve accuracy in predicting and managing cyber-related

financial risks (Wright & Kumar, 2023, p. 3). Similar findings have been revealed in another study. In 2023, ransomware attacks against healthcare organizations increased by 55 percent, while the average cost of a data breach reached $10.93 million. Healthcare organizations store valuable personal and medical data, making them attractive targets for cybercriminals, and the critical nature of their services makes them more likely to be ransomed. The rapid digital transformation and the introduction of telemedicine and electronic health records have often outpaced advances in security measures. The vulnerability of the sector and the economic impact of increasing attacks contribute to the growing public fear of cybercrime, especially regarding the protection of healthcare data (Cook et al., 2023).

Specific sectors are more vulnerable to cybercrime and bear a significant proportion of these costs. According to statistics, the financial services sector has an exceptionally high exposure. In 2023, the financial services industry was the fourth most attacked sector, although it showed a lower attack rate than in previous years. 25% of malware attacks continued to target this industry, indicating stability in earlier trends. The average cost of data breaches in the financial sector in 2023 was $5.9 million, the second highest after healthcare, and the number of ransomware attacks increased by 64% compared to the previous year. Overall, the number of cyberattacks in the financial industry has increased significantly, and the constantly changing nature of attacks poses a challenge for defense and the development of security strategies. (Kovalchuk et al., 2021).

Naturally, the economic impacts of cybercrime do not affect the economies of different regions of the world equally. Criminals primarily target countries and territories with higher incomes and more developed digital infrastructure. According to a study, Europe and Central Asia have the highest exposure to cybercrime-related losses. The areas with significant losses often invest the most in cybersecurity ecosystems. According to the Cyber Risk Index, Sweden, Norway, the United States, and the United Kingdom are among the countries whose economies are most exposed to the risks of cybercrime (Sviatun et al., 2021).

3. ANALYSIS OF THE EUROPEAN TRENDS OF THE ECONOMIC IMPACT OF CYBERCRIME

This chapter reviews European trends in the economic impact of cybercrime. The COVID-19 pandemic has exacerbated existing problems and increased the number of incidents. Cyberattacks target both the public and private sectors (Deres, 2022). In 2023, Eurojust ranked cybercrime as one of the top five crime areas. The number of new reports increased by 43% compared to 2022. Ransomware attacks are widespread. Joint Investigation Teams have been set up within Eurojust to combat such attacks. One of the key results was dismantling a ransomware program that launched attacks in 71 countries and caused financial damage to more than 1,800 victims. Another major operation targeted the Ragnar Locker ransomware group, responsible for attacking 168 international companies since 2020. Social engineering attacks have also evolved as criminals increasingly use artificial intelligence and large language models. Phishing also remains a primary form of attack (Eurojust, 2024). Other threats included malware, denial of service attacks, supply chain breaches, and data manipulation (Eurojust, 2024). Eurojust also assisted in cases involving encrypted communication platforms such as EncroChat and Sky ECC. These investigations revealed how organized crime groups exploit encryption to evade law enforcement. We believe action plans based on international criminal cooperation will become even more necessary as cybercrime becomes increasingly internationalized and individual countries cannot effectively combat it independently.

Cybercriminals primarily target economically developed and densely populated areas, such as London and the South East of England, due to the high concentration of potential victims, including businesses and individuals with valuable digital assets (Chen et al., 2024).

Financial institutions and multinational corporations operating in urban centers are prime targets for cyberattacks, as they can steal valuable customer data and make significant economic gains (Chen et al., 2024). Another characteristic of such regions is that they have relatively high internet usage, which increases their exposure to cyber fraud, phishing, and identity theft (Chen et al., 2024).

According to the Eurobarometer survey, which was published in 2022, 28% of small and medium-sized enterprises (SMEs) in the European Union have experienced at least one form of cybercrime, with the highest rate in Portugal (48%) and the lowest in Sweden (15%). The most common cyber threats affecting SMEs were online bank account hacking (32%), phishing and impersonation attacks (31%), and malware infections (29%) (European Commission, 2022). Despite these risks, SMEs lag behind larger businesses in cybersecurity awareness and preparedness, often due to a lack of commitment from management. Only 30% of EU SMEs implement more than basic cybersecurity measures, and less than 30% provide mandatory cybersecurity training for employees (European Commission, 2022). The survey highlights the need for increased cybersecurity awareness, tailored guidance, and better cyber risk management practices to protect SMEs from financial losses and operational disruptions. To mitigate risks, improving cyber resilience through SME-specific cybersecurity standards and frameworks is essential. By raising awareness, implementing stronger security measures, and enhancing training, SMEs can significantly improve their defenses against cyber threats.

Cybercrime has also had a profound economic impact on Central Europe, particularly in the wake of the COVID-19 pandemic and ongoing geopolitical instability (UpGuard, 2023). The costs of cybercrime continue to rise, with global losses projected to reach $8 trillion in 2023, rising to $10.5 trillion by 2025, significantly impacting Central European businesses and institutions (UpGuard, 2023). The economic burden of cybercrime in Europe is particularly severe, accounting for nearly 0.84% of regional GDP, exceeding North America's 0.78%, underscoring Central Europe's vulnerability to digital threats (UpGuard, 2023). Sectors such as finance, healthcare, and public administration remain highly vulnerable, with ransomware attacks causing significant disruption, particularly in the healthcare sector during the pandemic (Europol, 2023). The geopolitical situation, in particular Russia's invasion of Ukraine, has exacerbated the cyber threat landscape in the region, with state-sponsored and criminal cyber activities targeting critical infrastructure and businesses (Council of Europe, 2022). In response, Central European governments are prioritizing cybersecurity measures, increasing investment in cybersecurity infrastructure, and raising awareness among businesses about mitigating risks and preventing long-term economic damage (Eurojust, 2024; World Bank, 2023).

4. ECONOMIC IMPACT OF CYBERCRIME IN HUNGARY

According to statistics, cybercrime has significantly increased in Hungary in recent years. The increasing reliance on digital technologies, including online banking and the widespread use of smartphones, has created new opportunities for cybercriminals. In Hungary, the number of cyberattacks increased by 125% between 2021 and 2022, reflecting the global trend of a 358% increase in malware between 2019 and 2020 (Kapolyi, 2023).

In addition to the increase in cases, criminals are also using more sophisticated techniques to commit crimes in cyberspace successfully. Another trend is that cybercriminals are launching more targeted attacks against victims. Ransomware attacks, phone scams based on psychological manipulation—such as fraudsters impersonating bank representatives and asking for personal information—and even identity theft have become increasingly common (Portfolio, 2024). Identity theft can take multiple forms, including financial identity theft, medical identity theft, and romance fraud (Telex, 2023).

At the end of 2023, an online fraudster impersonated Tesla CEO Elon Musk and scammed a woman from Balmazújváros using manipulation tactics typical of romance fraud. The fraudster contacted the woman via social media and communicated in English. In December, he asked for financial help, claiming he needed money to buy Christmas gifts for his children. Although the victim initially failed to purchase the gift cards, the perpetrator convinced her to transfer 400,000 forints directly to him. Later, he persuaded her to transfer another 300,000 forints, claiming he needed the money to expand Tesla's operations in Hungary. He falsely claimed that he could not transfer funds himself due to restrictions on his American bank account, but assured the victim that she would receive a share in exchange for her help. Later, the fraudster even claimed he was in Los Angeles, preparing travel documents to visit Hungary and meet the victim. This case illustrates how cybercriminals target socially vulnerable victims to commit romance fraud (Telex, 2025).

Another notable case of medical identity theft occurred during the pandemic. A 16-year-old female student had her vaccine application rejected because someone had already used her Social Security number twice. The perpetrator likely registered on the healthcare provider's electronic platform using a foreign passport and the Hungarian student's social security number to receive the vaccine. Cases like this highlight the need for stronger security measures in electronic personal identification, as simple registration procedures can be easily exploited (Tóth, 2021). During the pandemic, cybercriminals increasingly targeted patients and healthcare institutions (Dornfeld, 2020).

Beyond these case studies, general trends in Hungary show that attackers frequently target elderly individuals, primarily through phishing scams (Portfolio, 2024). However, attacks are not limited to individuals—companies are also targeted. Ransomware attacks and illegal data breaches are common among businesses. A study estimated that cybercriminals in Hungary stole approximately ten billion forints from victims in 2023 alone. This figure includes direct financial losses, reputational damage, and cybersecurity costs incurred by organizations. Experts predict this number will continue to rise in the coming years (XpatLoop, 2025). The geopolitical situation, particularly the Russian-Ukrainian war, has further heightened cybersecurity threats in Hungary (Portfolio, 2024).

Despite the growing risks for individuals, businesses, and public institutions, surveys show that cybersecurity awareness in Hungary remains low compared to other European countries. According to a Mastercard report, 23 percent of Hungarians are unaware of cyber threats, while another 36 percent have minimal knowledge. This lack of awareness makes people particularly vulnerable to the aforementioned types of fraud. The report also confirms that the most common types of cyberattacks in Hungary include ransomware and email-based social engineering attacks and a high incidence of malware infections. Weak security practices such as - outdated software and weak passwords - are often exploited by cybercriminals. Between 2020 and 2022, malware-based attacks accounted for half of all reported cyber incidents (Mastercard, 2023).

On a positive note, the Hungarian government introduced mandatory two-factor authentication for users of the country's primary electronic administration platform in mid-January 2025. While this measure enhances security, its implementation has faced widespread criticism. To combat the growing cybercrime, the Hungarian government has implemented several initiatives. In 2023, Hungary adopted EU Regulation 2019/881 elements, which introduced a national cyber certification system to improve digital security standards (AZS Partners, 2024). In addition, the comprehensive cybersecurity law adopted in December 2024 ensures compliance with the EU NIS2 Directive, increasing the resilience of critical infrastructure and digital services (Smart Legal, 2025).

In addition to the problems and challenges, discussing Hungary's role in the fight against global cybercrime is essential. One significant milestone was the adoption of the Budapest Convention on

Cybercrime in 2001. While it may be considered outdated in many respects, it remains one of the most important international treaties against cybercrime. The convention provides a framework for international criminal cooperation in cases where cybercrimes cross borders and helps ensure minimum regulatory coordination among participating states. Hungary further strengthened this role by adopting the Second Additional Protocol, which addresses international challenges in accessing electronic evidence (Deres, 2022).

Beyond this, Hungary is also actively involved in the European Union's cybersecurity strategy. The strategy, which covers 2020–2025, focuses on preventing cybercrime and increasing digital resilience across EU member states. Hungary is also a member of Europol's Joint Cybercrime Task Force (J-CAT), which plays a key role in ensuring that law enforcement agencies across the EU can coordinate their actions against cybercriminals in cases of cross-border crime (Szabó, 2024).

In summary, Hungary faces several challenges in the fight against cybercrime. One of the most pressing issues is the low level of cybersecurity awareness among both individuals and businesses. At the same time, cybercriminals are constantly evolving their technologies and tactics, making it increasingly difficult to counter their attacks.

One particularly alarming development is the use of artificial intelligence in psychological manipulations. Foreign perpetrators can now deceive victims more convincingly by leveraging AI, making fraud schemes even more effective. Europol has also warned that as AI-powered cybercrime becomes more widespread, traditional prevention and protection strategies will no longer be sufficiently effective, even if they were once considered reliable.

However, we believe that education, awareness campaigns, and media efforts can significantly improve public knowledge of cybersecurity, helping to reduce the likelihood of individuals falling victim to cybercrime and the overall number of incidents.

Finally, it is also encouraging that the Hungarian government has introduced stricter security measures for the public, such as implementing a customer portal requiring two-factor authentication and promoting digital citizenship. These steps could contribute to strengthening cybersecurity awareness and resilience in Hungary.

5. CONCLUSION

The following conclusions can be drawn from the literature analysis, statistics, and case studies. Cybercrime poses significant economic risks, particularly for the financial sector. This study has shown that criminals operating in cyberspace can cause economic instability within specific sectors. We also observe that cybercriminals continuously adapt—they adjust to new technological opportunities, seek out security gaps, and exploit vulnerable victims. This is especially true in Hungary, where criminals primarily target elderly individuals with psychologically manipulative attacks.

It is essential to consider not only the direct financial losses caused by individual cybercrimes but also the costs of prevention, damage mitigation, opportunity costs, and the reputational and trust-related costs that arise from these crimes. All of these factors impact national economies and the global market.

Cybercrime affects different regions in different ways. Criminals target countries and areas with developed digital infrastructures and high-income populations. However, less developed regions are not immune either—as seen in Central and Eastern Europe, including Hungary, where cybercrimes

are steadily increasing. Moreover, many cybercrimes remain undetected or unreported, meaning the number of incidents is likely much higher than statistics indicate. Hungarian legal cases and statistical data suggest that public cybersecurity awareness remains relatively low. Educational programs, corporate and public sector training, and media campaigns must be strengthened to address this. Raising awareness through case studies and sharing prevention techniques can significantly reduce future cybercrimes' frequency and effectiveness.

International criminal cooperation is essential in the fight against cybercrime. In our view, it would be beneficial to update the current Budapest Convention on Cybercrime or develop a new international agreement to provide modernized support for states coordinating criminal investigations, particularly in cross-border cases.

Additionally, we consider it essential to invest in cybersecurity infrastructure and software development and to integrate new technologies, such as artificial intelligence, into cybersecurity mechanisms. These advancements could enhance digital security and reduce cybercrimes committed worldwide. By leveraging these technologies, the global economic damage caused by cybercrime could be significantly mitigated in the future.

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Audit Thresholds and the Incidence of Corruption Cases in Selected Countries of Central and Eastern Europe

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Abstract: *The purpose of the article is to point out the relationship between the number of corruption cases in the countries of Central and Eastern Europe and the size criteria set for conducting the audit. The size criteria for conducting an audit are set in national legislation for accounting as threshold values and are derived from the size criteria of companies listed in Directive 2013/34/EU on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings. It is important that small businesses characterized by relatively high size criteria do not have the obligation to conduct an audit. The article analyzes the relationship between increased audit size criteria since 2013 and corruption cases in the same time period. The research was carried out for the following countries: Slovakia, Czechia, Poland, Hungary, Romania, Bulgaria, Slovenia, Croatia, and Serbia.*

1. INTRODUCTION

An audit of financial statements enhances the credibility of the accounting information of companies that are required to publish their financial statements and annual reports. The objective of an audit is to enable the auditor to express an opinion on whether the financial statements have been prepared, in all material respects, in accordance with a given financial reporting framework. This protects the interests of shareholders, creditors, investors, customers, business partners, employees and the interested public. In principle, an audit is a service in the form of a process of independently obtaining evidence to determine compliance between a company's claims and predetermined criteria and communicating the results to interested parties. Auditing contributes to increasing the reliability of accounting information of those companies that are required to publish financial statements and annual reports. The derived objective of auditing is its moral and preventive effect against the occurrence of errors and fraud. Auditing therefore, contributes significantly to the existence of reliable and comparable financial information about accounting entities and to the efficient functioning of capital markets.

For further investigation, it is necessary to state a few facts. The European Parliament mandates an audit of the financial statements of public interest entities, medium-sized and large enterprises (Directive 2013/34/EU of the European Parliament and of the Council on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings). At the same time, size indicators have been set for these categories of companies. EU countries have set thresholds for indicators, after which an audit becomes mandatory.

According to a Eurobarometer survey, Europeans are skeptical about governments' efforts to fight corruption. Only a third of citizens believe that governments' fight against corruption is effective. 68% of citizens consider corruption to be widespread in EU Member States (European Commission, 2024).

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The article presents the thresholds of the indicators of companies in Central and Eastern European (CEE) countries, changes in their settings since 2013, the number of corruption cases in 2016-2021, and the Corruption Perceptions Index in the years 2013-2023 from Transparency International (2024).

2. LITERATURE OVERVIEW

Several authors have examined various factors that influenced the perception of corruption and revealed corruption cases in countries. The most frequently occurring factors were IFRS adoption, auditing as an obligation, audit fees, the Code of Ethics, and internal control. Jeppesen (2019) states that auditing is one of the eight pillars of the national integrity system against corruption. According to this author, auditing is a tool for preventing and detecting corruption. The relationship between the level of code of ethics quality and the amount of audit fees was examined by Duong et al. (2022). These authors pointed to the finding that riskier clients are burdened with higher audit fees due to higher audit risk. Mottinger (2024) observed a relation between corruption, audit fees, and reporting lags in 27 European countries. This author found that companies in more corrupt countries pay higher fees for audits, and they have a longer period between the end of the fiscal year and the auditor's report. Sargiacomo et al. (2024) conducted a text analysis of media articles concerning corruption in the healthcare sector in Italy. They announced that auditors and accountants should be aware of their roles in the public interest in suppressing various forms of fraud and corruption. Auditors who were more involved in anti-corruption activities usually received higher audit fees for their efforts (Sarhan & Cowton, 2024). CPI and set audit thresholds compared to Özbirecikli et al. (2016) on the examples of Turkey, Japan and Albania. They concluded that audit thresholds are too high in Turkey and too low in Albania. Audit thresholds in Japan approach the European directive. The CPI index in these countries is almost incomparable. However, these authors did not find a connection between the Corruption Perceived Index and the wrongdoings detected. According to Hoque and Monem (2016), "the length of IFRS experience is negatively related to perceived corruption in a country" (p. 363). Based on evidence, they confirmed that corruption is perceived to be lower in countries that have adopted IFRS. The importance of Corporate Governance and Corporate Boards for suppressing corruption, and also the finding that corruption is lower in countries with higher accounting standards, is presented by Wu (2005).

3. RESEARCH OBJECTIVE AND METHODOLOGY

Directive 2013/34/EU of the European Parliament and of the Council on the annual accounts and related reports of certain types of undertakings aims to take into account the administrative burden on small and medium-sized enterprises, in addition to the provision of financial information. This Directive is in line with the objective of the "Europe 2020 Strategy" to ensure smart, sustainable and inclusive growth. The Directive also supports the internationalization of small and medium-sized enterprises. The European Union aims to strike a fair balance between the interests of users of financial statements and the interests of undertakings so that they are not overburdened by reporting requirements. The annual financial statements form a single whole and include at least the balance sheet, the profit and loss account, and the notes to the financial statements. It is still true that the financial statements should be prepared with the principle of prudence (overvaluation of assets and undervaluation of liabilities) and should faithfully and truthfully present the subject of accounting. The financial statements therefore, show the financial situation and the results of the company's operations. The adopted directive ensures the harmonization of requirements for small businesses throughout the EU and is based on the principle of "think small first". Recital 43 of the Directive states that there is a need to audit annual accounts. However, the annual accounts

of small undertakings should not be subject to an audit obligation, due to the potential administrative burden. The reason is that in the case of small undertakings, shareholders and managers are often the same persons. Article 34 (Chapter 8) stipulates that an auditor or auditors or audit firms shall audit the financial statements of public-interest entities, medium-sized and large undertakings. The audit shall include an opinion on whether the management report is consistent with the financial statements and whether this report has been prepared in accordance with applicable legal requirements, i.e. whether it complies with the legislation. The European Parliament has set minimum criteria for undertakings, exceeding which an audit becomes mandatory. The following table shows the classification of undertakings and boundaries which were set for audit performance according to Directive 2013/34/EU The following table shows the sorting of businesses for the performance of the audit according to Directive 2013/34/EU.

Table 1. Categories of undertakings for audit according to the Directive 2013/34/EU

Indicator	Medium sized undertakings	Large undertakings
Balance sheet	Limit up to 25 000 000 €	Value over 25 000 000 €
Net turnover	Limit up to 50 000 000 €	Value over 50 000 000 €
Average number of employees	Limit up to 250	Over 250

Source: Own processing based on European Union (2013)

In the article, we use the data comparison method, data standardization, statistical calculation of Z-Score and standard deviation, and correlation coefficient.

4. RESEARCH AND DISCUSSION

The countries of Central and Eastern Europe adjusted the minimal boundaries for the audit. The following table provides an overview of the criteria for undertakings, when exceeded, an audit is required.

Table 2. Minimal audit criteria set in countries of CEE as of December 31, 2024

Country	Balance sheet in EUR	Net turnover in EUR	Average number of employees
Bulgaria	2 045 200	4 090 398	50
Croatia	2 500 000	5 000 000	25
Czechia	1 600 000	3 200 000	50
Hungary	-	726 000	50
Poland	2 500 000	5 000 000	50
Romania	3 500 000	7 000 000	50
Serbia	-	4 400 000	-
Slovakia	4 000 000	8 000 000	50
Slovenia	4 000 000	8 000 000	50

Source: Own processing based on Accountancy Europe (2021)

The number of corruption cases registered in the EU is relatively low but growing (Eurojust, 2024). The number of corruption cases registered in the EU (2016-2021) is in Table 3.

Table 3. Number of corruption cases in the EU in 2016-2021

Year	2016	2017	2018	2019	2020	2021
No. of cases	78	67	78	77	93	112

Source: Own processing based on Eurojust (2024)

Registered corruption cases in CEE countries in 2016-2021 are also at relatively low levels.

Table 4 shows registered corruption cases (2016-2021) in CEE countries.

Table 4. Corruption cases in 2016-2021 in CEE countries

Corruption	BG	HR	CZ	HU	PL	RO	RS	SK	SI
cases	38	37	34	34	32	88	12	28	14

Source: Own processing based on Eurojust (2024)

The tables show that the number of corruption cases is low for our analysis. For this reason, the Corruption Perception Index (CPI) from Transparency International (2024) was used for our next analysis. A Higher Score means that the country has a better position.

Table 5. Score of CPI in CEE countries:

CPI	BG	HR	CZ	HU	PL	RO	RS	SK	SI
2013	41	48	48	54	60	43	42	47	57
2016	41	49	55	48	62	48	42	51	61
2020	44	47	54	44	56	44	38	49	60
2023	45	50	57	42	54	46	36	54	56

Source: Own processing based on Transparency International (2024)

Improved CPI positions (2013-2023) were in countries BG, HR, CZ, and SK. The decline in position was in HU, PL, RO, RS, and SI.

Table 6 shows the changes in threshold values for the audit: Balance sheet, Net turnover, Average number of employees (2013-2023).

Table 6. Changes in values of audit thresholds (2013-2023) in CEE countries

Audit	BG	HR	CZ	HU	PL	RO	RS	SK	SI
thresholds values	up	up	up	down	unchanged	down	unchanged	up	down

Source: Own processing based on Accountancy Europe (2021)

Audit thresholds increased in countries BG, HR, CZ, and SK. The values were reduced in the countries HU, RO, and SI. Countries PL and RS remained unchanged. The following graphs show the development of the CPI and audit threshold for the Net turnover item in the period 2013 - 2023. The Balance sheet item has the same development as Net turnover, and the Average number of employees item is almost unchanged.

Research question: Several authors have addressed the importance of auditing as a tool for detecting errors and fraud, or various wrongdoings (Jeppesen, 2019; Mottinger, 2024; Hoque & Monem, 2016). However, they did not find a link with the set thresholds for the audit and the number of cases of corruption or the corruption perception index. We found that the number of revealed corruption cases is not enough for analysis, so we used a comparison of the thresholds for the audit and the CPI. We have been researching developments in set thresholds since 2013 concerning CPI development.

RQ: Is there a relationship between thresholds set since 2013 and CPI development?

The hypothesis is set:

Hypothesis One: We assume a relationship between audit thresholds set since 2013 and CPI development in CEE countries.

We graphically illustrated the relationship between CPI and net turnover in countries. The growths in both items (CPI and Net turnover) were in the BG, HR, CZ, and SK countries. The decline in both items was in HU, RO, and SI. The decline in at least one item was in PL and RS.

For further analysis, we standardized CPI, Net turnover and Balance sheet data. We calculated the Z-score, standard deviation, and correlation coefficient. The correlation coefficient for the relationship between CPI and Net turnover is 0,364, which means a positive, slightly moderate dependence. The correlation coefficient for the relationship between CPI and Balance sheet is 0,398, which also means a positive, slightly moderate dependence. The results are shown in Figure 2.

We set the hypothesis: we assume a relationship between the audit thresholds set since 2013 and CPI development in CEE countries. The correlation coefficient pointed to a slight positive dependence between CPI and Net turnover, and also between CPI and Balance sheet data.

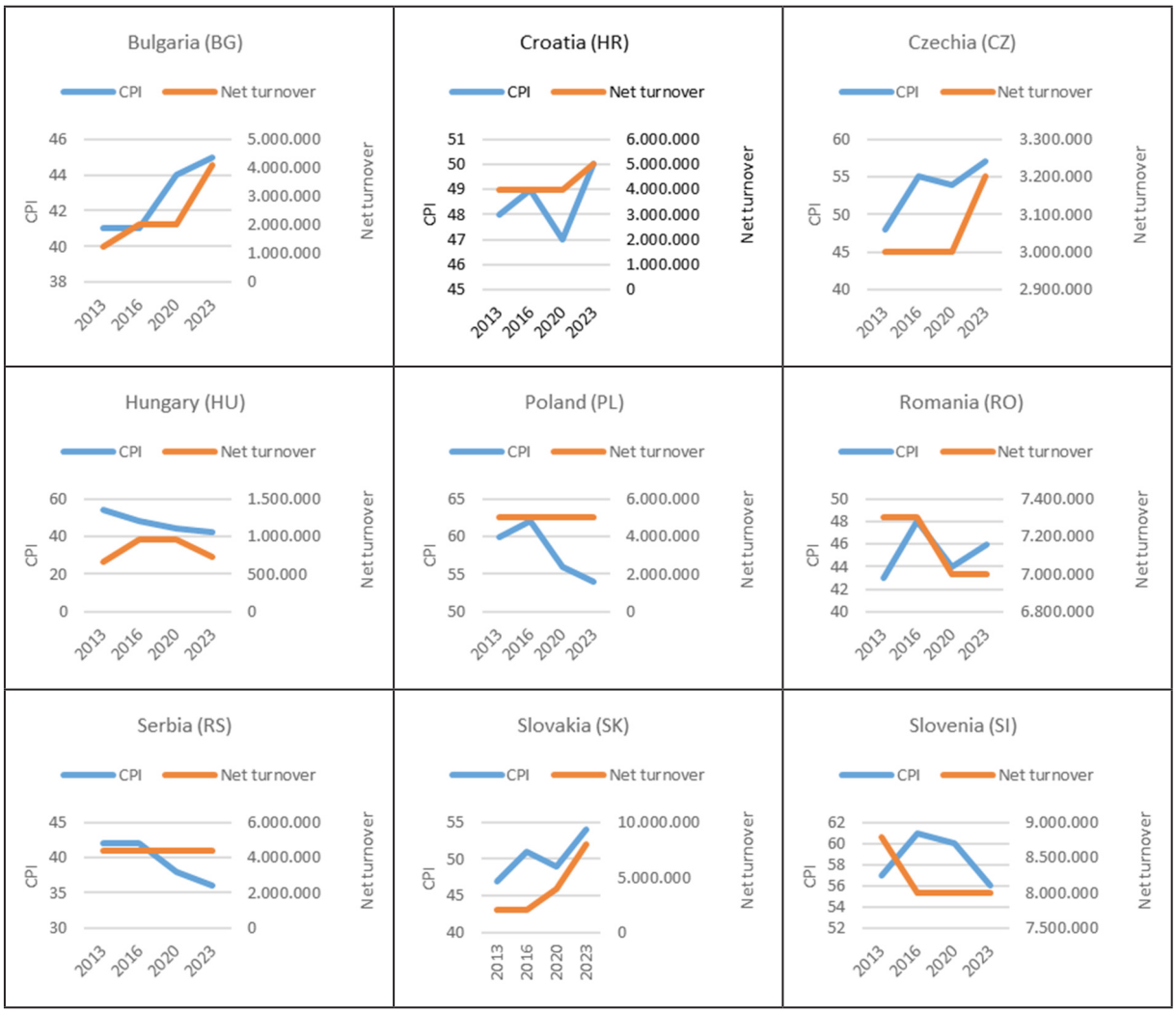

Figure 1. The CPI and audit thresholds in CEE countries (2013 – 2023)

Source: Own processing

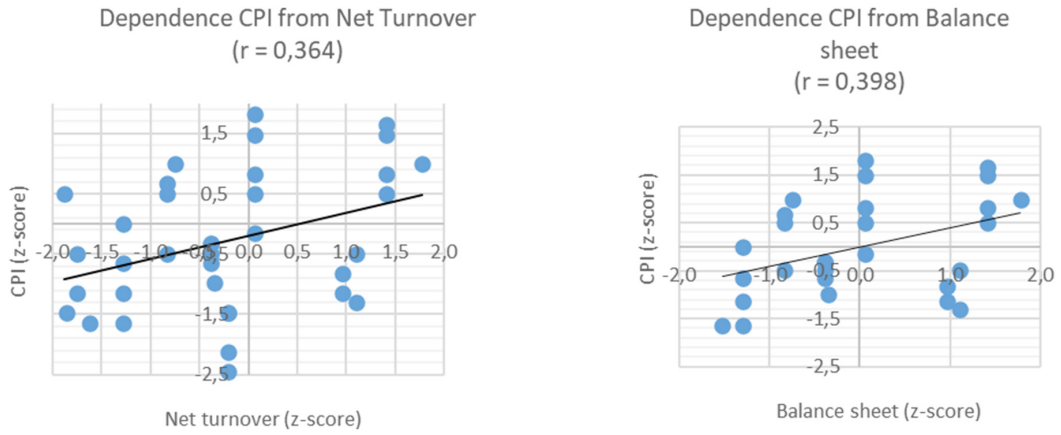

Figure 2. Dependence between CPI and Net turnover, CPI and Balance sheet

Source: Own processing

5. FUTURE RESEARCH DIRECTIONS

Future research could focus on the impact of other economic and social variables affecting CPI.

6. CONCLUSION

Several authors have investigated auditing as a tool for combating some so-called wrongdoings. They have found a link between lower corruption rates and the use of IFRS in some countries. The authors have also expressed the importance of Corporate Governance and Corporate Boards for combating corruption. However, few authors have investigated the relationship between CPI and set audit thresholds in countries Özbirecikli et al. (2016). We set the hypothesis that we assume a relationship between audit thresholds set since 2013 and CPI development in CEE countries. We collected data on CPI, assessment items for audit thresholds (Net turnover, Balance sheet, and Average number of employees), we standardized the data, calculated Z-score, and correlation coefficient. The calculated correlation coefficient confirmed a positive, slightly moderate dependence between CPI and Net turnover, and CPI and Balance sheet.

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The Role and Importance of Principles of Taxation in Creating a (Solid) Tax System

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Abstract: *Since the early 18th century, theory and practice have sought universal principles for a "solid" tax system. These principles help assess existing tax policies and review proposed innovations. Taxes are not just fees for living in a society; they shape the civilization citizens want to live in. The state's decisions on taxation profoundly affect the economy, resource allocation, and public satisfaction. This research examines key tax principles necessary for any good tax policy, focusing on how taxes support economic growth and other specific fiscal and parafiscal goals. The analysis also explores the role and importance of a solid tax system. Using the Republic of Srpska's tax system as a case study, the paper assesses distortions in its current tax system. The author concludes that while no universal tax principles are ideal for all countries and times, certain principles lead to a solid tax system in any country.*

1. INTRODUCTION

"The art of taxation consists in so plucking the goose as to obtain the largest possible amount of feathers with the smallest possible amount of hissing"

Louis XIV's Finance minister, Jean-Baptiste Colbert

Despite numerous efforts, a universally accepted definition of taxes applicable across all socio-economic systems has not been established. Still, certain key features distinguish taxes from other charges, such as their compulsory and monetary nature, the lack of direct return (quid pro quo), and their derivativeness. Broadly speaking, a tax system includes all tax forms and public revenues collected to meet both fiscal and non-fiscal goals, while in a narrower sense, it refers only to the collection of taxes themselves.

Tax systems vary significantly due to historical, economic, social, and political factors, such as economic development, population size, education level, and international affiliations, making it difficult to find two identical systems. Nevertheless, a solid tax system should satisfy basic principles: equity, certainty, neutrality, simplicity, adequacy, convenience, transparency, and administrative efficiency.

Taxation is central to fiscal policy, providing the funds needed for public services and development. Tax principles guide how taxes should be levied to ensure fairness, effectiveness, and economic stability. These principles help maintain public trust and support inclusive growth.

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This paper, following the introduction, consists of two main parts. The first outlines the fundamental principles of taxation and explains their significance in shaping a sound tax system. The second examines the tax system of the Republic of Srpska through the lens of these principles, assessing whether it meets them and identifying areas of distortion. Using dogmatic and historical-legal methods, alongside a review of legal literature, the paper aims to determine which principles are essential for effective tax policy and how their application can support national development. It also evaluates whether aspects of the current RS tax system cause imbalances and offers suggestions for improvement.

2. PRINCIPLE OF TAXATION

Although the theory and practice of principles od taxation can be traced back to the time of the Sumerians (around 4000 BCE), and was also discussed by the famous Chinese philosopher Confucius, the significance and role of taxation principles in creating any sound tax system, which still apply today with certain adjustments, have remained largely unchanged since the time of Adam Smith, that is, since 1776 (Smith, 1776, p. 676). At that time, Smith established four fundamental principles of taxation, which are still considered today as the "canons of taxation", "the golden principles", and/or the "main canons of taxation". Smit's four principles, namely fairness, certainty, convenience, and efficiency, have proven their validity over time, so they can be summarized by contemporary economists as three key requirements, i.e., equality, efficiency, and applicability. Of course, with time, these requirements have evolved, causing the principles of taxation to acquire various meanings and, as a result, transform into principles of fiscal policy, economic policy, as well as social and political principles.

However, many theorists and practitioners believe that Adolf Wagner, at the end of the 19th century, provided the most comprehensive systematization of tax principles, grouping them into four categories, namely: Financial (Adequacy and Elasticity), Economic (Proper selection of Tax Sources and Assessment of Effects), Social Justice (Universality and Fairness), and Financial-Technical Principles (Legality, Convenience, and Minimal costs). Almost all modern tax systems are based on this last classification of tax principles by Wagner.

Regardless of the previously mentioned principles, and regardless the fact the principle of legality that is not within the "mentined golden principles", it is essential to emphasize that the basic legal framework for every tax, and consequently for the tax system and taxation in general, must, above all, entail taxation in accordance with the rule of law, i.e., in accordance with the constitution and positive legal regulations (Tipke & Lang, 2018, p. 94) The fundamentals of this framework are that (1) a tax can be levied only if a statute lawfully enacted so provides, (2) a tax must be applied impartially, and (3) revenue raised by a tax can be used only for lawful public purposes, not for the prince's private ends (Thuronyi, 2003, p. 21).

However, before moving on to a more detailed explanation of some specific tax principles that will be discussed later in this paper, it is important to highlight that the demands placed on taxes by certain tax principles are not always in harmony with the demands set by other tax principles.

Moreover, these demands are often in conflict. For example, socio-political and/or economic principles are frequently in collision with financial principles, especially the principle of adequacy, which in practice leads to the incomplete realization of one or more of the principles in real life.

For this reason, tax policy makers must take into account the priority of individual principles, as well as their role in taxation. The prevailing view among practitioners and theorists, for centuries

now, is that the principle of adequacy (sufficiency), i.e., financial principles, must have precedence. Given that it is not possible to fully analyze all the tax principles in this paper, the author will provide an overview of some of them.

2.1. The Principle of Fairness and the Principle of Equity

The demand for fair taxation is a fundamental normative principle that is set before the creators of tax policy. Although, as mentioned in the paper, both Smith and Wagner identified the principle of fairness as one of the basic principles of taxation, its implementation in modern tax systems remains one of the most challenging to this day. The challenge (or rather, the problem) arises from theoretical disagreements regarding the definition of the concepts of justice and fairness, which stem from the philosophy of ethics. Namely, the principle of fairness can also be seen as a bridge between two systems of social norms, namely: law and morality. According to the German professor of Tax Law Klaus Vogel "the meaning of fairness, unlike efficiency, cannot be defined; it can only be explained or paraphrased. Moreover, fairness is an interpretative concept. In other words, discovering what fairness requires in a specific situation involves an element of creativity" (Vogel, 1990, p. 152).

The Fairness principle in tax collection highlights the need for equal treatment of all taxpayers in similar circumstances. This principle incorporates aspects of justice, ensuring that all decisions and policies are made in the best interest of every taxpayer, as well as customers, suppliers, shareholders, investors, and the wider community. The core idea of fairness, or equality, requires that actions be taken with consideration for the interests of others, grounded in the principle of equity.

Further, fairness means that individuals or businesses in a similar or the same position should bear comparable tax burdens. Similarly, a fair tax system could be defined as one in which taxation is based on the economic capacity of taxpayers.

It can be said, a tax system is fair if it encompasses the principle of horizontal and vertical equity. The first one signifies the requirement that taxpayers with the same economic strength pay the same amount of tax. However, it should be emphasized that this principle, although incorporated into nearly all modern constitutions, is very difficult to fully implement. This is because tax policy is not based solely on one principle, but rather on multiple types of arguments that condition a selective tax policy, which leads to differentiated tax treatment of certain incomes. The second requirement, or the principle of vertical equity, represents the demand that taxpayers with greater economic strength should pay higher amounts of tax. In other words, taxpayers with different economic capacities should pay different amounts of tax, thus ensuring that the tax burden is equitable for all taxpayers. On the other hand, how much higher a tax amount should be paid is the subject of long-standing and frequent debates, which have ultimately led to the application of different (progressive) tax rates, as well as tax deductions and exemptions. In line with the equity principle, the tax creditor (the state and/or any of its public legal entities) must adjust tax collection based on the taxpayer's income and capacity, ensuring that taxes are levied in a fair and non-discriminatory manner. This implies that every taxpayer should be taxed proportionately to their economic capacity. So, the equity principle can, or could be achieved through a progressive tax system, where tax rates increase with higher income. It also emphasizes the importance of treating all taxpayers fairly and preventing tax evasion.

Finally, but no least, it is important to mention when assessing the principle of equity, it is essential to consider the full spectrum of taxes a taxpayer is subject to, rather than focusing on just one type of tax.

2.2. The Principle of Neutrality (Principle of Economic Growth and Efficiency)

The principle of tax neutrality can be defined as a tax system that does not affect the business decisions of taxpayers. Some authors, such as Nobel laureate Stiglitz (Stiglitz, 2004, pp. 466-471), view this principle as a principle of economic growth and efficiency.

Taxes that are not neutral, i.e., distortive taxes, can significantly affect the economic decisions of taxpayers, both legal entities and individuals. In the case of introducing distortive taxes, it is expected that legal entities will move their capital and headquarters to countries and/or regions with more favorable tax policies, or invest in sectors with more favorable tax treatment. Individuals will be forced either to work more or replace more heavily taxed products and/or services with other products. Also, distortive taxes, i.e., their effect on the economic behavior of taxpayers, produce negative consequences for the efficiency of resource allocation. However, apart from head taxes, there are no non-distortive taxes, i.e., taxes that do not change the behavior of the taxpayer in the market. Considering that modern states, through taxation, aim to achieve a range of non-fiscal goals in addition to fiscal ones, and that we often witness the active role of these states in addressing market imperfections, the deviation from neutrality in taxation in certain situations is unavoidable, or even desirable in some cases. Economists' views on the importance of the principle of tax neutrality are highly divided.

Some theoreticians and practitioners believe that neutrality is a characteristic of only a theoretical or ideal tax system (Rothbard, 1981, pp. 519-563). According to some authors, ideal (neutral) tax systems serve as benchmarks for comparing real systems, with any deviation from neutrality measured by tax expenditures or used to assess fairness—both vertical and horizontal equity. Others argue that tax neutrality has become a myth, as it is unachievable within modern public choice theory. A third group contends that deviations from neutrality should be judged by their consequences—such as increased compliance costs, higher tax administration budgets, and broader impacts of a more complex system. They emphasize that any disruption of neutrality must be justified by valid objectives, like promoting social or demographic goals, or supporting R&D and education.

Countries should align their tax systems as closely as possible with theoretical neutrality, as its violation can lead to global fiscal and economic consequences. While minimizing the tax law's influence on decision-making is important, taxation's primary function remains raising revenue—not shaping personal or business choices.

The principle of economic growth and efficiency is closely tied to neutrality, as distortionary tax rules can undermine productivity. A tax structure should maintain neutrality between different business types, avoiding discrimination against certain models. Although all taxes create distortions, effective policy minimizes their impact while supporting goals like growth, capital formation, and competitiveness. Rules should not disadvantage resident firms or distort capital and labor flows in favor of specific industries, as such effects harm overall economic performance.

2.3. The Principles of Certainty, Simplicity and Flexibility

The Principle of Certainty requires tax rules to be clear and easy to understand, allowing taxpayers to know their position. These rules must specify how the tax amount is determined, when it is due, and how payment is/or should be made. A straightforward tax system helps individuals and businesses to understand their obligations and entitlements, leading to better decision-making and alignment with policy objectives. Certainty about tax liabilities is crucial, as ambiguity can confuse. The system should clearly outline what is taxable (the tax base) and the applicable tax rates.

Taxpayers should be able to determine their tax obligations with reasonable certainty, particularly when transactions are easy to identify and value. This certainty helps ensure compliance and fosters respect for the tax system, which is achieved through clear laws and accessible guidance.

Conversely, complexity in tax rules can encourage aggressive tax planning, potentially resulting in economic inefficiencies. The principle of certainty is intertwined with simplicity—complex rules undermine both. Simple tax laws improve compliance, reduce errors, and help taxpayers understand the consequences of their transactions.

Moreover, a well-structured tax system should provide predictability, stability, and reliability, enabling the government to accurately determine when and how much tax revenue will be collected. It must also be adaptable and responsive to evolving needs, technological progress, and business developments. A flexible tax system is essential for addressing the government's ongoing revenue requirements while adjusting to changing circumstances. Regular evaluations of the system are important to ensure it aligns with the jurisdiction's objectives, accommodates new business models, and generates sufficient revenue. To meet government spending needs, tax revenues must be stable and predictable. A diversified tax mix ensures stability, as different taxes react differently to economic fluctuations. For instance, during an economic downturn, income tax revenues may fall, but other taxes that are less affected by unemployment can help maintain overall revenue stability.

Tax systems must remain adaptable to technological and commercial changes, ensuring they stay relevant as circumstances evolve. While the system's core features should be resilient to changing policies, it must remain flexible enough to respond to future developments that may be hard to foresee.

2.4. The Principle of Nonretroactivity

An essential principle that contributes to a fair tax system—ensuring predictability, fairness, and trust—is the principle of non-retroactivity. It requires that tax laws apply only to future periods, protecting taxpayers from unexpected obligations and supporting the rule of law. In essence, this principle means that tax liabilities should not arise from actions taken under a different legal framework. It reflects the broader legal maxim *lex prospicit, non respicit*, and the rule *lex retro non agit*—the law does not operate retroactively (Popović & Ilić Popov, 2015, p. 6).

Non-retroactivity promotes legal certainty, enabling individuals and businesses to make informed decisions based on existing law without fear of future retroactive penalties. Conversely, the retroactive application of tax laws, especially those that increase obligations, can damage public trust and legal security. Retroactive taxation may unfairly penalize those who acted in good faith and deter investment due to legal uncertainty. As Özgüven notes, legal certainty exists to protect individual security, and the non-retroactivity principle serves this purpose by ensuring people can foresee and adapt to legal obligations (Özgüven, 2006, p. 232).

By respecting non-retroactivity, tax authorities reinforce transparency and build public confidence in the fairness of the system. The principle's violation, especially in fiscal matters, can be particularly harmful in democratic societies where the predictability of tax obligations is key to voluntary compliance.

In legal theory, retroactivity is categorized as true retroactivity and imperfect (quasi) retroactivity. True retroactivity applies a new tax rule to events that have already occurred or concluded, such as applying a law enacted in 2024 to taxable events from 2022. This type of retroactivity, especially

when it increases the tax burden, is typically considered unlawful and should be annulled—unless it benefits taxpayers by reducing their obligations. However, in extraordinary circumstances (e.g., economic crises, inflation control, rectifying income inequalities, or deficit reduction), true retroactivity may be temporarily justified to tax unjust gains.

Imperfect retroactivity, by contrast, concerns legal changes applied to ongoing or incomplete tax matters—e.g., a law passed before the tax period ends or before final tax liability is determined. This is not considered unlawful since it affects processes still underway. For example, a tax law enacted on November 30, 2024, and applied from January 1, 2025, to a tax period still open, falls under imperfect retroactivity (Pehlivan, 2014, p. 41).

While non-retroactivity is a foundational legal and fiscal safeguard, exceptions do exist, particularly for issues concerning public order or morality. Nevertheless, to preserve legal certainty and protect taxpayer rights, retroactive laws—especially those increasing burdens—should be rare and carefully justified.

2.5. Convenience of payment

This principle holds that taxes should be imposed at a time or in a manner that is most convenient for the taxpayer. In other words, taxes should be levied in a way that minimizes inconvenience for the taxpayer. The Principle of Convenience emphasizes the need to structure taxes in a way that makes compliance easy and without undue hardship. It requires that paying taxes be convenient, with convenience referring not only to the time and manner of payment, but also to the associated dynamics, administrative procedures, and costs incurred by the taxpayer.

One common payment mechanism is withholding, where income tax is deducted monthly from salaried individuals. This system ensures taxes are paid regularly and on time, with minimal effort from the employee. Withholding taxes not only simplify the payment process for taxpayers but also reduce the risk of non-compliance, as the taxes are deducted directly from income before the taxpayer has the chance to redirect or use the funds. On the other hand, consumption taxes such as VAT should be collected at the point of purchase, allowing the taxpayer to decide whether to buy the goods and pay the tax at the time of the transaction.

The use of secure technology also plays a crucial role in enhancing the convenience of payment. In today's digital age, many countries have implemented online systems that allow individuals and businesses to file tax returns, make payments, and access relevant information at their convenience. These digital platforms not only save taxpayers time and effort by eliminating the need to visit tax offices or deal with complex paperwork but also reduce administrative costs for tax authorities. By enabling taxpayers to manage their obligations digitally, governments can improve compliance rates and minimize errors in tax filings.

Additionally, flexibility in payment schedules is an important aspect of this principle. Taxpayers should be offered reasonable options regarding when and how they can fulfill their tax obligations. For instance, some countries allow businesses to pay taxes in installments or defer payments depending on their cash flow. This flexibility, along with clear communication and transparency, can foster a positive relationship between taxpayers and the government.

When applied effectively, the convenience of payment principle contributes to higher compliance rates, lower administrative costs, and an overall more efficient tax system.

3. TAX SYSTEM OF THE REPUBLIC OF SRPSKA IN LIGHT OF PRINCIPLES OF TAXATION

After 2006, i.e. after the transfer of responsibilities for indirect taxation to state-level institutions in 2006, the tax systems of both entities in Bosnia and Herzegovina—the Republic of Srpska (RS) and the Federation of BiH—were restructured to focus primarily on direct taxation. These systems now consist of direct taxes, property taxes, some minor taxes (such as those on the use, possession, and wearing of goods), and various contributions and fees governed by entity-specific regulations.

The centuries-old legal principle *nullum tributum sine lege*, meaning taxation must be based on law (the principle of legality), is incorporated into the Constitution of the RS. Article 63 specifically proclaims the principles of universality and fairness/equity in taxation. Universality entails that all individuals with legal or economic ties to the RS fall under its tax jurisdiction. Fairness, meanwhile, requires that taxes be levied according to the taxpayer's economic capacity. Universality also forms a prerequisite for the application of the fairness principle and is thus essential for a just tax system.

A deeper analysis of the RS Constitution reveals two additional tax principles: sufficiency and elasticity. Article 62 connects public revenues and expenditures within the budgeting process, implying that public revenues must be adequate to meet public needs (sufficiency), and that the tax system must be responsive to changes in expenditure levels (elasticity). Furthermore, Article 68 confirms the RS's authority to regulate and ensure the operation of its tax system. However, given the multilevel governmental structure of RS, fiscal sovereignty is both centralized and shared with local self-government units, as per the RS Constitution and the Law on Local Self-Government (Milošević et al., 2018, pp. 233-239).

The Constitution also mandates that laws and regulations be publicly accessible and legally consistent. Article 108 requires conformity of all legal acts with the Constitution and applicable laws. Article 109 guarantees the principle of publicness, demanding that legal acts be published in official gazettes. Article 110 limits retroactivity in taxation, allowing it only if explicitly provided by law and justified by public interest.

Given that constitutions are drafted in abstract terms, the RS tax procedure is concretely regulated by the Law on Tax Procedure of the RS, implemented by the Tax Administration of the Republic of Srpska (TARS). This law governs only the special part of administrative procedure related to taxation, thus qualifying as a *lex specialis* compared to the Law on General Administrative Procedure (Vasiljević Poljašević, 2018, pp. 482-483), which applies only when tax-specific provisions are absent.

Since TARS manages only direct taxes, this analysis focuses on Personal Income Tax (PIT) and Corporate Income Tax (CIT), examining their compliance with the principles of a good tax system.

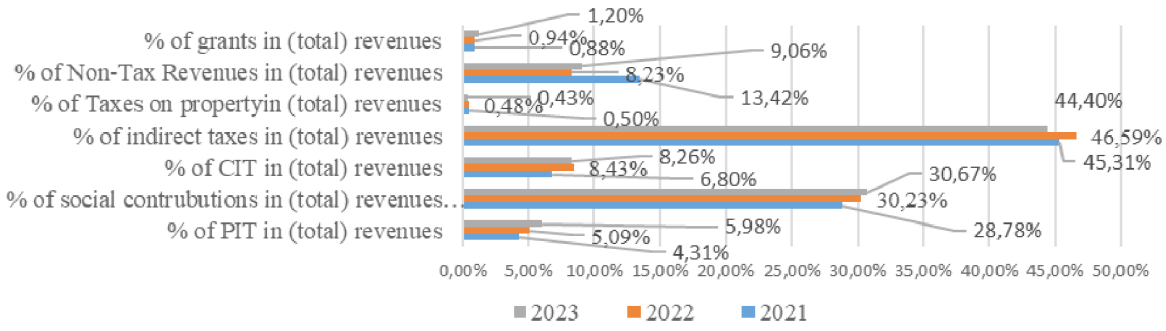

Chart 1. Structure of collected public revenues in the RS for the period 2021 to 2023

Source: Own illustration

The above chart shows the structure of collected public revenues in the Republic of Srpska (RS) for the period 2021–2023. It is evident that the most significant portion of public revenues under the jurisdiction of the Tax Administration of the Republic of Srpska (TARS) derives from personal income tax (PIT) and corporate income tax (CIT), accounting for 4.31%–5.98% and 6.85%–8.26% of total revenue, respectively. Due to their fiscal weight and jurisdictional importance, this section will focus on the application of tax principles in the implementation of PIT and CIT, particularly regarding their neutrality and fairness, and whether these taxes target those most able to pay.

The tax year for both PIT and CIT aligns with the calendar year. A PIT taxpayer is considered a resident if their residence, center of vital interests, or business is in RS, or if they spend at least 183 days in the RS within a tax year. This framework indicates that PIT in RS is based on individual, not joint, taxation. Residents are taxed on their worldwide income, while non-residents are taxed solely on income sourced within RS.

The PIT base is determined as gross taxable income reduced by applicable deductions. These include interest on a first and only housing loan, allowances for dependent family members, and voluntary pension contributions up to specified limits. PIT rates are generally flat and low but vary by income source, legal form, and registration status. Employment income is taxed at 8%, registered entrepreneurs and professionals at 10%, and non-registered professionals at 13%. Small entrepreneurs with a turnover below BAM 100,000 are taxed at 2% on gross revenue. Capital income is taxed at 13%, although some exemptions apply—dividends to residents and interest on savings are tax-exempt.

The tax system incorporates several deductions aimed at increasing fairness, including a personal deduction of BAM 12,000 annually, plus BAM 1,800 per dependent, along with additional deductions for voluntary social security and life insurance premiums (up to BAM 1,200 each per year). While such provisions promote horizontal equity—ensuring taxpayers with equal income levels bear a similar burden—the system falls short of achieving vertical equity. The unequal taxation of different income types incentivizes individuals and businesses to adjust economic activity or legal form purely for tax purposes, thus violating neutrality and efficiency principles.

Moreover, while the PIT system incorporates social policy instruments—such as allowances for children, housing support, and parental leave benefits—these are not equally accessible. Families without dependents, for example, cannot benefit from family-related deductions, resulting in higher marginal tax rates and unequal treatment. Consequently, the PIT framework fails to fully meet standards of fairness or neutrality. The erosion of core tax principles is further evident in the use of preferential regimes and exemptions, which create tax expenditures and deviations from flat-rate neutrality. As a result, the effective tax wedge varies significantly based on legal structure, sector, and income type.

Importantly, many non-neutralities do not stem from the tax system itself, but rather from its interaction with social security rules and labor legislation—such as the Labor Code or entrepreneurship laws. These overlaps create inconsistencies and opportunities for arbitrage that compromise the integrity of the tax system. Although recent digital reforms (e.g., pre-filled tax forms and online filing) have simplified administration, the PIT system remains complex in practice, often requiring taxpayers to engage professional assistance for compliance.

In the case of CIT, the taxpayer is any legal entity registered in the RS or with effective management located in the RS. Non-residents are taxed only on RS-sourced income, including income

from permanent or temporary establishments. The standard CIT rate is a proportional 10%, which is relatively low in regional terms. However, tax incentives—such as deductions for investment in equipment and facilities—allow for reductions in taxable income. These incentives function as policy tools to stimulate investment but result in effective tax rate differences across firms. Consequently, businesses not utilizing these incentives face a relatively higher tax burden.

This variation undermines neutrality and creates room for tax planning and minimization strategies, particularly for well-informed taxpayers. While the number of CIT taxpayers is relatively small, simplifying administration and enforcement, the tax itself remains substantively complex. This complexity stems from the treatment of deductible and non-deductible expenses, varied exemptions, and sector-specific provisions. Furthermore, CIT affects business behavior, particularly investment decisions, and thus cannot be regarded as fully neutral.

Overall, both PIT and CIT in RS serve as essential revenue sources, yet fall short of fully satisfying fundamental tax principles. Although administrative modernization has improved efficiency, the tax system remains fragmented and marked by significant non-neutralities, equity concerns, and distortive effects. Ongoing reform would be necessary to align these taxes more closely with the principles of neutrality, fairness, simplicity, and efficiency.

4. CONCLUSION

Taxation principles provide a foundation for designing and evaluating tax systems, setting expectations for how public revenue should be collected and managed. These principles, such as fairness, neutrality, certainty, simplicity, efficiency, and adequacy, serve as benchmarks for measuring the quality of tax policies. However, their practical application depends on the legal, social, and economic context in which taxation occurs. No single principle can be universally prioritized; instead, tax systems must strive for a balanced and adaptable framework that responds to shifting priorities and fiscal challenges. A flexible tax system is vital for securing public resources, fostering growth, redistributing wealth, and maintaining social cohesion, all while encouraging voluntary compliance and minimizing distortions. A well-designed tax policy, grounded in economic reasoning and consistent legal norms, can contribute to a more just, stable, and prosperous society.

The Constitution of the Republic of Srpska acknowledges key tax principles, while the Law on the Tax System provides a binding framework for their implementation at all government levels. This legal structure aims to ensure that tax legislation reflects not only declarative commitments but also enforceable standards that guide the adoption, modification, and repeal of tax obligations. However, the actual application of these principles, especially in the Personal Income Tax (PIT) and Corporate Income Tax (CIT), often reveals deviations and inconsistencies that challenge the system's fairness and coherence.

In the case of PIT, the use of different tax rates and classifications for various income sources leads to fragmentation and significant differences in effective tax burdens. This undermines neutrality and fairness, both horizontally and vertically. Numerous deductions, exemptions, and special regimes (e.g., for small entrepreneurs, investors, or certain income types) further complicate the system, making it less transparent and less equitable. Although PIT supports broader policy goals such as family support and housing, the system's complexity and inconsistencies suggest a need for reform. This could include expanding the definition of employment income to close loopholes, limiting the scope of "other income," excluding independent professionals from simplified regimes, and introducing a clear legal framework for the taxation of gifts.

CIT, though based on a proportional rate of 10%, also departs from neutrality due to various tax incentives and deductions. These measures lower the effective tax rate for some businesses and create room for tax planning, which undermines equity and horizontal fairness. Despite recent efforts to simplify administration, the system remains complex due to numerous rules on deductibility and reporting. CIT is easier to manage administratively than PIT, given the smaller number of taxpayers, but it still requires significant expertise in application and compliance.

Finally, it can be said that, although the RS tax system is not always equitable and neutral due to the different tax rates and tax exemptions available in the RS tax laws, the tax system, as generally required, is largely compatible with the majority of tax principles.

Through empirical research on different PIT and CIT in RS, this paper aims to contribute to the literature on the application of tax principles in tax law and their importance for the growth and development of the country. The conclusions of this analysis can be further used by researchers and practitioners who address the ongoing need to refine the taxation system in accordance with the requirements of tax principles, and the results could be considered universally applicable in any country.

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IFRS 17 and Solvency II: A Comparative Analysis

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Contractual Service Margin

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Abstract: *This paper explores two key frameworks in the insurance industry: IFRS 17, an accounting standard implemented in 2023 to unify global insurance contract reporting, and Solvency II, a regulatory regime established in 2016 to ensure capital adequacy and risk management within the EU. While both aim to enhance transparency and financial stability, they differ in scope, purpose, and application. IFRS 17 focuses on long-term profit recognition using concepts like the General Measurement Model (GMM) and Contractual Service Margin (CSM), while Solvency II emphasizes short-term solvency through market-consistent valuations. Key differences include risk adjustment methodologies and the specification of liquidity premiums.*

This paper also addresses challenges in operational implementation, costs, stakeholder expectations, and data integration. Despite these hurdles, the synergies between the frameworks present opportunities for harmonization, improved transparency, and stakeholder confidence, marking a significant step forward for global insurance markets.

1. INTRODUCTION

The insurance industry operates in a very regulated environment, where both financial stability and effective risk management are very important. In recent years, two major regulatory frameworks have been introduced and implemented to address these challenges: IFRS 17 and Solvency II. While both these regulatory frameworks aim to enhance transparency, comparability, and policyholder protection, they do so through different approaches and focus areas. IFRS 17, an accounting standard introduced by the International Accounting Standards Board (IASB), revolutionizes the way insurance contracts are measured, reported, and disclosed, ensuring greater consistency and comparability across global insurance markets. On the other hand, Solvency II, the European Union's regulatory regime, focuses on risk-based capital requirements and governance, with the ultimate goal of safeguarding insurers' solvency and promoting market stability within the European Union.

This paper has the goal to provide a comparative analysis of IFRS 17 and Solvency I, examining their similarities and showcasing their differences, and implications for insurers. By exploring their regulatory definitions, scopes, measurement models, and impact on financial reporting and risk management, this paper will provide valuable information on how these two standards will shape the future of the insurance industry.

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2. IFRS 17

IFRS 17, or the International Financial Reporting Standard 17, is an accounting standard developed by the IASB[3] for insurance contracts. It replaces the older standard, IFRS 4 (IFRS Foundation, n.d.-a), which allowed significant variation in how insurers reported their financials (Dufrasne, 2020). IFRS 17 sets out the principles for recognizing, measuring, presenting, and disclosing insurance contracts covered by the standard. Its goal is to ensure entities provide reliable and relevant information that accurately reflects these contracts (IASB, 2010). This enables users of financial statements to evaluate the impact of insurance contracts on an entity's financial position, performance, and cash flows. Issued in May 2017, IFRS 17 became effective for annual reporting periods starting on or after January 1, 2023 (European Insurance and Occupational Pensions Authority, 2024).

2.1. Timeline of the Project

The development of a global standard for insurance accounting first began in 1997, resulting in the development of IFRS 4 in 2004 as an interim standard to address immediate issues. However, IFRS 4 allowed significant flexibility, permitting insurers to continue using local Generally Accepted Accounting Principles (GAAP) and practices such as the cash basis method, which often conflicted with the accrual method used in other industries (Dufrasne, 2020). This flexibility led to inconsistencies and a lack of comparability in insurance accounting (Koskipalo, 2022).

To address these shortcomings, IFRS 17 was introduced in May 2017 as a comprehensive replacement for IFRS 4. Its implementation was initially set for 2021 but was delayed to January 2023 following many rounds of feedback and amendments. A brief timeline of the development of IFRS 17 is given in Table 1.

Table 1. History and development of IFRS 17

Date	Development
2001	Added to the IASB's agenda
2004	Insurance Working Group appointed
2007	Discussion Paper Preliminary Views on Insurance Contracts published
2010	Exposure Draft ED/2010/8 Insurance Contracts[4] published
2013	Exposure Draft ED/2013/7 Insurance Contracts[5] published
2017	IFRS 17 Insurance Contracts[6] published
2020	Amended by Amendments to IFRS 17[7]
2021	Amended by Initial Application of IFRS 17 and IFRS 9 — Comparative Information (Amendment to IFRS 17) to permit entities that first apply IFRS 17 and IFRS 9 at the same time to present comparative information about a financial asset as if the classification and measurement requirements of IFRS 9 had been applied to that financial asset before[8]

Source: Own research

[3] Formed in 2001, the International Accounting Standards Board (IASB), is an independent group of experts that develops and approves International Financial Reporting Standards (IFRS)
[4] International Accounting Standards Board (2010)
[5] International Accounting Standards Board (n.d.)
[6] IFRS Foundation (n.d.-b)
[7] IFRS Foundation (n.d.-c).
[8] IFRS Foundation (n.d.-d)

2.2. Scope of IFRS 17

IFRS 17 largely maintains the same scope as IFRS 4, applying to the same types of contracts (Dufrasne, 2020). Similar to IFRS 4, it excludes insurance contracts[4] where the company is the policyholder, except for reinsurance contracts. IFRS 17 applies to:

1. Insurance contracts issued (i.e., sold),
2. Reinsurance contracts held (i.e., acquired), and
3. Investment contracts with discretionary participation features were issued.

Some contracts qualify as insurance contracts but primarily serve to provide services for a fixed fee. These contracts fall under the scope of IFRS 17 unless the entity opts to apply IFRS 15 Revenue from Contracts with Customers (IFRS Foundation, n.d.-e), provided the following conditions are met (Yousuf et al., 2021):

1. The entity does not consider the individual customer's risk when determining the contract price.
2. The contract compensates the customer by delivering services rather than making cash payments.
3. The insurance risk arises mainly from the customer's use of services rather than uncertainty about the cost of those services.

2.3. Measuring Insurance Contracts Under IFRS 17

Under IFRS 17, insurance contracts are measured by grouping them according to specific aggregation requirements and calculating a Contractual Service Margin (CSM) for each group. The CSM is a key concept that aligns insurance accounting with the accrual method through two main principles:

1. profits from a profitable group of contracts are deferred and recognized over the coverage period as services are provided, and
2. losses from unprofitable groups are recognized immediately in profit or loss (Yousuf et al., 2021).

At each reporting date, insurers must reassess their estimates using updated information on the timing, amount, and uncertainty of future cash flows (Koskipalo, 2022). This requirement ensures that insurance accounting remains consistent with other industries, such as financial instruments, by reflecting current economic conditions (Palmborg et al., 2021).

IFRS 17 implements these concepts through three measurement approaches for insurance contracts:

1. the General Measurement Model (GMM),
2. the Variable Fee Approach (VFA),
3. and the Premium Allocation Approach (PAA).

The GMM serves as the default and most comprehensive approach, designed for contracts without participating features, where insurance liabilities are measured based on the expected future cash flows, discount rates, and risk adjustments. The VFA, on the other hand, is specifically for contracts with significant direct participation features, such as life insurance contracts, where the policyholder participates in the insurer's returns. It allows for a more flexible approach, focusing on the allocation of variable fees over time (Widing & Jansson, 2018). Lastly, the PAA is a simplified method

[4] A contract in which one party (the issuer) assumes significant insurance risk from another party (the policyholder) by agreeing to compensate the policyholder if a specified uncertain future event (the insured event) negatively impacts the policyholder (IFRS 17: Appendix A).

intended for short-term contracts, typically those with coverage periods of one year or less, and is similar to the unearned premium reserve approach under traditional accounting (Francisco, 2024). While the GMM and VFA are more complex and tailored to different contract features, the PAA offers a simplified alternative, with less frequent adjustments to the contractual service margin and a focus on premiums. Despite their differences, all three approaches aim to align the recognition of revenue and expenses with the transfer of insurance services over the contract period (Fleischmann & Hirz, 2018).

3. SOLVENCY II

Solvency II, on the other hand, is the European Union's regulatory framework for insurance and reinsurance companies, replacing the Solvency I regime. The Solvency II supervisory framework fully came into effect on January 1, 2016. Established under Directive 2009/138/EC (European Parliament & Council of the European Union, 2009), it introduces enhanced solvency requirements for insurers, emphasizing a comprehensive risk-based approach (Eling et al., 2007). A key component is the Solvency Capital Requirement (SCR), which represents the minimum amount of own funds insurers must hold. Solvency II also introduces the Risk Margin (RM), calculated using a cost-of-capital method to determine the market value of liabilities.

Insurers can calculate the SCR using either an internal model tailored to their risk profile and depending on their risk appetite, or a standard formula provided by regulators. The framework's calculation guidelines were initially set by the Committee of European Insurance and Occupational Pensions Supervisors (CEIOPS), now succeeded by the European Insurance and Occupational Pensions Authority (EIOPA). While the standard formula is mathematically defined, most regulatory guidelines remain described in general terms (Christiansen & Niemeyer, 2014).

Table 2. History and development of Solvency II

Date	Development
2001	The Solvency II project is officially launched by the European Commission.
2003	The European Commission issues a first consultation paper on Solvency II.
2007	The Solvency II Directive (2009/138/EC) was proposed by the European Commission.
2009	The European Parliament and Council formally adopted the Solvency II Directive.
2010	EIOPA is established, replacing CEIOPS.
2011 - 2013	Development of Delegated Acts and Implementing Measures.
2013	The European Commission delays implementation and proposes the Omnibus II Directive for amendments.
2014	Omnibus II Directive is adopted, refining key aspects of Solvency II.
2015	Preparatory phase begins, with insurers aligning risk management practices with Solvency II requirements.
January 1, 2016	Solvency II fully comes into force, replacing Solvency I.
2018–2019	Solvency II Review initiated to assess effectiveness and propose adjustments.
2020	European Commission launches a formal Solvency II review consultation.
2021	European Commission proposes amendments as part of the Solvency II 2020 Review.
2023	Final reforms are expected to be adopted, refining the framework for future improvements.

Source: Own research

3.1. Timeline of the Project

As mentioned in the introduction, the primary objectives of Solvency II are to enhance consumer protection, modernize supervision, deepen EU market integration, and strengthen the international

competitiveness of European insurers (Doff, 2016). By establishing a uniform regulatory framework, it aims to ensure a higher level of policyholder protection across the EU, which in turn will increase the trust in insurance products across all European countries. The framework also introduces a Supervisory Review Process, shifting the regulatory focus from simple compliance and capital requirements to a more comprehensive assessment of insurers' risk profiles, governance, and risk management practices (Rae et al., 2018). Finally, aligning regulatory standards with global best practices enhances the international competitiveness of EU insurers, ensuring they can operate effectively on a global scale (Doff, 2016). Table 2 shows a detailed timeline of the development of Solvency II.

3.2. Scope of Solvency II

Solvency II establishes regulatory standards for insurance firms and groups, encompassing capital requirements, governance and accountability, risk evaluation and management, regulatory supervision, reporting, and public disclosure (Buckham et al., 2010). In order to understand the solvency II regulatory framework better, it is very important to differentiate between its three pillars (Heep-Altiner et al., 2018):

1. Pillar 1: Establishes the quantitative requirements, including the valuation of assets and liabilities, as well as the capital requirements.
2. Pillar II: outlines the qualitative requirements, covering governance, risk management, and the Own Risk and Solvency Assessment (ORSA) of the entities.
3. Pillar III: defines the requirements for supervisory reporting and public disclosure.

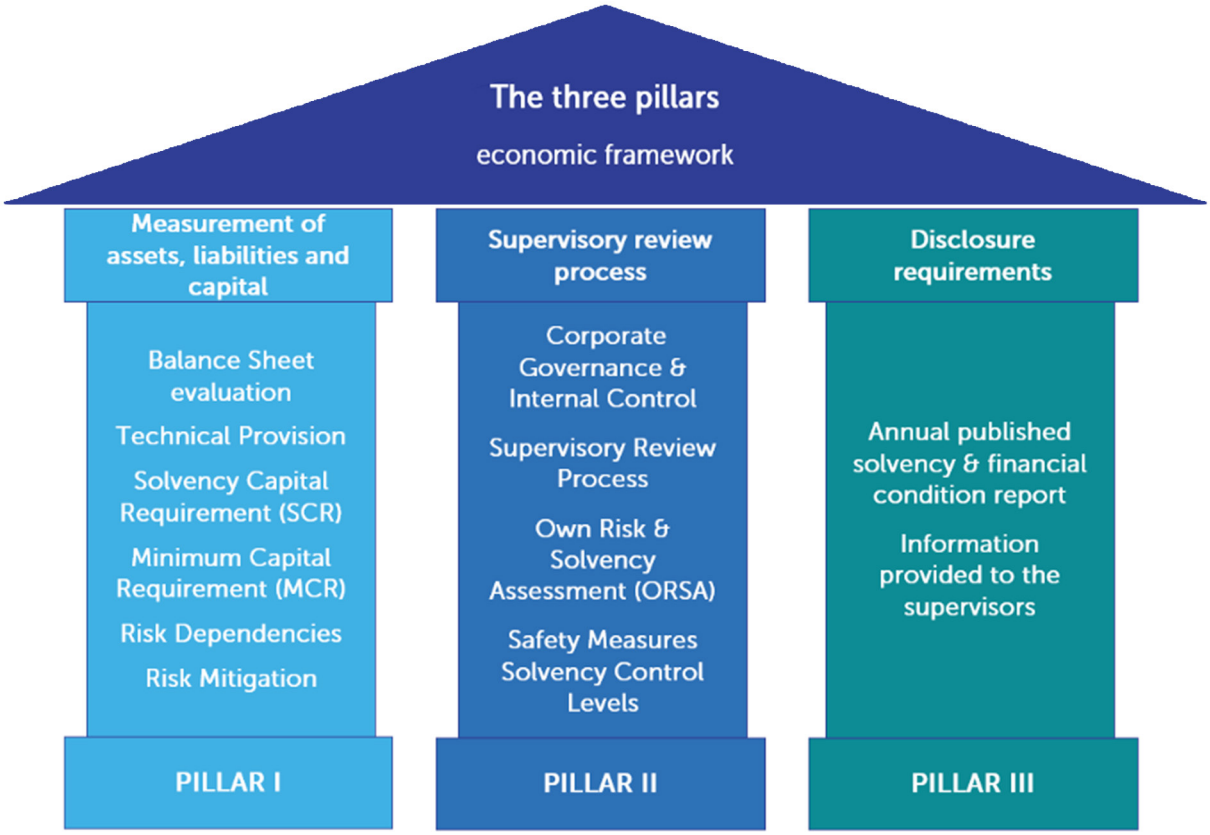

Figure 1. The three pillars of the Solvency II
Source: Finalyse (2025)

4. COMPARATIVE ANALYSIS

To summarize, it can be said that Solvency II and IFRS 17 serve different purposes: Solvency II focuses on policyholder protection, while IFRS 17 aims to provide reliable information to financial statement users. Despite these differences, both regulatory frameworks share key similarities, such as realistic market-based valuations, probability-weighted estimates of future cash flows, discounting using risk-free rates, and the inclusion of risk adjustments (Di Lorenzo & Magenta, 2017).

However, IFRS 17 poses significant challenges, requiring substantial changes to existing processes, which has put much pressure on the industry. Researchers have identified several structural differences between the two frameworks, including the use of different valuation methods (e.g., PAA), treatment of surplus funds (owned by the insurer under IFRS 17 but considered Own Funds in Solvency II), and the CSM, which does not exist in Solvency II (Flamee, 2008). This reflects the different objectives: IFRS 17 focuses on the business and performance of insurers, while Solvency II prioritizes solvency (Duverne & Le Douit, 2009). Other differences include risk adjustments, discount rates, contract boundaries, and expense allocation.

Solvency II covers all contracts that are legally classified as insurance activities, while IFRS 17 is based on the definition of insurance contracts as defined in Section 2.2, and the presence of significant insurance risk (Duverne & Le Douit, 2009). This distinction results in some differences, such as investment components and contracts without discretionary participation features that do not involve significant insurance risk. These are excluded from IFRS 17, but included under Solvency II (Dahiyat & Owais, 2021). Despite these differences, the overall scope is largely consistent, with only less than 7% of Solvency II technical provisions falling outside the scope of IFRS 17.

When comparing the same life insurance contracts, Solvency II technical provisions were, as per EIOPA's report on the implementation and synergies and differences with Solvency II "IFRS 17 – Insurance contracts report" (European Insurance and Occupational Pensions Authority, 2024), on average, 2.5% higher than IFRS 17 life fulfillment cash flows (i.e., insurance liabilities excluding the CSM). Breaking it down by IFRS 17 valuation method, the differences were more pronounced, reaching 12.8% for contracts valued under the PAA and 7.5% for those using the GMM. However, for contracts valued using the VFA—the primary method for life participating contracts—the difference was only 1.7%. Furthermore, since Solvency II does not measure financial performance, there is no mechanism to reflect changes in estimates of future cash flows in the profit or loss account. In contrast, under IFRS 17, changes in estimates of future cash flows are recognized gradually in profit or loss over future periods through adjustments to the CSM (Dahiyat & Owais, 2021). This results in a gradual change in equity (Duverne & Le Douit, 2009). This approach is a significant departure from other financial reporting systems, where the full impact of changes in estimates is immediately reflected in the profit or loss statement for the year in which the estimates change, leading to an immediate change in equity. Additionally, IFRS 17 requires a detailed breakdown of insurance contract liabilities to be presented in the notes to the financial statements (Dahiyat & Owais, 2021).

5. CONCLUSION

In conclusion, this comparative analysis of IFRS 17 and Solvency II reveals both similarities and key differences between the two frameworks. While Solvency II focuses on ensuring insurers' solvency and risk management within the European Union, IFRS 17 aims to provide reliable financial reporting for global insurance markets. Both frameworks emphasize market-consistent valuations, risk adjustments, and discounting using risk-free rates, but they diverge in their

treatment of insurance liabilities and performance measurement. IFRS 17 introduces significant complexities in terms of contract measurement and the recognition of profits over time, whereas Solvency II prioritizes solvency and regulatory compliance. Despite these differences, both frameworks aim to improve transparency and enhance stakeholder confidence, making them integral to the ongoing evolution of the insurance industry.

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Social Impact Reporting Is a Corporate Responsibility and a Personal Need

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Abstract: *This paper examines the reasons for the need to take into account the social effects of an enterprise's activities. An attempt is made to explain the emergence of parallel nonprofit activity along with the economic one. The aim is to show that the emergence of socially oriented entrepreneurial activities, which, in addition to profit, have a high social effect, are caused not by corporate responsibility but by satisfying personal needs to achieve a higher social status. Along with the high-tech development and the emergence of artificial intelligence in the last 10-20 years, the requirements for social accountability of the effects of the activities of enterprises are also increasing. This, on the one hand, leads to greater public awareness and, on the other hand, to greater importance of a company in solving social problems. The conclusions reached are that the reporting of social effects may have been introduced legislatively as a corporate responsibility, but this, in its essence, is the satisfaction of a personal need to achieve a higher social significance and confirm the given company as responsible and promising for societal requirements in general.*

1. INTRODUCTION

All forms of economic activity, whether they are commercial or non-commercial, have social impacts. More clarity about the accomplishment of social and environmental goals is a result of their reporting.

This paper seeks to demonstrate that the social impact reporting in the historical aspect is a corporate responsibility.

Retrospection and analysis are the techniques employed.

2. SOCIAL EFFECTS REPORTING IN A BRIEF HISTORICAL VIEW

The commercial and nonprofit sectors have a close and reciprocal interaction. A corporate company cannot engage in any activity without causing consequences for both society and the environment. Part of the profit of the corporate sector is used to finance socially significant initiatives that are directly related to the purpose of the nonprofit sector.

Historically, with the emergence and development of the nonprofit sector, accounting with a social focus has also developed.

A whole chapter of Professors Helmig and Boenigk's (2020) book "Nonprofit Management" (pp. 31–52) is devoted to the origins and historical evolution of the nonprofit sector, specifically in Germany.

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The two authors (Helmig & Boenigk, 2020) divide this chapter into a historical growth of the nonprofit sectors into five periods:

1. Antiquity (1400 BC – 600 AD);
2. The Early Middle Ages (600 – 1050);
3. Late Middle Ages and Flourishing (1051 – 1500);
4. Early Modern Times (1501 – 1800);
5. Modernity (1801 – present).

Considering this classification concerning the growth of the nonprofit, the evolution of the reporting on social impacts during the different periods will be briefly explored from a theoretical perspective.

Accounting for nonprofit endeavors directly related to the achievement of political and religious goals is the focus of the first two periods. Both the commercial and nonprofit sectors participate in religious and political life during these times.

A form of social effect that reflects the individual's desire to achieve a higher status is the disclosure of the results achieved with a public focus during these times.

In terms of accounting, according to Peragallo (1938), medieval accounting reports developed from fragmentary records. Along with business transactions, other social or political events were recorded in a book resembling a diary (Peragallo, 1938).

According to Littleton (1933): "Wealth in such forms creates questions and doubts and hopes, and men, in striving to find answers to these, slowly evolve or adapt methods of records to serve their needs." ... "Wealth needed the pressure of an extensive and profitable commerce to give it real productivity" (Littleton, 1933, p. 264).

As for the author (Littleton, 1933), the early records of medieval trade are necessary for reporting the activities of the given active partner in the particular undertaking.

In the Late Middle Ages and the Flourishing, education and culture started to progress due to trade, and the first guilds appeared.

According to Peragallo (1938), the city of Florence is ideal for the development of the arts, which are closely related to trade. For the author (Peragallo, 1938), the arts and sciences are promoted through commercial enterprises in this city to the same extent as the accumulation of wealth.

The promotion of wealth growth and the advancement of the arts and sciences at the same time demonstrates how economic objectives and non-economic interests interacted in Florentine society at the time.

Accounting records are kept in a book with notes, in which the most important facts of the day are described (Peragallo, 1938).

The very determination of the importance of a certain event is at the discretion of the individual himself, which is directly related to his personal understandings, education, and his needs.

According to Peragallo (1938), at the same time, a guild system appears and develops in Florence, to which the origin and development of accounting for industrial costs are due. All Florentine industries are united in separate guilds, each of which guarded its trade secrets, privileges, and

rights against encroachments, both in Florence and abroad, by outsiders. Peragallo (1938) adds that in the Florentine Republic, guild laws and regulations were passed prohibiting the emigration of skilled workers and the export of materials and objects belonging to the guilds.

Peragallo (1938) provides an example of dyers, who were prohibited from forming their own separate guild but could come together in family units and other organizations to engage in specific tasks related to their craft. All such associations were subordinate to the wool guild regarding their political and social status.

These guilds were essentially nonprofit organizations, and the disclosure of their accounts elevated them in society as prestigious.

In the fourth period, Early Modern Times (1501-1800), the nonprofit sector expands the scope of its operations in the fields of education, medicine, and the emergence of various guilds.

Explaining the ideas of Flory's accounting, Peragallo (1938) points out that double-entry bookkeeping and the capital account gradually entered enterprises of a nonprofit nature, such as hospitals, religious orders, and the government. For Flory, according to Peragallo (1938), the ledger of each monastery must be recorded regularly in order to keep the information on the financial status of the monastery up-to-date and accessible (Peragallo, 1938).

This transparency of the financial status and social interests achieved contributes to the better reputation of the respective religious or secular institution.

The fifth period is associated with the emergence of various legislative provisions regarding the reporting of all commercial and non-commercial activities. Standardized reporting helps to better understand each organization, significantly influencing its importance among stakeholders and in society as a whole.

3. SOCIAL IMPACT REPORT AND SOCIAL INDICATORS

The use of accounting information is essential for a more accurate reflection of social and environmental indicators. According to research by Lemos et al. (2023, pp. 93-102) about non-financial disclosure, "there is a positive and significant relationship between a company's profitability and the disclosure of non-financial information." (Lemos et al., 2023, p. 100).

By accountability is meant all information about the activities of a nonprofit organization, through which it is accountable for its own responsible actions and to its indirect addressees, to make them transparent (Helmig & Boenigk, 2020).

According to the pertinent target groups, the two authors (Helmig & Boenigk, 2020, p.195) give Kumar's classification from the year 1996 in terms of the systematization of reporting:

- The duty of a nonprofit organization's management to the authorities that handle financial transactions is known as management accountability. The achievement of legal objectives, when they are effectively pursued, along with compliance with legal regulations, may also be a contributing factor.
- Contacts with duties within the nonprofit organization, such as management's accountability to the board of directors, are also included in internal accountability.
- Accountability to the external environment, which refers to society. (Helmig & Boenigk, 2020)

Compared to the corporate sector, the nonprofit sector reports on its accomplishments in a more detailed manner. The accounting of their operations takes up a whole chapter in "Accounting Principles" by Fess and Warren (1987). The most distinctive characteristics of this kind of organization, in contrast to commercial ones, are explained by the writers.

As to the two writers, the primary trait that sets nonprofit organizations apart is that "there is neither a conscious profit motive nor an expectation of earning net income" (Fess & Warren, 1987, p. 1259).

As the sense of social responsibility in society has grown, so has the number of nonprofit organizations.

The accounting system for all nonprofit organizations must provide financial data to internal management for use in planning and controlling operations, as well as to external parties, such as taxpayers and others, for use in determining the effectiveness of operations (Fess & Warren, 1987).

The need for information about the social effects report is usually focused on two things:
1) achieving important public goals;
2) pursuing individual interests.

Reporting on the results achieved in both directions is to demonstrate the importance of an organization that serves the interests of its members and society, responding to both individual and public requirements.

Adopted directives (European Commission, 2024), standards (International Organization for Standardization, 2010), and other regulatory acts (Global Reporting Initiative, 1997) require commercial organizations to publish increasingly detailed socially oriented results, showing the sustainability of each organization.

Businesses must now disclose, in addition to financial data, their involvement in socially responsible initiatives by including information on the social impact of their operations in their annual reports.

In the preface in 1971 to his book "The Social Costs of Private Enterprise" Kapp (1975) writes: "Human action, both individual and public decisions, takes place within and has repercussions on our natural (and social) environment. This environment is itself a complex composite of structures, each of which is subject to specific regularities or organizing principles." (Kapp, 1975, p. xvi)

Kapp's (1975) study covers all costs that affect social life and the ecological effects on nature. The phenomenon of social costs, in his opinion (Kapp, 1975), calls into question the entire decision-making process, particularly the selection of technologies and factor inputs, as well as the establishment of production models based only on a comparison of market costs and returns from the perspective of the microeconomic unit. In order to evaluate the effects of alternative technologies on the preservation of human life as measured by objective standards of human health and well-being, the author (Kapp, 1975) holds that an evaluation of the total costs and benefits of investments is required from a wider and more thorough macroeconomic perspective.

The sociologist Heinz-Herbert Noll (1996) examines social indicators that are the basis of social accountability. On the one hand, they have a common goal, consisting of improving the information base of the community, and in the broadest sense, they are a tool for monitoring and analyzing social changes.

The author (Noll, 1996) adds that social indicators also perform two other functions:
1) Monitoring social changes;
2) Measuring well-being.

Monitoring social changes concerns the actions of business and nonprofit organizations in changing economic conditions, the impact of their activities, and their sustainability in relation to corporate responsibility to the public.

The very measurement of well-being depends on the personal needs and cultural values of individuals.

Noll (1996) distinguishes between objective and subjective social indicators. As objective social indicators, the author (Noll, 1996) indicates statistical data presenting social facts, regardless of personal assessments.

Examples that the author (Noll, 1996) gives as such indicators are the unemployment rate, the poverty rate, and the working hours per week or month.

Subjective social indicators are the individual perception and assessment of social conditions, with the examples given by the author (Noll, 1996) for subjective indicators being life satisfaction, perception of distributive justice, and class identification.

For Noll (1996), "social reporting is the most important and successful application of social indicator research." (Noll, 1996, p.7)

Noll (1996) defines this type of reporting as the presentation of data that assesses the living conditions of the population and their change over time.

According to Noll (1996), subjective living conditions and elements of the population's subjective well-being are among the subjects for reporting. He adds that some concepts regarding accountability, such as modernization, individual well-being, subjective well-being, and quality of life as reference frames for monitoring social development at the end of the twentieth century, should be reviewed and reconsidered in their usefulness in view of changing social conditions.

The process of using accounting to provide information to users is in accordance with their information needs. Different types of businesses and nonprofit organizations provide different types of information depending on their field of activity and the respondents. Social accounting can provide each user group with economic information to help them make decisions about future actions.

Noll (1996) divides social accounting into formal, which can be called legislatively regulated, and informal, which is according to the needs of each business or nonprofit organization. The advantages of formal social accounting are "continuity and liability", and of informal accounting are "greater autonomy, freedom, and flexibility" (Noll, 1996, p. 10).

Legislatively regulated social accounting is in accordance with the requirements of corporate social responsibility, and here, this continuity and responsibility have the most significant role.

Informal or internal organizational social accounting is in accordance with the needs of the individual organization in relation to the goals set by it, with a business nature and a nonprofit orientation.

According to research (Bevanda et al., 2020, pp.191-201) about growth and development of company one of conclusion is: "Growth and development of a company arise as a consequence of its constant aspiration to adapt to changes in the environment, to take advantage of new market opportunities, avoid dangers, and ensure the continuity of efficient business." (Bevanda et al., 2020, p.199)

This is also valid for the nonprofit sector. The need for growth and development of nonprofit organizations is usually focused on two things:

1) achieving important public goals - clean nature, better healthcare, and education;
2) pursuing the individual interests of their members and recipients.

The reporting of the results obtained in both directions is to demonstrate the importance of an organization that serves the interests of its members and society, meeting both individual and societal requirements.

4. CONCLUSION

While the social impact report represents a corporate responsibility regarding social and environmental issues, it also serves as a means for individuals to achieve heightened social importance and affirm the company's commitment to addressing societal needs overall.

The role of nonprofit organizations is increasingly being questioned in light of the high-tech revolution and the increasing use of artificial intelligence in modern times.

In sectors that are entirely nonprofit, new technologies provide a niche for the growth of entrepreneurial activity. The growing integration of the commercial and nonprofit sectors in the pursuit of socially significant goals shows that, in addition to the desire for profit that drives business entities, there is also a desire to provide basic human needs such as health care, education and a cleaner environment.

Business and nonprofit sectors develop a better reputation among stakeholders by disclosing the beneficial social effects they have achieved, positioning them as socially significant, responsible and hopeful. For individual respondents to this information, this shows that this organization is stable and profitable and helps them make a better-informed decision about investing in or applying for a job with it.

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Local Self-Governments Financing in the Slovak Republic Under Crisis Situations

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Abstract: *Managing crisis situations depends on the preparedness of local self-governments, the availability of their resources, and their ability to respond to changing conditions. The main objective of the paper is to evaluate the impact of crisis situations on the tax revenues of local self-governments. For the analysis we selected a group of small municipalities (up to 199 inhabitants) that are most sensitive to changes in financing. They represent 13% of the total number of municipalities. The evaluation time period is 2005 to 2023, which captures the economic crisis, the pandemic crisis, and the energy crisis. The analysis showed that the economic crisis and the Covid-19 pandemic hit small municipalities the hardest through tax revenues, which saw a decline compared to pre-crisis periods. In addition, Covid-19 also negatively affected local tax revenues. Conversely, the energy crisis has only marginally affected small municipalities in context of reduced local tax revenues.*

1. INTRODUCTION

Local self-governments play a pivotal role in managing crises, as they are often the first responders to local emergencies. Xu and Lin (2022) emphasize the importance of decentralization and strategic crisis management in Europe. Similarly, Cvetković et al. (2021) conducted quantitative research on the degree of implementation of strategic, legislative and institutional frameworks, as well as the capacity of local authorities in Serbia to respond to crisis situations. The results showed that effective implementation of crisis resolution requires continuous strategic, tactical and operational transformation of the public administration and the public administration management system in order to strengthen the capacity of local authorities to prevent, prepare for and resolve crises. Ter-Minassian and Fedelino (2010) note that local self-governments financing in crisis situations is an important topic in public finance, highlighting the capacity of local self-governments to cope with unexpected financial challenges caused by economic recessions, natural disasters, pandemics or energy crises. According to Aït-Sahalia et al. (2012), and Mishkin (2011) the financial crisis period can be divided into the US mortgage crisis phase (2007-2008) and the global financial crisis phase (2009-2010). In late 2008, the financial crisis worsened due to the collapse of large US institutions such as Lehman Brothers and AIG (Mishkin, 2011). In this phase, the crisis spilled over to

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Europe with the focus on the ECB interventions in 2008-2009. From the second half of 2009, the economies of some European countries began to fall into recession (Greece, Ireland, Italy, Portugal, Spain) (Mody & Sandri, 2012). Alphandéry (2012) adds that Sovereign Debt Crises in the Eurozone occurred in 2010-2012. This crisis started in the sovereign bond markets in peripheral countries. It had an impact on the European financial sector and ended up in the real economy of the euro area, which was on the verge of recession. These macroeconomic changes have also had a significant impact on the financial management of local self-governments. Slovak local self-governments were no exception. Although the country underwent fiscal decentralisation in 2005, the aim of which was, on the one hand, to strengthen the own revenues of local self-government representatives through their powers to determine the level of local taxes by means of General Binding Ordinances and, on the other hand, to reduce their dependence on funds from the state budget. The financial crisis that hit local self-governments in 2009 revealed the financial instability and vulnerability of the financial management of local self-governments and the high dependence of municipalities on the state budget. In 2009, even by the Resolution of the Government of the Slovak Republic, an extraordinary subsidy from the resources of the State Budget of the Slovak Republic in the amount of € 100 million was approved for local self-governments to cover the shortfall in personal income tax and to improve the initial situation in 2010. The dependence of local governments on central government bodies is also confirmed by Mullins and Pagano (2005), who have confirmed from their research that one important attribute of local self-government financial crises is their dependence on central government through grants. This is also confirmed by Midwinter (2002), who examined the impact of financial crises at the local self-government level and concluded, based on its analysis, that central government authorities have prevented local self-governments from running deficits through the use of grants. As a consequence of the financial crisis, many countries decided to reduce transfers to local self-government. Such a decision has contributed to an important reflection by local self-governments to rationalise their expenditure and to look for other ways to finance their needs in order to minimise similar negative impacts in the future.

Nevertheless, another crisis linked to the Covid-19 pandemic has once again shown the financial vulnerability of local self-governments. At the time of the spread of the Covid-19 pandemic, many countries were implementing radical measures to protect their populations. People had to protect themselves and, based on public health advice, take the suggested precautions and comply with the guidelines issued by health authorities (Shah & Farrow, 2020; Pollak et al., 2021). Park (2020) note that what started with the closure of one city in China quickly spread to quarantine entire provinces and subsequently entire countries. Social isolation and curfews have been one of the most effective ways of breaking the chain of transmission of the virus. Wang et al. (2020) and Dvořák et al. (2020) note that a period of several months of isolation has led to severe and devastating economic impacts both in the short and long term. Ahrens and Ferry (2021) note that local self-governments were not only dealing with a drop in revenue at the time of the pandemic, but were also confronted with new responsibilities to respond to the pandemic and the expenses associated with them. The consequence was increased pressure to ensure day-to-day operations, which was also linked to the expectation of support for their activities from central government. This behaviour resulted in changes in the structure of budgets (Andrejovska & Andrejkovicova, 2024) and declining incomes, which have significantly affected the financial independence of local self-governments. Although the World Health Organization in May 2023 lifted the public health emergency of international concern that was declared in January 2020 in connection with the pandemic, the world economy is on the verge of a recession, which is accompanied by economic uncertainty (French & Monahan, 2020). This is confirmed by Dorn et al. (2020), who used scenario calculations to estimate the economic costs of a pandemic for Germany. The authors estimated the financial impact on the government budget and the effects on employment depending on the length of the shutdown, also based on a business

climate index. Based on this, they identified the sectors most affected by the pandemic (tourism and catering) and the sectors that continued to operate (pharmaceuticals, logistics, health care). COVID-19 caused an economic slowdown or economic downturn, resulting in a reduction in both state and local self-government revenues.

This has created a space for reflection on the question whether the current model of financing local self-governments should not be more flexible in relation to the macroeconomic development of the country and especially in relation to critical periods.This is also confirmed by Maj-Serwatka and Wichowska (2024), who confirm that the pandemic has increased the role of budget planning and rationalisation of public spending by local self-governments in Poland in response to declining state revenues. The recent energy crisis has further strained the financial capacities of local governments. The Covid-19 pandemic has triggered a global crisis, but it is not the last crisis that has highlighted the vulnerability of the current economic and political system. The military invasion of Ukraine has deepened the economic crisis and expanded it to include other dimensions, financial, energy and political (Liptáková, 2022). Mindár (2024) investigates the role of local self-governments in energy transition efforts amidst financial and energy crises, identifying both challenges and opportunities for sustainable governance.

2. MATERIAL AND METHODS

In the research part the paper evaluates how different types of crises affect local tax revenues and personal income tax revenues, which form a significant part of small municipal budgets. The study also identifies the factors that contribute most to the decline or stabilization of small municipal revenues. The results provide valuable insights for local self-government officials as well as financial analysts. Financing municipalities in crises requires flexibility, effective planning and cooperation between local self-governments, the state and other actors in the context of ensuring sustainable development of local self-governments even in crisis conditions.

Slovakia is characterized by a fragmented settlement structure resulting in 2890 municipalities. For the analysis we selected a group of small municipalities (up to 199 inhabitants) that are most sensitive to changes in financing. They represent 13% of the total number of municipalities. The article evaluates selected local taxes, share tax, non-tax revenues, tax revenues, and current revenues as an important segment of small municipal budgets.

Research sample was compiled of data from the Ministry of Finance of the Slovak Republic within the period 2005-2023. To estimate the future development of the data, we will use a linear regression model with one dependent variable (i.e. simple linear regression), which examines the relationship between one independent and one dependent variable. The model equation is:

$$y = \beta_0 + \beta_1 x + \varepsilon, \tag{1}$$

where y is the dependent variable, x is the independent variable, β_0 is the intercept, β_1 is the slope, ε is the error term. The estimation of other models and the prediction for the next period were processed using Time Series Lab (2023) (freeware).

3. RESULTS

The country's macroeconomic development also has a significant impact on the financing of local self-governments. Fiscal decentralisation, which took place in the Slovak Republic in 2005, was

the culmination of one of the stages of public administration reform. The basis for the new system of local self-government financing was the designation of the personal income tax as the only share tax, mainly because this tax is expected to grow dynamically in the medium term and has relatively the most balanced collection, which is a high priority in terms of planning and ensuring the smooth generation of local government resources. Another positive aspect of this process is that the fears of municipalities, which expected to receive less funding than before fiscal decentralisation, have not been met. Already in the first year, municipal revenues from this tax increased by €488.8 million compared to 2004, an increase of 44.4%. In this case, we can conclude that the collection of personal income tax as the only share tax was correct.

The share tax had an increasing trend in 2005-2008, then a decrease in 2009-2010. In 2009, with the onset of the financial crisis, the Slovak economy slowed down and therefore the state collected less money in taxes, which was consequently reflected in lower revenues for municipalities. In 2009, even by Government Resolution No. 868 of 2 December 2009, municipalities were approved an extraordinary subsidy from the resources of the State Budget of the Slovak Republic in the amount of € 100 million to cover the shortfall in personal income tax and to improve the initial situation in 2010. In the period 2010-2019, the share tax increased, with a fluctuation at the end of the period and the values increasing again in the years 2020-2023. The real values and the created share tax model are approximately the same, with the real values being slightly higher than the estimated values (Figure 1).

Linear trend for share tax: $y = 0.5414x + 3.3728$

Coefficient of determination: $R^2 = 0.8979$

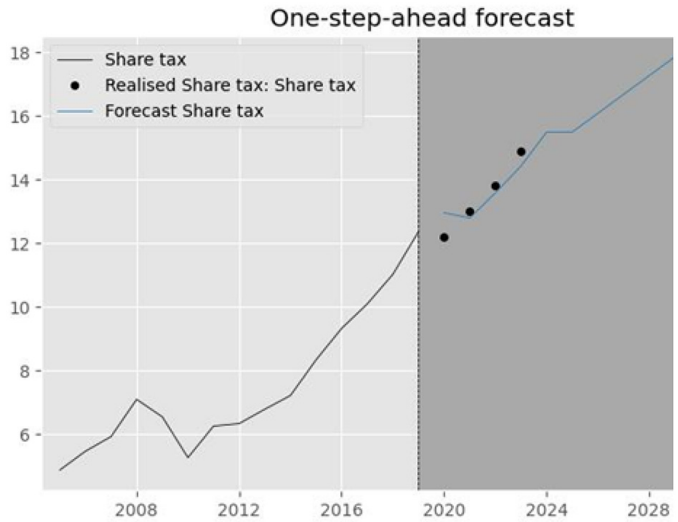

Figure 1. Model of share tax

Source: Datacentrum, Ministry of Finance of the Slovak Republic (2024), own processing

Since 2005, local charges have been transformed into local taxes. In addition to local taxes, local authorities levy a half-tax on municipal solid waste and small construction waste. Local authorities may also introduce a development charge by law. The graphic interpretation A slight decrease in local tax revenues is recorded in 2006, 2009, 2020 and 2022. Compared to the share tax, the decrease in local tax revenues was not significantly affected by either crisis. The real values of local taxes were higher than predicted by the model created using Time Series Lab software (Figure 2).

Linear trend for local taxes: y = 0.1626x + 2.1404

Coefficient of determination: $R^2 = 0.9749$

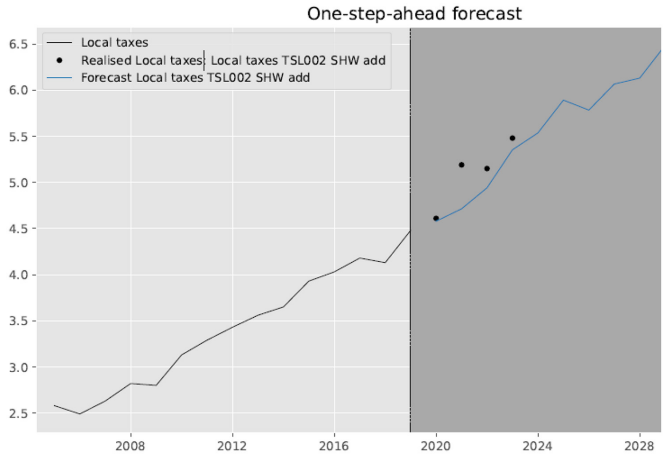

Figure 2. Model of local taxes

Source: Datacentrum, Ministry of Finance of the Slovak Republic (2024), own processing

Tax revenues had an increasing trend in 2005-2008, then a decrease occurred until 2010. In the period 2010-2019 tax revenue increased, while in 2020 there was a decrease and then in the period 2020-2023 the values increased again. The situation is similar that for share tax, i.e. the real values and the created model of tax revenues are approximately the same; for real values, they are slightly higher than the values estimated using the model (Figure 3).

Linear trend for tax revenues: y = 0.7042x + 5.5144

Coefficient of determination: $R^2 = 0.9304$

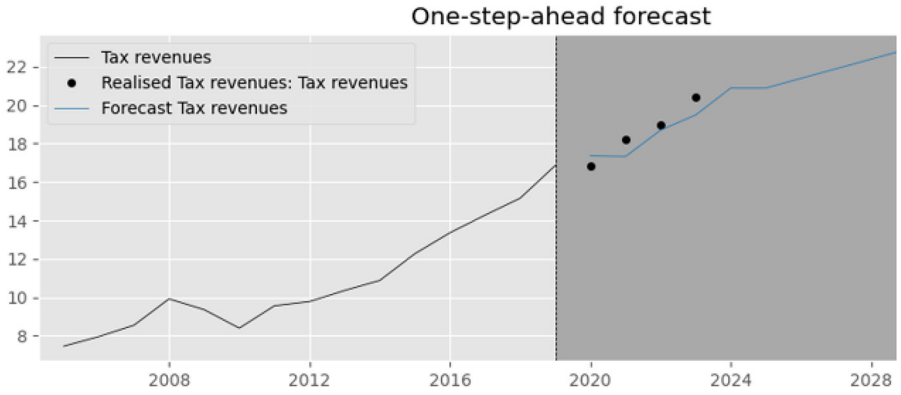

Figure 3. Model of tax revenues

Source: Datacentrum, Ministry of Finance of the Slovak Republic (2024), own processing

The aim of fiscal decentralisation was to reduce the financial dependence of local self-governments on the state. One of the options could be non-tax revenues, which are mainly made up of revenues from the use of property. In the period 2005-2023 the development of non-tax revenues has a fluctuating character. If we estimate the model with a linear trend, it shows an increasing tendency (the intercept $\beta_0 = 0.00669$ is positive). The real values and the created model for non-tax revenues are different, with the real values being slightly lower than the values estimated by the model (Figure 4).

Linear trend for non-tax revenues: y = 0.0669x + 0.9156

Coefficient of determination: $R^2 = 0.7864$

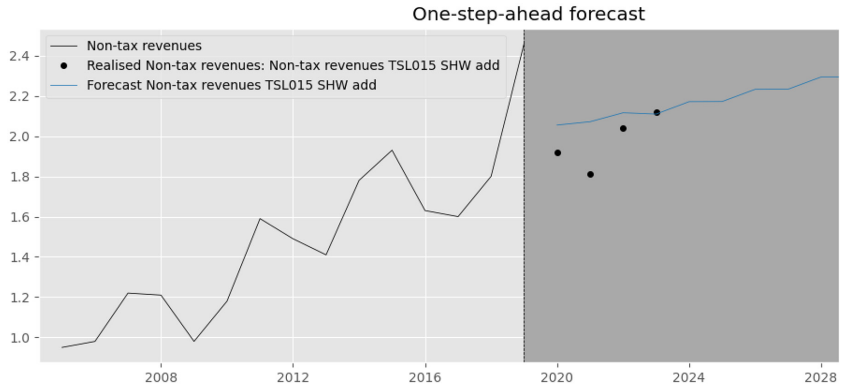

Figure 4. Model of non-tax revenues

Source: Datacentrum, Ministry of Finance of the Slovak Republic (2024), own processing

Current revenues showed a significant decline in 2012, which continued in 2013. Subsequently, in 2014-2015, there was an increase in current revenue, which fluctuated in 2016-2018 and the highest current revenue was in 2019. The COVID-19 pandemic presented new financial challenges for local self-governments. Buček (2022) and Vartašová and Červená (2023) highlight the difficulties municipalities faced in balancing increased expenditures and declining revenues during the pandemic. Then there was a decline in 2020 due to the Covid-19 pandemic and from 2021, current revenues showed an increasing trend. The model created in the Time Series Lab predicted a development where the real values are higher than the values determined by the model (Figure 5).

Linear trend for current revenues: y = 0.8873x + 8.9081

Coefficient of determination: $R^2 = 0.9245$

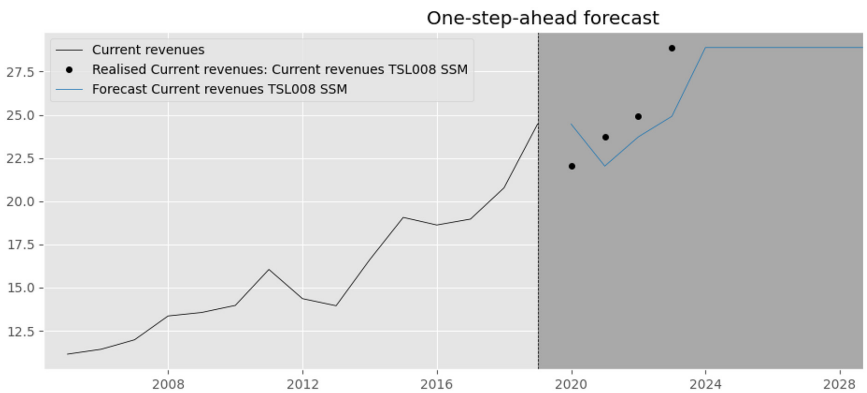

Figure 5. Model of current revenues

Source: Datacentrum, Ministry of Finance of the Slovak Republic (2024), own processing

4. FUTURE RESEARCH DIRECTIONS

Any crisis significantly affects the ability of local self-governments to generate revenue and deliver public services efficiently. All the crises that local authorities have faced so far have been a challenge for them. Each has highlighted the ability of local self-governments to respond flexibly

to situations as they arise to ensure the protection of their residents and the delivery of services. On the other hand, the crises have exposed the financial vulnerability of local authorities. In the future, this creates room for the search for more appropriate models and systemic changes in the financing of local authorities, particularly in relation to the state.

5. CONCLUSION

Sustainable financing of local self-governments is a key aspect for ensuring stable development and quality public service delivery not only in times of crisis but also in the long term. One of the main principles of sustainable financing is revenue diversification. The analysis shows that in times of crises, local self-governments have had the greatest financial problems, mainly due to the decline in revenue from the share tax, which comes from the state budget. In the case of the small municipalities analysed, the share tax accounts on average for 69% of total tax revenues and 49% of total current revenues. This relatively high dependence on revenues from the state budget contributes to the financial instability of municipalities, especially in times of crisis. Local tax revenues have not been so significantly affected by crisis situations. In the future, this raises the question of how to ensure the sustainability of local self-government financing so that they are able to finance their needs and development without depending on state budget revenues. Sustainable financing of local self-governments should thus become a combination of revenue diversification and expenditure streamlining. However, research into other size categories of municipalities should be considered for a possible change in local government financing in the future.

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Legal and Financial Challenges of "Brain-Drain" in Healthcare in Bosnia and Herzegovina

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Shortage of the health service

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Abstract: *The problem of the health workers (technicians and nurses) outflow from Bosnia and Herzegovina and from the other countries of the former Yugoslavia represents a key challenge for the sustainability of health systems. After the collapse of the socialist system, the public healthcare institutions, once supported by strong educational systems serving as the backup of healthcare service delivery, have faced challenges with the introduction of the market economy thus leading to competition with the private sector and a significant outflow of skilled personnel.*

The freedom of movement of people and work, both within the European Union and globally, additionally encourages migration, thus causing inequality in the availability of health services, both within countries and between them, but also the negative effect of tightening competitive relations, which in the health sector causes undesirable compromises in the quality of providing health services, at the expense of patients.

The paper will discuss the possibilities of finding measures to retain medical staff, taking into consideration modalities of combining employment policy with fiscal policy, and policies in the field of public health, or interstate agreements.

1. INTRODUCTION

The trend of medical personnel emigration, particularly nurses and medical technicians, from the Federation of Bosnia and Herzegovina (FBiH) and Sarajevo Canton, which this paper highlights as a case study, saw a significant increase at the beginning of the 2010s. However, the causes and the dynamics of this phenomenon could be traced back earlier, through several key phases. This process is not the result of a specific legislative intervention, a notable historical event, or any immediately recognizable factor, but rather a combination of various circumstances, both domestic and influenced by global trends and international factors.

The emigration of medical personnel from BiH, including nurses and technicians, began shortly after the end of the war (1995). However, it was initially limited due to poor migration opportunities and the difficulty of recruiting foreign workers into the healthcare sector in Europe. Nevertheless, a significant increase in migration occurred during the 2010s, when European countries, particularly Germany, Austria, and Slovenia, began actively recruiting medical staff from Southeast Europe to address their own healthcare labor shortages.

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2. FACTORS AFFECTING THE EMIGRATION OF MEDICAL PERSONNEL

2.1. External Factors – International Agreements and Border Openings

- *EU Blue Card*: The introduction of the EU Blue Card in 2009 (Council Directive 2009/50/EC, repealed by Directive (EU) 2021/1883), which allows highly skilled workers from outside the EU to be employed in member states, facilitated the emigration of medical personnel from BiH.
- *Germany's Foreign Medical Staff Employment Law*: In 2013, Germany simplified the procedures for employing medical staff from non-EU countries, including Bosnia and Herzegovina, through programs such as Triple Win (in collaboration with GIZ).
- *Agreements with Slovenia and Croatia*: Particularly after Croatia's EU accession in 2013, personnel from Bosnia and Herzegovina found it easier to move to these countries due to linguistic similarities and cultural proximity.
- *Ratification of the Agreement on Recognition of Qualifications for Western Balkan Countries (October 10. 2024)*: This agreement provided a recent framework for facilitating cross-border employment within the region.

2.2. Internal Factors – Working Conditions in the Country

- *Inadequate Salaries and Working Conditions*: Salaries in the healthcare sector in Bosnia and Herzegovina, especially for nurses and technicians, are often cited as insufficient and among the lowest in the region[3]. Furthermore, the perceived harsh working conditions, characterized by staff overloading and a lack of necessary resources, constitute additional motivations for leaving Bosnia and Herzegovina.
- *Limited Career Advancement Opportunities*: Healthcare workers frequently expressed dissatisfaction with the lack of opportunities for professional development and specialization within the Bosnian healthcare system, contributing to dissatisfaction and professional frustration, which influenced their decision to leave.

2.3. Demographic and Social Factors

- *General Emigration Trend*: The emigration of medical workers was part of a broader trend of emigration from BiH, particularly among young and educated individuals, driven by overall economic and political instability.
- *Family Migration*: Many medical workers left BiH, accompanied by their families. This form of migration represents a relatively permanent type of emigration, as it involves comprehensive logistical planning for the individual and their family members. It suggests a long-term decision and emphasizes the seriousness of this phenomenon as a problem for the host countries.

3. DID LEGISLATIVE INTERVENTION PLAY A ROLE?

Domestic Legislation: There is no valid evidence or adequate scientific analysis indicating that domestic legislation, either directly or indirectly, contributed to the emigration of medical personnel from BiH. However, healthcare workers themselves, primarily through media channels, have emphasized that existing legal norms were ineffective in improving working conditions and retaining staff.

[3] Average salary for nurses and medical staff by the end of 2024 was about 1.800 BAM – that is approximately 900 euros. Unfortunately, it is not uncommon for healthcare workers to protest and fight for better working conditions and higher wages. In 2024 they fought for a wage of 3.40 BAM per hour (previous was 2,76 BAM per hour). See: Federalna televizija (2024). Wages increased for 10% in June 2025. See: Vlada Kantona Sarajevo (2024).

It is important to note that some cantonal healthcare institutions in the 2010s even introduced measures such as contractual obligations for medical personnel, which required workers to remain employed at healthcare facilities for a certain number of years after completing their specialization.

International Influences:

- *EU Harmonization and Diploma Recognition Facilitation:* Harmonization of educational standards with EU regulations enabled easier recognition of qualifications from Bosnia and Herzegovina in EU countries, thus further facilitating migration.
- *Schengen Area and Visa Regime Liberalization (2010):* The liberalization of the visa regime for Bosnian citizens in 2010 allowed easier travel and establishment of contacts with employers in the EU. The liberalization of the visa regime was viewed by Bosnian citizens as the most significant qualitative change, contributing to all forms of communication with destinations within the EU, especially those where there was a demonstrated demand for healthcare professionals. In this way, direct contact between employers and workers is simplified.
- Role of International Programs (Triple Win): The Triple Win program (n.d.), implemented by Germany in collaboration with Bosnia and Herzegovina and other countries, formalized the migration of medical personnel. The goal of the program was to enable legal and regulated migration. However, the question arises as to how beneficial this has been for Bosnia and Herzegovina in the long term, as there was insufficient reinvestment in the domestic healthcare system. The latter leads to the conclusion that the trend of medical personnel emigration from BiH was not the result of a specific legislative decision, but rather a combination of: 1. International policies and agreements (facilitating migration); 2. Inadequate domestic policies (low wages, poor working conditions); 3. Broader social and economic conditions in BiH.

4. SHORT OVERVIEW OF THE SOCIALIST FEDERAL REPUBLIC OF YUGOSLAVIA (SFRY)

Yugoslavia, the state established as a socialist federal republic that existed from 1945 to 1991, was in a political, economic, and cultural senses unique in Europe. At its peak, it represented a model of self-managed socialism combining Western and Eastern influences. However, its dissolution raised questions about the true sustainability of such a system in the modern world. Here, a brief overview of the key aspects of Yugoslavia's economy, politics, and society, as well as the consequences of its dissolution for the successor states, will be offered. Understanding, among other factors, the emigration of skilled workers from Bosnia and Herzegovina, particularly healthcare professionals, is possible only by contextualizing the historical factors that directly contributed to today's economic realities in Bosnia and Herzegovina, including its healthcare sector.

Therefore, with the aim to provide insight into the economic, political, and social factors that contributed to the dissolution of Yugoslavia, attention was turned to some of indicators: foreign debt, industrial production, agricultural exports, management positions, and especially the state of Yugoslavia's banking system, which will vividly illustrate the picture of two significantly different realities for the population of the same region within just two generations.

a. The Establishment and Development of Yugoslavia:
Yugoslavia was founded after World War II as the Federal People's Republic of Yugoslavia, which later became the Socialist Federal Republic of Yugoslavia (SFRY). Its leader, Josip Broz Tito, succeeded in maintaining a balance between the East and West during the Cold War, which enabled Yugoslavia to occupy a unique geopolitical position and receive significant economic support from both blocs.
According to World Bank (1990, p.181-191), between 1960 and 1980, Yugoslavia achieved an average GDP growth rate of around 6.1% annually, while industrial production grew at

a rate of 7.2%. This period is often referred to as the "Golden Age of Yugoslavia" due to the relatively high standard of living compared to other socialist countries.
Economic Challenges of the 1980s: Economic problems began to escalate in the 1980s after Tito's death in 1980. The external debt of Yugoslavia, which amounted to approximately $9.5 billion in 1979, grew to over $20 billion by 1985. Inflation reached 250% annually (OECD, 1990, p. 11), leading to austerity measures and social unrest.
Political and National Tensions: The political structure of Yugoslavia, based on a federative model, became increasingly unsustainable. The 1974 Constitution decentralized power, granting republics and provinces greater autonomy, which further weakened central authority. Nationalist ideologies became dominant, culminating in the breakup of the country in the 1990s.

b. The Economy of Yugoslavia: Rise and Fall:
External Debt: According to the IMF, in the 1970s, Yugoslavia used favorable loans from the West to finance the modernization of its industry. However, the global economic crisis of the 1980s led to increased interest rates, significantly raising the cost of debt servicing. For example, Yugoslavia's external debt stood at $21 billion in 1983, while the successor states owed more than $60 billion by 1995.
Industrial Production: During the 1970s, Yugoslavia was among the 30 largest industrial producers in the world (Rocha, 1991, p. 29). Agricultural exports, such as wheat, corn, and fruit, accounted for a significant portion of revenue. However, by the end of the 1980s, industrial production fell by 15%, while the agricultural sector became uncompetitive in global markets.

c. Consequences of the SFRY Dissolution and Impact on the Healthcare System in BiH:
After the collapse of the socialist system, public healthcare institutions in BiH found themselves searching for new models of operation. Transition to the market economy brought competition from the private sector, which often lacked resources and qualified staff. The reality of the European Union and global migration further exacerbated the situation and led to the dispersion of the experts who had previously shaped and were the backbone of the healthcare system.

5. ECONOMIC CAUSES OF MIGRATION

Low wages if compared to countries in the region, in EU and wider (World Bank, 2024, p. 77, 88), insecure working conditions, and a lack of prospects for professional advancement are the main factors driving healthcare workers to emigrate. Nurses and technicians often face difficult working conditions, with low wages. As a result, many of them seek a better future abroad, further exacerbating the already critical shortage of skilled personnel in BiH.

- *Demographic Changes:* One of the key elements in analyzing the brain drain issue is the demographic structure. Older healthcare workers are retiring, while young people are hesitant to enter the sector due to fears of an uncertain future. Statistics data review indicates that since 2017 the number of pupils in secondary schools in Federation BiH decreased from 81.452 to 70.344 in 2024. In 2024 total number of graduated was 17.606, while 1.511 pupils left schools (approximately 60% of them moved to other schools in FBiH/BiH, and 312 pupils, more than 20% dropped out of schools because their families moved abroad or went to an unknown destination (Institute for Statistics of the Federation of Bosnia and Herzegovina, 2025, p. 36). Medical schools in 2022/23 in FBiH attended 10.252 pupils, while 1.906 of them in Canton Sarajevo, where total number was 14.770, the share of medical school pupils was 12,5%. In the same period, medical schools graduated 2052 pupils in FBiH, and 454 in Canton Sarajevo (Institute for Statistics of the Federation of Bosnia and Herzegovina, 2023, pp. 14, 26, 28).

- *Employment in BiH:* According to the Labor and Employment Agency (LEA BIH, 2024), on October 31, 2024, there were 323,143 people registered with employment offices, representing a decrease of 6,62% compared to the same period in the previous year. Women are 59.22% of the total number of job seekers. Unemployment decreased in all entities: by 0.47% in the Federation of BiH, 0.59% in the Republika Srpska, and 0.28% in the Brčko District of BiH.

According to the Labor Force Survey (Agency for Statistics of BiH, 2024, pp.1-14) results for the third quarter of 2024, the workforce in BiH consisted of 1,427,000 people, while the number of inactive individuals was 1,449,000. Within the workforce, 1,254,000 were employed, and 173,000 were unemployed. The unemployment rate in BiH for the third quarter of 2024 was 12.2%, showing a decrease compared to the second quarter of 2024, when it stood at 13.3%.

6. BRAIN DRAIN TRENDS AND TENDENCIES AMONG NURSES AND TECHNICIANS IN FBIH

Brain drain, especially in the healthcare sector, has become one of the greatest challenges facing Bosnia and Herzegovina after the dissolution of Yugoslavia. According to data, over the last decade, more than 5,000 nurses and technicians have left the country, making up a significant portion of the healthcare workforce.

In the Federation of BiH, according to the data for 2023 (HSY FBiH, 2024), the total number of employed nurses and technicians was 12,619. Higher education held 687, accounting for 45.5% of the total number of healthcare workers with higher education. Nurses and technicians with a higher technical education number 743, making up 62.4% of this category. The largest group of nurses and technicians holds a secondary education, with general-purpose nurses being the most represented at 69.1%.

The emigration of nurses and technicians has multiple negative consequences for the healthcare system. The reduction in the number of experienced professionals leads to increased strain on the remaining staff, which affects the quality of care. Additionally, replacing experienced staff with younger or less qualified personnel requires additional time and resources for training, which further burdens healthcare institutions.

According to the Federal Ministry of Health and the Medical Chamber of the Federation of BiH in 2024, in healthcare institutions in the FBiH, a total of 3,366 specialist doctors were employed, and 113 of them were over 65 years old. These data point to the aging of the medical workforce, further highlighting the need to retain young professionals in the country.

7. CHARACTERISTICS OF THE HEALTHCARE SYSTEM IN THE CONTEXT OF THE OUTFLOW OF WORKERS

The outflow of healthcare workers has direct consequences on the quality of healthcare services, including longer waiting times (waiting lists), increased workload for remaining staff, and the inherent risk of reducing the quality and standards of healthcare services. These issues not only undermine patients' trust but also create additional challenges for the Ministry of Health in terms of fulfilling basic tasks, as well as for stakeholders and individual healthcare workers. Almost 80,000 people from Western Balkan countries immigrated to Germany, that increasingly include health and elderly care professionals. From 2013 to 2020, more than 5,850 healthcare workers from BiH migrated to Germany. At the end of 2019, BafA registered 21,950 citizens of BiH working in

the German health, educational and social sectors, and nearly 30,000 citizens of Western Balkan countries who are employed in the German health sector have a recognized professional qualification and more than 8,700 hold an academic degree (Schmitz-Pranghe et al., 2020, p. 3). By the end of 2022, 637 doctors from BiH were registered in Germany. According to Domazet et al. (2020): „More than 1,000 medical doctors, some 200 specialists and around 2,500 medical technicians have left BiH in the past five years, which amounts to an approximate loss of EURO 250 million in human capital." Internal migration further exacerbates the situation in smaller communities, while the number of pediatricians in the Federation is continuously decreasing. The aging of the workforce is evident, with the highest number of specialists who are 55 to 64 years old (38.7%).

More broadly, the unemployment rate in BiH stands at 12.2%, with a significant number of inactive individuals (1.45 million). The healthcare sector faces disparities in the regional distribution of staff, while the lack of competition further hinders the influx of new personnel. Due to rapid changes in working conditions, besides migration abroad, there is also internal migration of healthcare personnel from smaller towns to larger medical centers, which creates problems in smaller communities and exacerbates regional disparities throughout BiH. For example, the number of pediatricians in the Federation has decreased from 228 in 2020 to 217 in 2022, with 84 pediatricians over the age of 55 (HSY FBIH, 2023). President of the Medical Chamber of the FBiH, dr. Zaid, stated that during 2024 according to data from the cantonal Medical Chambers 41 doctors (experienced specialists as well as young doctors) have left the Federation of BiH, while 25 doctors in the Sarajevo Canton requested a Certificate from the Cantonal Medical Chamber to work abroad, as well as eight students, recently after completing their studies at a private Faculty of Medicine. Another noticeable trend is the transition of doctors from the public to the private sector (Faktor, 2025).

a. State of Healthcare Personnel in the Healthcare Sector of the Federation of BiH
According to the data published by the Institute for Public Health FBiH (HSY FBiH, 2023) the total number of employees in healthcare institutions in the Federation amounts to 28,196, with 73.2% being healthcare workers. The number of doctors is 5,387, representing a 2% increase compared to the previous year. The highest number of doctors is registered in the age group up to 34 years (29.4%), while the number of doctors aged 65 and over is 95, accounting for 1.8%. Significantly more female doctors (62%) are employed than male doctors (38%).
The number of specialists is 3,361, with no significant changes compared to the previous year. The highest number of specialists is registered in the age group of 55 to 64 years (38.7%), while the number of specialists aged 65 and over is 93 (2.8%). Specialist staff is predominantly female (60.4%), while males account for 39.6%.
Unlike doctors of medicine, the number of dentists is 575, showing a slight decrease of 2% compared to the previous year. The highest number of dentists is registered in the age group of 35 to 44 years (31.8%), while the number of dentists aged 65 and over is 4 (0.7%). There are significantly more female dentists (68.2%) than male dentists (31.8%).

b. Challenges regarding the brain drain problem in the healthcare system
The described situation regarding the brain drain in healthcare presents a serious challenge for BiH, affecting the quality of services, the availability of personnel, and the overall healthcare system. Only through targeted, well-designed, strategic, and collective efforts from all stakeholders – the government, educational institutions, all healthcare organizations, and healthcare workers – can provide for sustainable solutions be found to retain healthcare workers in the country and ensure the future of healthcare in BiH. However, this is not possible without broader international support, finding intergovernmental solutions and agreements, regional exchanges within cross-border cooperation plans, and systemic solutions.

c. Possible measures for Retaining Healthcare Workers

To address the problem of outflow, comprehensive measures are necessary. Combining employment policies with fiscal and tax policies can provide relief for healthcare workers. Resources and positions should be directed toward improving working conditions and placing professionals trained in the country. It is also necessary to devise mechanisms that will contribute to the long-term retention of personnel, such as scholarships, professional development programs, and public health initiatives.

Solutions to this problem include increasing salaries, investing in working conditions, professional development, and international cooperation that would ensure mutual benefits for the healthcare system in BiH. Additionally, the establishment of an international/regional Fund for addressing the needs for medical personnel and mobile teams could be a viable option.

8. PROPOSAL FOR ESTABLISHING A FUND FOR MEDICAL PERSONNEL AND MOBILE TEAMS

Establishing cross-border Mobile teams, at one side, and, on the other side, establishing a Fund for Addressing the Needs for Medical Personnel could overcome some of the issues:

1. Regional Cooperation: Countries facing similar challenges (brain-drain of medical staff, uneven access to healthcare services) could pool resources for joint solutions.
2. Staff Mobility: The Fund could provide financial and organizational support for healthcare personnel wishing to work in rural or less developed areas, thereby reducing inequality in the availability of healthcare. Especially, cross-border cooperation, during tourist seasons (e.g., border areas between BiH and Croatia), could be explored.
3. Retention of Staff: The Fund could ensure better working conditions, additional education, and benefits for healthcare workers, reducing their departure to wealthier countries.
4. Efficient Use of Resources: Instead of individually solving the problem of each country, a joint Fund and networking would enable synergy and optimize investments.
5. Development of Local Capacities: Financial sources could be directed toward education and the development of locally trained personnel tailored to local needs.

The authors recognize the challenges and problems that may arise when establishing a new fund and, in this regard, emphasize the following:

1. Financing the Fund:
   - Challenge: Wealthier countries may be skeptical about contributing to the Fund, while poorer countries may feel their needs will remain unmet.
   - Solution: Define clear proportional contributions (quotas) based on the financial/economic capacity and needs of each country.
2. Distribution of Finances:
   - Challenge: Ensuring that financial means are distributed equitably and do not favor certain countries or regions.
   - Solution: Establish a neutral governing body to oversee the distribution of funds based on clearly defined criteria.
3. Brain Drain Issue:
   - Challenge: Preventing trained personnel from migrating to wealthier countries despite investments.
   - Solution: Implement contractual obligations for healthcare workers to work in the region/state that funded their education for a specified period.

4. Differences in Healthcare Standards:
   - Challenge: Coordination of mobile teams between countries with different healthcare standards.
   - Solution: Harmonize minimum standards and procedures in a bi(multi)lateral memorandum of cooperation within the region.
5. Attractiveness of Work in Rural Areas:
   - Challenge: Ensuring long-term attractiveness of such jobs.
   - Solution: Offer additional benefits (e.g., housing allowances, bonuses, professional development, additional free days, tax reduction or tax returns etc.).

- Long-Term Effects and Cost-Effectiveness of the Fund: If qualitative solutions are found and implementation is consistent, the Fund should achieve the following effects:
  - Reduction of pressure on the healthcare systems of neighboring countries;
  - Improvement of healthcare accessibility in rural areas; response to seasonal increases in pressure on the healthcare system in border areas of tourist destinations;
  - Establishment of a model for similar regional initiatives in other sectors and regions;
  - Reduction of the economic and social consequences of healthcare worker migration.

Certainly, the proposed solution is complex and demanding on a number of levels - administrative, organizational, technical and such. It is important to acknowledge that, at first glance, there are many very complex and real challenges in implementation. However, above all, strong political will, transparent management, and clearly defined goals could make this idea successful, cost-effective, and ultimately beneficial on multiple levels and for various stakeholders. The effort invested in such a solution would not be in vain, as even partial realization would be considered a success. Naturally, a gradual, phased, and partial approach, combined with a strategic commitment and a solid execution plan, could be relatively easy and quick to begin without significant financial investments.

Analysis of the Phenomenon - Thesis: The brain drain in the healthcare sector of the Federation of Bosnia and Herzegovina is often viewed as a one-sided loss for the country of origin. However, it is important to consider that host countries are not always unequivocal “winners” of this process. The acceptance of highly qualified personnel from other countries can paradoxically have negative consequences on their own educational systems, resource planning, and long-term workforce stability.

Antithesis: In contrast, it is often argued that host countries benefit from the integration of experts (brain gain), as they speed up the filling of deficient positions, reduce education costs, and obtain professionals who are already proven in practice. However, this "gain" is short-term in nature. Education systems in host countries lose the incentive to develop their own workforce, while imported experts, despite their competence, often encounter problems with integration, language, or cultural differences, which can lead to professional tensions and feelings of unfair competition.

Synthesis: Brain drain in healthcare is not a straightforward process where one side loses and the other gains; it is a phenomenon that, in the long term, destabilizes both systems. The country of origin loses the resources it has invested in, while the host country becomes dependent on imported personnel and weakens the foundation of its own educational system. Therefore, addressing this issue requires broader international cooperation, which would include: Regulation of migration in the healthcare sector, Encouragement of the return of experts through exchange programs or investments in their home countries, Investment in local education systems to reduce dependence on foreign workforce.

However, it is crucial to see the entire brain drain vs. brain gain scheme as a phenomenon that should be freed from emotional characterizations and objectively assessed as a potential for all participants

in this exchange. Thus, countries of origin could institutionalize their role as "nurseries" in some way, accepting the realities and using them through bilateral and/or multilateral agreements that would define a *quid-pro-quo* with destination countries, offering material and/or financial benefits.

9. THE ASSUMED NEGATIVE OUTCOMES

1. Erosion of Domestic Educational Structures:
   – When host countries rely on foreign experts, they often reduce pressure on the development of their own educational programs. This can lead to stagnation in educational standards in medical schools and faculties.
   – Moreover, local students and professionals may be demotivated due to the lack of opportunities, further encouraging talented individuals to leave.

2. Problems in Workforce Planning:
   – Systematically accepting foreign professionals can disrupt long-term workforce planning in host countries. For example, if the healthcare system relies on migration, there may be an inadequate assessment of local workforce needs, which could create additional challenges in crisis situations (e.g., pandemics).
   – This can also create dependency on external sources of personnel, which is inherently unstable.

3. Unfair Competition:
   – The migration of experts can cause unfair competition for local professionals, especially if foreigners accept lower wages or worse working conditions. This lowers the standards of work and pay across the entire sector.
   – This is particularly problematic if the local workforce feels that their efforts (education, training) are not adequately rewarded because employers prefer cheaper options.

4. Long-Term Underproduction of Local Experts:
   – If host countries do not invest in educating their own experts, they face the risk of becoming too dependent on foreign personnel. This can reduce the competitiveness of their universities and research centers.
   – Also, the lack of local professionals weakens the sense of belonging and loyalty to the system, as foreign professionals often remain temporarily.

5. Ethics and Global Solidarity:
   – Although host countries benefit in the short term, accepting professionals from countries with weaker economies can be seen as a form of "exploitation." Countries of origin often invest significant resources in educating their citizens only for them to work abroad.
   – Long-term, this deepens global inequalities and can create political tensions between countries.

6. Potential Effects on Patients:
   – Migrant professionals may not always be fully familiar with the local healthcare context, which could affect the quality of the services provided. This is especially a sensitive issue in cultures where patients expect a certain standard of communication or understanding of local customs.

• Broader Perspective: Although host countries often justify these practices due to a lack of personnel, such a system is not sustainable. The long-term solution includes:
   – Strengthening local educational capacities and creating a more attractive working environment for domestic professionals.

- Global cooperation, where host countries support countries of origin (e.g., through educational programs, joint research, and healthcare investments).
- Migration policies that promote the circulation of knowledge, allowing experts to occasionally contribute to their countries of origin.

The migration of experts and generally insufficient workforce inevitably represents only a temporary solution to problems in host countries. However, systemic investments, a solidarity-based approach, coordination, and cooperation among stakeholders can bring about qualitative progress and ensure long-term benefits for all parties.

To stop this negative trend, it is essential to improve working conditions, ensure adequate salaries, and provide professional development opportunities for healthcare professionals, i.e., nurses and technicians. Additionally, efforts should focus on stabilizing the political and economic situation in the country to create an environment where healthcare workers see their future.

10. CONCLUSION

Bosnia and Herzegovina face complex challenges in the healthcare sector, including the migration of healthcare personnel and an aging workforce. While data show an increase in the number of doctors in the Federation of BiH, continuous departures of healthcare workers abroad and internal moves within the country may jeopardize the stability of the healthcare system. Strategies are needed to retain existing staff, offer solutions for local and regional cooperation, qualification of new resources, and optimal distribution of existing healthcare professionals across the Federation of BiH territory in line with the needs of the population and patients to ensure sustainable and quality healthcare and stability across the entire system.

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Local Government Approaches to Development in Croatia

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Abstract: *Local economic development is a priority for cities and municipalities, aiming to enhance economic capacity and improve residents' quality of life. However, local units in Croatia pursue different approaches and have varying priorities based on their unique circumstances. Each local government unit has distinct fiscal capacities, availability of public services, efficiency in public spending, and other factors influencing their development. This paper analyzes the perspectives of locally elected actors on fourteen topics related to the development of local government units. The research is based on the results of a survey conducted in 2023-2024 in Croatia. The topics address various aspects of urban life, including economic activities, mobility, housing, cultural services, poverty, environment, and others. The findings highlight local development priorities and identify the differences in perspectives on local economic development, providing insights into how local governments approach development and community well-being.*

1. INTRODUCTION

Local economic development is a key priority in cities and municipalities, aiming to enhance their economic capacity and improve residents' quality of life. Local government has an essential role in creating a favorable environment for business development by improving the quality of transport, developable urban land, availability and quality of housing, education services, and many other factors (Swinburn et al., 2006). However, different local units may pursue varied approaches to stimulate local development. Their priorities for fostering development can differ significantly. Each local government unit has distinct fiscal capacities, availability of public services, efficiency in public spending, and other factors influencing their development.

Municipal and city councils are representative bodies of local units that pass acts within the scope of the local unit and perform other tasks according to the law (Act on Local and Regional Self-Government, 2020). Local councilors are essential in determining the development priorities of cities and municipalities. Their perspectives on local issues can have a profound impact on decision-making and the execution of policies. Egner et al. (2013) noted that local councilors are essential for local representative democracy, bridging ordinary citizens and decision-makers within local settings. Due to their local mandate, councils play a vital role in promoting sustainable development within communities. This positions them effectively to implement the Sustainable Development Goals at the local level (Local Government Association, 2024). Biermann et al. (2022) paper on the political impact of the Sustainable Development Goals suggests that the goals impacted local institutions and policies and affected the way actors think about local development.

This paper aims to analyze local councilors' attitudes about different topics related to the development of municipalities and cities. The topics address various aspects of urban life, including economic activities, mobility, housing, cultural services, poverty, environment, and others. The

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research is based on the results of a survey conducted between 2023 and 2024 among local councilors in Croatia.

The paper consists of five parts. The second part provides data regarding the local development index. The third part describes the survey design and methodology used in the research. The fourth part provides descriptive statistics and results for factor and cluster analysis. The final section summarises the findings.

2. LOCAL DEVELOPMENT IN CROATIA

The role and strength of local government units have changed in recent decades. Since 2001, when the fiscal decentralization process started in Croatia, local government units' administrative power and responsibilities have changed. So, it moved the responsibilities to the lower level of government and brought it closer to local stakeholders and citizens. Local self-government, based on the territorial division of power, should ensure the realization of democratic political values. These include citizens' participation in governance, accessibility of public offices, the increased political influence of the local population, responsibility for the local community's situation, and promoting other objectives (Koprić, 2003).

The assessment of the development levels of local government units in Croatia for 2024 relies on the Development Index, a composite measure derived from six key indicators outlined in the Regulation on Development Index (2017). These are the unemployment rate, income per capita, income from the local budget per capita, the number of inhabitants, the rate of education, and the aging index. The calculation of the Development Index for 2024 is based on the data for the 2020-2022 period.

Table 1. Local government units according to the level of Development Index

	Number of local government units with below-average development index	Number of local government units with above-average development index	Share of local government units with below average level of development in total number of local government units, in %	Share of local government units with above average level of development in total number of local government units, in %
Zagreb	9	25	1,6	4,5
Krapina-Zagorje	7	25	1,3	4,5
Sisak-Moslavina	16	3	2,9	0,5
Karlovac	13	9	2,3	1,6
Varaždin	11	17	2,0	3,1
Koprivnica-Križevci	19	6	3,4	1,1
Bjelovar-Bilogora	20	3	3,6	0,5
Primorje-Gorski Kotar	5	31	0,9	5,6
Lika-Senj	7	5	1,3	0,9
Virovitica-Podravina	14	2	2,5	0,4
Požega-Slavonia	8	2	1,4	0,4
Slavonski Brod-Posavina	27	1	4,9	0,2
Zadar	6	28	1,1	5,0
Osijek-Baranja	39	3	7,0	0,5
Šibenik-Knin	11	9	2,0	1,6
Vukovar-Srijem	29	2	5,2	0,4
Split-Dalmatia	24	31	4,3	5,6

Istria	1	40	0,2	7,2
Dubrovnik-Neretva	8	14	1,4	2,5
Međimurje	13	12	2,3	2,2
City of Zagreb	0	1	0,0	0,2

Source: Own calculation based on Ministry of Regional Development and EU Funds (2025) data

There are sizeable local development differences in Croatia among cities and municipalities in terms of the level of development. Data in Table 1 show that Zagreb, Krapina-Zagorje, Primorje-Gorski Kotar, Zadar, Split-Dalmatia, and Istria counties have the highest share of local government units with an above-average level of development in total number of local government units. This is also confirmed at the regional level (OECD, 2024). As Bartik (2004) noted, since there are large differences among local areas, there is no best local strategy for successful local economic development. Local government units formulate strategies to achieve development and sustainability (Krantz & Gustafsson, 2021).

3. DATA AND METHODOLOGY

The analysis is based on the data collected by surveying the local councilors in Croatia. The survey was created using the online survey program Qualtrics. In the 2021 Croatian local elections, 6,380 councilors were elected to municipal and city councils. A survey was distributed in two phases. In the first step, surveys were sent directly to councilors for whom individual email addresses were available, sourced from public information on municipal and city websites. In the second step, surveys were sent to the general contact email addresses of cities and municipalities, with a request to forward them to council members. In total, 610 surveys were sent to individual councilors' email addresses in 41 cities and municipalities, while 515 surveys were sent to general contact addresses in municipalities and cities where individual councilors' email addresses were unavailable. The survey covered all municipalities and cities.

The structure of respondents according to age, gender, and county is shown in Table 2.

68.8 percent of the survey population are local councilors between 20-39 years old, and 19.7 percent are aged 60-64. 57.3 percent of local councilors are male, 39.0 percent female, and 3.7 chose not to disclose their gender. The 50.2 percent of respondents are from counties with a below-average development level. 15.2 percent of local councilors are from Primorje-Gorski Kotar County, 11.0 percent from Osijek-Baranja County, 9.4 percent from Varaždin County, and 9.2 percent from Međimurje County.

The paper includes an analysis of local councilors' views on 14 topics related to the development of cities and municipalities. It explores the level of importance that should be granted to:

- attract economic activities in the city/municipality,
- regenerate or rebuild specific areas of the city/municipality,
- improve infrastructures and services for mobility,
- develop leisure services and cultural offer,
- develop a housing offer,
- defend the traditional values of the local society,
- emphasize diversity and tolerance in the local society,
- reduce air and water pollution,
- steer energy consumption practices,

- promote food security,
- improve the external image of the locality,
- prevent urban sprawl,
- fight against marginality and poverty,
- fight climate change.

Table 2. Sample, n=566

	Group	%
Age	20-39	68,8
	60-64	19,7
	65+	11,6
Gender	Female	39,0
	Male	57,3
	Prefer not to say	3,7
County	Zagreb	2,1
	Virovitica-Podravina	2,5
	Požega-Slavonia	0,4
	Slavonski Brod-Posavina	1,8
	Zadar	1,9
	Osijek-Baranja	11,0
	Šibenik-Knin	2,7
	Vukovar-Srijem	2,3
	Split-Dalmatia	4,8
	Istria	5,8
	Dubrovnik-Neretva	4,1
	Krapina-Zagorje	8,3
	Međimurje	9,2
	City of Zagreb	2,7
	Sisak-Moslavina	3,0
	Karlovac	4,6
	Varaždin	9,4
	Koprivnica-Križevci	2,7
	Bjelovar-Bilogora	3,2
	Primorje-Gorski Kotar	15,2
	Lika-Senj	2,7

Source: Own calculations

The above-mentioned questions were measured using a 5-point Likert-type scale ranging from 1 (not important at all) to 5 (very important). Additionally, the survey contained questions revealing the respondents' socio-demographic characteristics (age, level of education, gender, county, etc.).

A factor and cluster analysis was performed to group local councilors according to similar attitudes about local development priorities. All 14 topics representing different local development topics were analyzed in the first step. The principal component analysis and K-means cluster analysis was used.

4. RESULTS

Figure 1 shows the views of local councilors on topics related to local development. The results indicate that more than half of the respondents believe it is important to develop leisure services and cultural offers in the local unit, steer energy consumption practices, and improve the local unit's external image. On the other hand, more than half of the respondents think that they should pay very little attention to the improvement of mobility and the fight against marginality and poverty in the local unit.

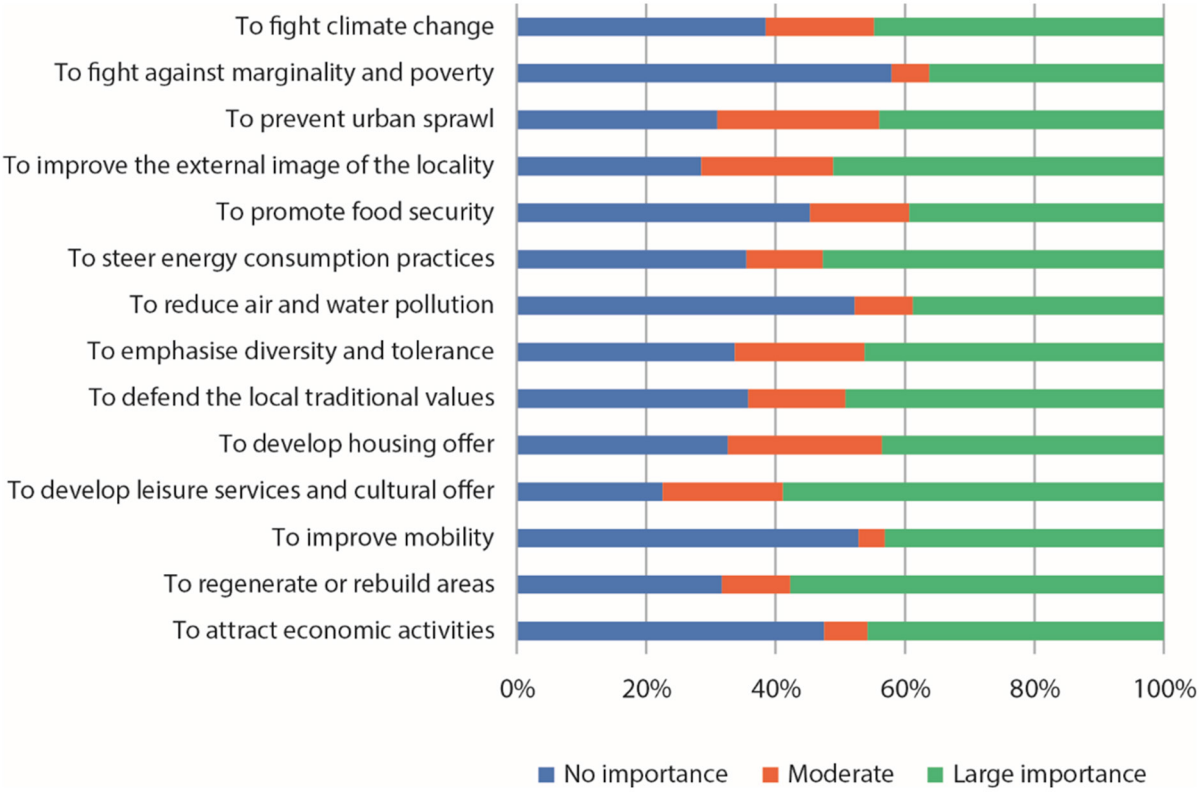

Figure 1. Attitudes toward local development topics

Source: Own calculations

In the next step, explanatory factor analysis was conducted to identify which factors drive local development and are the most important from the local councilors' perspective. The reliability of the measurement scale was assessed using the Cronbach alpha indicator, which measures internal consistency reliability. According to Kline (1998), it measures the degree to which the responses are consistent across the items. The result shows that the Cronbach alpha coefficient is 0.847. This is above the accepted value (Kline, 1998; Griethuijsen et al., 2014).

To evaluate the suitability of the items for factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were employed. As shown in Table 3., the KMO measure was 0.869, and Bartlett's test of sphericity is significant, supporting the use of factor analysis as a method used to reduce the number of variables to a few factors.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.869
Bartlett's Test of Sphericity	Approx. Chi-Square	1873.226
	df	78
	Sig.	0.000

Source: Own calculations

Principal component analysis was applied for factor extraction, with the eigenvalue criterion used to determine the number of factors. Three factors had eigenvalues equal to or greater than 1. Varimax rotation was applied as the factor rotation method. In the first step of conducting factor analysis, 14 variables were included in the analysis. One variable had a low loading and was removed from the analysis, consistent with Hair et al. (1987).

The total variance explained with eigenvalues larger than one, as shown in Table 4, suggests that three factors explain 55.7 percent of the variance. The factor analysis resulted in the reduction of items to three factors.

Table 4. Variance explained with eigenvalues

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	4.6	35.8	35.8	4.6	35.8	35.8	3.4	25.9	25.9
2	1.5	11.5	47.2	1.5	11.5	47.2	2.3	17.6	43.5
3	1.1	8.5	55.7	1.1	8.5	55.7	1.6	12.1	55.7
4	0.9	6.7	62.4						
5	0.8	6.0	68.4						
6	0.7	5.4	73.8						
7	0.6	5.0	78.8						
8	0.6	4.9	83.6						
9	0.5	4.1	87.8						
10	0.5	4.0	91.8						
11	0.4	3.3	95.0						
12	0.3	2.5	97.6						
13	0.3	2.4	100.0						

Source: Own calculations

Table 5. Results of the factor analysis

	Priorities	Factor loadings
Factor 1	To emphasize diversity and tolerance	.524
	To reduce air and water pollution	.822
	To steer energy consumption practices	.779
	To promote food security	.766
	To fight against marginality and poverty	.593
	To fight climate change	.803
Factor 2	To attract economic activities	.549
	To regenerate or rebuild areas	.646
	To improve mobility	.696
	To develop leisure services and cultural offer	.623
	To develop a housing offer	.658
Factor 3	To improve the external image of the locality	.753
	To defend the local traditional values	.825

Source: Own calculations

The result presented in Table 5 shows that there are three main factors. The first is related to environmental sustainability and security issues. The second factor is related to urban planning, regeneration, and economic activities. The third factor is related to promoting local identity. Mean scores for each factor are presented in Table 6.

Table 6. Mean

	Mean	Standard deviation
Factor 1	2.98	0.15
Factor 2	3.12	0.19
Factor 3	3.18	0.06

Source: Own calculations

Cluster analysis was conducted based on these three factors. Three main clusters of local councilors have been identified, as shown in Figure 2. The validity of the results was confirmed using ANOVA, proving significant differences between the three groups of clusters.

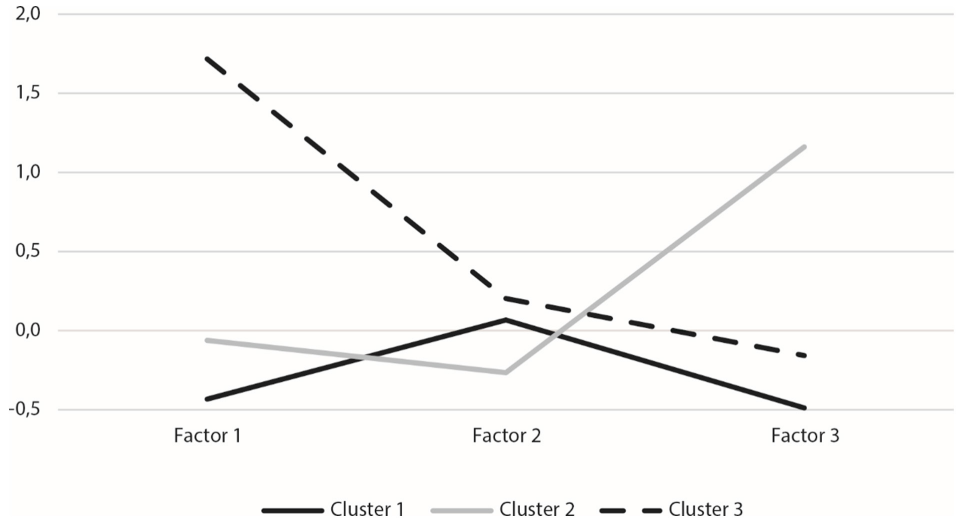

Figure 2. Cluster analysis
Source: Own calculations

In the first cluster are local councilors focused on promoting urban planning, regeneration, and economic activities. This cluster has a positive but small positive relationship with the second factor, while there is a strong negative relationship with the first and third factors 57.9 percent of respondents belong to the first cluster. In the second cluster, respondents mainly focused on promoting local identity. 26.5 percent of respondents belong to the second cluster. In the third cluster are local councilors primarily focused on promoting environmental sustainability and security issues, meaning putting efforts to reduce pollution, steer energy consumption practices, and combat climate change, which they find essential to ensure a healthy environment for their residents. 15.6 percent of respondents belong to the third cluster.

5. CONCLUSION

The paper deals with the local development priorities from the local councilors' perspective. The results reveal that local councilors have different attitudes toward local development priorities. The analysis highlights several key topics that shape their priorities and strategies for local development. Local councilors strongly support the regeneration and rebuilding of the cities and municipalities and the development of leisure services and cultural offers. At the same time, topics such as fighting marginality and poverty show less consensus among respondents regarding their significance in local development. Understanding locally elected actors' perspectives on local development is necessary for creating effective, inclusive, and sustainable development plans. Different local development priorities in the same area could lead to conflicting goals and must be understood to

ensure debate, solve contradictions, and achieve trade-offs and co-benefits. Oseland and Haarstad (2022) noted that goal conflicts among local and urban authorities exist and are often avoided, overlooked, or denied in different ways rather than solved.

In Croatia, local government units have different capabilities to perform public services (Slijepcevic et al., 2024). Local councilors are the bridge between citizens and the council and should encourage citizens to communicate their views. They are involved in making decisions on topics that have a local significance and are essential for ensuring the provision of public services at the local level, improving the living conditions in the local area, and fostering local development.

However, as noted by the World Bank (2021) report, despite some reforms, a clear framework for the provision and financing of public services has not yet been established in Croatia, and some political economy issues with expenditure assignment have to be solved. Also, engaging the citizens is crucial to understanding their needs and priorities and ensuring that development policies reflect the needs of the citizens and that all local government units provide public services necessary to the citizens.

This paper highlights the differences in the views of locally elected representatives on development priorities at the local level. Further research is needed to explore whether these differing opinions, where some issues are deemed less important and others more so, stem from variations in the actual development and services provided within each local unit. Investigating these differences could provide insights into how local development and service delivery influence the priorities of locally elected actors. This understanding can help tailor policies to better meet the needs of diverse local communities and the well-being of the citizens.

Acknowledgment

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The Importance of Infrastructure Performance for Attracting Foreign Direct Investments to the Territory of Bosnia and Herzegovina

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Abstract: *Foreign direct investments (FDI) in the conditions of globalization and a dynamic economic environment are gaining the role of a significant lever of economic development. Governments worldwide are making enormous efforts to enhance FDI inflow. One of the mechanisms for attracting them is investment in infrastructure development. The paper explores the impact of infrastructural performance on attracting FDI to the territory of Bosnia and Herzegovina (B&H), to ensure greater economic development. The research problem in this paper stems from the fact that B&H has a less developed infrastructure than the neighboring countries, and it is necessary to research the importance of infrastructure development in attracting FDI to the territory of B&H. The research goals are reflected in the impact of the development of road, rail and air transport, as well as the development of electrical networks, telecommunication and Internet traffic, on the inflow of FDI.*

1. INTRODUCTION

Infrastructure development is vital for a country in order to attract FDI, boost exports and enhance economic growth. A country with poor infrastructure discourages foreign investors; therefore, improving infrastructure development and expanding its services are significant for the economic development of a country (Hasan et al., 2022, p. 1).

The quality of infrastructure affects investor perceptions and confidence. Investors are more likely to commit capital in regions where they believe infrastructure will support their business operations. A report from UNCTAD noted that infrastructure improvements are essential for enhancing the attractiveness of developing countries for FDI, as they signal a stable and supportive investment environment (United Nations, 2024).

Sustainable infrastructure development contributes to long-term economic stability, which is crucial for attracting FDI. A stable economic environment, supported by reliable infrastructure, encourages foreign investors to view a country as a viable location for investment. The World Investment Report 2024 emphasized that international project finance, essential for infrastructure investment, plays a significant role in shaping FDI trends globally (United Nations, 2024). Generally, a country with good physical infrastructure, such as highways, ports, bridges, and communications, is likely to attract more FDI (Bakar et al., 2012, p. 206).

When it comes to B&H, the quality and efficiency of infrastructural performance play an important role in shaping the economic environment. Given the global race to attract FDI, countries with developed and reliable infrastructure generally become more attractive to foreign investors. Given that B&H is an undeveloped country, which requires foreign investments for further economic

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progress, the infrastructural performance and its influence on the attraction of foreign investments were analyzed. Therefore, the main goal of the research of this paper is to determine the importance of infrastructure in attracting foreign investments to the territory of B&H.

The importance of research stems from the fact that a well-developed infrastructure influences the attraction of FDI, which, in addition to the inflow of capital and the reduction of unemployment as the most important effects, also achieves many other benefits such as access to modern technologies and has a positive impact on the health and education sectors, reducing the overall poverty rate.

The paper is composed of several chapters. In the first part of the paper, an overview of existing literature is presented, and scientific achievements and findings are discussed. The research methodology is presented in the second part of the paper, while the third part of the paper presents the results of the primary research. In addition, it includes recommendations for further research and concludes with a summary of key findings.

2. LITERATURE OVERVIEW

Almost all locations have a special set of attributes through which they strive to increase the inflow of foreign investments. First of all, a certain minimum of conditions must be met, without which there is no attraction for them. This means, above all, political and economic stability, business environment and infrastructure (Paliaga & Strunje, 2011, p. 45). Infrastructural facilities are a key to attracting foreign investors in a host country. Infrastructure, such as efficiency and access to transportation infrastructure, plays a fundamental role in inviting FDI (Faheem et al., 2022, p. 4).

The investment environment is a significant factor in the decision of investors for the realization of foreign investments. It represents: a set of indicators of the economic and market strength of the country, indicators of the development of its natural and human resources, indicators of the development of infrastructure, political stability that affects the credit risk of the country and legislative openness and the efforts of government agencies to improve foreign investments (Paliaga & Strunje, 2011. p. 216).

Urban design sets the framework for building an ideal location, while infrastructure makes design possible. Infrastructure can be viewed as any object, asset or institution provided by the state to improve and facilitate the link between production and consumption (Martin & Rogers, 1995, p. 337). In the literature on foreign investments, infrastructure includes the road network, railway traffic, the number and proximity of airports and ports, continuity and power of water and electricity supply, access to telecommunication and Internet networks (Shah, 2014, p. 4). A well-developed and maintained infrastructure cannot be the only factor that will ensure the stable growth and development of the community, while its absence greatly impairs it. Foreign investors prefer to invest in economies with a well-developed network of roads, airports, water supply, environmental sanitation, uninterrupted power supply, telephones and Internet access (Fous, 2020, p. 2).

Locations require an assessment of the needs of their capital facilities according to age, condition and renovation and adaptation plan with a period of five to twenty years (Kotler et al., 1993, p. 108). Besides the fact that some locations had such plans and teams that took care of these issues, governments very often neglected such indicators due to a lack of funds. This influenced the relocation of certain companies from the old environment to new economic centers.

Although for individuals, investment in infrastructure represents an expense, various studies have shown that underdeveloped or neglected communities suffer huge costs due to insufficient

investment in road and rail networks, as well as telecommunications and electrical systems. The competitive position of a country is determined by its transportation costs, tariffs and access to a new market (Rehman & Ilyas, 2011, p. 269). In developing economies, the role of infrastructure is twofold; in addition to influencing the promotion and attraction of foreign investments, its development leads to additional investments and an increase in the number of employees, which affects the improvement of macroeconomic indicators (Rehman & Ilyas, 2011, p. 270). Better quality and significant improvements to the transport system can save a lot of time and expenses for foreign investors (Badada et al., 2023, p. 2). On the other hand, the poor condition of roads significantly increases the depreciation of engines on vehicles and machines, which increases the costs of both fixed and working capital. Investors prefer countries with well-established/developed infrastructure, as other things constant, they can optimally utilise the imported machinery/paraphernalia in such economies (Shah, 2014, p. 4). Apart from its effect on firm productivity, infrastructure may affect the costs of investment adjustments, which decreases the amount of sunk costs, the durability of private capital, and demand for as well as supply of health and education services (Estache & Fay, 2007, p. 6).

The lack of electricity, water and sewage installations hinders the expansion of construction because they cause an increase in expenses. Also, the paradox of today's time is that the lack of basic energy resources, such as the availability of electricity, telecommunication installations and the Internet in all parts of the country, results in far greater consequences than the high cost of their installations and the payment of high fees. Better telecommunication infrastructure reduces the cost of knowledge pursuit and dissemination, which are the key inputs for all economic activities (Rehman & Yibing, 2019, p. 360). In addition, developed e-commerce has made trade more accessible and modernized technology-oriented, facilitating potential customers, the advertisement process, communication, and other marketing requirements (Arndt et al., 2015, p. 10).

Local communities should learn to start sustaining themselves and investing in their environment, because this is the only way to maintain competitiveness, provide an increase to employment and improve living conditions. Viewed from that aspect, today's infrastructure development is approached not only in a way to influence the increase of its capacity, but new approaches are applied that should influence the improvement of its performance (Kotler et al., 1993, p. 109). We can conclude, favourable infrastructure ensures the efficient production of goods and services, reduces production costs, and leads to lower product prices (Maciulyte-Sniukiene & Butkus, 2022, p. 14). Nevertheless, the effects of infrastructure development on the economy also manifest through other channels. Ongoing infrastructure projects increase labour demand in the construction and related sectors and reduce the country's or region's unemployment level (Cigu et al., 2019, p. 67).

To summarize, a review of the literature on the relationship between infrastructure and FDI inflows found a positive and significant role of infrastructure in attracting FDI inflows.

3. RESEARCH METHODOLOGY

The research problem stems from the fact that B&H has less developed infrastructure; thus, it is necessary to examine the significance of infrastructure development on the inflow of foreign investments.

The main goal of the research is to determine the importance of the infrastructure and business environment for attracting foreign investments to the territory of B&H, with the aim of ensuring greater economic growth and development.

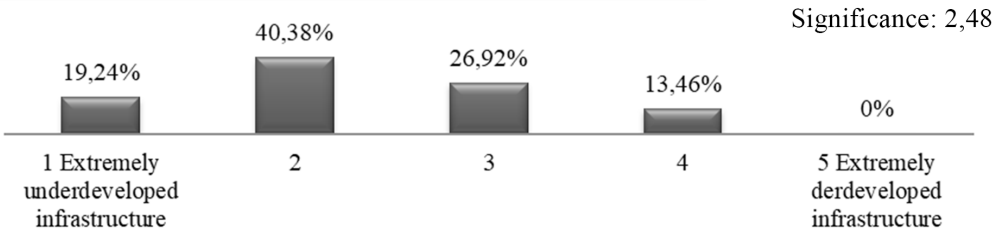
The primary research hypothesis goes as follows: *"Infrastructure and business environment significantly determine the final decision of a foreign investor on the choice of location for investment"*.

Two hundred companies operating on the territory of B&H, whose capital is entirely owned by a foreign investor, participated in the primary research. A sample of two hundred companies was obtained based on a list of companies obtained from the Agency for the Promotion of Foreign Investments of B&H. Applying a stratified proportional sample, companies were selected to which a survey questionnaire was sent. Data collection was done through personal contact with the management of the company or via e-mail. Of the selected companies that were sent the questionnaire, one hundred and thirty-four companies filled it out, which is, a response rate of 67% was achieved. The obtained research results were systematized and grouped, and processed in the SPSS Statistics 20 program. In addition to the descriptive analysis, the collected data were analyzed, and the interdependence between the observed variables was determined using the $\chi 2$ test.

4. RESEARCH RESULTS: INFRASTRUCTURAL CHARACTERISTICS OF BOSNIA AND HERZEGOVINA AND THEIR SIGNIFICANCE FOR FOREIGN INVESTORS

Infrastructure represents either a significant advantage or limitation of investment locations. The developed infrastructure promotes the inflow of foreign investments, because better connections with other locations are provided, and in this way, easier distribution of products and raw materials is enabled. Access to Internet connection, banking systems, and electrical and telecommunication networks as well as largely determines the attractiveness of the location. In the questionnaire, foreign investors had the opportunity to evaluate the infrastructure and its importance on the inflow of foreign investments in the territory of B&H.

In the context of the realization of their investment, foreign investors, when filling out a questionnaire, had the opportunity to evaluate the development of infrastructure in B&H. The ratings ranged from one to five, where number one represented extremely underdeveloped infrastructure, and number five represented extremely developed infrastructure. According to the obtained research results, we can conclude that foreign investors have a negative assessment of the development of infrastructure in B&H. That is, 19.24% of foreign investors rated infrastructure development as extremely negative, 40.38% of foreign investors rated infrastructure development as negative, 26.92% of foreign investors rated infrastructure development as neither positive nor negative, while 13.46% of foreign investors assessed positively the development of the infrastructure. The results of the research are shown in Graph 1.



Graph 1. Assessment of infrastructure development of B&H

Source: Own research

Applying the $\chi 2$ test, where the assessment of infrastructure development in B&H was set as the independent variable of the research, and the decision on the choice of B&H as a business destination compared to the neighboring countries was set as the dependent variable of the research,

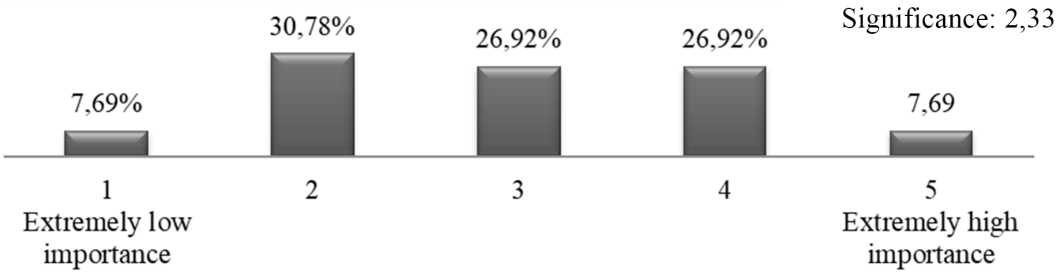
the obtained significance is 0.000 (Asymp. Sig.). Based on the obtained research results, it can be confirmed that there is a dependency between the observed variables. The values of the contingency coefficient and Cramer's V coefficient (Cramer's V 0.434 and the Contingency Coefficient is 0.422) show that the dependence between the observed variables is moderate. Based on the presented research results, which are presented in Table 1 and on the previous Graph 1, the recommendation to the Governments in B&H is to intensify activities on the improvement of infrastructure in B&H because it is important for foreign investors, especially bearing in mind that more half of the respondents (19.24%+40.38%=59.62%) rated the infrastructure in B&H as underdeveloped in the context of the needs of their investment activities in our country.

Table 1. Assessment of the relationship between the evaluation of infrastructure development and the decision to choose B&H as a business destination

	Chi-Square Tests; Pearson Chi-Square; (Asymp. Sig.)	**Symmetric Measures;** Cramer's V	**Symmetric Measures;** Contingency Coefficient	Assessment (comment)
Assessment of infrastructure development (independent variable) vs. Choice of B&H as a business destination compared to neighboring countries (dependent variable)	,000	,434	,422	Yes, there is a significant dependence

Source: Own research

When it comes to the importance of infrastructure when choosing B&H as a business destination, foreign investors rated the observed feature on a scale from one to five. The lowest rating, i.e. number one represents the least importance of infrastructure when choosing a business destination, and number five represents extremely high importance of infrastructure when choosing a business destination. Among the observed respondents, 7.69% of foreign investors stated that for them, infrastructure was of extremely little importance when choosing B&H as a business destination, while for 30.78% of investors it was of little importance. For 26.92% of investors, infrastructure development was neither important nor unimportant. On the other hand, for 26.92% of investors, infrastructure was important, while for 7.69% of foreign investors, infrastructure was extremely important. The aforementioned research results are presented in Graph 2.



Graph 2. Significance of infrastructure in the choice of B&H as a business destination

Source: Own research

Applying the $\chi 2$ test, where the importance of infrastructure when choosing B&H as a business destination is set as the independent research variable, and the decision to choose B&H as a business destination concerning neighboring countries as the dependent research variable, the obtained significance is 0.000 (Asymp. Sig .). Based on the obtained research results, it can be confirmed

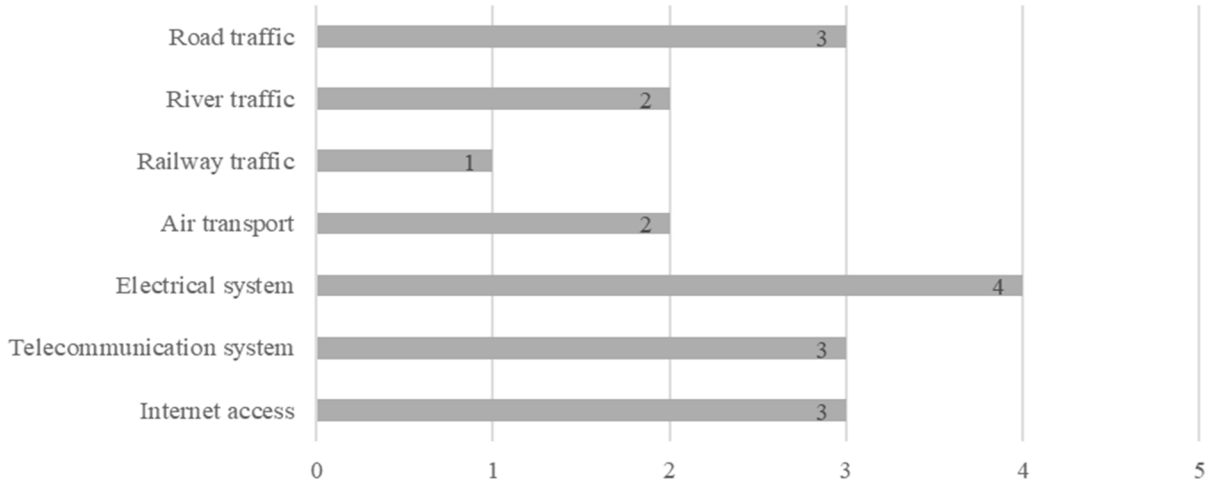
that there is a dependency between the observed variables. The values of the Contingency Coefficient and Kramer's V coefficient (Contingency Coefficient is 0.844, and Cramer's V is 0.787) show that the dependence between the observed variables is moderate. Based on the presented research results, which are presented in Table 2 and the previous Graph 2, we can conclude that infrastructure plays a significant role when choosing an investment destination.

Table 2. Assessment of the relationship between the importance of infrastructure and the decision to choose B&H as a business destination

	Chi-Square Tests; Pearson Chi-Square; (Asymp. Sig.)	**Symmetric Measures;** Cramer's V	**Symmetric Measures;** Contingency Coefficient	Assessment (comment)
Importance of infrastructure when choosing B&H as a business destination (independent variable) vs. Decision to invest in B&H rather than in neighboring countries (dependent variable)	,000	,787	,844	Yes, there is a significant dependence

Source: Own research

In the survey questionnaire, foreign investors were offered to evaluate the infrastructural advantages of B&H, which refer to: the development of road traffic, river traffic, railway traffic, air transport, the development of the electrical system, as well as the development of telecommunications and Internet traffic. The lowest rating, i.e., number one, represents the worst rating of the observed infrastructure component, and number five represents the highest rating of the infrastructure of the observed infrastructure component in B&H. According to the results of the research, railway traffic was rated the worst, while the electrical system in B&H was rated the best. The results of the research are presented in Graph 3.



Graph 3. Assessment of the infrastructure characteristics of B&H

Source: Own research

Using the $\chi 2$ test, we examined whether the characteristics of B&H infrastructure had an influence on the choice of B&H as a business destination in comparison to neighboring countries, and the results of the research are presented in Table 3. The results of the Chi $\chi 2$ test show that there is a prominent dependence between the observed infrastructure characteristics, as independent research variables, and the choice of B&H as an investment destination, as dependent research variables.

Table 3. Assessment of dependence between the observed infrastructural features and decisions of foreign investors to invest in B&H

Characteristics of infrastructure (independent variable) vs. Decision to invest in B&H rather than in neighboring countries	**Chi-Square Tests;** Pearson Chi-Square; (Asymp. Sig.)	**Symmetric Measures;** Cramer's V	**Symmetric Measures;** Contingency Coefficient	Assessment (comment)
Road traffic development	,000	,779	,803	Yes, there is a significant dependence
Development of river traffic	,000	,678	,875	Yes, there is a significant dependence
Development of railway traffic	,000	,760	,881	Yes, there is a significant dependence
Air transport development	,000	,745	,857	Yes, there is a significant dependence
Electrical and telecommunications system development	,000	,708	,866	Yes, there is a significant dependence
Internet access	,000	,687	,860	Yes, there is a significant dependence

Source: Own research

5. FUTURE RESEARCH DIRECTIONS

Given that the infrastructural performance of business locations has a significant role in attracting foreign investments in the future, it is necessary to approach the study of their causal relationship in more detail. In the last decades, researches were mainly focused on the impact of infrastructure on the reduction of transport costs, depreciation of fixed assets as well as the benefits brought by developed infrastructure. Acknowledging the trend of technological progress and innovation, future research should be directed towards the impact of technological progress and the development of smart cities and modern infrastructure on attracting foreign investments and reducing production costs. In addition, we should not neglect the importance of political and strategic influences on the development of the infrastructure of individual locations, which is reflected in the attraction of foreign direct investments. When it comes to B&H, special attention should be paid to the research of private and public partnerships in the field of infrastructure.

6. CONCLUSION

In summary, infrastructure performance is a critical determinant of FDI globally. Infrastructure improvements enhance operational efficiency, build investor confidence, facilitate trade, and contribute to long-term economic stability. As countries strive to attract FDI, prioritizing infrastructure development will be essential for creating a favorable investment climate.

Based on the results of the analysis, i.e. the evaluation of infrastructure development and the choice of B&H as a business destination in relation to neighboring countries, it has been proven that there is a moderate dependence between them (Cramer's V=,434). That is, those investors who positively evaluated the infrastructure of B&H did not consider other countries in the surrounding area when choosing B&H as an investment destination. On the other hand, the evaluations of the

infrastructure of B&H as a business destination are really negative. The infrastructure in B&H was evaluated by respondents from the real sector with an average score of 2.48, and foreign investors perceive it as negative. Based on the results of the research, it was proven that there is a pronounced dependence between the importance of infrastructure and the choice of B&H as an investment destination in relation to neighboring countries (Cramer's V=,787). When we look at the individual features of the infrastructure in B&H and the amount of initial investment, we come to the conclusion that foreign investors believe that there is a pronounced dependence between the observed features and the decision to choose to invest in B&H. That is, road traffic development (Cramer's V=,779), development of river traffic (Cramer's V=,678), development of railway traffic (Cramer's V=,760), air transport development (Cramer's V=,745), electrical and telecomunication system development (Cramer's V=,708), Internet access (Cramer's V=,687), they significantly influence foreign investors when choosing B&H as a business destination in comparison to neighboring countries. Based on the presented research results, we can conclude that the majority of foreign investors perceive the infrastructural characteristics of B&H negatively.

Based on the theoretical research as well as the presented research results, we can conclude that infrastructure is a very important factor when choosing an investment location. It is precisely for this reason that it is necessary to approach its development and maintenance systematically and not to view investment in infrastructure as a cost, but as an investment whose positive effects will be multiplied.

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Sustainable Regional Development – Nudging Behavioural Economy Policies

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Abstract: *In accordance with the new paradigm in regional policy, the development of the regions should be based on the local characteristics of the specific territory. This requires the implementation of a place-based /decentralized/ approach, promoting investments in endogenous growth factors such as the business environment, small and medium-sized enterprises, human capital, cultural heritage, etc. Endogenous development factors are even more important in the context of a green and just transition, as different regions will be affected to different degrees. The present study identifies evidence from Bulgaria for the application of the nudge approach in regional policy. The possibilities of behavioral economics for improving cohesion policy and achieving sustainable development of European Union regions are analyzed.*

1. INTRODUCTION

Sustainable regional development in the European Union (EU) remains a top priority in the context of climate change and the desired green transformation. The new regional policy paradigm proposes to strengthen the decentralization of governance and give regions and cities more autonomy in the planning and implementation of policies based on local specificities and an integrated territorial approach (OECD, 2009). The place-based approach assumes that the geographical context is important in terms of the institutional, cultural and social characteristics of regions to mobilize their internal (endogenous) resources (Barca et al., 2012), such as the quality of human capital, innovation development, the presence of networks and clusters, and a specific knowledge infrastructure (Rodriguez-Pose & Crescenzi, 2008). A governance approach emphasizing regionally and locally managed policies has the potential to stimulate the development, and sometimes the creation, of their own economic and governance capacities (Crouch et al., 2004).

The specific characteristics of social and cultural factors suggest that the behaviour and response of the population to certain policies and decisions may not be consistent and universally applicable across regions. Therefore, interventions may have differing impacts on the respective regional economy and social progress in general. In this context, it is crucial to examine the economic behaviour, attitudes, and preferences of people towards public goods, the environment, and the choice of alternatives. Behavioral economics is considered a modern theory that focuses on individuals' economic decision-making and its consequences on various aspects of the economy, such as returns, resource allocation, market prices, etc. Interest in behavioral tools remains relevant as traditional economic measures often fail to capture the full range of motivations and constraints that determine individuals' decisions. Behavioral economics offers various methods through which sustainable development and economic activity can be promoted in the regions of the EU

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and Bulgaria by influencing individual and collective behavior. Governments can also utilize the tools of behavioural economics to formulate more diverse and effective policies, and to examine the reasons behind certain actions of economic agents in relation to a particular decision or policy (James Lind Institute, 2022). Influencing behaviour on a larger scale is possible through nudge policies, linked to the implementation of a priority shared development goal or vision.

In recent decades, behavioral economics has become recognized as a useful tool for implementing policies that promote sustainable behavior among population and businesses (Thaler & Sunstein, 2008; Shogren, 2012). In the context of regional development, behavioral interventions can contribute to the creation of sustainable communities. Research by Allcott and Rogers (2014) indicate that information about social norms can lead to significant energy savings. In the context of regional economics, Frey and Stutzer (2002) highlight that the use of behavioural economics tools can support sustainable regional development by enhancing the sense of community and belonging. Green transition policies need to be adapted to the specificities of local economies, cultures and infrastructures. Local governments have an important role by providing incentives, facilitating approval procedures and providing training and information on new technologies (Neij & Nemet, 2022).

2. PROBLEM STATEMENT AND METHODOLOGY

The problem of regional development in Bulgaria and the EU lies mainly in the uneven economic development and significant disparities between regions in terms of economic, social and infrastructural conditions that determine the quality of life and opportunities for economic growth (IME, 2023). Bulgaria is divided into 28 districts (NUTS3) and six planning regions (NUTS2) which exhibit varying economic, social and demographic characteristics. There are large disparities in socio-economic development between the capital region and all other regions, which contradict the objectives of polycentric spatial development. The city of Sofia produces about 41% of the country's GDP.

Cities in Bulgaria and the EU face numerous challenges related to sustainable mobility, congestion, air pollution and social segregation. The transport sector generates approximately ¼ of the greenhouse gas emissions in the EU (European Environment Agency, 2021). Urban authorities are attempting to guide citizens behaviour in terms of mobility and public transport. However, information campaigns aimed at promoting sustainable mobility have not demonstrated sufficient results (Huber et al., 2017). According to a recent study, the use of digital data and tools promotes sustainable urban mobility, and facilitates the design of policies necessary to achieve more sustainable lifestyles and the measurement of actual behaviour change (Luger-Bazinger & Hornung-Prähauser, 2021).

The current study builds upon the observation of regional and local policies implemented in Bulgaria since its accession to the EU, aimed at sustainable and integrated regional and urban development. An inductive approach is utilized through case studies to illustrate the application and potential of behavioural economics in promoting sustainable regional and urban development. A literature review of behavioural economics and regional development research is conducted, as well as a factor analysis of the determinants of behaviour towards sustainable development and green transition.

The paper examines the potential of behavioural economics to enhance the efficacy of regional policy and urban development, with a particular focus on the promotion of energy efficiency and sustainable urban mobility. A systematic presentation of case studies from Bulgaria is provided, which demonstrate the application of behavioural interventions in regional and urban development contexts.

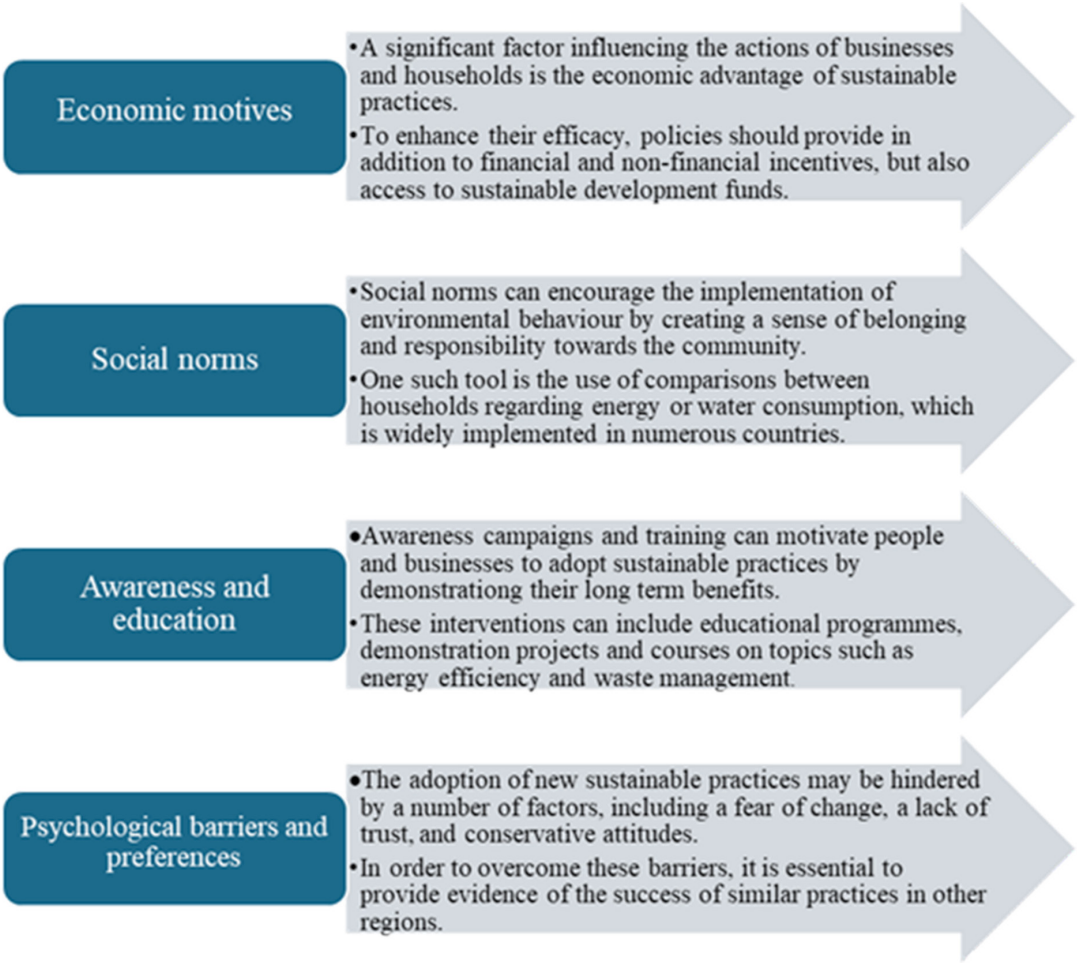

Figure 1. Determinants of behavior
Source: Own processing

3. RESEARCH RESULTS AND DISCUSSION

Within the framework of a long-standing observation of regional development in Bulgaria, our team has identified several significant nudging policies and approaches at the national and local levels that have a considerable impact on the sustainable development of regions and certain urban municipalities.

a. Case study 1: Energy renovation of multi-family residential buildings in Bulgaria

The promotion of energy efficiency in multi-family residential buildings (MFRBs) in Bulgaria has been a long-standing process that began in 2007 with an extensive information campaign and demonstration projects. However, the process has faced numerous difficulties in convincing homeowners of the voluntary association and the benefits of renovating buildings through the introduction of energy efficiency measures. Initially, the Ministry of Regional Development and Public Works (MRDPW) received technical and financial assistance from the United Nations Development Programme (UNDP), through which the first 50 multi-family residential buildings in 13 cities in the country were renovated. Interest in demonstration projects is proving to be extremely weak. But owners have been encouraged to form associations and undertake energy efficiency measures through an integrated approach that simultaneously addresses the physical, social, and economic aspects of the renovation process (MRDPW & UNDP, 2012).

The lack of tradition in owners associations, the absence of regulations for condominium ownership management and the lack of access to financing are addressed by the joint initiative of the Ministry of Regional Development and UNDP by providing technical assistance and professional advice to the residents of multi-family residential buildings (MFRBs) for: the establishment and sustainable functioning of a voluntary owners association (a prerequisite for renovation); facilitated access to credit; organization of the process of implementation of renovation activities. Furthermore, tax relief measures were also employed. Additionally, the joint demonstration project assists in participating municipalities to formulate municipal urban development programmes on a limited scale and to manage the integrated renovation process. The joint initiative is leading to the development of a model for large-scale energy renovation that is being partly applied in subsequent energy efficiency programmes for MFRB, as well as to the refinement of the national housing strategy and condominium management legislation.

The subsequent stages of the state's involvement are outlined in the implementation of the project "Energy Renovation of Bulgarian Homes" under the Operational Programme "Regional Development" (OPRD) 2007-2013, co-financed by the European Regional Development Fund, through which 50 million BGN is financed the implementation of energy efficiency measures in MFRBs in 36 cities of the country. For each approved building, the owners receive a grant funding covering 75% of the renovation budget of the respective building/block-section. Despite the increased interest from the owners of MFRBs as a result of the project, only 158 buildings in the selected cities have been renovated. However, the complex effect of the renovated residential buildings is already visible to the public. Additionally, a Housing Renovation Fund has been established as a financial instrument to ensure that owners contribute equity through the provision of loans or bank guarantees (MRRB, 2013). To further increase interest in energy renovation, the government decided to increase grant funding by creating the Energy Efficiency of Multi-Family Residential Building National Programme (EEMFRBNP) in 2015. The National Programme, with a budget of BGN 2 billion entirely nationally funded was applied nationwide and provided 100% grant funding for owners of MFRBs. All multi-family residential buildings designed prior to 26.04.1999 with three or more floors and six or more detached residential units were eligible. The programme provide financial support for the most cost-effective package of energy-saving measures for the building, intending to achieve a minimum energy consumption class "C". The implementation of the programme is decentralised, with the municipalities organising the application process, assessment, provision of funding and monitoring of the implementation of energy efficiency measures in buildings. The mayor of each municipality bears responsibility for the implementation of the entire process of renovating residential buildings within their jurisdiction and for the selection of contractors for the individual building works (MRRB, 2015).

In parallel with the implementation of the EEMFRBNP under the new Operational Programme "Regions in Growth" (OPRG) 2014-2020, additional opportunities are provided for 39 cities to implement energy efficiency projects in MFRB with European co-financing in line with the investment programmes of their Integrated Plans for Urban Regeneration and Development (MRRB, 2022).

Thus, the interest of MFRB owners has steadily increased since 2015, as illustrated by the more than 3,000 projects submitted under the National Recovery and Resilience Plan (NRRP), which is part of the EU Recovery Mechanism after the 2020 health crisis. The procedure "Support for Sustainable Energy Renovation of the Residential Building Stock - Phase I" also provides 100% grant support, though the financial resources were sufficient for only 756 buildings. In the second phase, the owners will be required to provide 20% of their co-financing (MRRB, 2023).

MFRB energy efficiency programs serve as an illustration of a behavioral economics tool to encourage sustainable behavior among citizens. In the context of green investments such as energy renovation, incentives may not be effective enough, and social norms to govern preferences and measures may prove more effective (Belaïd & Flambard, 2024). The identified problems in connection with energy efficiency are costs, complexity of implementation, lack of information, access to experts, and the length of the financing procedure. Related to these elements, the public's negative attitude due to misleading information, maintenance of ineffective practices due to risk aversion and inertia, as well as the long time to receive the benefit that keeps the individual focused on current needs over long-term benefits, are behavioral barriers. In the case of renovation, in response to the weak initial interest, directing information and assistance to the social and physical aspects of renovation, adding consultations and facilitating access to finance have had an impact. By offering pecuniary incentives for the implementation of energy efficiency measures, these programmes nudge the public choice and facilitate the attainment of climate objectives, reducing energy poverty and improving the quality of life in regions across the country.

Although there was little public interest in the grant once more, giving visibility has influenced public perception in building a social norm and changing the community's attitude in favor of energy awareness. Homeowners are now clearly aware that energy efficiency is important to them, as, in addition to direct economic benefits, it also ensures the long-term safe maintenance of their buildings. Moreover, grant funding in practice turns out to be the only option for the complete renovation/reconstruction of large residential buildings in cities. It is noteworthy that municipalities play a key role in the success of energy efficiency programs and projects. The strength of nudging is different in each municipality, which contributes to the large differentiation in the number of renovated MRFBs by city. The leaders in renovated MFRBs, according to the needs and applications submitted by the owners' associations, are the municipalities of Burgas, Blagoevgrad, Haskovo, Stara Zagora, Smolyan, etc.

Table 1. Energy-renovated MFRB according to programs and planning regions /number/

Regions	NWR	NCR	NER	SER	SWR	SCR	Total
UNDP /MRDPW / 2007-2011	…	4	4	7	26	9	**50**
OPRD 2007 -2013	5	15	11	23	62	42	**158**
OPGR 2014-2020	213	65	71	88	175	199	**811**
EEMFRBNP 2015-2024	156	166	178	450	517	501	**1968**
Total number of buildings renovated	374	250	264	568	780	751	**2987**
Number of residential buildings of 3 or more storeys - 2021 census	11062	11516	18422	25226	54107	39797	**160130**
Percentage renovated MRFB of total building stock	3,38	2,17	1,43	2,25	1,44	1,89	**1,87**

Source: MRDPW & UNDP (2012), ISUN (n.d.), ISUN (2020), NSI (2021), Own calculations

The implementation of the aforementioned measures has resulted in the renovation of 2,987 MFRB by mid-2024 (Table 1), which represents less than 2% of the residential building stock of three or more storeys in the country, as indicated by the 2021 census data. The proportion of refurbished buildings comprising three or more floors is highest in the North West planning region, which is consistent with the objective of balanced regional development. In addition to the improved living conditions and socio-economic benefits, the energy efficiency measures implemented result in primary energy savings and tonnes of greenhouse gas emissions per year, thereby contributing significantly to sustainable development. In addition to the implemented measures, programs that demonstrate the positive effects of using renewable energy or recycling can be included in combination with initiatives that engage a sense of community and belonging to create a culture of local development.

b. Case study 2: Burgas – sustainable urban mobility

Burgas Municipality is a good example of strategic planning and targeted actions to promote sustainable urban mobility. Burgas is the first municipality in Bulgaria to develop a Sustainable Urban Mobility Plan (SUMP) 2014-2023 and to implement an integrated urban transport project. In a relatively short period of time (since 2010), the city has been able to utilise almost all opportunities of EU funds, its own resources and financial instruments to completely transform its public transport and significantly improve its transport infrastructure.

In terms of sustainable urban mobility the determining factors of environmental behavior, which are attitudes, beliefs and the existing connection with nature should be taken into account (Iwińska et al., 2023). And to encourage the use of public transport, behavioral characteristics can be outlined as: saving money and time, environmental concern, convenience, avoiding traffic (Ertyurk-Mincheva et al., 2021). The local authority in Burgas has been able to nudge sustainable urban mobility by enhancing the attractiveness, convenience and environmental friendliness of its public transport, as well as by constructing a network of cycle lanes and encouraging walking.

The public bus transport system is centered around two rapid bus lines that connect two of the outer districts with the city center. A network of secondary bus lines, which feed into the rapid bus lines, covers the entire city and the outer districts. The city's rapid bus system is undergoing continuous upgrades, with the addition of new segments and segregated bus lanes. Concurrently, the traffic light management system is being optimised with bus priority, an integrated traffic management system, electronic ticketing, real-time information, and video surveillance on buses and at bus stops (Municipality of Burgas, 2023).

In addition to the expansion of public transportation, a bicycle lane network is being developed. As one of the most environmentally friendly modes of urban transport, cycling contributes to reducing private vehicle use and promotes sustainable transportation alternatives. The roots of this policy can be traced back to the Integrated Urban Transport project, co-financed by the OPRD 2007-2013, which has constructed approximately 60 km of cycle lanes. The municipality continues to expand the cycle network by constructing new routes and establishing shared streets. Additionally, a municipal bicycle rental system has been established and is being expanded across the city center and several neighborhoods.

The city of Burgas has a well-developed system of pedestrian spaces, with full pedestrian traffic in the central part of the city. The municipal policy is becoming increasingly oriented towards the preservation and further development of traditional pedestrian routes, aiming to connect them with nature, cultural attractions, and the creation of a symbiotic relationship with the green system and the sea. Promoting pedestrianisation is an essential measure for sustainable mobility in the city. Pedestrian underpasses and pedestrian crossings have been constructed to ensure safe pedestrian crossings across the street lanes, especially in high-traffic areas (Municipality of Burgas, 2023).

The current public transport system in Burgas is the result of the implementation of several consecutive integrated projects under the operational programmes for regional development and the environment. The transport infrastructure has been modernised and the bus fleet electrified, which contributes to the reduction of air pollution with PM_{10} and greenhouse gas emissions, noise, and vibration in the urban environment. As a result, the bus/trolleybus fleet has been completely renewed, with almost half of the vehicles being electric (Interreg Europe Programme, 2023).

A Eurostat survey on citizens` satisfaction with public transport in 2019 ranks Burgas as one of the top 10 European cities. A total of 103 cities participated in the survey (112 in 2015). The highest proportion of residents in Zurich (78.2%) and Vienna (70%) expressed satisfaction with public transport in Europe. Burgas ranked seventh in the ranking with 49.3% of residents satisfied with public transport (Mayors of Europe, 2019).

A survey of 500 citizens of Burgas, aged between 12 and 80, revealed that public transport is the most popular mode of transport in the city, with a 46.3% share of the population. This is followed by walking (17.6%) and the use of private vehicles (26.4%) (Municipality of Burgas, 2023). The high usage rate of public transport in Burgas demonstrates the efficacy and accessibility of the public transport network, which is a crucial aspect of sustainable mobility. The public transport system offers an affordable, efficient, and low-emission mode of travel for users of all ages and social statuses. Beyond its environmental benefits (from the renewal of the bus fleet), public transport also plays an important social role by providing a service for those without access to a car and offering discounted fares to vulnerable social groups, including schoolchildren, students, pensioners, and people with disabilities.

The consistent, sustainable urban mobility policy of the Municipality of Burgas is a great example of a behavioral approach to local development and of skillful management of citizens' preferences by encouraging the use of public urban transport, cycling and walking. Fast, convenient, and green public transport is becoming a socially acceptable norm, contributing to the sustainable development of the city and the region as a whole, as Burgas is one of the two leading centers of sea tourism in Bulgaria. In addition, it is possible to include "green public transport on demand" similar to initiatives such as the INNOAIR project.

4. FUTURE RESEARCH DIRECTIONS

The results obtained direct the research interest towards deepening the commitment to achieving green behavior and creating a green culture in society. Also, behavioral determinants and behavioral economics tools can be and have been applied to improve other policies for sustainable regional development.

5. CONCLUSION

Achieving sustainable regional development in Bulgaria requires a combination of investment, social and behavioural interventions that promote sustainable behaviour and create new opportunities for economic growth. Behavioural economics tools facilitate the reduction of regional disparities and inequalities by stimulating change in the daily practices of citizens and businesses, leading to better resource management, less time-consuming activities (which have economic dimensions), reduced emissions, and improved quality of life.

Behavioural economics can contribute to the improvement of cohesion policy in the EU and Bulgaria through the proper use of the factors and motives determining individuals' choices and economic decisions, adapted to regional specificities and local expectations. Figure 1 demonstrates key determinants of behaviour in the context of the green transition and sustainable development.

The acceleration of regional development in the context of a green and just transition requires the adaptation of policies to local conditions and the potential of the endogenous assets of territorial units. The place-based approach provides an opportunity to effectively utilize the unique resources and capabilites of each region while applying behavioural economic tools to promote sustainable behaviour.

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Geography and Regional Economic Development: The Role of Market Potential in Italy, 1911-2011

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Abstract: *This article analyses the evolution of regional economic inequalities in Italy from 1911 to 2011, focusing on the role of market potential as a determinant of economic development. The Italian case is particularly relevant for two reasons: First, the process of industrialization has significantly widened the gap in GDP per capita between regions; second, it allows us to examine whether factors such as market potential have influenced and exacerbated regional development differences. Using methods from New Economic Geography (NEG), the study quantifies market potential and integrates it with variables such as industrialization, education and urbanization to explain income differences between Italian regions. The results show that market potential is a key variable for understanding regional differences in development. Despite improvements in the transport sector, the South's greater distance from the main domestic and foreign markets is the main obstacle to its economic development.*

1. INTRODUCTION

Among the countries of the European Union, Italy is characterized by a pronounced regional disparity in per capita income. The extent and persistence of these differences, as well as territorial dualism, have made the Italian case a central theme in numerous studies on regional convergence processes. Since the 1950s, the debate on growth and convergence between the Italian regions has produced an extensive literature that cannot be fully reproduced here[2].

Studies on convergence mainly rely on the methods of sigma and beta convergence, both absolute and conditional. Sigma convergence, introduced by scholars such as Easterlin (1960) and Barro and Sala-i-Martin (1991, 1995), examines the degree of dispersion by variance: a decrease indicates convergence. Beta convergence, on the other hand, is based on the transition equation of the neoclassical model and measures the relationship between per capita GDP growth and the initial income level, with a negative correlation signalling convergence (Barro et al., 1991).

In addition to traditional economic factors, more recent studies emphasise the role of elements such as education, social capital and infrastructure in regional development[3]. However, geographic factors, especially market access, have received less attention. This latter aspect is at the centre of the extensive literature inspired by the New Economic Geography (NEG) models, which examines regional development differences from a novel perspective. Empirical studies in the context of new economic geography (NEG) emphasise the importance of market potential for the spatial distribution of industry, income and education levels (Midelfart-Knarvik et al., 2000; Hanson,

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[2] Cfr. for example: Mauro & Podrecca (1994); Paci & Pigliaru (1995); Cellini & Scorcu (1997); Bianchi & Menegatti (1997); Paci & Saba (1997); Paci & Pigliaru (1998); Terrasi (1999); Ciriaci (2001); Tullio & Quarella (2001).

[3] For education see: Baici & Casalone (2005); Bronzini & Piselli (2006); Scoppa (2007); Felice (2012). For social capital see: Guiso et al. (2004); De Blasio & Nuzzo (2006); Nuzzo (2006).

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2005; Breinlich, 2006; López Rodríguez & Faiña, 2007). The main conclusion is that regions with better access to domestic and international markets offer advantages for industrial location and, as a result, have a relatively higher level of income.

Historical studies have emphasised the importance of market potential for the geographical distribution of the industry in various European contexts, including Spain, Portugal and France. In Italy, A'Hearn and Venables (2013) noted the crucial role of the domestic market and proximity to foreign markets in the industrialization of the North. Missiaia (2016) showed the relationship between domestic market potential and regional GDP for the period 1871–1911, while Daniele et al. (2016) shed light on the impact of market potential on the distribution of manufacturing in the Italian provinces from 1911 to 2001.

Building on these studies, this article aims to apply the same methodology to the Italian case and to analyze the regional income differences in Italy in the period 1911–2011. Using a regression model, market potential is introduced as a central variable, alongside the variables traditionally used in the economic growth literature to explain differences in development levels. In contrast to previous studies, the focus is on geographical factors, in particular market access, rather than social, structural or institutional aspects. The aim is to assess whether geographical factors can explain the significant differences in development between Italian regions.

The paper is divided into six sections. Section 2 describes sources and data and explains in detail the estimation of market potential; section 3 illustrates the differences in market potential between Italian regions for some census years; section 4 analyzes the relationship between market potential and regional development levels; section 5 identifies future research directions. Section 6 contains a discussion of the results.

2. SOURCE AND DATA

To examine the impact of market potential on the spatial distribution of income, we use data on GDP per capita of the Italian regions in the period 1911–2011. The data come from the Bank of Italy.

To estimate the external market potential (PME), we also need the GDP data of Italy's main foreign trading partners for the entire period. This data was obtained from "The Conference Board - Total Economy Database".

Our analysis focuses mainly on four census years: 1911, which marks one of the key moments in Italy's industrial development and underlines the beginning of industrial concentration in the regions of the "industrial triangle" (Piedmont, Lombardy and Liguria); 1951, the first census after the end of Second World War and the beginning of the golden age of Italian industrialization; 1981, a period of stability following the end of the Italian economic miracle; and 2011, when Italy transitioned to a post-industrial economy, as evidenced by a relative decline in both the share of manufacturing in GDP and employment.

Following Harris (1954), the market potential function defined below represents the potential demand for goods and services produced in a region, taking into account the proximity of this region to consumer demand areas:

$$PM_i = \sum_{i \neq k} \frac{Y_k}{d_{ik}} \quad (1)$$

where PM_i represents the market potential of region i, Y_k, is an index of the purchasing power of region i (typically measured as value added or, as in our case, gross domestic product), and d_{ik} is the bilateral distance between regions i and k. The distance between regional capitals has been calculated as road distance, expressed in kilometers.

To differentiate the effects of Italian regions from those of major European capitals, market potential can be divided into two components: domestic market potential (PMI) which includes the self-potential (SP_i) of each region, and external market potential (PME). Thus, the total market potential of a region i (PMT_i) is calculated as the sum of internal and external market potential:

$$PMT_i = PMI_i + PME_i \tag{2}$$

Following this expression, the internal market potential of each of the 19 regions i is calculated as follows:

$$PMI_i = \sum_{1}^{k=19} \frac{Y_k}{d_{ik}} + SP_i \tag{3}$$

where $SP_i = Y_i / d_{ii}$, measures the self-potential of each region i, and d_{ii} is calculated using a standard approach, assuming that the regions are circular and all economic activities are concentrated at their center:

$$r_i = \sqrt{\frac{region's\ area_i}{\pi}} \tag{4}$$

and following Keeble et al. (1982) the internal distance is calculated as follows: $d_{ii} = ⅓\ r_{ii}$.

The following information is needed to calculate the self-potential: firstly, the market size of each region, which is measured using GDP figures; secondly, the area of each region is needed to calculate r, with the data coming from the Italian Statistical Institute (ISTAT). The internal distance for each region is then estimated as one-third of the radius of a circle with an area equal to that of the region. Finally, to obtain the self-potential of each region, the GDP of the region is divided by the previously calculated distance.

The external market potential of region $I\ PME_i$ is calculated simply by summing the GDP of Italy's main trading partners j (France, Germany, Belgium, Austria, Switzerland, the United Kingdom, the United States, and the Netherlands) divided by the bilateral distance between i and j:

$$PME_i = \sum_{1}^{j=8} \frac{Y_j}{d_{ji}} \tag{5}$$

For the United Kingdom, the Netherlands and the United States, the market potential was calculated on the basis of the nautical distance, expressed in kilometers, between the main Italian ports and the ports of Rotterdam, New York and London, to which the distance between the regional capital and the nearest port was added[4]. In 1951, these countries accounted for 48% of Italy's total exports; by 2001, this share had risen to 56% (Federico et al., 2011; Istat Historical Series). The inclusion of Italy's most important European trading partners is sufficient to estimate the external market potential of the Italian regions relatively accurately. This is since most European countries are easily accessible via a dense road and rail network, so that the inclusion of other European countries is not necessary for the estimate.

The estimates obtained for PMI, PME and PMT are normalized in relation to the Italian average in order to create an index for the relative market potential.

[4] The Italian ports considered are the following: Pescara, Naples, Messina, Ravenna, Trieste, Civitavecchia, Genoa, Ancona, Taranto, Cagliari, Palermo, Livorno and Venice.

3. MARKET POTENTIAL: ESTIMATES AND COMPARISON ACROSS ITALIAN REGIONS, 1911-2011

In this section, we provide a brief overview of the market potential estimates. Figure 1 illustrates the market potential of Italian regions in 1911, 1951, 1981, and 2011. Regions are ranked based on their market potential value in 1911. Based on this classification, a clear distinction in accessibility between the North and South is evident from the beginning of the period under review. The only exception is Campania, whose market potential was comparable to that of some regions in Central-Northern Italy. Lombardy, however, stands out as the region with the highest market potential throughout the entire period examined.

Additionally, over the entire timeframe, changes in market potential are observed, particularly within the group of Central-Northern regions. While regions such as Emilia Romagna, Lazio, and Veneto improved their relative position by 2011, others like Liguria and Piedmont lost ground. In 1911, Liguria's market potential was about 90% of that of the wealthiest region, Lombardy; this declined to 72% in 1981 and approximately 67% in 2011. A similar trend, though less pronounced, is seen for Piedmont. Conversely, Emilia Romagna, Veneto, and Lazio show slight improvements in their relative market potential.

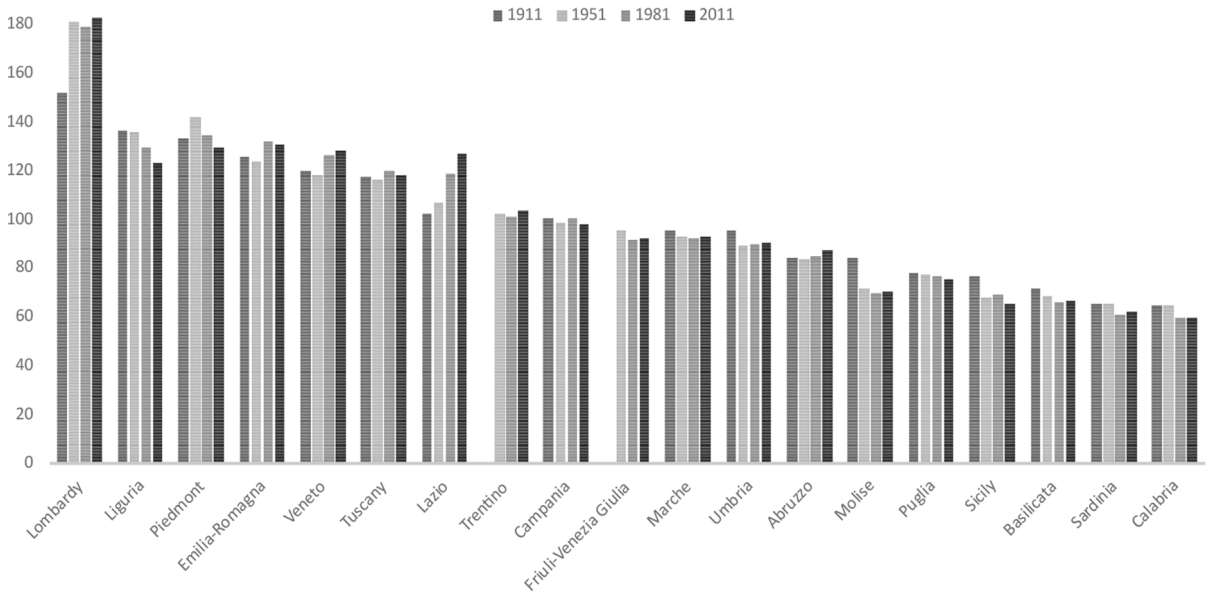

Figure 1. Market Potential in Italian Regions, 1911-2011 (Italy=100)

Source: own calculations

In order to analyze the geographical distribution of the market potential in more detail, several maps of Italy were created to show the regional differences and their development over time (Figure 2). From the early years of the new century, a clear division emerges between the north, which is characterized by a high market potential, and the south, with significantly lower values. The same can be observed in 1951; in this year, the main northern regions (Lombardy, Liguria, Piedmont, Emilia Romagna, and Veneto) recorded market potential up to 1.7 times the national average, while southern regions, with the exception of Campania, ranged between 0.6 and 0.8 times the average.

In 1911, modern industrialization in Italy was already characterised by considerable geographical imbalances, with about half of the industrial workforce concentrated in the "industrial triangle" (Zamagni, 1987). In 1951, Piedmont, Lombardy and Liguria were still the economic centre of the country; 45% of the workforce was employed in manufacturing, compared to 30-35% in the other

regions of the north and 20% in the south. High market potential, combined with a significant demographic concentration in major urban centers, fostered a virtuous cycle for the economy. At this stage, the North-South divide was already evident, with the South's per capita GDP at 50% of the North's (Daniele & Malanima, 2011, 2014).

In 1981, despite the Italian economic miracle, the North-South gradient in market potential remained largely unchanged. Campania, with a market potential equivalent to 56% of Lombardy's, remained the southern region with the highest value. Between 1911 and 2011, the regions with the highest market potential were all in the North (Piedmont, Liguria, Lombardy, Veneto, Emilia Romagna, and Tuscany), while those in Central Italy had moderate levels, and those in the South and the islands exhibited significantly lower levels.

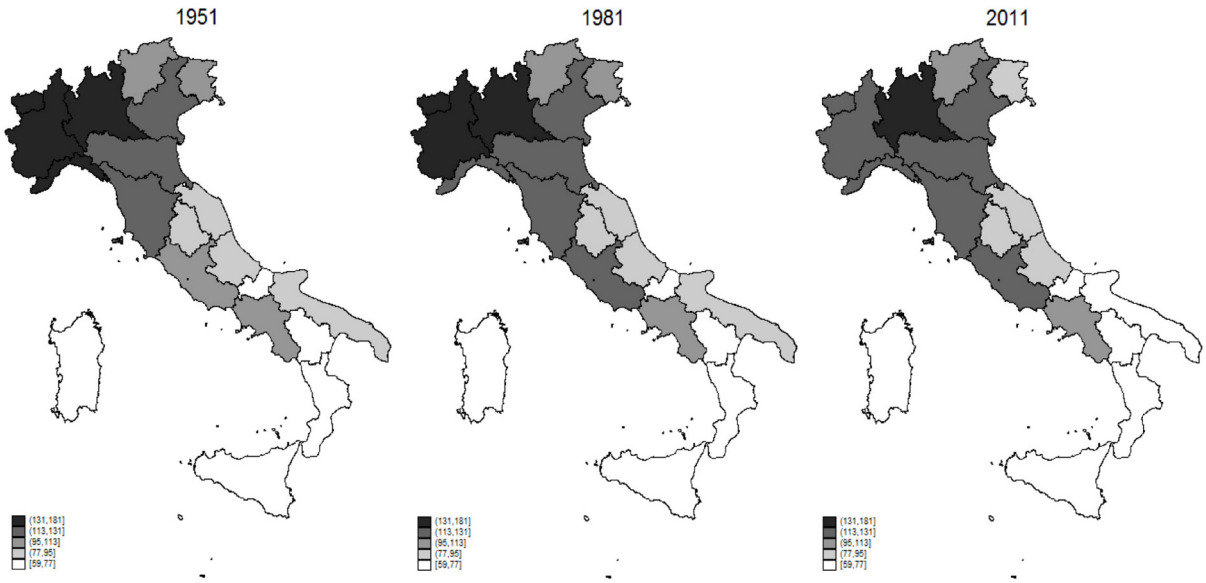

Figure 2. Market Potential in Italian Regions, 1951, 1981, 2011 (Italy=100)
Source: own calculations

4. MARKET POTENTIAL AND ECONOMIC DEVELOPMENT

The analysis presented so far suggests that the evolution of regional differences in per capita income in Italy is closely related to the size of the market potential. In this section, we use the panel structure of our data for the census years 1911–2011 to examine whether there is a close relationship between the market potential of Italian regions and their respective levels of development.

$$Y_r = \beta_1 + \beta_2 MP_r + \delta(control)_r + \varepsilon_r \quad (6)$$

The main explanatory variable is total and domestic market potential (as a measure of market access), together with several geographical, structural and socio-economic control variables commonly used in the growth literature, such as urbanization, share of industrial employment and education. All variables are expressed as indices, relative to the national value. We will also include state fixed effects to account for other regional characteristics that are not specified in the model but influence GDP per capita. For this purpose, we will use both pooled OLS and fixed-effects models.

Table 1 shows the results of the pooled OLS estimates for equation (6) for the period 1911–2011. In the first two columns, GDP per capita is regressed on domestic and total market potential without control variables. Both estimates confirm a positive and statistically significant impact — at the

1% level — on the level of development of the Italian regions. The domestic market potential has a coefficient of 0.475, while the total market potential is 0.651. For both specifications, but especially for the second one, the R-squared is high, which underlines the strong explanatory power of the estimated model. The key variables of interest, domestic and total market potential, are responsible for most of the regional differences in GDP per capita.

Table 1. GDP per capita and market potential, 1911-2011
(Pooled OLS with geographical control)

GDP p.c.	(1)	(2)	(3)	(4)
Cons	0.470***	0.268***	0.589***	0.501***
	(0.075)	(0.077)	(0.057)	(0.071)
PMI	0.475***		0.178***	
	(0.006)		(0.064)	
PMT		0.651***		0.272***
		(0.073)		(0.081)
North-east			0.326***	0.292***
			(0.071)	(0.069)
North-west			0.393***	0.346***
			(0.054)	(0.061)
Center			0.236***	0.219***
			(0.048)	(0.053)
n	169	169	169	169
adj. R-sq	0.59	0.67	0.78	0.77

Notes: Heteroscedasticity–robust standard errors, HC1; standard errors in parentheses; * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level.

Source: Own calculations

The estimates in columns (3) and (4) of the table include territorial dummies – South and Islands, Center, Northeast and Northwest – to capture macro-regional differences and avoid overestimating the role of market potential. The result is a reduction in both coefficients for market potential; both measures remain positive and significant at the 1% level – although lower than the previous estimates. The dummies for the Center, Northeast and Northwest are all strongly significant and positive, confirming that the regions in these macro-areas had higher levels of GDP per capita than the regions in the South and Islands throughout the period studied.

Table 2 shows the results of the pooled OLS estimates for equation (6) with control variables. Several studies suggest that structural changes related to industrialization and deindustrialization can affect per capita income (Daniele & Malanima, 2014). To account for this effect, the analysis includes variables that capture the productive structure of each region, such as the relative industrialization index, which is calculated by comparing the share of industrial employment in each region with the national average (columns 1 and 2).

Another socio-economic control was included in columns (3) and (4): the relative urbanization index. Urban density, as used in Brakman et al. (2009) and various NEG studies, is one of the most important demographic variables correlated with the distribution of per capita income. The data for each region were calculated as the ratio of the population living in urban centers with more than 20,000 inhabitants to the total regional population; these values were then normalized relative to the national average.

Finally, education is the most important measure of human capital, widely recognized for its positive impact on GDP per capita. Studies such as Head and Mayer (2004) and Felice (2012) point to

a significant effect of education on Italy's regional development by using the average number of years of schooling or the school enrollment rate as an indicator of human capital. Columns 5 and 6 present the results with this variable.

In the different Pooled OLS estimates, despite the inclusion of several geographic, structural, and socioeconomic control variables in the model, market potential, in both measures, has a positive and statistically significant impact on regional per capita GDP levels.

Table 2. GDP per capita and market potential, 1911-2011 (Pooled OLS with control variables)

GDP p.c.	(1)	(2)	(3)	(4)	(5)	(6)
Cons	0.316***	0.198*	0.471***	0.252***	0.249	0.093
	(0.103)	(0.096)	(0.101)	(0.083)	(0.217)	(0.207)
PMI	0.361***		0.476***		0.455***	
	(0.084)		(0.067)		(0.058)	
PMT		0.546***		0.640***		0.627***
		(0.096)		(0.078)		(0.072)
Industry	0.297**	0.197*				
	(0.116)	(0.108)				
Urbanization			-0.001	0.030		
			(0.093)	(0.078)		
Education					0.245	0.202
					(0.204)	(0.227)
n	167	167	169	169	167	167
adj. R-sq	0.64	0.69	0.59	0.67	0.60	0.68

Notes: Heteroscedasticity–robust standard errors, HC1; standard errors in parentheses; * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level.

Source: Own calculations

Table 3. GDP per capita and market potential, 1911-2011 (Fixed effect)

GDP p.c.	(1)	(2)	(3)	(4)	(5)	(6)
Cons	0.253	0.431	0.283	0.353	0.289	0.234
	(0.270)	(0.314)	(0.284)	(0.394)	(0.178)	(0.245)
PMI	0.693**		0.715***		0.576***	
	(0.270)		(0.272)		(0.116)	
PMT		0.495*		0.634*		0.624***
		(0.301)		(0.385)		(0.165)
Industry					0.414***	0.469***
					(0.083)	(0.082)
Urbanization					-0.039	-0.002
					(0.098)	(0.100)
Education					-0.201*	-0.286*
					(0.104)	(0.119)
Time dummies	no	no	yes	yes	yes	yes
n	169	169	169	169	169	169
adj. R-sq	0.25	0.07	0.31	0.13	0.63	0.57

Notes: Heteroscedasticity–robust standard errors, HC1; standard errors in parentheses; * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level.

Source: Own calculations

The Pooled OLS estimates performed with various control variables have certainly mitigated but not entirely eliminated the issue of omitted variable bias, as regional disparities in per capita GDP

may be influenced by numerous factors that cannot be measured and/or observed. To address this issue, a fixed-effects panel model was estimated. The results are presented in Table 3. The results of the fixed effects estimates are consistent with previous estimates and show a positive and significant effect of market potential, especially domestic market potential, on the distribution of GDP at the regional level.

The market potential developed by Harris includes the contribution of regional GDP, the so-called self-potential, which can lead to endogeneity in the model, as the explanatory variable (market potential) and the dependent variable (GDP per capita) influence each other. To solve this problem, OLS estimates, which are inconsistent in the presence of endogenous regressors, are replaced by the instrumental variables (IV) method using the two-stage least squares estimator (TSLS). Following the literature (Brakman et al., 2009), the distance of each Italian region from Lombardy is used as an exogenous instrument. The IV estimates, not reported in the article but available upon request, also confirm the significant influence of market potential on regional development.

5. FUTURE RESEARCH DIRECTIONS

This paper examines the relationship between per capita GDP and regional market potential, understood as a measure of market access. The results highlight a positive relationship between the two variables, consistent with findings from previous economic studies. However, the analysis could be further refined by using data at the regional or, preferably, provincial level to estimate a Barro regression model. This approach would allow for a more detailed analysis of the relationship between regional economic growth and market access, providing valuable insights for comparisons with other countries.

6. CONCLUSION

This study analyzed regional inequality in Italy from 1911 to 2011, focusing on market potential as the main determinant. The Italian case is relevant for two reasons. First, industrialization greatly increased the differences in GDP per capita between regions; second, this analysis allows us to examine whether factors related to New Economic Geography (NEG) patterns influenced and increased regional inequality over the period. To do so, the market potential of the Italian regions was estimated and the dataset supplemented with variables relevant to economic development.

The results show that market potential played a crucial role in development differences. As early as 1911, the North had greater market potential due to its proximity to European markets and benefited from factors such as a higher level of industrialization, urbanization and education. This potential continued to positively influence regional development until 2011, even considering other controlling variables.

Centripetal forces, which favor the agglomeration of economic activities in central areas, prevented the catch-up process between North and South, widening inequalities. Distance to markets has thus emerged as a key factor in regional economic development, contributing to widening the gap. Despite improvements in transportation, the South has remained hampered by its distance from markets.

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Sustainable Development Goals and the Adoption on Local Level – Case of Albania

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Budget

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Abstract: *The Sustainable Development Goals and the adoption of them on central and local levels have been seen as very important, in order to fulfill the obligations of Albania for the Agenda 2030. Albania has signed the Agreement and has started work on its fulfillment. Albania has constituted a Parliamentary Sub-Commission for the Sustainable Development Goals (SDGs), which is monitoring the implementation of these goals at the government and local level.*

The paper will analyse the level of adopted SDGs, the problems, the threats for the future, the impact of them on the government and community, as well as the opportunities and obstacles for achieving them. The study will give a full picture of SDGs in Albania and compare it with the other six Western Balkan Countries. The implementation of SDGs will increase the awareness of the central government and municipalities toward drafting the budgets at each level. The implementation of SDGs requires enough budget at all Ministries and Municipalities, which will impact the allocation and reallocation of funds.

Hence, the paper will discuss the importance of fastening the adoption of SDGs from the local level toward the central one, because it is necessary to have sustainable development at the local level, in order to achieve sustainable growth at the national level.

1. INTRODUCTION

Local authorities play an important role in the implementation of the 2030 Agenda and the Sustainable Development Goals (SDGs). Many Local Self-Government Units (LGUs) across Europe and around the world are raising awareness of the SDGs and looking for ways to integrate the SDGs into their policy plans (Reddy, 2016). The Assembly of Albania has confirmed its commitment to Agenda 2030, through the approval on 04.12.2017, of the Resolution "On the objectives of the sustainable development of Agenda 2030 of the member states of the United Nations". The adoption of this resolution confirms our country's commitment to the 2030 Agenda, as it plays an important role in monitoring the achievement of the SDGs. Also, and equally important, in 2022, a parliamentary subcommittee for sustainable development was established. All the joint institutional work between many actors, such as Parliament, RUs, businesses, civil society, etc., is mainly based on the objectives of eradicating poverty, inequality and realizing human dignity.

1.1. Statistical Information

According to the "Sustainable Development Goals" Report, our country ranks 42nd among 166 countries in total, accumulating 75.03 points in the overall index. Currently, only 43% of the SDGs have been achieved or are in the process of being achieved, 29 % have limited progress and 28% have suffered deterioration (Figure 1) (Sustainable Development Report, 2024).

The progress of the implementation of the objectives from a statistical point of view is presented in Figure 2. SDG 1 (poverty), 7 (energy), 9 (infrastructure), and 10 (inequality) have been implemented

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or are on track for full implementation at the national level (Figure 2). Challenges remain for most of the SDGs, while targets that have deteriorated are: 8 (decent work and economic growth), 14 (water) and 16 (peace, justice, strong institutions) (Figure 2).

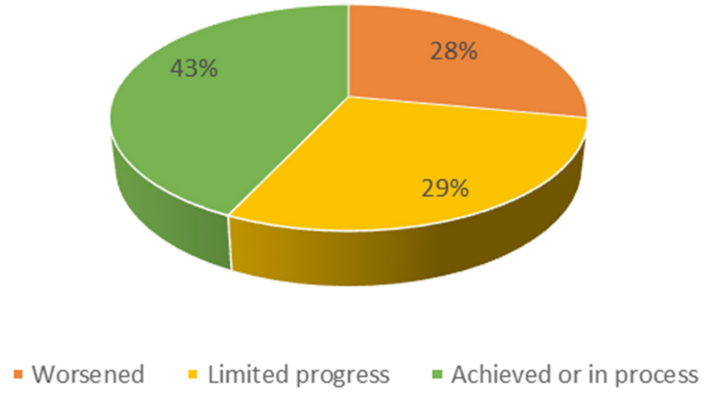

Figure 1. Actual Status of SDS in Albania for the year 2024
Source: Sustainable Development Report (2024)

Figure 2. Progress of implementation/achievement of 17 SDGs by Albania (2024)
Source: Sachs et al. (2024)

The main purpose of this paper is to reflect information related to the implementation and achievement of the SDGs at the local level in Albania. The paper analyzes the implementation of the SDGs at the local level during the period 2019-2024, mainly those related to areas such as sectoral alignment, recognition and awareness, social or social protection, and municipal capacities (such as human resources, etc.). The material also analyzes the budget for local governments from 2022 to 2025 based on updated data from the Ministry of Finance. The collection of information was carried out through the analysis of various publications and national and international reports on the implementation of the SDGs, such as ALTRI, UNDP, FAO, UNICEF, etc. The paper is structured in 3 parts. The first part presents the findings of the study. The second part presents a theoretical basis on the role and challenges that LGUs encounter in the implementation of the SDGs at the local level. The third part investigates the situation, problems, and challenges related to the implementation of the SDGs at the local level for the period 2019-2024 and the financing available to local government in Albania during the period 2022-2025.

2. EVIDENCE FROM ALBANIA

Local governance is essential to the implementation of the SDGs as it empowers communities to take ownership of their implementation, while ensuring that global objectives are translated at the local level. By fostering collaboration between different parties, local authorities can drive transformative change that contributes to a more sustainable future for all. Although there may be certain limitations in competences, capacities and financial resources, local authorities are the ones that directly influence certain areas of public policy, such as social protection, gender equality, protection of the environment and biodiversity, disaster risk reduction, transport, municipal services, education, etc. all of which are closely related to each of the SDGs (Ansell et al., 2022).

At the strategic level, the local government in Albania has harmonized certain indicators to achieve the implementation of the SDGs as part of the Intersectoral Strategy for Decentralization and Local Government 2023-2030. In this strategy, the principles of gender integration and addressing inequalities are aligned in all its political goals. Statistical information. Based on the passport of indicators that this strategy contains, we can say that in Albania, some of the SDGs that are in the process of being implemented to address the needs and challenges at the local level until 2030 are presented in the table below (Strategjia Ndërsektoriale për Decentralizimin dhe Qeverisjen Vendore, 2023).

Table 1. Integrated SDGs on the Local Level based on the Sectoral Strategy on **Decentralization 2023-2030**

SDG	Indicator	Target Value	Actual Value (2023)
SDG 1,5,10,11	No. of municipalities, which finance social services	100% or 61 Municipalities	25% (14 Municipalities)
SDG 6,11,12	No. of municipalities that treat waste	100% or 61 Municipalities	Non defined
SDG 8	Municipality Staff Training	1000	1679
SDG 1, 11	Minimum standards of local services drafted and achieved	30%	Not defined
SDG 10	Tax on real estate as GDP %	0.8%	0.3%
SDG 10	Local Government Budget as GDP %	7.5%	3.1%
SDG 10	EU Directives discussed from the Consultativ Council (CC)	Not defined	30
SDG10	Addressed recommendations from local governments to CC	Not defined	20%
SDG 2	Irrigation and drainage canals	30% more in 2025 than in 2022	To be measured

Source: ALTRI (2019)

The provision of social care services is part of several SDGs, where we can mention SDGs 1, 3, 5, 10, and 16. In this regard, the study shows that the structures responsible for social protection in the municipalities of Albania encounter problems in their functions that can be covered. The functions that are covered in almost all municipalities are child protection, the administration of economic assistance and gender equality, while the functions that are not covered by a large number of municipalities are the establishment of social care services, the procurement of services and their strategic planning. As for human resources, it turns out that the structures of economic assistance, assistance for persons with disabilities, domestic violence and child protection are the functions with the largest staff coverage in the municipalities of Albania. In terms of gender, the number of women and girls working in municipal service structures significantly exceeds the number of men.

Meanwhile, regarding awareness and capacities in general, small municipalities have a lack of information regarding what the SDGs represent, what benefits and opportunities they present concerning the sustainable development of municipalities, etc. Also, in these municipalities, it was noticed that there was a lack of adequate mechanisms to collect the necessary disaggregated data, but also a lack of monitoring mechanisms for the implementation of the SDGs. For this, these municipalities have expressed the need for strengthening human resource capacities through training and greater awareness to understand the importance of these objectives, increased support from the central government, etc. The researchers also recommend that work should continue with the inclusion of SDGs in local strategies and development action plans.

2.1. Financial Resources Available

The legal framework in force (for local government, local finance, and social services) provides for various sources of financing for local governments, but nevertheless, in practice, transfers from the state budget remain the main source of financing for them.

For public institutions at the local level, information on budget expenditures is provided only at the total level and always based on the institutional classification. This includes the budgetary expenditures foreseen for the SDGs, transfers from the central budget to the local budget in the form of conditional and unconditional transfers, budgetary expenditures for special funds related to social and health insurance, also, details are given for the number of employees in public institutions and the list of capital investments, which include the purchase of tangible and intangible assets, etc. (Ministry of Finance, 2024).

Local budget expenditures for 2025 are estimated at 89.9 billion ALL, with an increase of 13% more than the 2024 budget. The local government budget is expected to represent about 3.4% of GDP in 2025 (of which was 3.2% for 2024). Meanwhile, as a percentage of total budget expenditures, it represents a relatively small percentage (10% in 2024, while 10.9% of total budget expenditures is predicted in 2025). The unconditional transfer has undergone significant growth in recent years, while in the 2025 budget bill, sectoral funds for new functions will be added to the transfer, the performance grant, which is used for the first time as a financial mechanism in local government as well as transfers for salary increases (Ministry of Finance, 2024). According to UNDP and FAO (2023) experts, this dependence of the local government on the financing conditions of the central government can be an obstacle to the implementation of the SDGs at the local level.

3. EMPIRICAL FINDINGS FROM REPORTS

Local government plays an important role in realizing the SDGs. Given their proximity to communities, local governments have the opportunity to implement tailored solutions that address specific challenges facing their populations (Ansell et al., 2022). Local governments are responsible for providing essential services. such as social protection, education, health, hygiene, infrastructure, etc. and these services are fundamental to the achievement of some SDGs, especially those related to Objective 1, 3 and 4 (ICLEI Local Governments for Sustainability, 2015).

Other aspects of local governments' responsibilities are community engagement and the provision of contextual solutions. By understanding socio-economic conditions at the local level, but also cultural nuances and environmental challenges, local governments can develop strategies that are more effective than universal approaches. In this context, local government can ensure that the SDGs are integrated into local development plans. To increase this, local authorities can

mobilize financial resources through innovative financing mechanisms, partnerships with the private sector and community input. This financial support is essential for the implementation of projects that advance the work on the SDGs. Also, local government structures facilitate the monitoring of progress towards the SDGs at the community level (UN Habitat, 2014). In conclusion, for an effective local government, there must be strong cooperation with the central government. Clear roles and responsibilities between different levels of government improve coordination to achieve the SDGs.

Despite its key role, local governments face several challenges in implementing the SDGs:

- Limited financial resources: local governments face insufficient funding, which hinders their ability to implement the programs/projects needed to achieve the SDGs;
- Insufficient capacities: there may be a lack of technical expertise and institutional capacity within local governments to plan and implement sustainable development initiatives;
- Political obstacles: political uncertainty or lack of support from higher levels of government can hinder local efforts to align with national and global sustainability targets (UNDP, 2018).

UNDP has introduced a special concept of the translation of the SDGs at the local level, the concept of "localization". The localization of the SDGs is the process of taking into account the local contexts in the achievement of the 2030 Agenda, from the definition of goals and objectives to the definition of the means of implementation and the use of indicators to measure and monitor progress. Localization relates both to how the SDGs can provide a framework for local development policies and to how local governments can support the achievement of the SDGs (UNDP, 2023).

3.1. Implementation Challenges During the Period 2019-2024: Awareness, Capacities, and Available Human Resources

According to a study conducted by the Albanian Institute for Legal and Territorial Studies (ALTRI, 2019), where the municipalities of Kukës, Librazhdi and Elbasan were evaluated in relation to the achievement of the SDGs, the measures taken, the tools used and the indicators for measuring them, it was found that in these municipalities there is a lack of information about what these objectives really represent, what benefits and opportunities they present in relation to the sustainable development of municipalities, etc. It was also observed in the evaluated municipalities that there was a lack of adequate mechanisms to collect the necessary disaggregated information and data at the local level, but also a lack of monitoring mechanisms for the implementation of the ODGs. Some other issues or challenges were related to:

- the need for greater training and awareness to understand the importance of these objectives;
- increased support from the central government;
- the inclusion of ODGs in local strategies and development action plans;
-strengthening human resource capacities;
- better management by RUs on new responsibilities in the provision of social care services; etc.

The provision of social care services is part of several SDGs, where we can mention SDGs 1, 3, 5, 10, and 16. In this regard, a 2022 study conducted by the Center for the Promotion of Human Development (HDPC) with the support of UNICEF highlights some problems of municipalities related to the structures responsible for social protection. The functions that are covered in almost all municipalities are child protection, the administration of economic assistance and gender equality, while the functions that are not covered by a large number of municipalities are the establishment of social care services, the procurement of social care services and the strategic planning of social care services (HDPC & Unicef, 2022).

As for human resources and capacities, it turns out that economic assistance, assistance for persons with disabilities, domestic violence and child protection are the functions with the largest personnel coverage in the municipalities of Albania. Municipalities are aware of the insufficient number of personnel and state that they need additional employees. In terms of gender, the number of women and girls working in municipal service structures significantly exceeds the number of men (HDPC & Unicef, 2022).

3.2. Financial Resources of Local Government for the Period 2022-2025

The legal framework in force (for local government, local finance, and social services) provides for different sources of financing for local governments (UNDP, 2023). They can use income from their own sources (collection of local taxes and fees), the state budget (conditional and unconditional transfers) and other contributions from third parties. Although local government units must be able to generate sufficient income to carry out their functions, in practice, transfers from the state budget remain the main source of financing for them.

For public institutions at the local level, information on budget expenditures is provided only at the total level and always based on the institutional classification. This includes the budgetary expenditures foreseen for the PSUs, i.e., transfers from the central budget to the local budget in the form of conditional and unconditional transfers, budgetary expenditures for special funds related to social and health insurance, also, details are given for the number of employees in public institutions and the list of capital investments, which include the purchase of tangible and intangible assets, etc. (Braho & Ymeri, 2021). Local budget expenditures for 2025 are estimated at 89.9 billion ALL, with an increase of 13% more than the 2024 budget.28 The local government budget is expected to represent about 3.4% of GDP in 2025 (Table 2).

Table 2. Local government expenditures in value and % of GDP (2022-2025)

	Real Budget 2022		Real Budget 2023		Normative Act 2024		Forecasting budget 2025	
	Million ALL	% of GDP	Million ALL	% of GDP	Million ALL	% of GDP	Million ALL	% of GDP
Total budget expenses	6511,015	30.3%	674,857	28.5%	771,348	30.9%	822,702	31.4%
Local budget	58,694	2.7%	68,841	2.9%	79,377	3.2%	89,861	3.4%

Source: Ministry of Finance (2024)

Local government expenditures represent a relatively small percentage of total government expenditures (Figure 3). In 2024, the budget for local government constituted only 10% of the total budget. While in 2025, a small increase is predicted where these expenses reach 10.9% of the total budget expenses. As mentioned above, their main source of funding is central government funding, mainly transfers. According to UNDP and FAO experts, this dependence of local government on the financing conditions of the central government can be an obstacle to the implementation of the SDGs at the local level (UNDP & FAO, 2023).

Unconditional transfer compared to previous years has grown significantly in recent years. For example, if we compare the year 2025 (from the draft budget) with the year 2015, the year before the implementation of the administrative-territorial reform, the unconditional transfer has increased by 13.9 billion ALL.

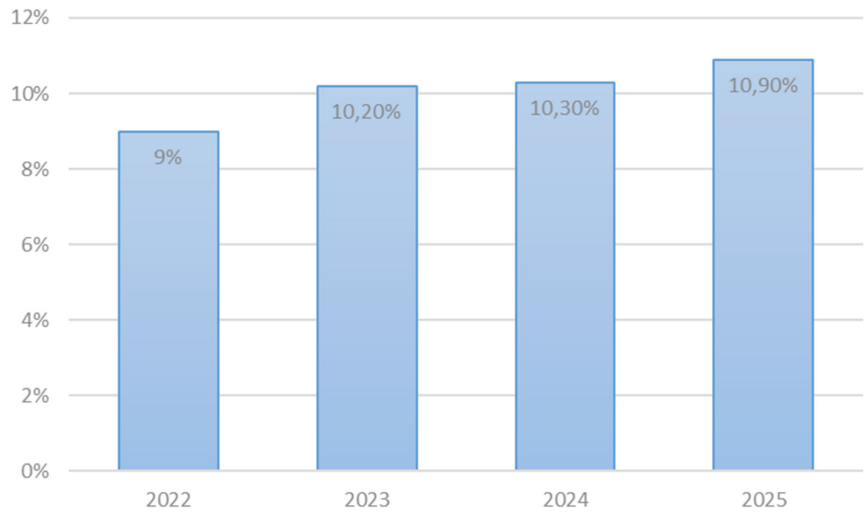

Figure 3. Budget for local government as a percentage of the total budget (2022-2025)
Source: Ministry of Finance (2024)

In the unconditional transfer foreseen for 2025, sectoral funds for new functions will be added, the performance grant, which is used for the first time as a financial mechanism in local government, as well as transfers for salary increases. In total, in 2025, the grant from the state budget for local government will be in the amount of 43.1 billion ALL, from 36.5 billion in 2024, with an increase of 6.6 billion ALL or an increase of 18% (Ministry of Finance, 2024).

4. CONCLUSION

The implementation of the SDGs in Albania remains a constant challenge, due to the problems in drafting concrete work plans. Even though it is the Cross-Sectoral National Strategy, once again, the implementation of the SDGs at the central and local levels is at a low level. The most serious problem remains the monitoring and evaluation system, which requires dedicated efforts, expertise, skills, and good management. This process is considered one of the most important during the period of implementation of a strategic document, as it avoids deviations from the fulfillment of the objectives of the SDGs 2030.

Our study concluded that quality and useful monitoring and reporting should be provided, especially for sustainable development strategies. Also, from the analysis of the SDGs at the local level, it was found necessary to define a clear reporting and monitoring process with fixed deadlines. Furthermore, the definition of a model and the instruments that will be used for monitoring as well as the capacities of the main structures, are required.

A clear monitoring and reporting process is necessary to inform the municipalities of their responsibilities and to enable them to prepare for all commitments based on a previously defined calendar. Models and instruments are necessary for the training of human resources, in order to guarantee the clarity of information given and received.

The government should draft clear guidelines for the implementation of the SDGs at the local level. In addition to the models, clarifications are also important, especially in cases where delays or deficiencies in the objectives are observed. The information produced through the monitoring and reporting systems can be used by the local government as well as delegated to the Government for higher decision-making. Also, it is very necessary that the SDGs implementation reports at the local and central levels are transparent and accessible to interest groups, to contribute as much as possible

to their achievement. The capacity of structures to produce quality information and to consolidate information is very important. It takes effort and skill to produce good reporting information based on analysis and supported by evidence. Practice in the public sector shows that too often, information reporting focuses on routine day-to-day operations rather than on the analysis of achievements. Capacity can be improved through instruction, training, and practice.

Monitoring the implementation of the SDGs is a very important stage and the best measure of its success. We suggest that, depending on the progress of the work, revisions of the SDGs or the way of work may also be proposed.

From the statistical data, which were discussed in the paper, it is clear that there is a need for increased funding for the implementation of the SDGs, as well as for the training of administrative staff. The study also revealed the lack of information about the SDGs in many medium or small municipalities, which require more attention.

This study is an impetus to advance the work and to encourage the reaction on the part of the central and local governments. The implementation of the SDGs is an obligation that Albania has towards itself and the international agreements it has signed.

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An Analysis of the Trends in Accelerating Sustainable Development Goals (SDG) Management Through AI Integration Frameworks

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Abstract: *Integrating artificial intelligence (AI) into the management of Sustainable Development Goals (SDGs) presents a transformative opportunity to address pressing global challenges. This paper explores the multifaceted applicability of AI in advancing the 17 SDGs, highlighting its potential to enhance efficiency, drive innovation, and foster inclusive growth across various sectors. Through a comprehensive review of existing literature and case studies, we identify that AI can enable progress on 134 targets (approximately 79% of all SDG targets) while recognizing the risks associated with its implementation, including ethical concerns and potential biases. The author discusses specific applications of AI in critical areas such as healthcare, agriculture, climate action, and education, illustrating how AI technologies can facilitate data-driven decision-making and resource optimization. More precisely, it is herein attempted to present how AI can be applied to SDG targets and goals, as well as to present a general flowchart of the steps of AI applicability in SDG management. Moreover, this paper attempts to model a framework for AI integration with SDG management employing a preliminary UML-based design. Ultimately, this paper aims to provide some insights into harnessing AI as a catalyst for accelerating the SDGs while addressing the challenges accompanying its rapid advancement and the relative risks.*

1. INTRODUCTION

In 2015, the United Nations General Assembly adopted the 2030 Agenda for Sustainable Development, establishing 17 Sustainable Development Goals (SDGs) to address pressing global challenges, including poverty, inequality, climate change, and environmental degradation (United Nations, 2015). These ambitious goals demand innovative solutions to accelerate progress, particularly in resource-constrained settings where traditional approaches often fall short. Artificial Intelligence (AI) has emerged as a transformative tool to enhance SDG management by enabling data-driven decision-making, optimizing resource allocation, and supporting predictive analytics across diverse sectors such as healthcare, education, agriculture, and climate action (Vinuesa et al., 2020). For instance, AI-driven precision farming advances SDG 2 (Zero Hunger) by optimizing crop yields, while disease surveillance systems support SDG 3 (Good Health and Well-being) through early outbreak detection (Wahl et al., 2018). However, AI's potential is tempered by ethical challenges, including bias, inequitable access, and lack of transparency, which can exacerbate inequalities if not addressed (Cowls et al., 2023).

Responsible AI integration, guided by ethical frameworks such as the AI4People Framework and the OECD AI Principles one, is essential to ensure that AI aligns with human-centric values and promotes equitable SDG outcomes (Floridi et al., 2018; OECD, 2019). These frameworks attempt to deal with fairness, transparency, accountability, safety, and inclusivity, providing a draft but not a fully satisfactory roadmap for mitigating risks such as algorithmic bias, which can disproportionately

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harm marginalized communities. This paper attempts to preliminarily analyze the trends in leveraging AI in order to accelerate SDG management, examining how AI technologies could be deployed to address specific goals, the responsible and ethical considerations shaping their implementation, as well as the barriers to scalability. In order to develop such a leveraging environment, however, a proper framework for AI integration with SDG management is required. This paper attempts to preliminarily develop such an integral framework using UML design. Through preliminary analysis of specific case studies, such as AI-driven climate modeling for SDG 13 (Climate Action) and inclusive education platforms for SDG 4 (Quality Education), this paper highlights successful applications and identifies gaps in current practices towards building a more specific roadmap for AI-based SDG management. By synthesizing technological advancements, policy developments, and ethical guidelines, in an integral way through UML design, this study aims to provide actionable insights for stakeholders—policymakers, technologists, and civil society—to harness AI responsibly and ethically in achieving the transformative vision of the 2030 UN Agenda.

2. A PROPOSAL FOR A RESPONSIBLE AI-BASED INTEGRATION FRAMEWORK TOWARDS SDG MANAGEMENT ACCELERATION

This analytical, but preliminary, proposal outlines the research structure for analyzing trends in accelerating Sustainable Development Goals (SDG) management through AI integration frameworks, focusing on ethical and practical dimensions. The study will examine how AI technologies, guided by frameworks like AI4People and OECD AI Principles, enhance SDG progress while addressing challenges such as bias, scalability, and inequitable access (Vinuesa et al., 2020; Floridi et al., 2018; OECD, 2019). The proposal uses preliminary UML diagrams based on analysis to model the stakeholders, interactions, and analytical components, providing a clear but preliminary framework for the research. The analysis will draw on case studies (e.g., AI for SDG 13 Climate Action) and ethical principles to propose actionable recommendations for stakeholders (United Nations, 2015).

UML Use Case Diagram

- Purpose: The Use Case Diagram illustrates how stakeholders interact with the analysis process, identifying key activities in researching AI-SDG integration trends.
  - Diagram Components:
    - Actors:
      - Researcher: Conducts the analysis, collects data, and develops recommendations.
      - Policymaker: Uses findings to shape AI-SDG policies.
      - AI Developer: Implements AI solutions for SDGs and provides technical insights.
      - Civil Society: Provides feedback on AI impacts and represents community needs.
      - SDG Stakeholder: Monitors SDG progress and applies AI-driven solutions (e.g., NGOs, UN agencies).
  - Use Cases:
    - Analyze AI-SDG Trends: Researcher identifies trends in AI applications for SDGs (e.g., precision agriculture for SDG 2).
    - Evaluate Ethical Frameworks: The Researcher assesses responsible AI frameworks for bias mitigation and inclusivity.
    - Review Case Studies: Researcher examines real-world AI-SDG applications (e.g., climate modeling for SDG 13) (Cowls et al., 2023).
    - Develop Recommendations: The Researcher proposes strategies for responsible AI integration.
    - Implement AI Solutions: AI Developer deploys AI systems aligned with ethical frameworks.
    - Shape Policy: Policymaker uses analysis to inform regulations or national AI strategies.

    - Provide Feedback: Civil Society contributes community perspectives on AI impacts.
    - Monitor SDG Progress: SDG Stakeholder tracks AI-driven outcomes for specific goals.
- Relationships:
  - Include: "Analyze AI-SDG Trends" includes "Evaluate Ethical Frameworks" and "Review Case Studies" (researcher must perform these to complete the analysis).
  - Extend: "Develop Recommendations" extends to "Shape Policy" (recommendations inform policy if adopted).
  - Association: Actors are linked to their respective use cases (e.g., Researcher to Analyze AI-SDG Trends, Policymaker to Shape Policy).

UML Class Diagram
- Purpose: The Class Diagram models the key components of the analytical framework, representing the structure of the research and its relationships to SDGs, AI technologies, and ethical frameworks.
  - Diagram Components:
    - Classes and Attributes:
      - SDG_AI_Analysis
      - Attributes: title (string), scope (SDGs 1–17), timeframe (2015–2030), ethicalFrameworks (list)
      - Methods: collectData(), analyzeTrends(), evaluateFrameworks(), proposeRecommendations()

SDG
- Attributes: goalNumber (int), goalName (string), targets (list), indicators (list)
- Methods: assessProgress(), integrateAI()

AI_Technology
- Attributes: type (e.g., machine learning, computer vision), application (e.g., healthcare, agriculture), biasRisk (float)
- Methods: deploySolution(), mitigateBias(), optimizePerformance()

Ethical_Framework
- Attributes: name (e.g., AI4People), principles (list), compliance standards (e.g., IEEE P7000)
- Methods: assessCompliance(), mitigateRisks(), engageStakeholders()

Case_Study
- Attributes: sdgGoal (int), aiApplication (string), outcome (string), challenges (list)
- Methods: documentImpact(), analyzeChallenges()

Stakeholder
- Attributes: role (e.g., policymaker, developer), organization (string), feedback (string)
- Methods: provideInput(), implementSolutions()
- Relationships:
  - Composition: SDG_AI_Analysis contains SDG, AI_Technology, Ethical_Framework, and Case_Study (the analysis encompasses these components).
  - Association: Stakeholder interacts with SDG_AI_Analysis, Ethical_Framework, and Case_Study (e.g., providing feedback or implementing solutions).
  - Aggregation: Ethical_Framework aggregates principles (e.g., fairness, transparency) as reusable components across analyses.
  - Dependency: AI_Technology depends on Ethical_Framework for responsible deployment.
  - Class Diagram Analysis

The Class Diagram models the static structure of the analytical framework, comprising six classes: SDG_AI_Analysis, SDG, AI_Technology, Ethical_Framework, Case_Study, and Stakeholder. It uses composition, association, aggregation, and dependency relationships to define its interactions.

- Structural Integrity:
  - Classes and Attributes:
    - SDG_AI_Analysis: Attributes (title, scope, timeframe, ethicalFrameworks) and methods (collectData, analyzeTrends, evaluateFrameworks, proposeRecommendations) accurately encapsulate the research's scope and activities. The timeframe attribute (2015–2030) aligns with the 2030 Agenda (United Nations, 2015).
    - SDG: Attributes (goalNumber, goalName, targets, indicators) and methods (assessProgress, integrateAI) reflect the SDG structure and AI integration process, ensuring relevance to specific goals like SDG 13 (Cowls et al., 2023).
    - AI_Technology: Attributes (type, application, biasRisk) and methods (deploySolution, mitigateBias, optimizePerformance) capture AI's role and ethical challenges.
    - Ethical_Framework: Attributes (name, principles, complianceStandards) and methods (assessCompliance, mitigateRisks, engageStakeholders) model frameworks like AI4People and OECD AI Principles, ensuring ethical grounding (Floridi et al., 2018; OECD, 2019).
    - Case_Study: Attributes (sdgGoal, aiApplication, outcome, challenges) and methods (documentImpact, analyzeChallenges) support case study analysis, as seen in SDG 4 education platforms (Vinuesa et al., 2020).
    - Stakeholder: Attributes (role, organization, feedback) and methods (provideInput, implementSolutions) ensure stakeholder engagement.
  - Relationships:
    - Composition: SDG_AI_Analysis's composition with SDG, AI_Technology, Ethical_Framework, and Case_Study correctly indicates that these components are integral to the analysis and cannot exist independently, aligning with the research's holistic approach.
    - Association: Stakeholders' associations with SDG_AI_Analysis, Ethical_Framework, and Case_Study reflect their multifaceted roles, though cardinality (e.g., one-to-many for Stakeholder to Case_Study) could enhance specificity.
    - Aggregation: Ethical_Framework's aggregation of principles is appropriate, as principles are reusable across frameworks, but lacks detail on specific principles (e.g., fairness, transparency).
    - Dependency: AI_Technology's dependency on Ethical_Framework accurately reflects the need for ethical guidelines in AI deployment, reinforcing AI4People's explicability (Floridi et al., 2018).
- Alignment with Research Objectives:
  - The diagram supports the research questions by modeling AI-SDG trends (AI_Technology, Case_Study), ethical framework evaluation (Ethical_Framework), and scalability solutions (SDG_AI_Analysis's proposeRecommendations). The biasRisk attribute in AI_Technology directly addresses bias mitigation, connecting to prior bias analysis.
  - Strengths: The diagram's comprehensive class structure captures the research's scope, from data collection to recommendation development. The composition relationship ensures a unified analysis framework, while Stakeholder's methods align with OECD's inclusive growth principle (OECD, 2019).
  - Limitations: The diagram lacks attributes for scalability barriers (e.g., cost, data access), which could be added to SDG_AI_Analysis or Case_Study. Methods like mitigateBias could be more granular (e.g., specifying audit tools like AI Fairness 360).

In Figure 1, a preliminary involvement analysis of the above-presented SDG-AI Integration Framework Actors is outlined.

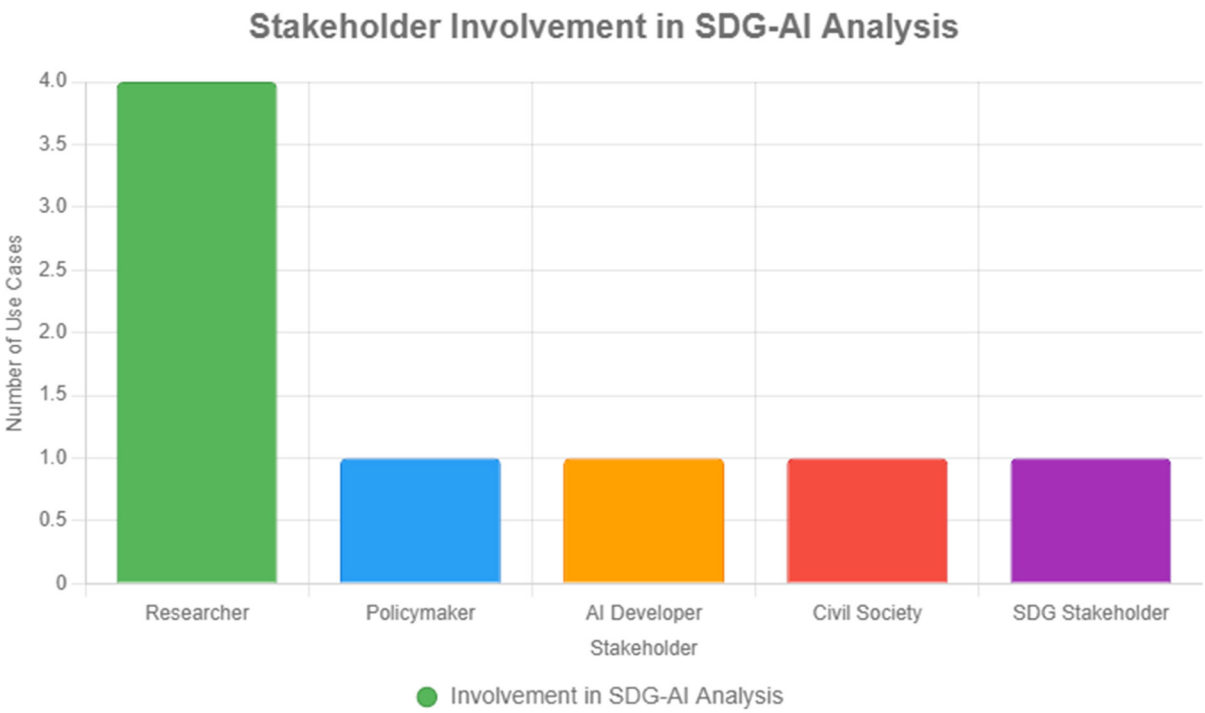

Figure 1. A preliminary involvement analysis
of the above-presented SDG-AI Integration framework Actors
Source: Own illustration

3. AI APPLICABILITY ANALYTICS FOR SDG MANAGEMENT

AI can be applied across various stages of SDG management, including data collection, analysis, monitoring, and evaluation. Table 1 illustrates the key areas where AI can contribute to SDG implementation (Chancel et al., 2022; Cowls et al., 2023; Floridi et al., 2018; Francisco & Linnér, 2023; Iazzolino & Stremlau, 2024; Kuradusenge et al., 2023; Makhlouf, 2023; Nasir et al., 2023; OECD, 2019; Singh et al., 2024; Siqueira et al., 2024; Tomašev et al., 2020; Trotochaud et al., 2023; United Nations, 2015; Vinuesa et al., 2020; Wahl et al., 2018).

Table 1 provides a comprehensive overview of how AI can be applied to each SDG target, highlighting specific applications and their impacts (Chancel et al., 2022; Cowls et al., 2023; Floridi et al., 2018; Francisco & Linnér, 2023; Iazzolino & Stremlau, 2024; Kuradusenge et al., 2023; Makhlouf, 2023; Nasir et al., 2023; OECD, 2019; Singh et al., 2024; Siqueira et al., 2024; Tomašev et al., 2020; Trotochaud et al., 2023; Vinuesa et al., 2020; Wahl et al., 2018).

To illustrate how AI applications can enhance the Sustainable Development Goals (SDGs) through various stages, such as data collection, analysis, monitoring, and evaluation, a flowchart can be structured. A flowchart depicting AI applications in SDG stages, including data collection, analysis, monitoring, and evaluation, with examples like image recognition, natural language processing, predictive modeling, etc. could be defined as follows (Chancel et al., 2022; Cowls et al., 2023; Floridi et al., 2018; Francisco & Linnér, 2023; Iazzolino & Stremlau, 2024; Kuradusenge et al., 2023; Makhlouf, 2023; Nasir et al., 2023; OECD, 2019; Singh et al., 2024; Siqueira et al., 2024; Tomašev et al., 2020; Trotochaud et al., 2023; Vinuesa et al., 2020; Wahl et al., 2018).

Table 1. Potential AI Integration with SDG Management

SDG Goal	Target	AI Application	Impact
No Poverty (SDG 1)	1.1	Poverty Mapping	Identifies poverty hotspots using satellite imagery
	1.2	Financial Inclusion Platforms	Provides access to banking services for underserved populations
	1.3	Social Protection Optimization	Ensures social protection programs reach the most vulnerable
	1.4	Data Analysis for Basic Services	Improves access to basic services and property rights
Zero Hunger (SDG 2)	2.1	Food Distribution Optimization	Reduces waste and ensures food reaches those in need
	2.2	Nutritional Program Monitoring	Improves the effectiveness of nutritional programs
	2.3	Precision Agriculture	Increases crop yields and improves food security
	2.4	Sustainable Agricultural Practices	Predicts weather patterns and pest outbreaks
Good Health and Well-being (SDG 3)	3.1	Early Diagnosis and Treatment	Reduces maternal mortality
	3.2	Child Health Improvement	Enhances vaccination tracking and disease prevention
	3.3	Disease Prediction and Control	Tracks and predicts outbreaks of infectious diseases
	3.4	Mental Health Support	Provides personalized care and early intervention
Quality Education (SDG 4)	4.1	Personalized Learning Platforms	Improves educational outcomes
	4.2	Early Childhood Education Tools	Enhances interactive learning
	4.3	Access to Technical Education	Provides quality technical and vocational education
	4.4	Employment and Entrepreneurship Skills	Develops skills through tailored training programs
Gender Equality (SDG 5)	5.1	Gender Disparity Analysis	Identifies and addresses gender disparities
	5.2	Combating Gender-based Violence	Analyzes social media to identify and combat violence
	5.3	Ending Harmful Practices	Supports initiatives to end child marriage and FGM
	5.5	Promoting Women's Leadership	Supports initiatives for women's participation in leadership
Clean Water and Sanitation (SDG 6)	6.1	Water Distribution Optimization	Ensures access to clean water
	6.2	Sanitation Management	Improves predictive maintenance of sanitation facilities
	6.3	Water Quality Monitoring	Detects pollutants and ensures safe water
	6.4	Water-use Efficiency	Enhances efficiency in agriculture and industry
Affordable and Clean Energy (SDG 7)	7.1	Energy Grid Optimization	Provides reliable and affordable energy
	7.2	Renewable Energy Efficiency	Enhances efficiency of renewable energy sources
	7.3	Energy Efficiency Improvements	Improves efficiency in buildings and industries
	7.4	Energy Technology R&D	Supports research and development in energy technologies
Decent Work and Economic Growth (SDG 8)	8.1	Economic Growth through Innovation	Drives economic growth
	8.2	Industrial Productivity	Drives innovation and productivity
	8.3	Supporting Entrepreneurship	Provides access to market data and trends
	8.5	Job Matching	Matches job seekers with employment opportunities
Industry, Innovation, and Infrastructure (SDG 9)	9.1	Infrastructure Development	Optimizes development and maintenance
	9.2	Sustainable Industrialization	Supports efficient resource use
	9.3	Financial Services Access	Improves access for SMEs
	9.5	R&D Support	Drives innovation through research and development
Reduced Inequality (SDG 10)	10.1	Addressing Income Inequalities	Analyzes economic data
	10.2	Social and Economic Inequality	Identifies and addresses inequalities
	10.3	Promoting Equal Opportunities	Ensures equal opportunities and reduces discrimination
	10.4	Social and Economic Inclusion	Supports inclusive policies

Sustainable Cities and Communities (SDG 11)	11.1	Urban Planning	Ensures access to affordable housing
	11.2	Public Transportation Optimization	Improves sustainability of transportation systems
	11.3	Participatory Urban Planning	Supports inclusive urban management
	11.6	Urban Pollution Management	Monitors and manages pollution
Responsible Consumption and Production (SDG 12)	12.2	Resource Efficiency	Enhances efficiency in production processes
	12.3	Reducing Food Waste	Improves supply chain management
	12.4	Hazardous Waste Management	Monitors and manages waste
	12.5	Promoting Recycling	Supports waste reduction initiatives
Climate Action (SDG 13)	13.1	Climate Change Mitigation	Predicts and mitigates impacts
	13.2	Climate Policy Integration	Supports policy and planning
	13.3	Climate Education	Enhances awareness and education
	13.a	Climate Finance	Supports finance initiatives
Life Below Water (SDG 14)	14.1	Marine Pollution Monitoring	Reduces marine pollution
	14.2	Marine Ecosystem Management	Supports sustainable management
	14.4	Sustainable Fishing	Supports sustainable practices
	14.5	Marine Biodiversity Protection	Protects marine biodiversity
Life on Land (SDG 15)	15.1	Ecosystem Monitoring	Protects terrestrial ecosystems
	15.2	Reforestation Efforts	Supports reforestation and afforestation
	15.5	Combating Deforestation	Reduces biodiversity loss
	15.9	Biodiversity Integration	Integrates values into planning
Peace, Justice, and Strong Institutions (SDG 16)	16.1	Conflict Prediction	Prevents conflicts
	16.3	Access to Justice	Supports legal analytics and case management
	16.6	Transparency and Accountability	Promotes institutional transparency
	16.10	Human Rights Monitoring	Analyzes human rights abuses
Partnerships for the Goals (SDG 17)	17.6	Global Partnerships	Facilitates knowledge sharing
	17.8	Technology for Development	Enhances technology use
	17.18	Data Collection and Analysis	Improves decision-making
	17.19	Capacity Building	Supports initiatives in developing countries

Source: Chancel et al. (2022), Cowls et al. (2023), Floridi et al. (2018), Francisco and Linnér (2023), Iazzolino and Stremlau (2024), Kuradusenge et al. (2023), Makhlouf (2023), Nasir et al. (2023), OECD (2019), Singh et al. (2024), Siqueira et al. (2024), Tomašev et al. (2020), Trotochaud et al. (2023), United Nations (2015), Vinuesa et al. (2020), and Wahl et al. (2018)

3.1. The Basic Steps on How AI Can Be Applied to MeetSDG Targets

1. Data Collection
- Image Recognition: Utilizes computer vision to gather data from satellite imagery for monitoring deforestation or urban development.
- Natural Language Processing (NLP): Analyzes social media and survey responses to assess public sentiment on health or education issues.
- IoT Sensors: Collects real-time data on environmental conditions, such as air quality and water levels.

2. Exploratory Data Analysis
- Predictive Modeling: Employs machine learning algorithms to forecast agricultural yields or disease outbreaks based on historical data.

- Big Data Analytics: Integrates diverse datasets (e.g., demographic, economic) to identify trends and correlations relevant to poverty alleviation or health outcomes.
- Sentiment Analysis: Uses NLP to derive insights from public opinions on policies related to gender equality or climate action.

3. Monitoring
- Real-Time Dashboards: AI systems create dashboards that visualize key indicators for SDG progress, enabling stakeholders to track performance dynamically.
- Anomaly Detection: Machine learning models identify irregular patterns in data, such as sudden spikes in pollution levels or resource consumption.
- Geospatial Analysis: Combines satellite data with AI to monitor changes in land use and biodiversity over time.

4. Evaluation
- Impact Assessment Models: AI evaluates the effectiveness of interventions by comparing pre- and post-intervention data across various SDGs.
- Scenario Simulation: Predictive analytics simulate different policy scenarios to evaluate potential outcomes on social, economic, and environmental targets.
- Feedback Loops: AI systems analyze feedback from stakeholders to refine programs and policies aimed at achieving the SDGs.

3.2. Examples of AI Techniques Across the above-presented stepwise Stages

This flowchart demonstrates the multifaceted role of AI in supporting the SDGs through systematic data handling and analysis processes. By leveraging these technologies, stakeholders can enhance their decision-making capabilities and improve the overall effectiveness of initiatives aimed at achieving sustainable development.

Table 2. Examples of AI Techniques in SDG Management related case studies

Stage	AI Technique	Application Example and relevant case studies
Data Collection	Image Recognition	Monitoring deforestation via satellite imagery (A notable case study for monitoring deforestation via satellite imagery is the Seringueira REDD+ Project in Brazil. This project utilizes satellite data from Planet NICFI, Sentinel-1, and Sentinel-2 to effectively monitor forest loss at a high spatial resolution of 4.7 meters. Overview of the Seringueira REDD+ Project Objective: The project aims to promote high-integrity nature-based carbon projects while ensuring transparency through reliable satellite monitoring. Collaboration: Nadar, Moss, and explorer.land collaborated to provide accurate monitoring and reporting of deforestation and aboveground biomass (AGB) changes in the Brazilian Amazon (Nadar, 2023)
Data Collection	NLP	Analyzing social media for public health sentiments (An example project is Analyzing Social Media Messaging on Masks and Vaccines: A Case Study on Misinformation During the COVID-19 Pandemic (Trotochaud et al., 2023)
Data Analysis	Predictive Modeling	Forecasting crop yields based on weather patterns (An example case study is Crop Yield Prediction Using Machine Learning Models: Case of Irish Potato and Maize (Kuradusenge et al., 2023)

Data Analysis	Big Data Analytics	Identifying trends in economic inequality (An example case study is Trends in Income Inequality: Evidence from Developing and Developed Countries (Makhlouf, 2023; Lucas Chancel et al., 2022)
Monitoring	Real-Time Dashboards	Visualizing progress on SDG indicators (An example case study is the event Visualizing Progress: Data Insights from the Atlas of Sustainable Development Goals (World Bank, 2023)
Monitoring	Anomaly Detection	Detecting pollution spikes in urban areas (An example case study is Air-pollution prediction in smart city, deep learning approach (Bekkar et al., 2021)
Evaluation	Impact Assessment Models	Assessing the effectiveness of health interventions (An example overview of case studies and literature is The effectiveness of interventions to change six health behaviours: a review of reviews (Jepson et al., 2010)
Evaluation	Scenario Simulation	Evaluating potential impacts of renewable energy policies (An example case study project is Tracking the Impacts of Innovation: Offshore wind as a case study This report is an initial output of two projects focused on tracking innovation impacts: the Innovation Impacts Dashboard (IID) project and the Tracking Energy Innovation Impacts Framework (TEIIF) project (IRENA, 2021)

Source: Own research

3.3. Data Collection and Analysis

- Remote Sensing and Image Recognition: AI-powered image recognition can analyze satellite imagery to monitor deforestation, track agricultural practices, and assess urban sprawl, contributing to SDG 13 (Climate Action), SDG 11 (Sustainable Cities and Communities), and SDG 15 (Life on Land).
- Natural Language Processing (NLP): NLP can analyze large volumes of text data from social media, news articles, and reports to identify public opinion, understand community needs, and monitor progress on SDG indicators. This can be particularly relevant for SDG 1 (No Poverty), SDG 3 (Good Health and Well-being), and SDG 16 (Peace, Justice, and Strong Institutions).
- Sensor Data and IoT: AI can process data from IoT devices deployed in various environments to monitor air and water quality, energy consumption, and traffic patterns, providing insights for SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), and SDG 11 (Sustainable Cities and Communities).

3.4. Monitoring and Evaluation

- Predictive Modeling: AI can leverage historical data and current trends to forecast future outcomes related to SDG indicators, allowing for proactive interventions and resource allocation. For instance, predicting food insecurity (SDG 2: Zero Hunger) or water scarcity (SDG 6: Clean Water and Sanitation) can empower early action.
- Anomaly Detection: AI algorithms can identify unusual patterns and deviations from expected trends in various datasets, flagging potential risks and enabling swift responses. This is crucial for monitoring SDG 10 (Reduced Inequalities) and SDG 17 (Partnerships for the Goals).
- Impact Assessment: AI can help assess the impact of interventions and policies on different SDG targets, facilitating evidence-based decision-making and optimizing resource utilization. This can be relevant across all SDGs.

4. CONCLUSION AND FUTURE PROSPECTS OF THIS STUDY

AI holds great potential to revolutionize SDG management by enabling data-driven decision-making, improving monitoring and evaluation processes, and driving innovation for achieving a sustainable future. By addressing the associated challenges and fostering responsible AI development, societies can leverage this transformative technology to accelerate progress towards the SDGs and build a more equitable and sustainable world for humans. To this end, a suitable framework is required to integrate responsible AI with the SDG management. This study has paid attention and effort at a preliminary stage, however, to comprehensively model such a framework involving UML design. Moreover, the major issues of the applicability of AI towards reaching the SDG goals and targets have been explored at a preliminary level, outlining the major associations between AI's potential applications and specific SDG management connections as well as presenting a sample of relevant case studies. The author, however, will present a more detailed analysis of this important subject at a deeper level in the near future based on all trends of the recent literature, something that has only been done here preliminarily. The UML design is incomplete, and many details are missing towards a fully functional integration framework of responsible and ethical AI with SDG Management.

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Building Back Better: Corporate Strategies for Sustainable Growth in the Post-Pandemic Era

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Abstract: *This paper explores the critical factors influencing corporate restructuring strategies in the post-pandemic global economy. The COVID-19 pandemic presented unprecedented challenges, forcing businesses worldwide to reevaluate their structures and strategies. In its aftermath, corporations face a landscape marked by economic uncertainty, shifting consumer behaviors, and volatile market dynamics. As a result, corporate restructuring has emerged as an essential strategy for organizations aiming to adapt, sustain operations, and achieve success in this transformed environment. The study identifies key drivers of post-pandemic era, emphasizing the need for digitalization, sustainability, operational agility, and strategic realignment. Among these, digitalization has proven to be a transformative force, fundamentally reshaping industries, economies, and societies on a global scale. Drawing on insights from both academic research and industry practices, this paper provides a comprehensive analysis of corporate restructuring strategies in the post-pandemic era. It offers actionable implications for executives, policymakers, and scholars, equipping them to navigate and leverage the complexities of the evolving global economy effectively.*

1. INTRODUCTION

The COVID-19 pandemic brought unprecedented disruptions to global economies, industries, and corporate ecosystems, exposing vulnerabilities and inefficiencies in traditional business models. The crisis underscored the need for agility, resilience, and innovation in corporate strategies to navigate an uncertain and rapidly evolving environment. As the world transitions to a post-pandemic era, businesses face critical imperatives to adapt and thrive while addressing challenges posed by shifts in consumer behavior, technological acceleration, and geopolitical complexities.

One of the most significant transformations in the post-pandemic landscape has been the accelerated pace of digitalization. Companies across sectors have been compelled to integrate advanced digital tools and technologies, enabling remote work, enhancing customer engagement, and optimizing operations. Digital transformation is no longer a choice but a necessity for sustaining competitive advantage and fostering long-term growth.

Concurrently, the pandemic highlighted the fragility of global supply chains, with disruptions causing delays, shortages, and increased costs. This has prompted organizations to reevaluate their supply chain strategies, emphasizing shorter, more localized, and diversified networks. Such changes aim to mitigate risks, enhance resilience, and ensure sustainability in the face of future uncertainties.

Sustainability has also emerged as a central tenet of corporate strategy, driven by increasing stakeholder expectations and the imperative to address climate change. Companies are now striving to embed sustainability into their core operations, aligning growth objectives with environmental,

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social, and governance (ESG) principles. This approach not only mitigates risks but also creates value by enhancing brand reputation, fostering customer loyalty, and meeting regulatory requirements.

This paper explores the corporate strategies that companies have adopted in the post-pandemic era to achieve sustainable growth, leverage digitalization, and build resilient supply chains. By examining case studies, industry trends, and theoretical frameworks, this study aims to provide insights into how businesses can navigate the complexities of the current environment while positioning themselves for future success.

2. LITERATURE REVIEW

The integration of digitalisation into supply chain management and sustainable corporate governance has emerged as a critical area of focus for contemporary businesses. Digitalisation, characterized by the adoption of advanced technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT), has transformed traditional supply chain processes, enhancing efficiency, visibility, and responsiveness. Simultaneously, global sustainability challenges and regulatory pressures have pushed corporations to align their governance practices with environmental, social, and governance (ESG) principles. As these dynamics intersect, the synergy between digital innovation and sustainable practices presents unique opportunities and challenges for organizations striving to remain competitive in an increasingly complex and dynamic business environment.

2.1. Digitalisation of Business

Some scholars contend that COVID-19 is "the great accelerator" in fast-tracking the existing global trend towards embracing modern emerging technologies, ushering in transformations in lifestyle, work patterns, and business strategies (Amankwah-Amoah et al., 2021). They argue that the pandemic was a kind of "catalyst" for the adoption and accelerated use of digitalization in work organization and the office. However, the opportunities offered by digital technologies and the pandemic for companies to reinvent their business models have been constrained by hindering forces such as organizational inflexibility, the digital divide and the uneven impact on employee wellbeing. Key forces driving digitalization include the availability of user-friendly digital technologies, the lower cost of storing digital data and the potential efficiencies this brings, and the savings and more efficient use of time and potentially flexibility that come with working from home; these benefits can be self-reinforcing in a positive feedback loop (Amankwah-Amoah et al., 2021). Hamburg (2021) emphasizes that small and medium enterprises, more than bigger companies, have experienced difficulties during Covid-19 due to less customer demand for goods and services, limited resources and problems with digitalization. All these facts require a rapid change in small and medium enterprises' strategies.

Scholars have examined how the relationship approach in business-to-business is changing due to the digital acceleration caused by the COVID-19 pandemic. Corsaro and D'Amico (2022) develop the framework, which is constituted by three dimensions: efficiency of the interaction, coordination and digital trust, and seven subdimensions.

Digitalisation is crucial during global crises because it enables business continuity, adaptability, and resilience. When physical operations are disrupted, such as during the COVID-19 pandemic digital tools allow companies to shift to remote work, maintain customer engagement, and manage supply chains virtually. It enhances data-driven decision-making, streamlines communication, and opens new digital revenue channels. Moreover, digitalisation supports cost-efficiency and innovation,

helping firms quickly adapt to changing environments and consumer needs. In uncertain times, businesses that embrace digital transformation are better positioned to survive, recover, and grow.

Abidi et al. (2023) found that digitally-enabled firms faced a lower decline in sales by about 4 percentage points during the pandemic compared to digitally-constrained firms, suggesting that digitalization acted as a hedge during the pandemic. Therefore, these results suggest that policymakers need to close the digital gap and accelerate firms' digital transformation. This will be crucial for economies to bounce back from the pandemic and build stronger foundations for future resilience to similar external shocks.

The complexity of the corporate transformation process brings with it certain challenges and problems that must be overcome on the way to creating innovative business models that enable the full potential of the company to be exploited. Digital restructuring activities require a new way of mindset by individuals as well as the organizations and bring with them challenges, issues, barriers and problems. Kutnjak (2021) in a research paper identifies challenges, issues, barriers, and problems that organizations are facing when they try to digitally transform their business under normal market conditions, but also in the current market conditions caused by the COVID-19 pandemic.

2.2. Reconfiguration of the Global Supply Chains

The COVID-19 pandemic is expected to trigger a reconfiguration of the global value chains according to four alternative trajectories: reshoring, regionalization, replication and diversification (Elia et al., 2021). These authors argue that reshoring policies need to be supported by and combined with industrial policies enforcing the competitiveness and sustainability of production systems. Global capitalism is at the brink of another round of restructuring and transformation based on a much more advanced digitalisation of the entire global economy and society, and the application of fourth industrial revolution technologies (Robinson, 2020).

The COVID-19 crisis strongly determined the global supply chain management of multinational companies. In the aftermath of the COVID-19 pandemic, further research is needed to understand how the impact of global events differs across alternative network structures, considering supply chain risks. Research study by Gurbuz et al. (2023) confirms that working with a larger number of smaller suppliers/buyers in geographically dispersed locations (a dispersed supply chain) significantly reduces the risk of demand and supply disruptions and contributes to a noticeable increase in utilisation rates (and thus revenue). The results suggest that certain network configuration strategies (collaboration, multi-sourcing) are more beneficial than others during disaster events.

COVID-19 will usher in a new era and revolution in global supply chains, and the time is ripe to review the performance and assessment of global supply chains (Magableh, 2021). One of the key outcomes of this crisis is the increased focus on local and regional supply chains. Investing in local supply chains has multiple benefits, but no company can operate alone. Therefore, global supply chains are still necessary. In light of the COVID-19 pandemic, organisations must promote information sharing, communication and supply chain transparency. Technology and corresponding plans and procedures will help to rebuild the supply chain system and improve its resilience in the future. Technology, digital supply chains and value chain transparency, as well as blockchain, should be a priority for future supply chains.

The energy crisis in 2022 significantly disrupted supply chains by increasing production and transportation costs, causing delays and reducing reliability. High energy prices led to factory shutdowns, especially in energy-intensive industries, limiting the availability of raw materials

and components. Transportation sectors, heavily reliant on fuel, faced rising costs and logistical bottlenecks. These challenges triggered global ripple effects, including shortages, inflation, and increased lead times. The crisis also forced businesses to reassess supplier networks, prioritise energy efficiency, and seek more resilient, localised supply chains to mitigate future disruptions.

The energy crisis and Houthi attacks in Yemen have profound theoretical implications for global supply chains, challenging traditional models built around cost-efficiency, lean operations, and global integration. These disruptions highlight the vulnerabilities of just-in-time (JIT) systems, which lack the flexibility to absorb sudden shocks in energy supply and logistics. The energy crisis, by sharply increasing costs and causing factory slowdowns, and the Houthi attacks, by threatening key maritime trade routes like the Red Sea, expose the critical need for supply chains to be resilient rather than just efficient. Resilience theory becomes increasingly important, emphasizing adaptability, redundancy, and the ability to respond to unexpected disruptions. Risk management theory also gains prominence, urging firms to integrate geopolitical, environmental, and energy risks into strategic planning. Additionally, resource dependence theory is reinforced as firms seek to diversify both their energy sources and supplier bases to reduce exposure to unstable regions. These developments suggest a theoretical shift from optimizing for low cost to optimizing for continuity, flexibility, and long-term sustainability in supply chain design and operations.

Scholars argue that business organizations need to formulate their strategies from a comprehensive and holistic viewpoint (Mansour & Al-Ajmi, 2020). Formulating strategies from a comprehensive and holistic viewpoint means that business organizations must consider the full spectrum of internal and external factors that influence performance—especially in supply chain strategic management. Rather than focusing solely on cost reduction or operational efficiency, a holistic approach integrates sustainability, resilience, technology, stakeholder collaboration, and global market dynamics into strategic decisions. This perspective emphasizes long-term value creation, adaptability to disruptions (like pandemics or geopolitical risks), and alignment with corporate goals. It requires cross-functional coordination across procurement, logistics, production, and distribution, and extends beyond the firm's boundaries to include suppliers, customers, regulators, and communities. A holistic supply chain strategy also factors in ESG (Environmental, Social, and Governance) concerns, digital innovation (like AI and blockchain), and risk management frameworks. Ultimately, this approach enables organizations to build agile, sustainable, and competitive supply chains that are better equipped to respond to complexity and uncertainty in today's global business environment.

2.3. Sustainable Corporate Governance

Environmental, social and governance (ESG) scores are becoming increasingly relevant in academic literature and the corporate world. However, there is little consensus among academics about the definition of ESG scores and their measures (Clement et al., 2023). Many scholars have used ESG scores to represent various issues. Scholars argue that ESG and all of its dimensions (environmental, social, and governance) have a significant positive association with ROA. ESG and its environmental and social dimensions also exert a significant positive effect on Tobin's Q (Rahman et al., 2023). A study made by Saini et al. (2023) indicates that stakeholder, legitimacy and signaling theories are the foundation for ESG and financial performance. Social firms have a lower capital cost because of their low-risk potential.

ESG (Environmental, Social, and Governance) studies are crucial for strategic management theory because they expand the understanding of what constitutes long-term value and sustainable competitive advantage. Integrating ESG into strategic management theory acknowledges that firms

operate within broader societal and ecological systems. ESG factors influence regulatory pressures, investor behavior, consumer preferences, and talent acquisition. Companies that proactively manage ESG issues are better positioned to anticipate and adapt to external changes, avoid reputational damage, and innovate responsibly. Thus, ESG studies help redefine strategic success, not just in terms of profits, but through sustainable value creation, resilience, and long-term stakeholder trust, key components of modern strategic management thinking.

In contrast with research from management and related disciplines as well as findings purported by industry reports, some other scholars did not find an outsized financial return for ESG strategies (Atz et al., 2023). The bulk of studies concluded that there was either no statistical difference compared to a conventional benchmark or that results were positive and negative (i.e. mixed) within a study. These four scholars argue that the academic literature in finance is more challenged by the many dimensions of sustainability, by the shortcomings of ESG data, and by pooling different investment strategies compared to the more mature corporate and management literature.

Some other scholars (Isik et al., 2024) argue that the concept of traditional ESG factors lacks the economic dimension (denotes ECON). They introduced ECON-ESG as a composite sustainability concept. While ESG represents firm and microeconomics-based sustainability based only on environmental, social, and governance factors, ECON-ESG also incorporates the economy and represents sustainability, including macroeconomics affecting the firm's performance. Delgado-Ceballos et al. (2023) connect the United Nations' Sustainable Development Goals (SDGs), an extensive collection of society-level goals and targets aimed at addressing grand challenges and achieving global sustainability by 2030 to firm-level sustainability and Environmental, Social, and Governance (ESG) factors. They emphasise the importance of connecting the SDGs with the concept of double materiality, stakeholder materiality and financial materiality.

Despite a lot of clear findings on why investors and firms conduct ESG and how ESG affects investor returns and firm performance, many questions related to ESG/CSR still have inconclusive answers (Rau & Yu, 2024). Therefore, some directions for future research include how other stakeholders, such as customers and employees, act as drivers behind firms conducting ESG/CSR and how ESG/CSR affects firms' investing and payout policies.

3. MANAGERIAL IMPLICATIONS

The post-pandemic era has underscored the critical role of digitalisation, resilient supply chain management, and sustainable corporate governance in navigating uncertainties and driving long-term organizational success. Managers must adapt to a rapidly evolving business environment where technological integration, sustainability, and governance are no longer optional but essential pillars for competitiveness and resilience. The following managerial implications determine the corporate restructuring in the post pandemic era:

1. Accelerating Digital Transformation
   Managers must prioritize digital transformation to enhance agility and adaptability. The pandemic revealed vulnerabilities in traditional operations, driving the need for real-time data access, predictive analytics, and automation. Digital tools such as blockchain for supply chain transparency, artificial intelligence for demand forecasting, and IoT for real-time monitoring are indispensable. Leaders should invest in upskilling employees to bridge digital skills gaps and foster a culture of innovation. Moreover, leveraging digital platforms to enhance collaboration across dispersed teams and partners ensures continuity and responsiveness in dynamic market conditions.

2. Building Resilient and Sustainable Supply Chains
   Supply chain disruptions during the pandemic highlighted the need for resilience and sustainability. Managers must adopt strategies such as nearshoring, diversification of suppliers, and building redundancy in critical operations. Emphasizing sustainability within supply chains involves integrating green logistics, ethical sourcing, and waste reduction practices. For example, employing digital twin technology can simulate supply chain scenarios to optimize resources and minimize environmental impact. Furthermore, fostering partnerships with suppliers and other stakeholders to ensure compliance with environmental, social, and governance (ESG) criteria enhances long-term value creation.
3. Strengthening Governance for Sustainability and Technology Integration
   Sustainable corporate governance frameworks are essential for aligning digitalisation and supply chain practices with ESG objectives. Managers should establish governance structures that prioritize accountability, transparency, and stakeholder engagement. This includes embedding ESG metrics into performance evaluations, adopting robust risk management systems, and ensuring compliance with emerging sustainability regulations. Digital tools like dashboards and reporting platforms enable real-time monitoring and reporting of sustainability initiatives, enhancing decision-making and stakeholder trust.
4. Leveraging Technology to Foster Stakeholder Collaboration
   Digitalisation offers innovative ways to engage stakeholders in sustainability initiatives. Managers can use technology to communicate sustainability goals, track progress, and foster collaboration with employees, investors, and communities. Blockchain, for instance, can ensure transparency in ethical sourcing, while AI-driven analytics can highlight areas for improvement in meeting ESG commitments. This collaborative approach not only improves reputation but also strengthens partnerships and market positioning.
5. Balancing Profitability with Purpose
   The post-pandemic has reshaped the way businesses operate and has underscored the importance of adaptability, resilience, and empathy in effective managerial practices. The EU leads global sustainability initiatives, especially on climate change. At the beginning of the year 2022, the European Commission presented the long-awaited proposal for a Corporate Sustainability Due Diligence Directive (CSRD), which imposes new obligations on large companies and their subsidiaries to identify, prevent and manage negative impacts on human rights and the environment. Corporate Sustainability Reporting Directive (CSRD) as well as the new European Sustainability Reporting Standards (ESRS) establish a new EU institutional framework with basic principles for sustainable corporate governance, pointing to comprehensive due diligence obligations for companies, CEOs and corporate boards (see Figure 1).

Figure 1. New institutional framework toward sustainable corporate governance
Source: Author's illustration

Post post-pandemic era has underscored more than ever before the importance of integrating sustainability into business strategies. Crafting a sustainable business strategy post-pandemic era requires a holistic approach that considers environmental, social, and economic factors. Post-pandemic era presents an opportunity for managers to redefine corporate strategies by leveraging digitalisation, strengthening supply chain resilience, and institutionalizing sustainable governance practices. By embracing these imperatives, organizations can achieve not only operational efficiency and risk mitigation but also sustainable growth and enhanced stakeholder value.

On the other hand, higher costs related to ESG European Directives can negatively impact the global competitiveness of EU companies by increasing operational and compliance expenses. Firms must invest in sustainable technologies, supply chain audits, and extensive ESG reporting, which raises their cost base. These added costs can reduce price competitiveness, especially against non-EU rivals from regions with less stringent or no ESG regulations. As a result, EU firms may struggle in price-sensitive global markets. Additionally, the administrative burden can divert resources from innovation and growth. Smaller companies are particularly vulnerable due to limited capacity to absorb these costs. This regulatory imbalance creates an uneven playing field, potentially encouraging firms to relocate operations outside the EU. While ESG aims to promote responsible business, without global alignment, it risks weakening the international position of EU companies striving to comply with higher standards.

4. CONCLUSION

The COVID-19 pandemic exposed deep vulnerabilities in global business systems, forcing companies across all sectors to re-evaluate their strategic priorities and operational models. As firms emerge from the crisis, the imperative to "build back better" has taken center stage, not only as a moral obligation but as a strategic necessity. This paper has explored how companies can develop and implement corporate strategies that promote sustainable growth, resilience, and long-term value creation in the post-pandemic era. At the heart of this transformation lies the strategic realignment of business activities to incorporate environmental, social, and governance (ESG) principles, digital innovation, and adaptive organizational structures.

The findings emphasize that sustainability is no longer a peripheral or optional element of business strategy; it is central to competitive advantage. Firms that align their strategies with global sustainability goals, such as reducing carbon emissions, enhancing social equity, and strengthening governance frameworks are more likely to thrive in an era marked by climate risks, social accountability, and stakeholder activism. Moreover, companies that fail to embrace these changes risk falling behind due to regulatory pressures, reputational damage, and a loss of investor and consumer trust.

Strategic realignment, therefore, becomes essential. Businesses must shift from traditional growth models based solely on efficiency and short-term profits to strategies focused on resilience, adaptability, and stakeholder engagement. This involves reconfiguring supply chains, investing in digital transformation, embracing remote and hybrid work models, and building more inclusive, transparent corporate cultures. Such realignment requires visionary leadership, a willingness to rethink legacy practices, and a commitment to long-term strategic planning that integrates ESG objectives into core decision-making.

Importantly, the paper argues that strategic management theory must evolve to reflect this new reality. Traditional frameworks must be expanded to incorporate sustainability metrics, stakeholder

perspectives, and systemic risk management. The crisis has shown that businesses do not operate in isolation from societal or environmental systems. As a result, strategic decisions must be informed by broader ecological and social considerations, requiring a more holistic and integrated approach to business strategy.

In conclusion, building back better is not merely about recovering from crisis, it is about reimagining the role of business in society and repositioning corporate strategy for sustainable growth. Companies that embrace this shift and strategically realign their operations to support long-term sustainability will not only enhance their resilience but also unlock new opportunities for innovation, competitiveness, and societal impact. The post-pandemic era presents a rare window for transformative change, one in which strategy, sustainability, and responsible business practices converge to shape a more equitable and resilient future. Future research should continue to examine innovative approaches that balance economic, environmental, and technological imperatives, ensuring sustainable growth in an increasingly complex global economy.

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Acquisitive Growth of Small and Medium Enterprises (SMEs): A Review of Existing Literature

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Abstract: *The literature on small business growth has predominantly emphasized organic growth. However, small and medium enterprises (SMEs) can also achieve growth through acquisitions, expanding their capabilities and market presence. This paper reviews the existing literature on SME acquisitive growth, focusing on motives, processes, and outcomes. In contrast to large firms, SMEs often have intertwined ownership and management roles, influencing their acquisition strategies. SME owners pursue acquisitions to create additional value. Entrepreneurs play a critical role in identifying targets, negotiating and integrating acquired companies. The smaller scale of SME acquisitions allows for flexible integration processes tailored to specific needs and cultures. Post-acquisition, SMEs exhibit unique value creation mechanisms, including accelerated organic growth and new organizational knowledge. Overall, this paper highlights the unique characteristics of SME growth through acquisition and contributes to a deeper understanding of how small and medium enterprises can effectively use acquisitions as a growth strategy.*

1. INTRODUCTION

Small business growth is an area of research that continues to attract the attention of academic researchers. Despite the growing body of research, little is still known about this phenomenon. One of the main reasons for this is that the literature is highly fragmented (Wiklund et al., 2013). In addition, despite the large number of empirical studies, theoretical development in this area has been slow (Davidsson & Wiklund, 2000; Delmar et al., 2003; Shepherd & Wiklund, 2009). It has been noted that researchers studying SME growth have been traying to prematurely answer the question of how much firms grow rather than focusing on how they achieve growth (McKelvie & Wiklund, 2010). The majority of research on small business growth has focused on organic expansion, viewing it as an exclusive way to achieve entrepreneurial growth. Firms can achieve growth in different ways; therefore, SME growth should not be viewed only through the lens of organic growth. Penrose (1959) or Gilbert et al. (2006), for example, distinguish between organic growth and growth through mergers and acquisitions. Davidsson et al. (2010) emphasize growth through partnership networks and through internationalization alongside organic and acquisitive growth, while McKelvie and Wiklund (2010) acknowledge hybrid growth, which they position between organic and acquisitive growth as it combines elements of both types of growth. In light of this, McKelvie and Wiklund (2010) argue that the 'how' aspect of growth is the fundamental question that needs to be considered and better understood before the question of how much companies grow can be answered. Although SMEs can engage in mergers and acquisitions in order to grow, it has been noted that growth through acquisitions is not a common topic in entrepreneurship research (Salvato et al., 2007). Therefore, there is a need to explore the body of knowledge created so far on the topic of SME acquisitive growth. This paper attempts to highlight the important specificities of SME acquisitive growth in literature and summarize critical streams of research in this area.

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2. ACQUISITIVE GROWTH OF SMALL AND MEDIUM BUSINESSES AS AN RESEARCH TOPIC

An acquisition is a method of achieving growth in which one company buys another (Park & Jang, 2011). Entrepreneurs can also use acquisitions to increase the number of companies they own, without necessarily merging the companies, but still combining the activities of the companies to achieve certain benefits. The study of acquisitions by SMEs is an under-researched topic, although acquisitions are an important way to achieve business growth (Arvanitis & Stucki, 2014; Lockett et al., 2011; Salvato et al., 2007; Vermeulen & Barkema, 2001). Some empirical data show that SMEs are involved in acquisition processes. From 1996 to 2007, SMEs accounted for 20% of all transactions related to corporate acquisitions in the US and Europe (OECD, 2018). Empirical evidence suggests that the number of acquisitions in the SME segment there is a proportionally higher in Europe than in the US, and that up to 30% of acquisitions in Western European countries are carried out by SMEs (Weitzel & McCarthy, 2011). In addition, acquisitive growth can offer certain advantages that cannot be achieved through organic growth. Some previous research on acquisitive growth suggests a positive correlation between acquisitive growth and the achievement of further organic growth in the future (Lockett et al., 2011).

3. REVIEW OF EXISTING LITERATURE ON AQUISITIVE GROWTH OF SMES

In the context of SMEs, there are a few studies that mainly focus on highlighting the differences between acquisitions in large and small companies. Some studies suggest that SMEs rely on acquisitions to achieve growth rather than eliminate competition. In other words, SMEs are primarily focused on achieving synergy effects that ultimately lead to an increase in company value (Weitzel & McCarthy, 2011). Considering the uniqueness of small business growth and the increasing number of acquisitions by SMEs in the market, there is a need to further explore and understand their characteristics. To gain insight into the acquisitive growth of SMEs, a narrative literature review was conducted focusing on three main areas: entrepreneurs' motivation for engaging in acquisition, the SME acquisition process, and SME acquisition outcomes.

Three questions emerged from this:

Question One: What motivates entrepreneurs to engage in an acquisition process and take over another established business?

Question Two: What are the characteristics of the SME acquisition process?

Question Three: What are the outcomes of the SME takeover process?

To ensure different perspectives on the growth of SMEs through acquisitions, a comprehensive literature search was conducted with no restrictions or rules on how many sources should be used or what those sources should be. The search included academic journals, conference proceedings as well as doctoral dissertations, policy documents and research reports.

3.1. Entrepreneurs' Motives for Undertaking Acquisition

One of the most important questions to be answered is why entrepreneurs choose acquisition as a growth strategy over organic growth. One of the most comprehensive works on the subject of growth was written by Penrose (1959). Penrose (1959) states that organic growth can be limited

for three reasons: by internal factors such as management capabilities, by external factors such as market factors or by a combination of internal and external factors. Limited management capabilities can limit the organic growth of the company. However, organic growth can also be limited by external factors. According to Penrose (1959, p. 65), companies have "*various incentives to expand in one or more directions*" at any given time, and these incentives can be found both inside and outside the company. Some of the external incentives may, for example, relate to demand for a particular product or to technological changes that may significantly affect the company. Since these changes can have a negative impact on the company, the company has the opportunity to protect itself by expanding in certain directions through various forms of integration or diversification (Davidsson et al., 2010).

Some evidence from the literature on SME acquisitions also suggests that the main reason why SMEs pursue acquisitions is their limited organic growth opportunities (Mezulić Juric, 2020; Geurts & Van Biesebroeck, 2019; Weitzel & McCarthy, 2011). Mawson and Brown (2017) point out in their study that growth ambitions, access to technology and technological capabilities, as well as access to the international market, are the main motives for external growth.

Certainly, one of the main reasons why companies engage in acquisitions is to achieve synergies. Acquisitions in small and medium-sized companies are more often made for the benefit of the owner and the company; i.e. small and medium-sized companies strive to achieve synergy effects through acquisitions. Weitzel and McCarthy (2011) test the applicability of theories of mergers and acquisitions developed on large companies on SMEs and find that value-decreasing theories are simply not applicable in the context of SMEs, because in the case of SMEs, the manager is often also the owner of the firm. Even if the owners are not in the management role, the degree of control is much greater than in large companies. Therefore, the theory of managerial entrenchment, where managers make acquisitions to reinforce job positions, or the theory of empire building, as managers make acquisitions to increase firm size, are not applicable in the context of SMEs.

Salvato et al. (2007) found in their study that acquiring firms had greater confidence in their ability to overcome resource constraints than those that refrained from the acquisition. Furthermore, they state that to a large extent, companies that carried out acquisitions were initially driven by competitive and other contextual conditions such as expanding or gaining access to a new market or vertical integration (Salvato et al., 2007). The study also identified some of the reasons why SMEs would be discouraged from undertaking acquisitions. One of the identified reasons is financial constraints, and others stemmed more from the orientation of the entrepreneur, showing strong fear of failure, e.g., not being able to bring the integration phase to a successful completion (Salvato et al., 2007).

Vretenar et al. (2017) conducted a study on the motives for acquisitions, focusing on SMEs from a narrow geographical area. Most respondents indicated that they see an increase in market power (86% of respondents gave a positive response, while 62% expressed strong agreement) and an increase in capacity (84% responded positively) as the main reason for interest in future acquisitions, while the possibility of achieving synergies through cost reductions is among the less prominent motives (Vretenar et al., 2017).

3.2. SME Acquisition Process

It can be argued that the acquisition process is different in small companies than in large corporations. This could be due to the fact that the role of owner and management is concentrated in one person. Petkova and McCarthy (2013) state that the strategic positioning of the company is one of

the most important tasks of management, so this will also play a major role in acquisition planning. For small and medium-sized enterprises, the role of the entrepreneur is likely to be additionally emphasized. Small and medium-sized companies do not have dedicated strategic departments that would take on the role of planning. A large part of the responsibility lies with the entrepreneur, who is the key person in the company and who usually plans and makes strategic decisions alone. In addition, the entrepreneur is the one who bears the risk and the future of the company depends on his (in)success in planning the takeover.

When searching for a target company and scanning a company, managers can ask various consultants for help (Petkova & McCarthy, 2013). In large companies, it is the consultants who can prepare a list of potential companies for acquisition and, in addition, managers use their services as part of the company's due diligence. Previous research shows that the use of consultants in mergers and acquisitions is widespread in large companies. Chang et al. (2016) find that financial advisors are used in 85% of all merger and acquisition transactions worldwide. Empirical data from developed Western European countries also show a high prevalence of the use of business advisors (70 to 80%) in mergers and acquisitions conducted by SMEs (Bruce & Picard, 2006; Van Teeffelen, 2014). Just like large companies, SMEs can use the services of different types of advisors, e.g. financial and tax advisors, lawyers, brokers or accountants. Van Teeffelen (2014) argues that the value of consultants will be more significant in the acquisition processes of SMEs because in SMEs there is no separation of ownership and management and consultants can reduce the complexity of the planning process. Several conclusions were drawn when examining the added value of advisory services in a sample of acquirers from North West Europe. The involvement of advisors in the acquisition process does not reduce the occurrence of certain obstacles that may arise at different stages of the acquisition, such as the financing of the acquisition, the occurrence of misinformation and certain personnel issues (Van Teeffelen, 2014). Involving several different advisors in the process doubles the likelihood of organizational change (Van Teeffelen, 2014). These findings suggest that consultants can play an important role in the acquisition processes of small and medium-sized enterprises. It is important to emphasize that this empirical data was collected in countries with more developed entrepreneurial support systems as well as a greater variety of advisory services for small and medium-sized enterprises. Evidence from countries with a less developed entrepreneurial ecosystem, such as Croatia, suggests that advisory services for small and medium-sized enterprises are often not adapted to their needs. Delić and Alpeza (2017) find that small and medium-sized entrepreneurs in Croatia are not inclined to use the services of advisors. In their sample, 78% of entrepreneurs had not used the services of consultants in the previous three-year period, although they were well aware of the offer of their services on the market, 9% had used them only once, and only a small proportion of them (13%) had hired consultants several times. The results of a qualitative study conducted with a sample of SMEs that have grown through an acquisition are consistent with this. According to the study, SME owners are sometimes reluctant to use advisory services when embarking on the takeover process (Mezulić Juric, 2020).

It is not known how acquirers find potential targets. The literature states that the most common reasons for selling a business are related to financial problems or the inability to find a successor (Buono et al., 2002). The question arises as to whether entrepreneurs buy companies whose owners are motivated to exit for the reasons mentioned above, or whether there are good opportunities to sell. Empirical evidence from studies on the acquisitive growth of SMEs shows that the reason for selling the business is consistent with the reasons mentioned, as the decision to exit the business or sell the business in the SME cases studied was made for personal reasons (tiredness of running the business, retirement, illness), but it was an entrepreneurial decision caused by poor management of the owner and financial problems (Mezulić Juric, 2020).

Some authors state that small and medium-sized enterprises can benefit more from acquisitions compared to large companies because there are fewer potential buyers in the market (Hussinger, 2010). For this reason, it is less likely that the buyer or acquirer will pay too high a price for the acquired company. In addition, small and medium-sized enterprises are more flexible and will more easily forego acquisitions that are potentially damaging and can lead to losses (Weitzel & McCarthy, 2011). Mezulić Juric (2020) states that SME owners find the potential takeover targets in the same industry and usually focus on companies they know very well, as they are business partners.

Some empirical data confirm that trust asymmetry is lower in smaller acquisitions (Graebner, 2009) and that the need for trust and prior knowledge of the seller is extremely emphasized in small acquisitions (Mezulić Juric, 2020). Trust is considered a key element of the socio-cultural variables that are a key factor in the success of the acquisition process (Trąpczyński et al., 2018), and is considered particularly important for the post-merger integration process (Chua et al., 2005). Some authors emphasize that a takeover is more likely to occur if the acquirer and the seller previously had a direct business relationship (Schildt & Laamanen, 2006). Furthermore, research based on case studies suggests that sellers prefer acquirers whom they trust (Mezulić Juric, 2020). Some authors emphasize that small acquisitions are easier to manage and that the integration process is simpler than for large companies (Hussinger, 2010), which may ultimately mitigate some of the common integration problems of large companies.

The integration of two companies is the most important phase of the takeover process. Some authors emphasize that the integration phase is important because it determines the success of the merger or acquisition (Cartwright & Cooper, 2000). In the phase after the takeover, during the integration, the management of the company plays the key role for success. In small and medium-sized enterprises, this role is assumed by the entrepreneur, who must effectively communicate the organizational goals to the employees of both companies (Ashton-James et al., 2013). The alignment of organizational cultures between two companies is also extremely important for the possibility of achieving synergy effects (Cartwright & Cooper, 2000). Companies that have similar organizational cultures will certainly spend less time integrating employees and will be able to achieve greater synergy effects.

Acquisition processes are complex and management is responsible for the successful execution of the acquisition in all its phases. A frequently asked question relates to the experience of management in carrying out acquisitions and the role of previous experience and knowledge in these processes. Research suggests that experience is a necessary but not sufficient condition for the execution of a successful acquisition. Barkema and Schijven (2008) find that customer experience contributes to higher financial returns when applied to acquired companies in the same or a similar industry and in the same or a similar cultural or geographic region. In the context of research on small and medium-sized enterprises, Salvato et al. (2007) provide interesting insights from their research on acquisition capabilities. Using qualitative research, Salvato et al. (2007) find that the companies in their sample learned through acquisition processes and were able to create a certain knowledge about acquisitions based on what they had learned ("acquisition knowledge"). The companies made acquisitions with a certain degree of caution and without going beyond the competencies that the company already possessed (Salvato et al., 2007). The authors point out that in almost all cases observed, buyers took great care to understand and respect the needs of the seller. Most of the companies in the sample, both on the buyer and the seller side, were family businesses, and they had a good understanding of the mechanisms that motivate families to sell their businesses and the mechanisms that influence the behaviour of the owners in the negotiation phase. Companies that made multiple acquisitions were able to develop advanced acquisition strategies in which they diversified the degree and method of

integration with the target company, rather than following the same methods as previous acquisitions. Furthermore, the companies in this sample demonstrated the ability to recognize both their mistakes and the reasons for their success, and were able to change their own acquisition process behaviours over time as a result of lessons learned previously (Salvato et al., 2007).

3.3. Outcomes of SME Acquisition

Studies on the effects of takeovers on samples of large companies show that a large proportion of takeovers do not ultimately lead to success or growth. In contrast to the large number of studies on the impact of acquisitions on samples of large companies, there are not many studies conducted on samples of SMEs.

A small number of studies have focused on examining the prevalence of acquisitions as a form of growth in small and medium-sized firms, and an even smaller number of studies have attempted to examine how different forms of growth affect the firm over time. Vermeulen and Barkema (2001) conclude that acquisitions can have positive effects, i.e. 'reinvigorate' the acquired firms and promote their long-term survival. New owners can give the company a new strategic direction, manage its resources better, but also introduce new ideas. Salvato et al. (2007) argue that takeovers can be a way of releasing entrepreneurial activity within the company. The authors believe that "under "certain conditions, acquisitions can be a response to maturity, ossification, and resource inertia, as they reinvigorate a firm and improve its ability to predict or respond appropriately to external conditions" (Salvato et al., 2007, p. 283). This is also confirmed by a qualitative study conducted on a sample of 18 Italian companies, which concludes that the positive results of acquisitive growth are achieved precisely through the ability to use new organizational knowledge. Lockett et al. (2011) support the above statements with empirical research and conclude that the use of acquisitions as a growth method in one period supports further organic growth of the company in the following period. Conversely, organic growth in the first period reduces the extent of organic growth in the following period (Lockett et al., 2011). Arvanitis and Stucki (2014) also empirically investigated how the use of takeovers in small and medium-sized enterprises affects the acquiring company. The study was conducted with a sample that included all Swiss companies that were acquired in the period from 2006 to 2008, most of which were small and medium-sized. To capture different aspects of performance, five different performance measures were used in the study: Capital expenditure, number of employees, sales revenue, value added per employee and sales of innovative products per employee (Arvanitis & Stucki, 2014). The study confirms the positive effects of acquisitions for three of the five indicators: sales revenue, value added per employee and sales of innovative products per employee. The authors interpret the fact that no positive effects on employment and investments were found to mean that the synergy effects realized through the takeover led to an increase in the average productivity of the acquiring company, even without additional investments (Arvanitis & Stucki, 2014). Mawson and Brown (2017) use qualitative research to make a theoretical contribution to the literature on the growth and innovation of small and medium-sized enterprises. Through their research, they empirically confirm that access to knowledge as a key resource is at the heart of the observed acquisitions. Acquisitions were used by the companies to gain new knowledge, which was then used to innovate different aspects of their business.

4. CONCLUSION

Most studies on SME growth have focused on organic growth and neglected other forms of growth, such as mergers and acquisitions. Although scholars argue that it is crucial to understand how firms grow before determining how much they grow, there is still little research on the different forms of growth, such as the acquisitive growth of small firms. Therefore, this literature review

aimed to highlight important work on acquisitive growth, focusing on three major streams of literature on SME acquisitive growth and highlighting the distinctive features of small business acquisitive growth.

Studies looking at entrepreneurs' motives for acquiring another company show that entrepreneurs opt for acquisitions due to the limitations of organic growth, both internal and external. Furthermore, the literature review has highlighted the specific context of the SME acquisition process and emphasized the importance of the entrepreneur's role in this process. Another important conclusion drawn from the study of the acquisition process of SMEs is the lower information asymmetry in this process, as well as the importance of trust. The third part of the review looked at the impact of acquisition and highlighted the benefits of this mode of growth for SMEs, especially in terms of further organic growth or gaining new knowledge and resources.

In conclusion, it should be noted that the number of studies on acquisitive growth of SMEs is still limited. This should therefore be a call to researchers to further explore this topic and conduct both quantitative and qualitative studies.

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Exploring the Influencing Factors of Big Data Analytics Adoption in Manufacturing Firms: A Survey Analysis

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Abstract: *Due to its attractive possibilities and potential benefits, the use of big data analytics is gaining popularity in both real operations and theoretical discourse. The goal of this research is to identify the factors that influence the adoption of big data analytics and their impact on the performance of supply chains in the manufacturing industry, examining how information sharing between firms affects this relationship with the help of a survey to collect and analyze data, with a sample size of 200 respondents. The study discovered that technological, organizational, environmental, and perceived risk factors all had a significant impact on big data analytics adoption. The study's findings also show a substantial and favorable relationship between big data analytics adoption and supply chain performance. Finally, it was observed that the act of sharing information had a moderating effect on the link between big data analytics adoption and firm performance.*

1. INTRODUCTION

In the recent years information has emerged as one of the companies' most valuable assets due to the ongoing development of IT and the advances of Industry 4.0 (Türkeş et al., 2019). This ever-expanding big data focuses on various disciplines and contributes to the rapid acceleration of global scientific and technological progress (Ziora, 2015). Businesses worldwide are under increasing pressure to expand their product lines and consumer bases while keeping up with a deluge of incoming data. The challenges of integrating supply-chain management systems across manufacturers, distributors, retailers, and trading partners can be overcome only through meticulous data management and professional integration. They are increasing the visibility of manufacturers and suppliers and fostering more reliable, long-lasting collaborations, data management, and integration, addressing supply-chain management challenges at every level and activity. Although it may be more difficult to evaluate and create information when using both unstructured and structured data from several sources, supply-chain management systems can transform the data to better suit the end user's needs (Ginting, 2020; Gopal et al., 2022).

This article has multiple connecting objectives. First, it aims to investigate the factors of big data analytics adoption in the manufacturing sector, building on the technology-organization-environment framework, the perceived risk framework, and the resource-based view theory as foundations. Second, it aims to identify those factors that influence the adoption of big data analytics and their impact on the performance of supply chains in the manufacturing industry. Third, it aims to examine how information sharing between firms affects this relationship with the help of a survey with a collected sample size of 200 respondents. To fulfill its objectives the article seeks to answer the following research questions:

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- **RQ1:** How do technological, organizational, environmental factors and perceived risk impact big data analytics adoption in manufacturing firms?
- **RQ2:** Is there any relationship between big data analytics adoption, information sharing, and supply chain management performance of manufacturing firms?
- **RQ3:** Does information sharing mediate between big data analytics adoption and supply chain management performance of manufacturing firms?

A supply chain can be interpreted as a network of organizations involved in the conception, production, and distribution of products and services from the point of conception to the final consumer. It has become evident that the information age manifests itself in various ways and that conventional methods and antiquated organizational structures are insufficient to provide the innovative opportunities necessary to increase productivity. This suggests that companies that rigorously adhere to the standards are failing to meet the requirements of consumers in the 21st century (Pournarakis et al., 2017).

To satisfy the demands of the digital economy, new concepts have emerged and manufacturers have adopted numerous cutting-edge technologies to obtain a competitive edge and to position themselves better in the dynamically changing digital marketplace. In recent years, scholarly interest in supply chain analytics has paralleled the emergence of new commercial and technical challenges and opportunities. The obstacles that must be overcome include, but are not limited to, issues with managing vast quantities of data and fluctuating demand and supply. Howaver the successful application of big data analytics applications can help companies to enhance their decision making processes, providing more insights, to optimize their processes by identifying inefficiencies and streamline operations, and to increase the visibility of their supply chain, allowing companies to track and monitor every aspect of their operations in real-time (Gunasekaran et al., 2017; Masa'deh et al., 2022).

This study applies a survey methodology to collect and assess information of big data analytics adoption experiences of 200 manufacturing companies in order to investigate what are the main influencing factors and the significant their connection is regarding their adoption motives. The article will first provide a detailed literature review regarding supply chain management, big data analytics, and the applied technology-organization-environment framework, perceived risk framework, resource-based view theory. Then the article will provide and discuss the results of the survey, answering the research questions.

2. LITERATURE REVIEW

Coordination and collaboration between the material, information, and financial channels that comprise a supply chain are the primary focus of this definition, as they are the fundamental elements that define an supply chain's efficiency and effectiveness. Supply chain management is a set of processes that effectively coordinate the activities of suppliers, manufacturers, transporters, and consumers to ensure that a high-quality product or service is delivered on time and in the right quantity to the right locations. If analytics are not used, business development is nothing more than the accumulation of vast quantities of arbitrary data. Companies should, therefore, interpret their sector data and implement it into their empirical evidence. Managers can benefit from effective big data analytics in two ways: first, by making meaning of the vast quantities of available data, and second, by discovering previously unknown insights. It is essential for managers to measure and therefore know radically more about their business, and directly apply this knowledge to improved decision making and performance. Also big data can significantly impact and entirely transform management. A company

can gain a competitive advantage by systematically implementing big data analytics, or it can fall behind if it fails to extract and analyze the data it already possesses (Wamba & Akter, 2015).

The primary theoretical foundations for this study were Technology, Organization, Environment (TOE) framework (Jemala, 2021), the Percieved Risk Framework (Afonso et al., 2016), the Resource-based View Theory (RBV) (Gangwar et al., 2016), and the Diffusion of Innovations Theory (DOI) (Dearing & Cox, 2018). These frameworks are used by individuals and organizations to analyze different drivers of information systems adoption. These concepts have also been applied in various research fields, such as e-commerce, e-learning, healthcare, and tourism, proving their validity and reliability (Chandra & Kumar, 2018; Fan et al., 2020). Without theoretical models to guide our understanding of the factors that affect the decision to embrace new technologies, confronting the challenges associated with adopting and implementing big data at either the individual or organizational level becomes difficult (Alfaro-Serrano et al., 2021).

The term "big data" involves more than rapidly increasing data collections but involves different types of data and storage approaches. The 5 V's of big data, Volume, Velocity, Variety, Value, and Veracity, refer to the nature of ever-evolving and complex data sets that demand newer approaches to analytics (Moktadir et al., 2019). It identifies ease of use, utility, and availability of existing IT resources as some factors that affect the rate of adoption of big data. Big data analytics is creating new business models since big data strategies aim to improve decision-making by enhancing techniques for data acquisition, processing, and visualization. This evolution creates new opportunities to leverage data to gain a competitive advantage (Chen et al., 2015; Lee & Mangalaraj, 2022). Big data enhances risk prediction, productivity, and customer satisfaction. It allows businesses to stay ahead of their competitors. Thus, though expensive and time-consuming, the use of big data can be very rewarding in the long run (Dash et al., 2019). Big data is increasingly being applied in supply chain management, but few studies have been conducted based on analytical models. Moreover, most of the modern analytical models focus on predicting sustainability with large-scale data. This indicates clearly that big data in supply chain optimization has not reached its complete potential yet (Tiwari et al., 2018).

The TOE framework identifies three elements that influence the adoption of new technology. First there are the technological factors, which are attributes of the technology itself (e.g., relative advantage, compatibility, complexity). Second, there are the organizational factors, which are internal characteristics of the organization (e.g., size, structure, top management support, organizational readiness). Third, there are the environmental factors, which are external pressures and influences (e.g., industry characteristics, market structure, regulatory environment). Overall the TOE framework provides a comprehensive model to analyze how different aspects of an organization and its external environment affect the adoption of big data analytics, and it helps in understanding the multi-faceted nature of technology adoption, considering both internal and external influences (Jemala, 2021).

An organization's technological context includes both adopted and unadopted technologies, along with any other commercially available technologies that may be relevant (Heredia et al., 2022). These technologies significantly influence the pace of technological change and the organization's adaptability. The likeliness to adopt innovations is affected by the organization's context, which includes its characteristics and resources (Gangwar et al., 2016). The degree of internal connectivity among different units within a company has also a strong correlation with innovation adoption, but factors such as top-down support, detailed organizational planning, proper communication, and clear structure are also essential to this context (Dwivedi et al., 2015). Successful innovation implementation often requires strong high-level support and organizational alignment (Maroufkhani et al., 2020), and because of this the support of top management, the creation of robust competencies, and

the assessment of organizational readiness to implement new technologies become very important (Lutfi et al., 2023). The measurement of organizational readiness can be used to determine whether the organization is able to lead and finance the implementation of new technologies. Analytics and big data experts emphasize that one should prepare the organization for big data adoption (Mikalef et al., 2020). While the environmental context entails the factors that are outside the organization. Government policies have considerably influenced the application of advanced technologies, as governments can help in the movement into big data adoption through the use of enabling legislation and the provision of funding. Funding, capital, regulation and standardization, technical advice, training, independent advice, and other ways of creating a trust-building culture that instills confidence in technology development are all incentives to using big data analytics. The technological, organizational and environmental framework suggests legislative restrictions as an external factor that can delay the leveraging of big data by organizations or lodging companies. Government regulations, policies, rules, and standards can either encourage or discourage innovative technologies' adoption (Jaya et al., 2019; Kline, 2022), while supportive regulations, policies, rules, and standards can further increase the adoption of big data usages (Hermina & Suryana, 2016).

The Resource-Based View Theory (RBV) focuses on an organization's internal resources and capabilities as key drivers of competitive advantage and performance, while emphasizes the importance of valuable, rare, inimitable, and non-substitutable resources. With the help of RBV we can highlight the significance of internal resources, such as IT infrastructure, skilled personnel, and data management capabilities, in the successful adoption and utilization of big data adoption ehile it provides insight into how leveraging these resources can enhance supply chain performance and achieve a competitive edge.

The possibility of uncertainties and adverse occurrences is what Afonso et al. (2016), terms "risk". What makes it so high is the subjective uncertainty about the outcomes related to Noreen et al. (2021). Businesses may feel more vulnerable where there is a mismatch between their goals and their experiences when it comes to decisions on adopting and engaging in an innovation. Within those organizational risks reviewed in relation to big data adoption, the focus is on respective data privacy and security, its quality, and the availability of key resources. Third-party storage of data also presents issues in terms of confidentiality and integrity. Personal data that includes consumer names and addresses is important to consider in outsourcing the data. This is usually an issue found within organizations which are starting to implement BDA systems but still cannot afford resources that ensure long-term success for the technology (Gangwar et al., 2016). People may feel uneasy because they are not confident in the data, as they are not in full control of the data. Organizations may be less confident in the completeness, accuracy, relevance, and timeliness of their data if they lack the resources and personnel to assess it (Al Nuaimi et al., 2015).

3. RESULTS

The objective of this article is to investigate the factors and implications of big data analytics adoption in the manufacturing sector, and to identify the factors that influence the adoption of big data analytics and their impact on the performance of supply chains in the manufacturing industry with the help of a survey. The article seeks to answer the following research questions:

- **RQ1:** How do technological, organizational, environmental factors and perceived risk impact big data analytics adoption in manufacturing firms?
- **RQ2:** Is there any relationship between big data analytics adoption, information sharing, and supply chain management performance of manufacturing firms?
- **RQ3:** Does information sharing mediate between big data analytics adoption and supply chain management performance of manufacturing firms?

During thedata collection process an online questionnaire was developed to collect data. Surveys were distributed to participants affiliated with various manufacturing firms. Participants were selected based on their involvement in supply chain management and data analytics roles. The survey received responses from 200 participants. Participants were from diverse manufacturing industries. Respondents included professionals with varying levels of experience in supply chain management and big data analytics. The collected data was analyzed using SPSS statistical software. Descriptive statistics were used to summarize the basic features of the data. Inferential statistics, such as regression analysis, were employed to examine relationships between variables. Measures were taken to ensure the validity and reliability of the survey instrument. Pilot testing was conducted to refine the questionnaire.

According to the results of the survey, regarding the demographic distribution males comprised 72.5% of the respondents, whereas females comprised 27.5%. In terms of agegroups 11% of the respondents were between the ages of 25 and 30. 57% of the participants fell within the age range of 30-35, while 32% were aged 35-40. Regarding educational level 24.5% of the participants possess a bachelor's degree, whereas 75.5% hold a master's degree.In case of work experience 23% of the participants reported having less than one year of work experience, whereas 50.5% had between one and five years of work experience. Furthermore, a total of 26.5% of the participants indicated that they possessed professional experience ranging from six to ten years. According to the results of the study, 50% of respondents said that their company has 30–75 Employees, and the remaining 50% said that the number of Employees in their company is more than 75.

As seen in Table 1, in case of job position 38% of respondents were from the job position of CEO/ Owner, 44% were from Senior Manager, 9% from Executive and the remaining 9% were Authorized Personnel.

Table 1. Job Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CEO/Owner	76	38.0	38.0	38.0
	Senior Manager	88	44.0	44.0	82.0
	Executive	18	9.0	9.0	91.0
	Authorized Personnel	18	9.0	9.0	100.0
	Total	200	100.0	100.0	

Source: Own research

The reliability was evaluated as well to measure the consistency of the acquired outcomes and to determine the dependability of research findings. According to the analysis every question possesses a reliability value greater than 0.7, indicating that every single item possesses an adequate level of dependability to produce significant and consistent results.

From Table 2, the p-value regarding Technological Factors and Big Data Analytic Adoption indicates a statistically significant relationship between the independent and dependent variables. That is, we have sufficient evidence to reject the null hypothesis of no relationship between the variables. The correlation coefficient of 0.413 describes a moderate positive relationship between the factors, hence a meaningful but again not perfect relation between the concerned variables. The R^2 value of 0.170 shows that 17% of the variance within the dependent variable could be accounted for by the independent variable. Though this percentage stands out, it means also that 83% is accounted for by other factors not under consideration within the model.

Table 2. Regression between Technological Factors and Big Data Analytic Adoption

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.413[a]	.170	.166	3.02486
a. Predictors: (Constant), Technological Factors				

Source: Own research

From Table 3: Organizational Factors and Big Data Analytic Adoption, the p-value signifies that there is a statistically significant relationship between independent and dependent variables. R-square value 0.190 and adjusted R-square of 0.186 suggests fair explanation by the model in the variance of dependent variable at 19% while substantial variability 81% is influenced by some other factors not covered in this model.

Table 3. Regression between Organizational Factors and Big Data Analytic Adoption

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.301[a]	.190	.186	3.16743
a. Predictors: (Constant), Organizational Factors				

Source: Own research

As presented in Table 4 concerning the Environmental Factors and Big Data Analytic Adoption, the p-value indicates a statistical significance of relationship between independent and dependent variables. The correlation coefficient, being 0.324, provides evidence of a moderate proportion of positive correlation, hence it reflects a reasonable but not very robust positive relationship. The R^2 value is 0.105, indicating that 10.5% of the dependent variable is explained by the independent variable. That may be a significant amount, but it also means that 89.5% of the variation is explained by other factors missing in the model.

Table 4. Regression between Environmental Factors and Big Data Analytic Adoption

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.324[a]	.105	.100	3.14248
a. Predictors: (Constant), Environmental Factors				

Source: Own research

From Table 5 about the Perceived Risk and Big Data Analytic Adoption, the p-value indicates a statistically significant relationship between the independent and dependent variable. The correlation coefficient of 0.284, indicating a weak to moderate positive correlation, would suggest that there is a relationship between the variables, but it is not particularly strong. The R^2 value of 0.181 indicates that the independent variable explains 18.1% of the variance in the dependent variable. While this is a considerable share, it also indicates that 81.9% of the variance is explained by other variables not represented in the model.

Table 5. Regression between Perceived Risk and Big Data Analytic Adoption

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.284[a]	.181	.176	3.18392
a. Predictors: (Constant), Perceived Risk				

Source: Own research

As it can be derived from Table 6 about the Moderating Role of Information Sharing, the p-value indicates a statistically significant relationship between the independent and dependent variables. With an R value of 0.440, this indicates that there is a fairly strong positive relationship between the dependent and independent variables, and a fairly good correlation exists. The R^2 value of 0.193 and the adjusted R^2 of 0.185 suggest that the independent variable explains 19.3% of the variance in the dependent variable. That is a big chunk, yet it also suggests that 80.7% of the variance is explained by other factors not included in the model.

Table 6. Moderating Role of Information Sharing

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.440[a]	.193	.185	2.69744
a. Predictors: (Constant), Big Data Analytics Adoption, INT				

Source: Own research

4. CONCLUSION

By investigating the perceived antecedents and effects of Big Data Analytic Adoption-BDA on supply chain performance from an organizational perspective, this study aimed to investigate the factors and implications of big data analytics adoption in the manufacturing sector, in order to identify the factors that influence the adoption of big data analytics and their impact on the performance of supply chains in the manufacturing industry. To analyze the impact of big data analytics adoption on perceived consequences and provide a comprehensive explanation, the article applied an integrated model that incorporates technological, organizational, and environmental factors, and analysed the results of a survey distributed among manufacturing companies with 200 participants.

The statistics pertaining to technical factors indicate that they exert a significant influence on the adoption of big data analytics, thereby impacting the supply chain performance of organizations. This supports the conclusion reached in prior studies that relative advantage has a substantial impact on the adoption of big data. The incorporation of big data is frequently influenced significantly by its benefits.

Organizations operating in the industrial sector might discover it more manageable to express this restricted impact through an examination of the flexibility of their processes and activities. Because of the flexibility exhibited by these organizations, the decision-making process does not face any challenges regarding the compatibility of methods with the big data analytics system during production.

All regression models show statistically significant relationships between the independent and dependent variables. The correlation coefficients (R) range from 0.284 to 0.440, indicating weak to moderate positive correlations in case of Technological, Organizational, Environmental factors and Information sharing. The R square values (R^2) range from 0.105 to 0.193, suggesting that the independent variables explain between 10.5% and 19.3% of the variance in the dependent variables. This indicates that while there is a significant relationship, a substantial portion of the variance is due to other factors not included in the models. All four analyses consistently indicate statistically significant, though not particularly strong, positive correlations between the independent and dependent variables. he explanatory power of the models is moderate, with a considerable amount of variance in the dependent variables attributed to factors outside the models.

The results of this study indicate that the level of organizational preparedness and the endorsement of senior management are the determinants of big data adoption. Prior research has demonstrated that

senior management support is crucial for the successful adoption of new technologies by organizations. It is the responsibility of manufacturing company managers and proprietors to establish an environment that promotes adoption, as they are in an ideal position to make decisions. Managers inspire employees to effect change by effectively communicating the organization's guiding principles and demonstrating the path forward. Lastly, throughout the adoption process, top-down support is crucial and may facilitate knowledge acquisition and dissemination of the organization's technologies and services.

The main goal of this study was to investigate the influence of technological, organizational and environmental factors on big data analytics adoption. Further investigation could expand upon the proposed framework of this study by examining additional factors, including support supply, corporate culture, cost-effectiveness, and peer influence.

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Why Do Firms Internationalize? An Empirical Analysis of Western Balkans Firms

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Abstract: *There is an increasing interest in and intention of firms to internationalize their business operations. Internationalization has become a critical strategy for businesses to achieve competitive advantage and to have better performance. However, the decision to internationalize business operations is driven by different factors that vary across countries and sectors. This research aims to empirically analyse the factors that drive businesses' decisions to go internationally. To do so, the analysis draws on the Barometer Business Opinion in six countries of the Western Balkans. Considering the data from 1,200 business leaders, the ordinal logistic regression was employed to test the hypothesis. The results confirm that Western Balkan businesses internationalize their operations to have access to new markets. In addition, factors such as access to natural resources, technological innovation and availability of land or real estate, are important drivers to go internationally. On the other hand, lower production costs, including labour force cost, better integration of company's value chain, business-friendly legal and regulatory environment and tax rates, are not significant factors for firm to go internationally. This article has important policy and managerial implications.*

1. INTRODUCTION

In today's globalized economy, internationalization has become a pivotal strategy for businesses seeking growth and a competitive advantage. Companies are increasingly venturing beyond domestic borders to capitalize on new market opportunities, diversify revenue streams, and mitigate risks associated with saturated home markets. However, the decision to internationalize into foreign markets is influenced by a complex array of factors that vary across regions and industries. Businesses internationalize for various reasons, including technological advancement, market diversification, risk mitigation, and leveraging social networks. For most firms, international expansion is a key strategy to achieve growth and competitiveness in an interconnected global marketplace. The motives of driving firms to venture beyond domestic borders are diverse, ranging from market seeking and cost reduction to technological advancement and risk mitigation. Firms often internationalize to access new customers and diversify revenue streams, especially when domestic markets are saturated (Cavusgil & Knight, 2015; Johanson & Vahlne, 2015). Many also seek to reduce costs by relocating operations to regions with cheaper inputs or more favorable economic conditions (Mudambi, 2008; Ngo & Igwe, 2019). Other drivers include securing natural resources, accessing skilled labor, and leveraging social networks to ease internationalization (Asiedu, 2006; Han et al., 2024). Firms are also drawn to favorable regulatory and tax environments, which reduce risks and enhance profitability (Bénassy-Quéré et al., 2007). Meanwhile, weak institutions in home countries often push businesses to explore better opportunities abroad (Ettalibi et al., 2025). In sum, international expansion reflects a strategic response to both opportunities and challenges in the global landscape.

The Western Balkans, a region encompassing six economies in Southeast Europe, has been undergoing significant economic transformation and integration into global markets. Despite its strategic

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location and potential for growth, there is limited empirical research on the motivations driving businesses in this region to internationalize. Understanding these drivers is crucial for business leaders aiming to formulate effective internationalization strategies and for policymakers focused on fostering economic development.

This study seeks to explore the key motivations influencing businesses operating in the Western Balkans to expand their activities for internationalization. Drawing on data from the Balkan Barometer Business Opinion Survey 2024, which sampled 1,200 business leaders across the region, the research employs ordinal logistic regression to analyze the impact of various factors on the likelihood of international expansion. Specifically, it assesses motivations such as access to natural resources and raw materials, technological innovation and capabilities, and access to land or real estate. The central research question guiding this investigation is: *What are the key motivations influencing businesses in the Western Balkan countries to expand their activities to be internationalized?* By addressing this question, the study aims to contribute to the broader literature on international business strategy, particularly within developing market contexts. The findings offer valuable implications for business leaders by highlighting which factors are most influential in promoting internationalization. Additionally, the research provides a foundation for future studies and informs policymakers on creating environments conducive to international business expansion.

This article is structured as follows. The second section provides the literature review on the main motivations of businesses to internationalize. The third section explains the methodology. The fourth section presents the ordinal logistic regression results, and the final section outlines the main findings and the research and policy implications.

2. LITERATURE REVIEW

For most firms, internationalization has been and will continue to be one of the strategic imperatives toward seeking growth and competitiveness in the global marketplace. In addition, the motives behind a firm's decision to venture beyond domestic borders are very varied, as documented by quite a significant amount of literature on the subject. Gaining an understanding of such drivers is important to understand the global dynamics of business and what motivates foreign direct investment.

One of the major drivers for internationalization is market seeking. Firms often enter foreign markets in search of new customers to increase sales and achieve growth beyond their saturated domestic markets. Internationalization can help companies diversify their revenue streams and capitalize on emerging market opportunities (Cavusgil & Knight, 2015; Johanson & Vahlne, 2015). It thus represents a strategic move that might allow these firms to partly avoid specific risks arising from market saturation and economic contraction in home countries.

Besides searching for new customers, companies often internationalize to lower their production costs. They aim to save money by moving their operations to places where labor is cheaper, raw materials cost less, or the economy is more favorable. This strategy helps them become more competitive in their industry (Mudambi, 2008; Ngo & Igwe, 2019).

Along with reducing costs, companies aim to better integrate their entire production process, known as the value chain. By expanding internationally, they can place different parts of their operations in locations that maximize efficiency, cut down delays, and simplify supply chain

management (Mudambi, 2008; Porter, 1986; Kogut, 1985; Ngo & Igwe, 2019). By strategically spreading activities like manufacturing, assembly, and distribution across different countries, firms can enhance their overall operational effectiveness.

Another major reason why companies internationalize is to access natural resources and raw materials. Firms invest in countries rich in specific resources they need for their production processes (Asiedu, 2006; Kolstad & Wiig, 2012; Ngo & Igwe, 2019). This not only ensures they have a steady supply but also cuts costs related to shipping and import taxes.

Moreover, companies are often drawn to opportunities for technological innovation available in other countries. Going global allows them to gain new technologies, innovate, and strengthen their competitive edge by tapping into advanced foreign knowledge and research facilities (Nisar et al., 2012; Ngo & Igwe, 2019). Laurens et al. (2015) analyzed the internationalization motives of firms through patent portfolios. Their findings highlight that companies often expand internationally to enhance technological capabilities and strategically strengthen their competitive position. Innovation and patent activities are seen as key motivators, especially in technology-driven industries where global presence amplifies competitive advantage. Han et al. (2024) provided insights into the importance of social networks in internationalization. Their systematic review of 210 studies reveals that robust social ties significantly reduce the uncertainties associated with foreign market entry. These networks enable firms to access critical market information, build trust-based relationships, and acquire resources essential for successful international operations.

Access to skilled workers abroad is another strong motivator. Having a highly qualified and specialized workforce helps companies boost productivity, innovate, and maintain a competitive advantage in their fields (Lewin et al., 2009). Skilled labor is especially important in sectors that require advanced technical expertise or specialized knowledge.

Sometimes, the desire to secure physical assets like land or real estate in other countries drives companies to expand internationally. Owning strategic physical assets is crucial for operations like manufacturing plants, retail stores, or resource extraction sites (Wei et al., 2007). Property abroad can also be a good long-term investment if its value increases over time.

A business-friendly legal and regulatory environment also encourages foreign investment. Favorable legal systems, helpful regulations, and stable political situations reduce risks and costs, making some countries more attractive to invest in (Bénassy-Quéré et al., 2007; Henisz, 2000). Companies prefer to invest where the legal system protects their interests and regulatory hurdles are minimized. Ameyaw et al. (2023) conducted a systematic literature review on foreign divestment strategies in emerging markets. Their research reveals that economic instability, regulatory challenges, and socio-political risks often compel businesses to withdraw from certain markets. However, they also find that firms re-enter these markets when conditions improve, underscoring the dynamic nature of international business strategies and the need for balancing risk with opportunity. Ettalibi et al. (2025) examined the role of institutional voids and socio-political factors in driving internationalization. Their findings suggest that firms operating in countries with weak institutional frameworks, such as inefficient regulatory environments or widespread corruption, are more likely to seek foreign markets. By expanding internationally, these businesses aim to mitigate challenges and capitalize on better institutional conditions abroad.

Lastly, tax rates in other countries can greatly influence a company's decision to internationalize. Lower or more favorable tax systems can increase after-tax profits, prompting firms to move or set

up operations abroad to optimize their tax responsibilities (Buettner & Ruf, 2007). Tax incentives and good fiscal policies make certain countries especially appealing for foreign direct investment.

This study aims to explore the motivations of businesses operating in the Western Balkan countries to expand their activities internationally. The research question this article seeks to answer is "What are the key motivations influencing businesses in the Western Balkan countries to expand their activities to be internationalized?"

3. DATA, VARIABLES, AND METHODS

3.1. Data

The 2024 Balkan Barometer Business Opinion survey was conducted in March and April 2024 in Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, North Macedonia and Serbia. They were financially supported by the Regional Cooperation Council (2024). The RCC initially drafted the questionnaire in English, after which it was translated it into the relevant local languages. RCC then reviewed and approved these translations to ensure accuracy. Given the use of the CAPI methodology, the questionnaires were digitized and loaded onto laptops or tablets for the interviewers. A designated supervisor in each economy conducted a final review of the programmed digital questionnaires to ensure they were ready for use in the field. The selection of companies for the Business Opinion Survey was carefully designed to ensure a representative sample across the Western Balkan region. Companies were chosen randomly, covering a diverse range of regions, sectors, sizes, and ownership structures. This approach ensured that the survey captured a broad spectrum of business perspectives. To achieve this, official data from the statistical offices of each Western Balkan economy served as the primary data source, providing a reliable foundation for the random selection process. A total of 1,200 businesses across WB6 were interviewed.

3.2. Variables

3.2.1. Dependent variables

The dependent variable measures the likelihood of a business extending its activities into new foreign markets over the next 12 months. It answers the question "How likely is your business to extend activity in (new) foreign markets"? It is categorized on a 4-point scale: 1- Very Likely, 2-Neither Likely nor Unlikely, 3- Rather Unlikely and 4- Very Unlikely.

3.2.2. Independent variables

The independent variables consist of various motivations for a company to invest abroad, each recorded as a binary indicator where 1 signifies that the reason is true for the company and 0 indicates it is not.

- Access to new markets: Whether the company is motivated to expand internationally to reach new markets.
- Lower production costs: the desire to reduce expenses, including labor costs, through foreign investment.
- Better integration of the value chain: aiming for smoother operations and supply chain efficiencies abroad.

* Under the UN Resolution 1244.

- Access to natural resources and raw materials: the need to secure vital resources for production purposes.
- Technological innovation and capabilities: seeking advanced technologies or innovation opportunities available in foreign markets.
- Skilled labour market: the availability of a highly qualified workforce as a motivation for international expansion.
- Access to land or real estate: the appeal of securing physical assets such as land or property in other countries.
- Business-friendly legal and regulatory environment: favorable legal conditions that might encourage foreign investment.
- Tax rates: the influence of lower or more advantageous tax rates in other countries.

3.2.3. Control variables

- Size of the company: This is a categorical variable that indicates the size of the company based on the number of employees, coded as follows:1 = Micro company (up to 9 employees),2 = Small company (10–49 employees),3 = Medium-sized company (50–249 employees) and 4 = Large company (more than 250 employees).
- Country of operation: This categorical variable identifies the country where the company operates. The coding is as follows: 1 = Albania, 2 = Bosnia and Herzegovina, 3 = Kosovo*, 4 = Montenegro, 5 = North Macedonia and 6 = Serbia.
- Legal form: This is a categorical variable that indicates the status of the company based on the legal form that they are registered in every country.

3.3. Modelling framework

This study uses the Ordinal Logistic Regression framework to analyze the relationship between the likelihood of a business extending its activities into new foreign markets and the motives of doing that. This method is appropriate when the dependent variable is ordinal, meaning it has a natural order but no consistent interval between categories, which is the case of our dependent variable.

4. RESULTS

Firstly, access to new markets emerged as a highly significant predictor. With an estimate of 1.125 ($p < .001$), this variable indicates a strong positive association, suggesting that businesses motivated by the opportunity to tap into new markets are much more inclined to consider international expansion.

In contrast, lower production costs did not demonstrate a significant impact, with an estimate of 0.407 ($p = .173$). This result suggests that the allure of cost savings, including cheaper labor or reduced manufacturing expenses, does not play a pivotal role in driving firms' decisions to internationalize.

Interestingly, the influence of access to natural resources showed borderline significance. With an estimate of 0.692 ($p = .069$), it implies that while not definitively impactful for all firms, this factor could be crucial for those dependent on resource access, particularly in sectors like manufacturing or energy, where raw materials are vital.

* Under the UN Resolution 1244

Similarly, technological innovation, with an estimate of 0.591 (p = .067), was also on the borderline of significance. This indicates that companies may be motivated to expand internationally to gain technological advantages or innovate in more advanced markets, although this is not a dominant driver for all.

Access to land or real estate presented an estimate of 1.327 (p = .061), again showing borderline significance. This suggests that for asset-intensive industries, the availability of strategic land or real estate could be a key consideration, though it is not universally significant across all sectors.

The analysis reveals that certain factors traditionally considered important for internationalization, such as a skilled labor market, a business-friendly legal and regulatory environment, and tax rates, do not significantly influence companies' decisions to internationalize. Despite having positive estimates, the p-values for each of these predictors indicate that their impact is statistically negligible.

The analysis further revealed the impact of company size. Micro Enterprises showed a significant negative effect with a coefficient of -0.982 (p = .006), indicating that smaller firms are less likely to extend their activities abroad, likely due to limited resources or risk tolerance. On the other hand, small enterprises and medium enterprises did not exhibit significant effects, with coefficients of -0.393 (p = .280) and -0.164 (p = .662), respectively, suggesting that size alone is not a definitive factor for these groups.

Legal forms, as the analysis revealed, do not significantly influence companies' decisions to internationalize despite having negative estimates.

Finally, the analysis uncovered notable country-level variations. Businesses from Albania had a significant positive coefficient of 0.665 (p < .001), implying a strong likelihood of extending abroad. Similarly, firms from Bosnia and Herzegovina showed a significant positive effect with a coefficient of 0.617 (p = .001), while companies from Kosovo* exhibited an even stronger association, with an estimate of 1.240 (p < .001). These results suggest that firms from these regions are particularly inclined to internationalize, perhaps due to market constraints or strategic opportunities. Conversely, the effect for Montenegro was borderline significant with a coefficient of -0.356 (p = .067), indicating a potential reluctance to expand abroad. Meanwhile, North Macedonia had a non-significant effect, with an estimate of 0.146 (p = .458), suggesting that country-specific factors might play a less critical role for businesses from this nation.

Table 1. Results of ordinal logistic regression

Motives	Estimate	Std. Error
Access to new markets	1.125***	.201
Lower production costs, including labour force costs	.407	.299
Better integration of your company's value chain	.216	.286
Access to natural resources and raw materials	0.692*	.381
Technological innovation and capabilities	.591*	.323
Skilled labour market	.185	.304
Access to land or real estate	1.327*	.707
Business-friendly legal and regulatory environment	.233	.473
Tax rates	0.412	.770

* Under the UN Resolution 1244

Size (RC: Large)		
Micro	-.982***	.359
Small	-.393	.364
Medium	-.164	.376
Country (RC: Serbia)		
Albania	.665***	.198
BiH	.617***	.192
Kosovo****	1.240***	.195
Montenegro	-.356*	.194
North Macedonia	.146	.197
Legal form (RC: Joint stock)		
Physical person	-.078	.365
Limited liability	-.054	.289
N	1200	
Nagelkerke	,220	

Standard errors in parentheses: ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

**** Under the UN Resolution 1244.

Source: Authors' calculations based on Regional Cooperation Council (2024)

5. FUTURE RESEARCH DIRECTIONS

There is further research that can be made in this field, especially to better understand the reason why firms from Western Balkan countries internationalize. At first, future research may consider a longitudinal study related to this topic. The idea presented in this study can also serve as guidance for future research, which may reveal other motives for internationalization, beyond the traditional ones.

6. CONCLUSION

The findings from the analysis highlight that access to new markets is a primary and highly significant driver of internationalization for businesses in the Western Balkans. Factors like access to natural resources and technological innovation demonstrated borderline significance. This implies that, while not universally impactful, these considerations may be critical for resource-dependent sectors, like manufacturing or energy, or for firms looking to innovate by leveraging advanced foreign technologies. Similarly, access to land or real estate also showed borderline significance.

In contrast, the traditionally important factor of lower production costs did not show a significant influence, indicating that cost-saving opportunities such as cheaper labor or reduced manufacturing expenses are not compelling enough to drive international investment decisions. On the other hand, factors such as a skilled labor market, business-friendly regulatory environments, and tax rates were found to be statistically insignificant.

The findings of this study have significant implications for businesses and policymakers striving to foster internationalization. For businesses, the results emphasize the critical importance of market-seeking strategies. Firms in the Western Balkans aiming for internationalization should prioritize identifying and accessing new customer bases, as market opportunities remain the most influential driver for expansion. Companies need to invest in thorough market research and develop customer-centric strategies to ensure a successful internationalization. For resource-intensive or asset-heavy industries, the availability of natural resources or real estate abroad should be a key

consideration. Similarly, technology-driven businesses must look to internationalize as opportunities to enhance their innovation capabilities and strengthen their competitive edge.

However, smaller firms, especially micro-enterprises, face significant hurdles in expanding internationally due to resource constraints. These firms should consider partnerships, collaborations, or government-backed programs that can mitigate financial and operational risks, enabling them to overcome the barriers of internationalization. In contrast, medium and large firms have greater capacity to navigate complex markets but still need to tailor their strategies to account for sector-specific opportunities and risks.

From a policy perspective, the findings suggest that governments in the Western Balkans must focus on creating conditions that enhance access to internationalization. Negotiating favorable trade agreements, reducing bureaucratic hurdles, and investing in cross-border infrastructure will be pivotal in enabling firms to expand. Policymakers should also consider the sectoral nuances of internationalization by ensuring the strategic availability of natural resources and land, which can serve as critical levers for attracting investments and supporting outbound expansion.

In addition, fostering a robust ecosystem for technological innovation will be vital. Governments can incentivize research and development through grants, tax breaks, and international collaborations, thereby equipping firms with the tools needed to thrive in competitive global markets. Supporting smaller firms through targeted interventions, such as financial assistance programs, training initiatives, and access to market intelligence, will be particularly important in overcoming their inherent limitations.

At the regional level, cooperation among Western Balkan economies can harmonize regulatory environments, streamline cross-border trade, and position the region as a unified and competitive player in global markets. Moreover, institutional reforms aimed at strengthening governance, reducing corruption, and enhancing legal transparency are essential to creating a business-friendly environment that attracts both foreign investors and supports domestic firms in their internationalization efforts.

In conclusion, businesses and policymakers in the Western Balkans must work hand-in-hand to address the barriers and leverage the drivers of international expansion. By focusing on market opportunities, fostering innovation, and creating a conducive regulatory environment, the region can unlock its full potential for global competitiveness and sustainable economic growth.

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Electric Vehicles and Environmental Attitudes: The Social Dimensions of Sustainable Mobility

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Abstract: *The widespread uptake of electric vehicles (EVs) is key to reducing emissions and achieving sustainable development goals. However, the acceptance of EVs depends not only on technological progress but also on consumers' environmental attitudes. The aim of this study was to investigate the role of these attitudes through a regionally representative survey of a sample of 500 people in a Central Eastern European country. The questionnaire was used to measure consumers' attitudes towards environment, acceptance of EVs and the availability of charging infrastructure. K-means cluster analysis was used to identify four clusters. Following the purchase intention of each cluster for EVs and the influence of charging stations location were analysed. Results showed that respondents with positive environmental attitudes were significantly more likely to plan to purchase an EV. These results underline the need not only for infrastructure development but also for initiatives to promote environmentally conscious attitudes in order to accelerate the uptake of EVs.*

1. INTRODUCTION AND LITERATURE REVIEW

The transport sector is one of the largest carbon-emitting industries, responsible for around 23% of global emissions, with road transport accounting for the largest share (International Energy Agency, 2023). The uptake of electric vehicles (EVs) is one of the most important steps to reduce the carbon footprint and can contribute to the achievement of the UN Sustainable Development Goals (SDGs) (Alanazi, 2023). Demand for EVs is growing dynamically, with global investment in this area increasing by 50% in 2022 to reach USD 425 billion, of which the largest share was from consumer vehicle purchases, while governments provided around USD 40 billion in direct purchase incentives (Khaleel et al., 2024). A key objective of the European Union is to decarbonise the transport sector, for which the mass uptake of electric vehicles is essential (Polom et al., 2020). Although in many Western European countries the share of EVs in new car sales already exceeds 20%, the transition is taking place at a slower pace in the Central and Eastern European region (Łuszczyk et al., 2021). The main barriers are limited charging infrastructure, economic challenges and differences in consumer habits and attitudes (Pavlínek, 2023). According to the Hungarian Central Statistical Office (KSH), the number of pure electric vehicles in Hungary increased to 41,000 by the end of 2023, a 38% increase compared to the previous year. Among the models sold, BMW, Nissan and Tesla led the market, while the number of public charging stations reached 2507 (Hungarian Central Statistical Office, 2024). One of the most important factors in the uptake of EVs is the availability of charging infrastructure, which has a direct impact on consumer attitudes (Kolacsek, 2020). The results of a study in Shanghai showed that the density of the charging network and government subsidies play a decisive role in purchasing decisions (Zhao et al., 2022). The largest buyers of EVs are high-income urban consumers aged

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31-40, for whom battery performance and the environmental friendliness of the car are also of high importance (Wang et al., 2017). Another study, also conducted in Shanghai, involving 458 respondents at car dealerships and test driving centres, found that men are less likely to buy EVs, while the 41-50 age group would choose them as a second car (Wang et al., 2018). Acceptance of electric cars depends largely on how far users drive the car on a daily basis. The results of a study comparing four studies found that the main barrier to EV adoption is not daily commuting, but the limited possibility of occasional long trips (Tamor et al., 2015). European studies have also shown similar results. In Poland, passengers supported the uptake of electric buses, but highlighted the need for infrastructure development and the importance of financial incentives (Połom, 2021). A survey of drivers of Deutsche Post's light commercial vehicle fleet found that the adoption of EVs was driven by perceived usefulness and ease of use (Wolff & Madlener, 2019). One promising opportunity for EV adoption is the expansion of car-sharing services, which allow consumers to try out the new technology with low risk. According to a recent study, the urban environment, multimodal transport habits and technological openness all contribute to a positive perception of EVs, while traditional car ownership tends to negatively influence adoption (Schlüter & Weyer, 2019). The transition to sustainable mobility requires not only technological improvements, but also a change in social and environmental attitudes (Featherman et al., 2021). People's environmental attitudes play a crucial role in the adoption of EVs (Wicki et al., 2023). In order to promote sustainable transport, it is particularly important to support disadvantaged regions where the high cost of EVs and infrastructure gaps may hinder uptake (Tadjiev & Donze, 2021). Research suggests that measurable social indicators and deeper social impact analysis are needed for the sustainable uptake of EVs. Improving charging infrastructure and reducing purchase uncertainty are key factors for successful market diffusion (Omahne et al., 2021). In addition to financial incentives, social impacts and sharing positive user experiences are also essential for wider EV uptake (Rezvani et al., 2015). Two research questions have been defined in relation to the research objective: RQ1 - How do different environmental attitudes impact the willingness to purchase or lease electric vehicles?; RQ2 - What role does access to charging infrastructure play in shaping preferences for electric vehicles?

2. METHODOLOGY

The research was carried out in the form of an online questionnaire survey with the involvement of a market research company in the Western Transdanubian region, interviewing 500 people. The sample is representative in terms of gender, age, type of municipality and education level. The reason for choosing the West-Transdanubian region is that it is close to countries such as Austria and Germany, where the penetration of electric cars and the willingness to buy are higher than in post-communist countries. A significant proportion of the people living in this region work in these countries and are therefore exposed to new technologies. Within the country, the average gross domestic product 2022 is 328.266 HUF/month/person in the West Danube region and 267.931 HUF/month/person in the North Plain (Hungarian Central Statistical Office, 2022). The GDP per capita is also higher than in the Eastern part of the country (West Danube region: Győr-Vas-Zala: GDP per capita: 6896 thousand HUF, Eastern part of the country, North Plain: 5048 thousand HUF (Hungarian Central Statistical Office, 2023). We are talking about an industrialised region with several automotive suppliers and the presence of Audi Hungaria (as the largest employer and electric car manufacturer in Hungary), where consumers are encountering electric cars almost every day. Our assumption is that consumers in the western region of the country will be more open to buying and using electric cars (consumers in the capital and in the municipalities around the capital may be similar). For the analysis the SPSS software was used to perform a cluster analysis. Table 1 shows the 14 attitude statements that form the basis of the cluster analysis.

Table 1. Environmental attitude statements and references

	Attitude Statement	References
E01a_1	I try to choose a means of transport that has as little impact on the environment as possible.	-
E01a_2	Through ride sharing, the environmental impact of transport can be significantly reduced.	-
E01a_3	Humans are severely abusing the environment.	Polonsky et al., 2014
E01a_4	If things continue on their present course, we will soon experience a major ecological catastrophe	
E01a_5	I am willing to pay a little more for products and food that are free of chemical elements and that do not harm the environment.	Straughan & Roberts, 1999
E01b_1	Using environmentally sustainable products is a primary way to reduce pollution.	Kumar et al., 2017
E01b_2	When I have a choice between two equal products, I always purchase the one which is less harmful to other people.	Roberts, 1996a
E01b_3	When I have a choice between two equal products, I always purchase the one which is less harmful to the environment.	
E01b_4	I usually purchase the lowest priced product, regardless of its impact on environment.	Roberts, 1996b
E01b_5	If I understand the potential damage to the environment that some products can cause, I do not purchase these products	Straughan & Roberts, 1999
E01b_6	When I purchase products, I always make a conscious effort to buy those products that are low in pollutants.	
E01b_7	I try only to buy products that can be recycled.	
E01b_8	I will not buy a product if the company that sells it is ecologically irresponsible.	
E01b_9	I always plan my purchases in advance, I'm not an impulse shopper.	-

Source: Own research

Table 2 shows the demographic data of the questionnaire participants, broken down into clusters. In terms of gender, cluster 2 has the largest difference, with men accounting for 74.1%, the least environmentally conscious consumers of the clusters. This cluster also has the highest proportion of young people, with 29.6% aged 18-27. Older age groups are more represented in the first and third clusters. Clusters 2 and 4 are the least environmentally conscious, with the highest proportion of people living in the village/town

Table 2. Demographic characteristics of the respondents

		Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**
Gender	Man	57.8 %	74.1 %	44.4 %	63.0 %
	Woman	42.2 %	25.9 %	55.6 %	37.0 %
Age	18-27	8.7 %	29.6 %	5.5 %	24.1 %
	28-37	26.5 %	14.8 %	15.9 %	22.5 %
	38-47	28.8 %	29.6 %	26.0 %	22.2 %
	48-57	18.9 %	25.9 %	34.3 %	22.3 %
	58-65	17.2 %	0.0 %	18.6 %	9.3 %
Municipality	County seat	49.2 %	33.3 %	41.7 %	40.7 %
	Other city	15.6 %	14.8 %	13.9 %	11.1 %
	Village, town	35.2 %	51.9 %	44.4 %	48.1 %

Source: Own calculations

3. RESULTS

As a results of the questionnaire analysis 4 clusters were defined, which are visibly distinct from each other and whose characteristics are explained in this chapter. The first cluster included a total of 128 people and they mostly agree with the environmental claims. Only 27 people belong to the second cluster, they are the ones who do not care about the environment. The third cluster, with 108 people, are those who care a lot about the environment and are doing something about it themselves. The fourth cluster has 108 people, they tend to agree moderately with environmental claims but do not have a strong commitment.

Figure 1. Clusters
Source: Own research

Figure 1 shows the distribution of the four clusters. The figure shows that clusters two and three are the furthest apart, with consumers who are very environmentally aware and consumers who are not at all environmentally aware. And clusters one and four are close together, as these two cluster groups are not as prominent for environmental attitudes.

Table 3 shows the mean, median, mode, standard deviation and variance for the first cluster. The means range from 3.3 to 4.59, indicating that respondents in the first cluster mostly agree with the statements on environmental protection. The highest mean was obtained for E01a_3 (4.59), which is related to the statement 'Humans are severely abusing the environment'. This attitude reflects the cluster's high level of environmental awareness. The median value for all statements is 3 or 4, which also indicates that respondents tend to agree with environmental statements. A lower standard deviation (e.g. E01a_3: 0.633) indicates that respondents' opinions on the issue are relatively homogeneous. On the other hand, opinions are more divided on shopping habits (e.g. E01b_4, E01b_8), which may indicate that certain practical barriers or preferences influence their behaviour.

Table 4 shows the characteristics of the second cluster. Respondents are typically less environmentally aware and often dismissive of sustainability claims. The averages are significantly lower than in cluster 1, indicating that cluster members tend to disagree with most of the claims about environmental sustainability. The highest mean is E01a_3 (3.56) and the lowest mean is E01b_5 and E01b_8 (1.26), indicating that environmental concerns are almost not reflected in their purchasing behaviour. Median values range from 1 to 3, with most cases being 1, indicating

that the majority of responses to each question fall into the "strongly disagree" category. The mode is also mostly 1, further confirming the low level of environmental awareness in this cluster. The standard deviations are relatively high for some questions, indicating a higher degree of variance in the answers.

Table 3. Cluster 1- Environmentally Concious Moderators

	N		Mean	Median	Mode	Std. Deviation	Variance
	Valid	Missing					
E01a_3	128	0	4.59	5	5	0.633	0.401
E01a_4	128	0	4.23	4	5	0.862	0.744
E01a_2	128	0	4.05	4	4	0.845	0.714
E01b_1	128	0	3.99	4	4	0.758	0.575
E01b_2	128	0	3.76	4	4	0.761	0.579
E01b_7	128	0	3.75	4	4	0.699	0.488
E01a_1	128	0	3.73	4	4	0.789	0.622
E01b_9	128	0	3.69	4	4	1.033	1.067
E01b_3	128	0	3.66	4	4	0.786	0.619
E01a_5	128	0	3.62	4	4	0.932	0.868
E01b_6	128	0	3.52	3	3	0.742	0.551
E01b_5	128	0	3.41	3	3	0.892	0.796
E01b_4	128	0	3.32	3	4	1.108	1.227
E01b_8	128	0	3.30	3	3	0.865	0.749

Source: Own calculations

Table 4. Cluster 2 - Skeptics of Sustainability

	N		Mean	Median	Mode	Std. Deviation	Variance
	Valid	Missing					
E01a_3	27	0	3.56	3	5	1368	1872
E01b_9	27	0	2.89	3	1	1.625	2.641
E01a_4	27	0	2.85	3	1	1.537	2.362
E01b_4	27	0	2.85	3	1	1.512	2.285
E01b_1	27	0	2.33	2	1	1.494	2.231
E01a_2	27	0	2.30	2	1	1.325	1.755
E01a_1	27	0	1.74	1	1	0.984	0.969
E01b_7	27	0	1.56	1	1	0.974	0.949
E01a_5	27	0	1.52	1	1	1.014	1.028
E01b_2	27	0	1.48	1	1	0.935	0.875
E01b_6	27	0	1.44	1	1	0.698	0.487
E01b_3	27	0	1.30	1	1	0.542	0.293
E01b_5	27	0	1.26	1	1	0.594	0.353
E01b_8	27	0	1.26	1	1	0.526	0.276

Source: Own calculations

Table 5 shows the results for the third cluster. The results of cluster 3 show that respondents are strongly environmentally aware and show a high level of agreement with statements related to the environment and sustainability. This cluster may be representative of committed environmentalists who actively take sustainability into account in their daily decisions. The majority of the mean scores are very high (between 4.25 and 4.88), indicating almost full agreement on most issues. The median and mode are 5 for almost all questions, reflecting maximum agreement. The standard deviation is mostly low (e.g. E01a_3: 0.426, E01b_3: 0.454), indicating that the respondents' opinions are very homogeneous, with almost all of them sharing similar views on these issues.

Table 5. Cluster 3 - Committed Environmentalists

	N		Mean	Median	Mode	Std. Deviation	Variance
	Valid	Missing					
E01a_3	108	0	4.88	5	5	0.426	0.182
E01b_1	108	0	4.84	5	5	0.457	0.209
E01b_3	108	0	4.79	5	5	0.454	0.207
E01b_7	108	0	4.74	5	5	0.602	0.362
E01b_2	108	0	4.73	5	5	0.485	0.236
E01a_5	108	0	4.72	5	5	0.577	0.333
E01b_5	108	0	4.68	5	5	0.667	0.445
E01b_6	108	0	4.68	5	5	0.639	0.408
E01b_8	108	0	4.56	5	5	0.765	0.586
E01a_2	108	0	4.50	5	5	0.837	0.701
E01a_1	108	0	4.44	5	5	0.824	0.679
E01a_4	108	0	4.43	5	5	1.07	1.144
E01b_9	108	0	4.25	5	5	0.996	0.993
E01b_4	108	0	2.40	2	1	1.57	2.466

Source: Own calculations

Table 6. Cluster 4 - Indifferent Pragmatists

	N		Mean	Median	Mode	Std. Deviation	Variance
	Valid	Missing					
E01a_3	108	0	3.77	4	4	1.001	1.002
E01b_9	108	0	3.38	3	3	1.083	1.172
E01a_4	108	0	3.35	3	3	0.979	0.959
E01b_4	108	0	3.28	3	3	1.003	1.006
E01b_1	108	0	3.20	3	3	0.862	0.743
E01b_7	108	0	3.18	3	3	0.795	0.632
E01a_1	108	0	3.11	3	3	0.998	0.997
E01a_5	108	0	3.06	3	3	0.868	0.753
E01b_5	108	0	3.06	3	3	0.777	0.603
E01b_2	108	0	3.05	3	3	0.79	0.624
E01b_3	108	0	3.00	3	3	0.82	0.673
E01b_6	108	0	2.92	3	3	0.833	0.694
E01b_8	108	0	2.85	3	3	0.925	0.856
E01a_2	108	0	2.81	3	3	0.968	0.937

Source: Own calculations

Table 6 shows the results for the fourth cluster by mean, median, mode, standard deviation and variance. The data for cluster 4 show that the respondents' attitudes and buying habits are medium. This group can be characterised more as moderately interested, not particularly environmentally aware, but not completely averse to sustainability issues. The mean scores range from 2.81 to 3.77, indicating that cluster members generally agree moderately with environmental claims, but lack strong commitment. Median scores are 3 for almost all questions, indicating that the majority of respondents hold a neutral position. The mode is also 3, reflecting a moderately committed stance. The standard deviation values are generally low, indicating that responses are relatively homogeneous.

3.1. Possession of Evs and Charging Stations

The questionnaire also asked respondents in the Western region of Hungary about the electric vehicles they own. In this question, the respondents could choose between 4 options and they could tick more than one answer: (1) Electric car, (2) Hybrid car, (3) Electric motor, (4) Electric bicycle/scooter.

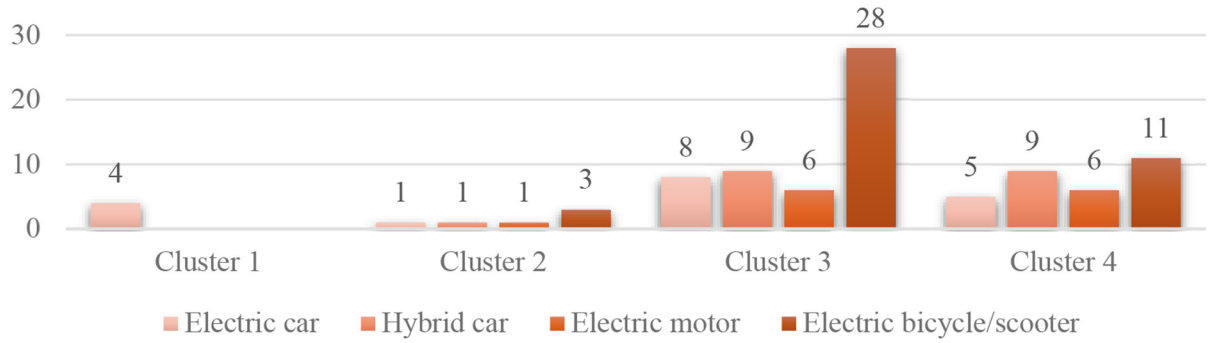

Figure 2. Number of electric vehicles by cluster
Source: Own research

Figure 2 shows the share of electric vehicle ownership by cluster. Overall, the highest number of respondents who own an electric bike or scooter is 42. This is followed by hybrid cars with 19 and electric cars with 18. The figure clearly shows that the most environmentally friendly cluster is cluster 3, which owns the most electric vehicles, and is therefore the group that pays a lot of attention to the environment when it comes to travel. In Hungary, the purchase and use of electric vehicles is not very common, but it is expected that the number of these vehicles will continue to increase in the future.

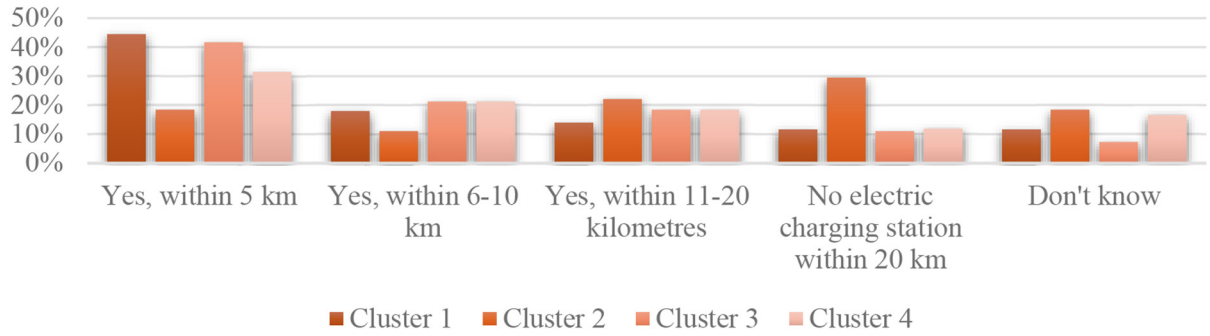

Figure 3. Availability of charging stations by cluster
Source: Own research

Figure 3 shows the extent to which members of the different clusters have access to electric charging stations close to their homes. Clusters 1 and 3, which are more environmentally conscious, have a higher proportion of people living in areas where electric charging stations are available. This suggests that there may be a correlation between pro-environmental attitudes and the availability of infrastructure. In Cluster 2, the lack of charging stations was reported by many. This may explain their low interest in EVs, as the lack of infrastructure reduces the chances of adoption. In cluster 4, many people do not know if there is a charging station near them, suggesting that they are less informed about electric transport options.

3.2. Purchase Intention to Evs

Figure 4 shows the future purchase plans for electric vehicles of the first cluster (Environmentally Conscious Moderators) broken down by different vehicle types. Electric bicycles and scooters show the highest value, especially among those who plan to buy "Yes, within 3 years" or "Yes, but in more than 3 years". Members of the first cluster tend to have a positive attitude towards electric vehicles, but their purchase is often dependent on external factors (e.g. price, infrastructure). The greatest interest is shown in electric bicycles and scooters, while a more cautious attitude is observed for electric and hybrid cars.

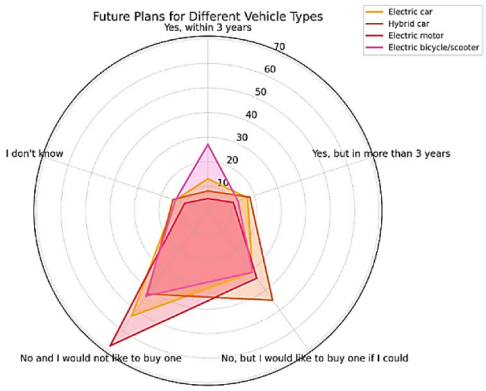

Figure 4. Purchase Intention – Cluster 1
Source: Own research

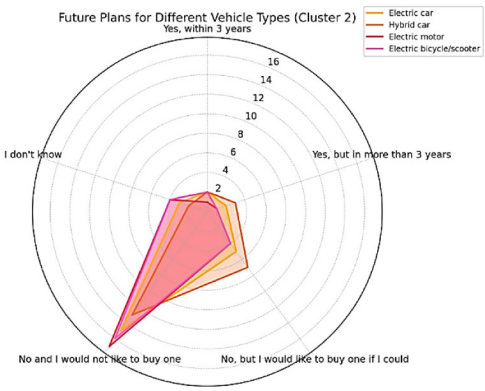

Figure 5. Purchase Intention – Cluster 2
Source: Own research

Figure 5 shows the future purchase plans for electric vehicles of the second cluster (Skeptics of Sustainability), broken down by different vehicle types. Members of the second cluster typically reject electric vehicles and have little motivation for sustainable forms of transport. Willingness to buy is very low and most are clearly not interested in EVs. This suggests that their environmental awareness is minimal and they probably have other transport preferences that EVs cannot satisfy.

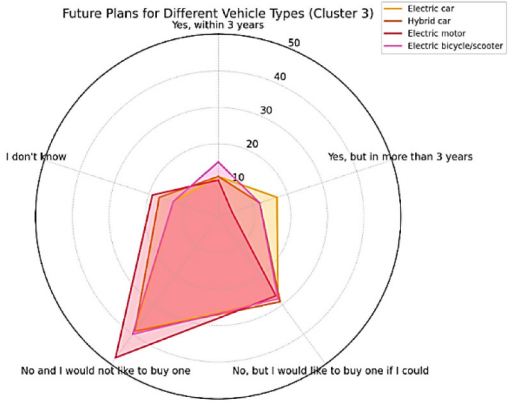

Figure 6. Purchase Intention – Cluster 3
Source: Own research

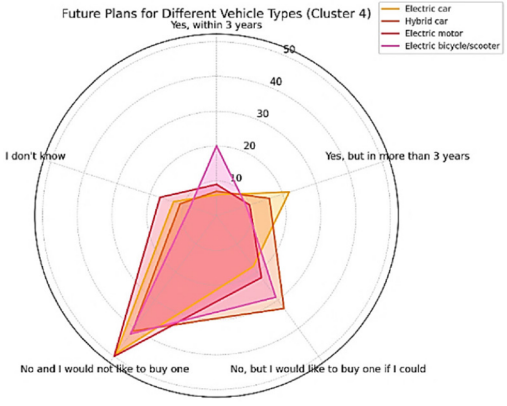

Figure 7. Purchase Intention – Cluster 4
Source: Own research

Figure 6 shows the future purchase plans for electric vehicles of the third cluster. The members of the third cluster are highly committed to environmentally friendly transport. Many of them are actively interested in electric vehicles and would buy one if they had the opportunity. Electric bicycles and scooters are most in demand, but electric and hybrid cars are also popular. Cluster members are likely to make their decisions with sustainability in mind and would adapt more quickly to electric vehicles if financial or infrastructure support were available.

Figure 7 shows the future purchase plans for electric vehicles of the fourth cluster (Indifferent Pragmatists). Members of the fourth cluster are pragmatic and show moderate interest in electric vehicles. Some would be open to buying EVs, but this is mainly constrained by financial and infrastructure factors. Electric bikes and scooters are the most popular in this cluster, while demand for electric and hybrid cars is more moderate. The cluster is characterised by uncertainty and a pragmatic approach, i.e. decisions are made on the basis of circumstances rather than a strong environmental commitment.

4. FUTURE RESEARCH DIRECTIONS

The results of the research highlighted that environmental attitudes, infrastructure availability and economic factors all play a key role in the adoption of EVs. As the research revealed that attitudes towards and acceptance of EVs are influenced by the availability of charging infrastructure, it may be worthwhile to make a deeper comparison between different regions to explore what political and economic steps would be needed to improve infrastructure and increase user confidence. The state also has a significant role to play in the relationship between take-up and use, as state support schemes and tax incentives can also influence consumer choices, so this could also be a future research direction. Furthermore, awareness and information can also play an important role in acceptance, and empirical research could be carried out to investigate which communication strategies and education programmes would be most effective in promoting sustainable transport.

5. CONCLUSION

The aim of the research was to explore the factors influencing the adoption of electric vehicles, in particular environmental attitudes and infrastructure availability. Using cluster analysis, 4 clusters were identified. Cluster 1 (Environmentally Conscious Moderators) has a moderate interest in EVs and their decisions are highly influenced by external circumstances. Cluster 2 (Skeptics of Sustainability) has the lowest interest in EVs and is characterized by minimal environmental awareness. Cluster 3 (Committed Environmentalists) has the strongest commitment to EVs and can be described as environmentally conscious consumers. Cluster 4 (Indifferent Pragmatists) have a pragmatic attitude towards the environment and are also interested in EVs. The results showed that EV adoption is significantly influenced by the availability of infrastructure. Cluster 1 and 3 members, who are more positive towards EVs, tend to live in areas with better charging networks. Cluster 2 members cited the lack of infrastructure as the main barrier to buying EVs. In the present research, we formulated two research questions, RQ1 (How do different environmental attitudes impact the willingness to purchase or lease electric vehicles?), according to which environmental attitudes have a significant impact on the adoption of EVs, so consumers with more environmentally conscious attitudes are more likely to purchase or use an EV. Under the second question RQ2 (What role does access to charging infrastructure play in shaping preferences for electric vehicles?), EV adoption is strongly influenced by the accessibility of charging stations, as proximity to charging stations increases the propensity to buy. The novelty of the research is that the data collection was carried out in a Central-Eastern European region, for which less empirical data was available, and that the relationship between environmental attitudes and EV adoption was analysed. The results may help policy makers to develop more effective support policies to promote the uptake of EVs. For automotive stakeholders, it provides useful insights into the environmental attitudes and decision-making processes of potential customers.

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Navigating the Hydrogen Transition in Petroleum Refining: A Comprehensive Market Assessment

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Abstract: *The urgency to decarbonize all industries, including petroleum refining, is driven by ambitious net-zero targets and a global shift towards renewable energy. The sector's significant contribution to greenhouse gas emissions underscores the urgent need to explore alternative energy sources and innovative technologies to mitigate climate impacts while enhancing energy security. This paper examines the potential role of green hydrogen in reducing emissions and transforming Europe's energy system. It comprehensively analyzes the global and EU-level hydrogen market landscape, focusing on production, consumption, and market segmentation. The paper examines the integration of large-scale electrolysis in refinery operations, assessing market identification, sizing, and potential replication. A PESTEL analysis is used to identify factors influencing the transition to hydrogen-based technologies, emphasizing pre-normative research, communication, and regulatory frameworks. The findings contribute to policymaking, investment decisions, and the successful integration of hydrogen into petroleum refining processes.*

1. INTRODUCTION

In the face of a global shift towards renewable energy and ambitious net-zero targets, the decarbonization of all industries, including petroleum refining, is paramount. This sector accounts for a significant share of global industrial energy consumption, reaching up to eight percent. While a transition to sustainable sources is underway, demand for fossil fuel-derived products, particularly plastics, will persist in the near future (EC, 2020). Therefore, optimizing emissions from refineries is crucial to mitigate their environmental impact as we navigate towards a low-carbon future (Jeje et al., 2024). The current energy crisis further underscores the urgency of accelerating this energy transition (Karakosta & Papathanasiou, 2024).

Decarbonizing the refining industry presents a multifaceted challenge and, thus, a comprehensive analysis of the hydrogen market landscape is important (Møller et al., 2017), as well as an analysis of the factors influencing the transition to hydrogen-based technologies is needed (Liu et al., 2021). Refineries boast extended lifespans, and integrating novel technologies necessitates not

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only technological advancements and economic viability but also supportive policy frameworks and societal acceptance, factors that lie, to a certain extent, beyond the direct influence of technology providers. Nevertheless, a strategic combination of low-carbon interventions across the oil refining sociotechnical system, alongside robust institutional and market drivers, can incentivize innovation (Mohammed et al., 2022). This multi-pronged approach will equip refineries to evolve and meet the growing demand for low-carbon fuels and feedstocks, ultimately delivering a more sustainable future.

In the above framework, this paper focuses on the potential role of green hydrogen in reducing emissions and fostering the transformation of Europe's energy system. Specifically, it aims to provide a comprehensive analysis of the hydrogen market landscape, focusing on global and EU-level production and consumption trends, market segmentation, and growth potential. It examines the viability of integrating large-scale electrolysis based on renewable energy sources within refinery operations, assessing market identification, sizing, and potential replication beyond the project scope.

A PESTEL analysis is employed to identify Political, Economic, Social, Technological, Environmental, and Legal factors influencing the transition to hydrogen-based technologies (Akbalik & Çitilci, 2019; Kokkinos et al., 2023). The analysis emphasizes the importance of pre-normative research, effective communication of environmental benefits, and the development of regulatory frameworks to promote large-scale hydrogen deployment.

Additionally, the paper highlights the necessity of a holistic approach, considering the entire value chain, including green electricity management, waste heat regeneration, wastewater treatment, and water reuse. The results of this research can inform policymaking, shape investment decisions, and ultimately facilitate the successful integration of hydrogen into petroleum refining processes.

2. MARKET ASSESSMENT

Hydrogen (H_2) is an essential element to enable a carbon-free future in our global economy. A comprehensive evaluation of the hydrogen market landscape is necessary to address the challenges associated with the transition and the potential role of green hydrogen. Specifically, in this study, the approach followed (Figure 1) is to provide a comprehensive analysis of the hydrogen market landscape, focusing on global and EU-level production and consumption trends, market segmentation, and growth potential. The paper examines the role of green hydrogen in reducing emissions and fostering energy system transformation, as well as the importance of a holistic approach for successful integration into petroleum refining processes.

The integration of hydrogen in different applications and industrial sectors requires safety and efficiency throughout the whole value chain. The hydrogen value chain can be split into three main segments such as Feedstock & Production, Storage & Distribution and End-users & Applications (Figure 2).

The cost of green hydrogen presents a common obstacle across various sectors struggling to reduce or eliminate CO_2 emissions, often referred to as "Hard to Abate" sectors. Studies and analyses (Gulli et al., 2023; PwC, 2022) suggest that green hydrogen production costs will become competitive within the next decade. According to the IRENA (2024), green hydrogen production could already be cost-competitive with blue hydrogen by 2050. Green hydrogen and its derivatives are considered crucial for achieving net-zero emissions by 2050, potentially contributing to 12% of emissions reductions and representing 14% of final energy consumption under a 1.5°C scenario.

Reaching this target necessitates a substantial increase in electrolyser capacity, from negligible levels today to an estimated 5,722 GW by 2050. Therefore, accelerating the deployment of green hydrogen and its derivatives is essential, alongside efforts to stimulate strong off-take signals.

01
Overview of the hydrogen market landscape in Europe

- Analysis of production and consumption trends
- Evaluation of market segmentation and growth potential

02
Role of green hydrogen in reducing emissions and fostering energy system transformation

- Focus on integrating large-scale electrolysis based on renewable sources in refinery operations

03
Importance of a holistic approach for successful integration into petroleum refining processes

- Considerations for the entire value chain, including green electricity management and waste heat regeneration

Figure 1. Approach followed
Source: Author's illustration

Recognizing the need to overcome cost barriers and accelerate adoption, various incentive schemes have been implemented globally. These initiatives are likely to have far-reaching implications beyond the borders of their implementing countries, potentially influencing international market dynamics. While the design and approaches of these schemes differ, they share a common goal: stimulating strong demand signals while securing sufficient supply.

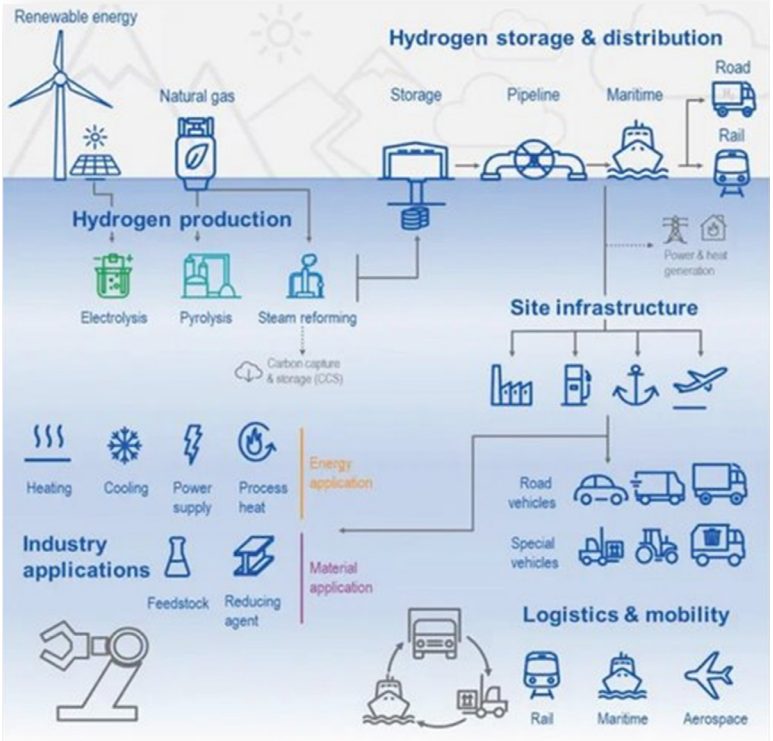

Figure 2. Hydrogen value chain fields, interconnection, and roles
Source: T.U.V. SUD (2022)

The market analysis indicated that, according to a recent report published by MarketsandMarkets (2023), the hydrogen global market was valued at USD 222.0 billion in 2022 and is projected to reach USD 410.6 billion by 2030, with a CAGR (compound annual growth rate of 7.8% during the forecast period (Figure 3). The growth of the hydrogen market is driven by the increasing adoption of hydrogen-based fuel cell vehicles and by increasing government initiatives to reduce greenhouse gas emissions and achieve a net-zero target by 2050 (MarketsandMarkets, 2023).

In particular, Greece's current hydrogen consumption in 2022 has been estimated at 326.54 kt, with just 0.11 kt recorded as clean hydrogen consumption (IEA, 2023).

Greece is poised to embark on a transformative journey towards a decarbonized future, with hydrogen playing a pivotal role in this transition (Nanaki et al., 2024). While the Greek H2 market is still in its nascent stages, it holds immense growth potential, driven by a supportive policy environment, abundant renewable energy resources, and a growing demand for clean energy solutions. Currently, Greece lacks commercial renewable H2 production facilities (Nanaki et al., 2024; Petrova, 2022). However, the country is actively pursuing the development of a robust H2 production infrastructure, with several promising projects in the pipeline (Aposporis, 2023).

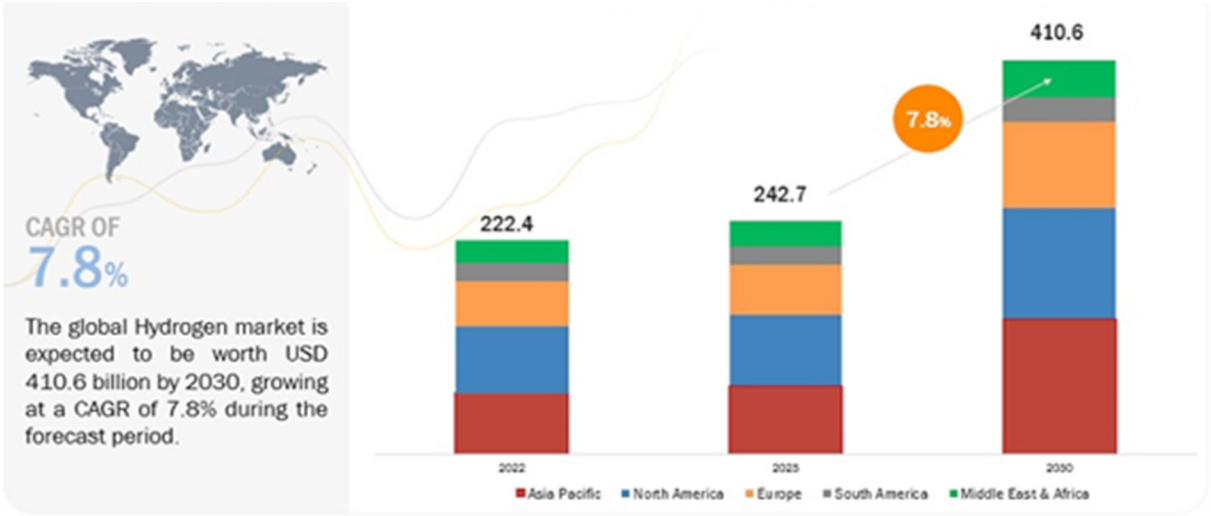

Figure 3. Hydrogen market global forecast to 2030 (USD BN)
Source: MarketsandMarkets (2023)

The Greek government actively fosters the development of the green hydrogen market through various policy instruments:

- National Energy and Climate Plan (NECP): This plan outlines Greece's roadmap for achieving climate targets, with GH2 playing a crucial role in decarbonizing various sectors. The NECP sets ambitious targets for green hydrogen production capacity, aiming for 300 MW by 2030 and a staggering 6 GW by 2050 (EC, 2023).
- H2 Support Scheme: This financial support program incentivizes investments in green hydrogen projects. Grants are provided for production, storage, and distribution infrastructure, alongside subsidies for green hydrogen vehicles and refueling stations. This scheme offers a significant financial push to overcome initial investment hurdles and stimulate broader market participation.

Beyond national policies, EU-funded projects provide additional impetus for green hydrogen market development in Greece. The Greek green hydrogen market is expected to grow significantly, driven by a supportive policy landscape, abundant renewable energy resources, and a growing demand

for clean energy solutions. With continued investment, innovation, and strategic partnerships, Greece has the potential to emerge as a frontrunner in the global H2 revolution, contributing to a sustainable and decarbonized future.

3. PESTEL ANALYSIS

To effectively navigate the complexities of decarbonization, a comprehensive PESTEL analysis is crucial. This framework examines the interplay of Political, Economic, Social, Technological, Environmental, and Legal factors that will influence the industry's transition.

This section presents the PESTEL analysis conducted to identify Political, Economic, Social, Technological, Environmental, and Legal factors influencing the transition to hydrogen-based technologies. Along with the analysis, mitigation strategies are also identified. Indeed, PESTEL analysis provided a comprehensive understanding of the evolving hydrogen sector, and its summary is illustrated in Figure 4.

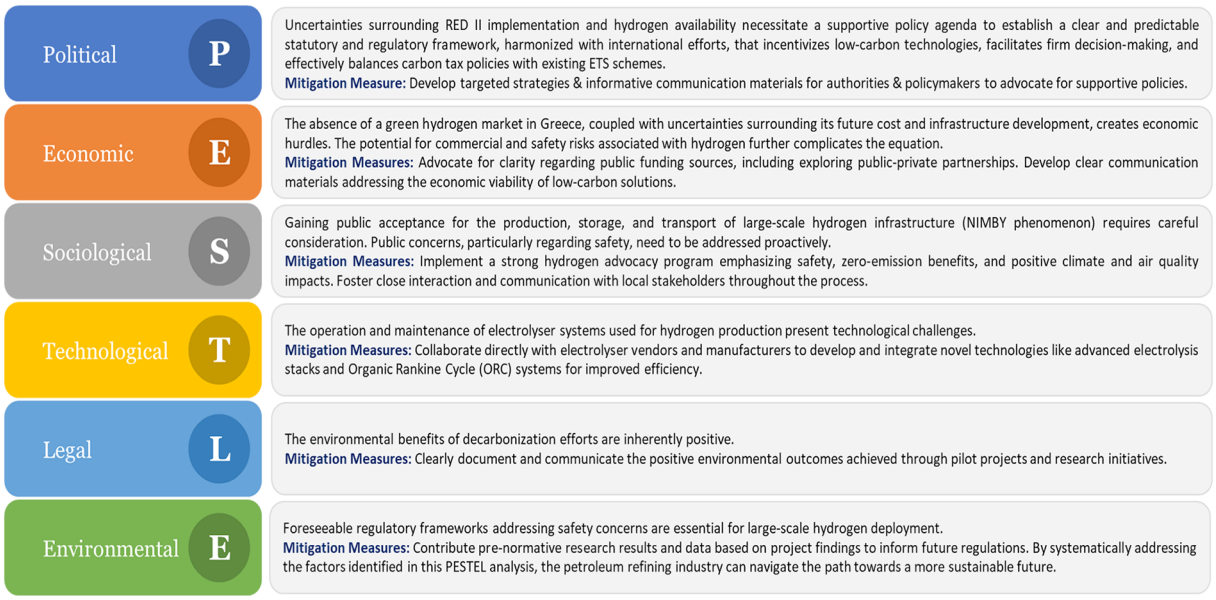

Figure 4. PESTEL analysis for hydrogen transition in petroleum refining
Source: Author's illustration

Political Factors. Uncertainties surrounding the implementation of the Renewable Energy Directive II (RED II) and the future availability of hydrogen by 2030 pose significant challenges. A supportive policy agenda is essential to foster a robust low-carbon hydrogen supply chain. This requires a clear and predictable statutory and regulatory framework that incentivizes the adoption of low-carbon technologies and facilitates firm decision-making, ideally aligned with international efforts. Balancing carbon tax policies with existing emission trading schemes (ETS) will be a crucial consideration.

Mitigation Measures: Develop targeted strategies and informative communication materials for authorities and policymakers to advocate for supportive policies.

Economic Factors. The absence of a green hydrogen market in Greece, coupled with uncertainties surrounding its future cost and infrastructure development, creates economic hurdles. The potential for commercial and safety risks associated with hydrogen further complicates the equation.

Mitigation Measures:
- Advocate for clarity regarding public funding sources, including exploring public-private partnerships.
- Develop clear communication materials addressing the economic viability of low-carbon solutions.

Social Factors. Gaining public acceptance for the production, storage, and transport of large-scale hydrogen infrastructure (NIMBY - not in my back yard - phenomenon) requires careful consideration. Public concerns, particularly regarding safety, need to be addressed proactively.

Mitigation Measures:
- Implement a strong hydrogen advocacy program emphasizing safety, zero-emission benefits, and positive climate and air quality impacts.
- Foster close interaction and communication with local stakeholders throughout the process.

Technological Factors. The operation and maintenance of electrolyser systems used for hydrogen production present technological challenges.

Mitigation Measures: Collaborate directly with electrolyser vendors and manufacturers to develop and integrate novel technologies like advanced electrolysis stacks and Organic Rankine Cycle (ORC) systems for improved efficiency.

Environmental Factors. The environmental benefits of decarbonization efforts are inherently positive.

Mitigation Measures: Clearly document and communicate the positive environmental outcomes achieved through pilot projects and research initiatives.

Legal Factors. Foreseeable regulatory frameworks addressing safety concerns are essential for large-scale hydrogen deployment.

Mitigation Measures:
- Contribute pre-normative research results and data based on project findings to inform future regulations.
- By systematically addressing the factors identified in this PESTEL analysis, the petroleum refining industry can navigate the path towards a more sustainable future.

4. FUTURE RESEARCH DIRECTIONS

To maintain a comprehensive understanding of the evolving hydrogen sector, it is essential to periodically reevaluate growth projections from various sources and to conduct a new assessment to reflect the latest market dynamics. This ongoing process ensures that research remains strategically aligned with the ever-changing hydrogen landscape.

A future research direction of the hydrogen market characterization could also focus on the suitability of large-scale electrolysis powered by renewable energy sources (RES) within the context of refinery operations. It should also assess the potential for achieving global circularity through the complete utilization of all intermediate streams and materials generated during the process.

5. CONCLUSION

Summing up some conclusions resulting from the market analysis conducted for this study, it could be mentioned that renewable energy sources are steadily increasing in Europe, and this trend is expected to continue. The flourishing hydrogen market, particularly for green hydrogen, presents a substantial opportunity, especially in the refinery industry. Hydrogen is an essential element to enable a carbon-free future in our global economy. The focus on green hydrogen production for the refining sector aligns with market trends and benefits from supportive policies. Cost challenges should be addressed in this rapidly growing market.

PESTEL analysis provided a comprehensive understanding of the evolving hydrogen sector. Overall, the study highlights the necessity of a holistic approach, considering the entire value chain, including green electricity management, waste heat regeneration, wastewater treatment, and water reuse and the results of this research can inform policymaking, shape investment decisions, and ultimately facilitate the successful integration of hydrogen into petroleum refining processes. Renewable hydrogen - crucial component of future green fuels – and green hydrogen play a key role in reducing emissions and fostering the transformation of Europe's energy system and the pathway to a sustainable energy future.

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A Review of Public Interest in Renewable Energy in the Visegrad Group Countries

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Abstract: *The issue of energy transition has become one of the most urgent in the global economy in recent years, with public opinion playing a significant role in shaping energy policies. This study examines public interest in renewable energy by focusing on keywords related to photovoltaic technologies in the Visegrad Group countries. We have used Google Trends and Semrush data to explore public interest in renewable energy during 2024 and over the five-year period 2020-2024. Based on the constructed distribution map of popularity scores, we found that rural and less urbanized areas showed significantly higher interest, while capital cities and industrial regions showed lower levels of engagement. Furthermore, an analysis of the dependencies of intent by country and intent by keyword type was conducted. The chi-square test confirms that targeted searches for photovoltaic-related information are statistically significant. Our results confirm that citizens of the Visegrad Group countries are actively seeking information about photovoltaics, with the strongest dependence observed in Poland, followed by Slovakia, Hungary, and the Czech Republic.*

1. INTRODUCTION

Since the beginning of 2022, respected journals and societies have been focusing on the analysis of the unprecedented energy shock that is literally changing the priorities of energy transformation in the world (World Energy Council, 2022, 2024; International Energy Agency, 2022). Whereas previously the goal was to counter global warming and pollution - which until 2022 was considered one of the most impressive challenges in the 21st (United Nations, 2022), with the beginning of the Russian invasion of Ukraine, energy security and accessibility have been threatened. The European Union (EU) is facing a common problem, but the consequences have been different for each member state, depending on the structure of the energy package, regional and economic conditions.

According to the World Energy Council (2021), European countries dominate the top positions in the 2021 Top Trilemma performers ranking, holding 10 out of 14 positions and 7 out of 10 positions in the Top 10 Rank Performers in Energy Security category. However, this is not the case for all EU countries, as there is a significant "gap" between northern, southern and eastern European countries (Haber et al., 2021; Bouzarovski & Tirado Herrero, 2017). Energy security, affordability, and environmental sustainability in the Visegrad countries, which include the Czech Republic, Poland, Hungary, and Slovakia, have always been critically considered due to the regional and historical context of these countries' dependence on fossil energy sources (Riepl & Zavarská, 2023; Jonek-Kowalska & Rupacz, 2024). Therefore, when the war broke out in 2022 and the energy crisis shook the world, it was clear that the Visegrad Group countries would be under particular pressure (Żuk et al., 2023).

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Difficult times call for difficult decisions. At the beginning of 2022, the world was still recovering from the Covid 19 crisis (Zakeri et al., 2022; Hussain et al., 2023). Economic problems, a growing energy crisis, and political instability created conditions of considerable tension in society. In such circumstances, public opinion and awareness can be a significant argument in support of energy policies or a significant obstacle (Kastrati et al., 2023; Dasgupta & De Cian, 2018). Thus, understanding public attitudes and awareness is crucial not only as a retrospective ('post facto') assessment of policy outcomes but also as a tool for planning socially responsive policies.

In order to study public opinion, it is becoming more and more common to analyze data from Internet users' search queries, posts and comments on social networks and blogs. These data are primary indications of the interests, opinions, and doubts of the population (Álvarez-García et al., 2023). In favor of this method of researching social opinion, the authors cite such arguments and advantages as the availability of large samples of data at a low cost and the availability of data for a long period of time, which allows for flexibility in choosing research methods and topics (Mellon, 2013; Álvarez-García et al., 2023). In particular, search term-based surveys are often used as an effective and statistically significant way to study public opinion on topics related to the environment, climate change and sustainability (Dabbous et al., 2023).

This paper addresses the issue of public interest in renewable energy sources in the Visegrad Group countries with the aim of assessing and identifying the current state and dependencies in the perception of this issue by the population across these countries. This study fills a research gap in understanding public acceptance and interest in renewable energy within the Visegrad Group countries. This problem has been studied only to a limited extent in this region, despite the growing global interest in these topics. By leveraging digital search data, the study offers an approach to assessing public interest in solar energy, providing insights for policymakers, businesses, and researchers. In addition, it highlights regional differences in interest in renewable energy and the characteristics of user interaction with content on this topic.

We examine the search intentions of residents in the Visegrad Group countries regarding photovoltaic energy. Additionally, we explore whether these intentions are influenced by factors such as governmental involvement, geographic location, and brand presence. Investigating public engagement and intention could provide valuable insights into local factors that affect renewable energy transitions, ultimately enriching the broader discourse on sustainable energy adoption in Central and Eastern Europe. The focus on photovoltaic technologies provides a concrete, localized picture of changing public attitudes toward renewable energy for households, thus providing information on the readiness of inhabitants to participate in the energy transition.

2. LITERATURE REVIEW

The European Union's climate goals, defined through policies, agreements, and regulations (e.g., the European Green Deal, Fit for 55, and the Climate Law), require member states to develop national strategies such as National Energy and Climate Plans (NECPs). Structural transformations in the energy, industrial, and transportation sectors resulting from NECPs lead to public debate about economic costs, technological feasibility, and societal impacts. Governments must solve potential social resistance, which can hinder policy implementation and lead to delays, project modifications, community opposition, and increased dependence on energy imports (Kost et al., 2021; Buchmayr et al., 2021). Thus, ensuring public acceptance and engagement may be crucial for achieving long-term sustainability goals.

According to Batel et al. (2013), effective implementation of renewable energy technologies requires a multilateral approach that actively involves social actors. Importantly, they distinguish between acceptance and support: acceptance refers to passive tolerance, while support implies active endorsement and engagement. This distinction highlights the need for proactive public involvement rather than mere acquiescence. Public skepticism toward energy transition often stems from economic concerns and perceived negative neighborhood factors (Komendantova, 2021; Buchmayr et al., 2021). These authors note that the second factor can be addressed by changing technologies, as certain communities may have prejudices against specific technologies, while other technologies may have high support due to local experience and positive opinions formed in the media or discourse. Understanding public sentiment toward specific renewable energy technologies is essential for predicting societal responses and ensuring smoother project implementation. Studying public opinion on specific technologies is essential for anticipating societal responses to their implementation. This facilitates dialogue between policymakers and the public, enabling either the presentation of well-founded arguments in support of projects or the reconsideration of implementation strategies.

The Visegrad Group (Czech Republic, Hungary, Poland and Slovakia) countries have relied mainly on Russian fossil fuels (Żuk et al., 2023; Riepl & Zavarská, 2023) and are therefore among the regions most affected by the energy crisis. Moreover, as Mišík and Oravcová (2024), Brusenbauch Meislová (2019) wrote, the Visegrad Group countries have different and uncoordinated strategies for achieving the energy transition to green energy and energy security. The skepticism within the EU regarding energy transition and decarbonization in Visegrad Group countries is driven by their historical reliance on fossil fuels, economic concerns, and political resistance, as reflected in their opposition to the EU's proposal to achieve climate neutrality by 2050. However, public perception in the Visegrad Group countries does not entirely align with governmental skepticism. Eurobarometer surveys indicate that societal attitudes toward sustainable energy solutions in these countries are close to the European average and continue to improve (Surwillo & Popovic, 2021). Nevertheless, a key challenge identified by Surwillo and Popovic is the low level of social mobilization, characterized by a weaker sense of personal responsibility for climate action. This lack of engagement could significantly influence public reactions to economically demanding energy policies, particularly those requiring higher financial contributions, lifestyle adjustments, or the adoption of new technologies.

Conducting social opinion research presents several challenges, particularly when using traditional data collection methods such as surveys, interviews, and focus groups. These approaches often require extensive preparatory work, significant financial resources, and long data collection periods, which can extend over several years. This poses additional difficulties when studying multiple countries simultaneously, as it increases the scope and complexity of the research (Komendantova, 2021; Dabbous et al., 2023). To address these challenges, researchers are increasingly turning to digital data sources, particularly social media content and search engine queries. These methods provide access to both historical and real-time data, offering quantitative and qualitative insights that enhance research flexibility. Unlike traditional surveys, digital data collection allows for longitudinal analysis, enabling researchers to track public opinion trends over time. Furthermore, it facilitates cross-regional studies using consistent methodologies, making it possible to examine social attitudes in regions where traditional surveys may be unavailable (Mellon, 2013).

Among non-traditional data sources, search engine queries have gained particular prominence. Google Trends (GT) is one of the most widely used tools in empirical economic research, offering free access to keyword popularity data. This approach allows researchers to monitor emerging

trends and compare search term frequencies. However, GT's Search Volume Index (SVI) presents a notable limitation: it provides relative search interest rather than absolute search volumes, which can restrict the precision of quantitative analyses (Cebrián & Demenech, 2023). To overcome this limitation, researchers often supplement GT data with alternative keyword search volume tools, which estimate search activity based on data collected from third-party providers. The versatility of search query data enables researchers to explore a broad range of research questions. Successful studies on the dynamics of public interest include research on biodiversity conservation, as well as analyses exploring the relationship between rising internet searches and factors such as international climate events, political decisions, high-profile celebrity statements, and extreme weather events (Burivalova et al., 2018; Álvarez-García et al., 2023). Accordingly, examining the relationship between public interest and geopolitical events and crises is a logical approach, potentially providing valuable insights in a region among the most affected by the energy crisis.

3. METHODOLOGY AND DATA

This paper utilizes data from Semrush and Google Trends to analyze public interest in solar energy-related topics across Visegrad Group countries. Semrush (2024) gathers search engine results page (SERP) data from third-party providers, including both organic and paid search results from Google. This dataset captures top-ranking domains and search terms, updated monthly to reflect shifts in search trends. From Semrush, we extracted the following keyword-related metrics:

1. Keyword Search Volume: the average number of monthly searches for a keyword over the past 12 months.
2. Intent: categorizing user search behavior based on intent (e.g., informational, transactional). To account for differences in internet usage, Keyword Search Volume was adjusted based on Eurostat (n.d.) percentage of the population using the internet and converted into the number of search queries per 10,000 users. The data cover the period from January 2024 to December 2024 for one-year statistics and from January 2020 to December 2024 for five-year statistics.

We examine whether the interest of Visegrad Group residents in searching for information about photovoltaics online is influenced by the type of information—whether it is provided by enterprises, government sources, location-based, or general informational content. With such purpose we grouped keywords into Regular (general terms), Locale (including geographic names), Brand (commercial names), and Government (keywords related to regulations or subsidies). To analyze this relationship, we will use association tables.

Keywords were identified using Semrush Keyword Magic Tool, selecting terms related to "solar energy," "solar panels/batteries/modules," and "photovoltaics" in each country's national language, restricted to the respective geographic region. This process yielded unbalanced keyword lists: Poland (3,690 keywords), Czech Republic (281), Slovakia (253), and Hungary (467). Given the high number of keywords, we applied a search volume cut-off threshold: 90 queries for Hungary and 110 for Poland, removing keywords contributing less than 0.001 to the total search volume. The cut-off principle is justified by authors, emphasizing that counting all queries is impossible and inherently part of the methodological approach (Lillo & Ruggieri, 2021; Álvarez-García et al., 2023). After applying these criteria, the final balanced keyword lists included Poland (269 keywords), the Czech Republic (281), Slovakia (252), and Hungary (275).

Google Trends data were used to analyze keyword popularity by region, with values ranging from 0 to 100, representing a keyword's proportion of total searches. Popularity values were derived from one-year (2024) and five-year (2020–2024) datasets.

To create statistical maps, the popularity value for each region was calculated as the weighted average of the top 10 keyword popularity scores, with weights assigned based on each keyword's search volume relative to the most popular keyword in the dataset.

4. RESULTS

To analyze keyword popularity across regions—both within individual countries and in a cross-regional context—we created analytical maps using Google Trends data (see Figure 1). Unlike the Search Volume Index, which measures a term's relative popularity over time, the index used in this study reflects keyword popularity in a given region relative to the total number of searches within the country.

To account for regional variations in keyword usage, we based the country-level popularity index on the top 10 keywords. Notably, none of these keywords are geo-referenced or tied to specific locations. The analysis covers both one-year (2024) and five-year (2020–2024) periods, allowing for an assessment of evolving trends across regions. The findings indicate a decline in interest across all regions in 2024 compared to previous years, though areas with consistently high keyword popularity remained unchanged. The most significant decline occurred in Hungary, where the regional average in 2024 was 13% lower than the five-year average. Slovakia and Poland experienced similar declines of approximately 10%, while the Czech Republic saw the smallest decrease at around 6%.

The popularity scores are distributed as follows, with the highest values observed in: Vysočina (98.26/96.24) in the Czech Republic, Žilina region (96.8/95.3) in Slovakia, Podkarpackie (96.94/98.32) in Poland, and Békés (85.13/86.8) and Bács-Kiskun (79.75/92.48) in Hungary. Interestingly, in all four countries, capital cities—including Prague, Bratislava, Warsaw, and Budapest—consistently show the lowest levels of interest. In the Czech Republic, Slovakia, and Poland, rankings remain relatively stable across regions in both the short and long term, with only minor fluctuations (1–3 position changes relative to the average). In contrast, Hungary exhibits greater variability, with position changes reaching up to 8 places.

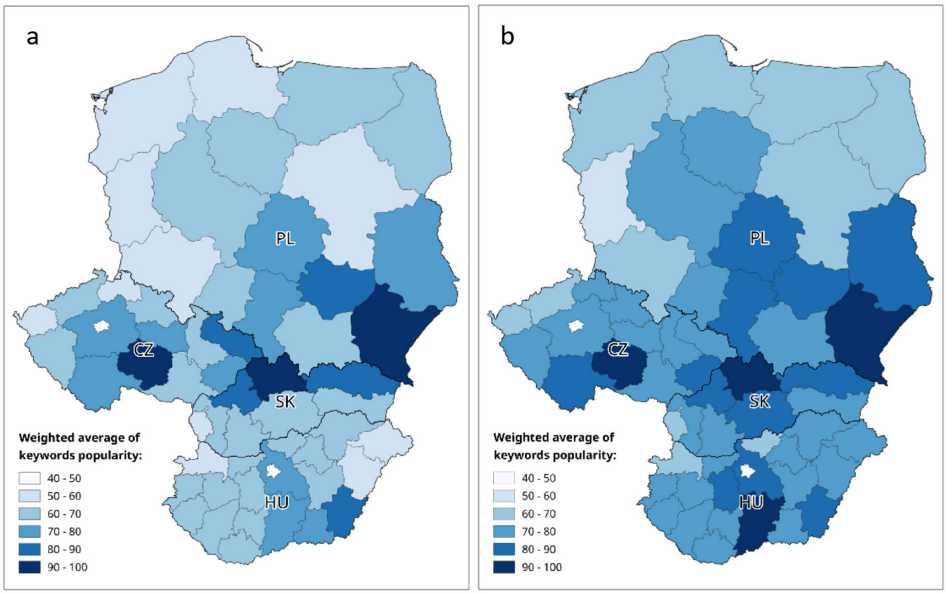

Figure 1. Regional Keyword Popularity (a: One-Year Data, b: Five-Year Data)

Source: Own processing based on Google Trends data

Keyword intent reflects the purpose behind a user's search query, with Semrush categorizing it into four types: Informational (I), Commercial (C), Navigational (N), and Transactional (T), representing a gradual progression from initial interest to action. Informational intent corresponds to the learning phase, where users seek general knowledge, asking questions such as "What is it?" or "How does it work?". Commercial intent represents the consideration phase, during which users compare options, research brands, and read reviews. Navigational intent indicates brand awareness, as users search for specific websites or brands. Transactional intent marks the final stage, where users are ready to make a purchase or sign up for a service.

Table 1. Descriptive statistics by Intent and Country

	CZ			HU			PL			SK		
Intent	**N**	**Avg**	**SD**	**N**	**Avg**	**SD**	**N**	**Avg**	**SD**	**N**	**Avg**	**SD**
C	60	0.10	0.20	24	0.23	0.23	68	0.08	0.06	73	0.07	0.12
I	156	0.12	0.24	202	0.28	0.42	147	0.12	0.17	128	0.13	0.27
I, C	9	0.19	0.28	25	0.14	0.06	3	0.04	0.02	3	0.06	0.03
I, T	41	0.10	0.28	8	0.23	0.10	29	0.22	0.34	24	0.09	0.16
N	5	0.15	0.17	10	0.33	0.31	17	0.10	0.08	8	0.18	0.31
N, T	2	0.17	0.12	4	0.20	0.16	3	0.05	0.02	5	0.03	0.01
T	4	0.01	0.00	0	0.00	0.00	0	0.00	0.00	7	0.02	0.00

Source: Own calculations based on Semrush (2024)

Analyzing the distribution of keyword intent provides insights into user behavior at different stages of this journey. Table 1 presents the intent distribution across the Visegrad Group, including keyword count (N), mean adjusted search volume (Avg), standard deviation (SD), and median adjusted search volume (M). The results show that informational intent dominates across all four countries, with Hungary having the highest share (74%), indicating a strong focus on learning rather than purchasing. In Slovakia, Poland, and the Czech Republic, informational intent ranges from 52% to 56%. Commercial intent follows a similar pattern, accounting for 29% in Slovakia, 26% in Poland, and 22% in the Czech Republic, while Hungary has a notably lower share at 9%. Navigational intent is most common in Poland (6%), reflecting a higher volume of searches for specific brands or websites. Transactional intent remains minimal, with Slovakia (3%) having the highest share, followed by the Czech Republic (1.5%), while Hungary and Poland show no purely transactional searches. Additionally, there is a significant share of searches classified as both informational and transactional, ranging from 10% to 15% in all countries except Hungary, where it stands at just 3%. This suggests that in most cases, users transition from research to purchase-related searches, though this pattern is less pronounced in Hungary.

We found that the response rate of residents is low, highlighting the need for more effective strategies to target potential individuals interested in photovoltaics. Across Visegrad Group countries, residents primarily searched for general Informational content related to photovoltaics. Information provided by state authorities, such as details on government subsidies for photovoltaic equipment, was the second most frequently searched category. The Chi-square test confirms a significant relationship between search intent and the type of information sought, with a significance level approximately equal to zero. This indicates that targeted searches for photovoltaic-related information are statistically significant.

Table 2 presents directional measures for intent by type of web search. These measures quantify the reduction in the error of predicting type of web search by intent or vice versa. The highest Goodman & Kruskal's tau value is 0.373 in Poland when intent is the dependent variable, meaning

a 37.3% reduction in misclassification. When type is dependent, it is expected a 39.2% reduction in misclassification. The lowest value was observed in the Czech Republic. Notably, in Slovakia, the Goodman & Kruskal's tau values differ significantly, with only a 6.4% reduction in misclassification when intent is the dependent variable. All directional measures are statistically significant, with *p*-values smaller than 0.01.

Table 2. Directional measures for intent by type of web search

Measure	Stat	Visegrad Group	CZ	HU	PL	SK
Lambda	**Symmetric**	0.117	0.033	0.064	0,457	0.107
	Intent Dependent	0.148	0.000	0.085	0,433	0.058
	Type Dependent	0.073	0.100	0.043	0,482	0.207
Goodman & Kruskal tau	**Intent Dependent**	0.114	0.028	0.096	0,373	0.064
	Type Dependent	0.143	0.111	0.109	0,392	0.217
Uncertainty Coefficient	**Symmetric**	0.149	0.106	0.146	0,359	0.173
	Intent Dependent	0.130	0.086	0.136	0,347	0.141
	Type Dependent	0.174	0.139	0.158	0,372	0.226

Source: Own calculations based on Semrush (2024)

Table 3. Symmetric measures for intent and type

Statistics	Visegrad Group	CZ	HU	PL	SK
Phi	0.655	0.623	0.657	0.967	0.742
Cramer's V	0.378	0.360	0.379	0.558	0.429
Contingency coef.	0.548	0.529	0.549	0.695	0.596

Source: Own calculations based on Semrush (2024)

Table 3 presents symmetric measures such as Phi, Cramer's V, and the Contingency Coefficient. All values are statistically significant, with *p*-values approximately equal to zero (not reported here). These results confirm that citizens of Visegrad Group countries actively seek information about photovoltaics. In Poland, the Phi coefficient is 0.967, indicating a strong dependency. Followed by Slovakia in second place, Hungary and the Czech Republic ranking third and fourth, respectively.

5. CONCLUSION

This study examined search intent for photovoltaic energy in the Visegrad Group countries. Analysis of interest distribution maps over two periods revealed a clear trend: rural and less urbanized areas showed significantly higher interest, while capital cities and industrial regions displayed lower engagement. This pattern likely reflects factors such as available space, favorable weather, energy independence goals, and economic conditions. Notably, high interest in eastern Poland, eastern Slovakia, and southern Hungary suggests that government policies, incentives, and climate influence adoption. In contrast, large cities may face barriers like infrastructure constraints and centralized energy reliance. These findings highlight the need for further research into regional disparities in solar adoption.

Our findings show that informational searches are the most common, reflecting the early stage of the user journey toward adopting photovoltaic energy. In Slovakia, the Czech Republic, and Poland, search terms with both informational and transactional intent rank third with a relatively high share, suggesting a positive shift from research to purchase-related queries. Commercial intent is the second most frequent, indicating interest in products and services but not necessarily an immediate intent to buy.

Chi-square test confirms a significant relationship between search intent and the type of information sought, with a near-zero significance level. This validates the relevance of targeted searches for photovoltaic-related information. The highest Goodman & Kruskal's tau value (0.373) was observed in Poland, indicating a substantial reduction in misclassification, while the lowest was in the Czech Republic. Slovakia showed notable differences in tau values depending on the dependent variable. Symmetric measures such as Phi, Cramer's V, and the Contingency Coefficient further support the strong link between search intent and information type. Poland exhibits the highest Phi coefficient (0.967), followed by Slovakia, Hungary, and the Czech Republic. These findings confirm active public interest in photovoltaics across the Visegrad Group countries.

Our research highlights the need for targeted strategies to better reach interested audiences, given the relatively low response rate observed. Future studies could explore how policy changes, technological advancements, or seasonal variations further influence public engagement with photovoltaics. These insights can support more effective promotion and adoption of renewable energy in the Visegrad Group.

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The 'Price' of Food as a Determinant of Food System Independence

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Food loss;
Food waste

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Abstract: *The idea for this paper is based on the relationship between a starving population and huge amounts of wasted food. The scarcity of resources for production, population growth, the growing number of hungry people and other prerequisites requires the adoption of timely and adequate social, economic, environmental and governmental decisions. All of them are relevant to the formation of the so-called 'price' of food. Its vital importance is a determining factor for the independence of the food system of countries - a guarantor of achieving food security. In search of opportunities to minimize the amounts of wasted food, their correct conceptual characterization is necessary - for example, food waste and others. Reducing the amount of waste requires optimizing production and activities, respectively, and costs of food production.*

1. INTRODUCTION

In this paper, the 'price' of food is examined in terms of its strategic nature. Attention is drawn to its social significance, on the one hand, from the point of view of maintaining the biological processes of the individual and his vital survival. On the other hand, the economic 'price' of food is important – in terms of the costs of food production.

Society's concern for environmental protection for future generations gives rise to the need to search for opportunities to optimize production and activities, i.e. the ecological aspect. Clean nature is also a guarantor of the health status of the population.

The realization of the social, economic and ecological 'price' of food is achieved by government decisions.

2. FUNDAMENTAL PROPOSITIONS

Public data indicate that by 2030, the global 'production' of solid waste is expected to reach 2.59 billion tonnes per year. By 2050, this is expected to increase to 3.40 billion tonnes per year.

'Waste' means substances or objects that are being disposed of or are intended to be disposed of, or are required to be disposed of under national law (European Union, 2007).

Waste means substances or objects, other than radioactive materials covered by other international agreements (Organisation for Economic Co-operation and Development, 2004).

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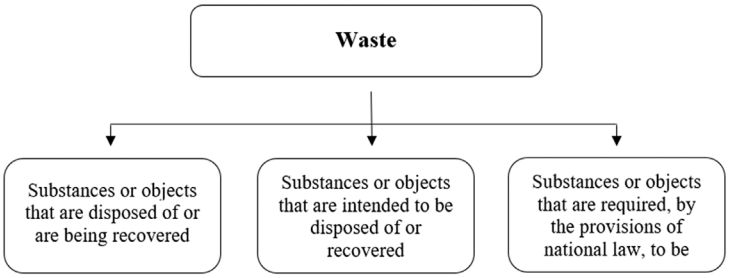

Figure 1. Substances or objects that are classified as waste

Source: Own processing

'Waste' means any substance or object which the holder discards or intends or is required to discard (European Union, 2024).

Households, industries and processes produce waste daily and inevitably. This requires optimizing activities and utilizing the waste created, produced (when that is possible).

Conditionally, waste can be divided into the following groups:

1. Liquid waste - these are waste oils, sludge, and washing water. Waste quantities of detergents, dirty water and others allow their separation as wastewater. They are formed by the activities of households and industries.
   From the point of view of the place where they arise, we distinguish point and non-point sources of liquid waste:
   a. point source of wastewater - the quantities of liquid waste obtained as a result of production activities.
   b. non-point source of wastewater - natural quantities of waste formed without human intervention.
   To limit the produced and unproduced amounts of liquid waste, their recovery and reuse (for example, composting of organic waste) is proposed whenever possible.
2. Solid waste – this is waste and sludge resulting from the production activities of enterprises, commercial establishments and households. In general, solid waste is divided into the following groups:
   a. glass and ceramics – these wastes allow for recycling, but for this purpose, they must be disposed of properly.
   b. Plastic waste – this solid waste is in the form of containers, bottles and others formed by businesses and households. Plastics are not biodegradable, and most of them cannot be recycled. For this reason, they should not be mixed with everyday household waste.
   c. paper waste – these are newspapers, packaging materials, cardboard, and other paper products that can be recycled if disposed of properly.
   d.metals and cans – this waste is formed from the consumption of processed foods in metal cans by households, commercial establishments, etc. The ability to recycle most of the metals allows for reuse.
3. Organic waste – this is rotten garden and food waste. It must be ensured that it is not mixed with everyday waste to avoid the production of methane during its decomposition.
4. Recyclable waste – objects and furniture that can be recycled.
5. Hazardous waste – waste that poses a threat to the environment. These are flammable, corrosive, toxic and reactive materials.

According to another classification, different types of waste products are – Figure 2.

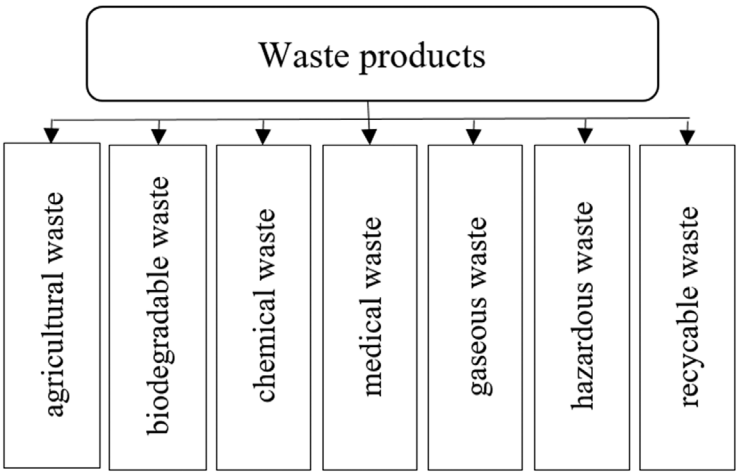

Figure 2. Types of waste products

Source: Own processing

According to their origin, waste is classified in detail as follows (University of Tartu, 2024):

1. Mining
   a. waste rock
   b. tailings
   c. mone water
   d. chemicals and others
2. Agriculture, Forestry
   a. obsolete pesticides and fertilizers
   b. organics
   c. plastics and containers
   d. manure
   e. slaughter waste and others
3. Industry
   a. textiles
   b. plastics
   c. chemicals
   d. ash
   e. nuclear waste and others
4. Household, commercial and government bodies
   a. municipal solid waste
   b. electronics
   c. medcal waste
   d. types and others
5. Construction, demolition
   a. concrete
   b. plastic
   c. wood
   d. metal
   e. glass and others
6. Wastewater treatment
   a. sewage sludge
   b. solid waste
   c. chemicals and others.

Another classification divides waste into:

1. Hazardous waste
   a. radioactive waste
   b. industial waste, electronic waste, medical waste, etc.
2. Non-hazardous waste
   a. municipal waste
      i. organic waste
   ii. packaging waste
   iii. other materials: glass, plastic, metal, etc.
   b. other non-hazardous (industrial) waste.

The presented classification features are indicative and do not exhaust the variety of classifications for covering residues and waste from production and non-production activities.

3. AGRICULTURAL RESIDUES AND WASTE

For the purposes of this study, it is appropriate to distinguish between residual and waste quantities of:

1. Biological[2] residues and waste from crop and livestock production.
   a. Residues from organic production – these are *residues* from the cultivation of plants and animals, as a result of ongoing biological processes.
   A specific point about these productions is that, along with the main production, a side or additional product is also produced - Figure 3.
   b. Failure to use the produced biological residue will redirect it to the group of *waste from biological production*.

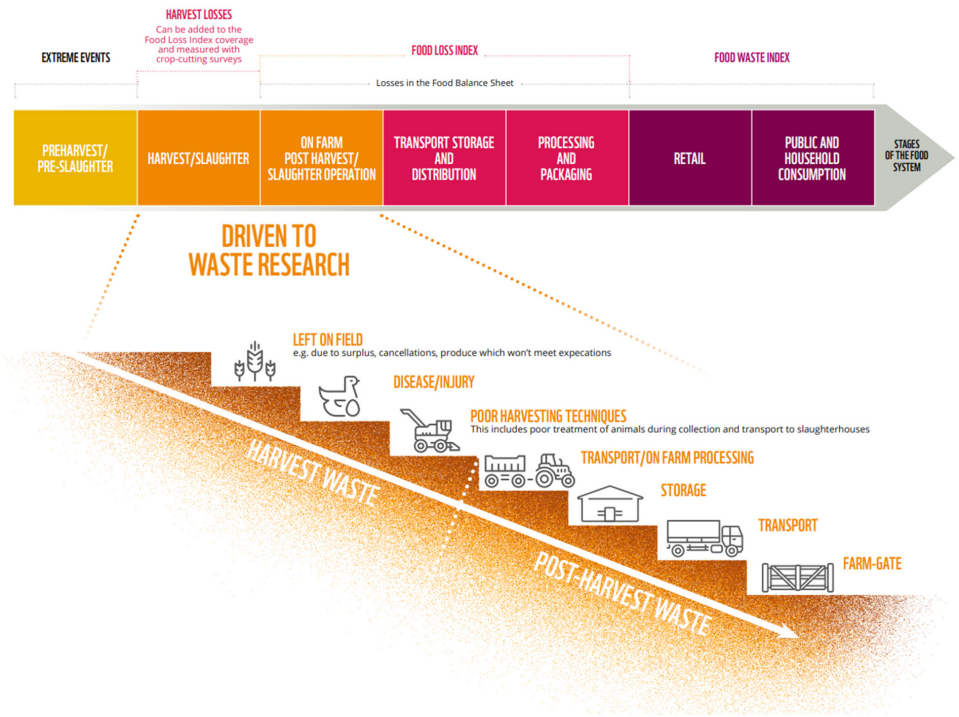

Figure 3. Residuals and Waste in the Supply Chain

Source: WWF-UK (2021)

[2] The distinction is conditional in nature. The aforementioned classification does not focus on other biological residues and waste, such as medical waste.

2. Non-biological residues and waste:
    a. *Non-biological residues* - these are residues from, for example, extractive industries.
    b. If residues from non-organic production are not used or do not allow them to be used at a later stage, they are characterized as *non-organic waste*.

The presented classification allows for a detailed description of the characterized residues and waste:
1. Depending on the substance, solid and liquid residues and waste.
2. Depending on the activity - production and non-production residues and waste.
3. Depending on the origin and the substances they are made of – hazardous and non-hazardous.
4. Depending on the source – producers, consumers, etc.

The variety of classification features also allows for a combination of residues and waste.

As a result of crop and livestock farming activities, agricultural residues and waste are generated with the potential to be used as a resource for production.

Agricultural residues and waste allow their classification (Maximize Market Research, 2024):
1. By type of plant and animal residues and waste.
    a. Crop residues and waste.
    b. Animal manure and bedding materials.
    c. Food industry waste.
    d. Agricultural by-products.
2. According to the services for the management of plant and animal residues and waste along the supply chain.
    a. Collection of residues and waste from plant and animal production activities.
    b. Transport of residues and waste from plant and animal production activities.
    c. Storage of residues and waste from plant and animal production activities.
    d. Ancillary, processing services.
3. According to the process of processing plant and livestock residues and waste.
    a. Composting – decomposition of organic waste and its transformation into compost.
    b. Anaerobic digestion – conversion of organic waste into biogas and biomass.
    c. Biomass – its use as a raw material for the production of biofuels, biochemicals or biomaterials.
    d. Bioenergy production – generation of renewable energy from agricultural waste
    e. Recycling – creation of new products or materials from residual and waste materials.

The inability to use leftovers and waste, i.e. unusable quantities, is a prerequisite for their separation as garbage. Food waste creates conditions for the emergence of food social insecurity, including malnutrition of the population. Globally, 1.2 billion tons of food are lost even before they leave the farm, i.e. at the farm level. For their production, 4.4 million km2 of agricultural land and 760 km3 of water are used (World Wide Fund For Nature, 2021).

Food waste is a global problem. The responsibility for minimizing food waste and waste generated in private households is individual, personal. 58% of food waste is recorded in middle- and high-income regions.

'Food waste' is defined as food waste and related inedible parts that have been removed from the food supply chain for humans (UN Environment Document Repository, 2024).

About a third of all food produced for human consumption is wasted along the food chain from farm to fork. The economic loss amounts to about $940 billion annually (World Recources Institute, 2024).

The huge amount of land, water and energy required for food production has an impact on climate change and environmental problems.

The main factor for agricultural residues and waste is overproduction in agriculture and market saturation, which leads to lower prices. The complexity of the supply chain requires optimizing processes (Petrova, 2023), improving waste transformation technologies, and exploring new digital applications for agricultural residue and waste management.

The growing environmental awareness has allowed the transformation of agricultural residues and waste into a resource. Their utilization, on the one hand, creates products with added value (*economic* aspect). On the other hand, they help reduce pollution with agricultural residues and waste (*environmental* aspect).

The data presented are indicative of the inefficient production of food in economic, social and environmental aspects.

The definition and classification of waste are of particular importance for *legislators* and *governments* when collecting and analyzing data on residues and waste from the point of view of their effective management.

4. FUTURE RESEARCH DIRECTIONS

The presented report has a staging nature for future authors' developments in the following steps:

Step 1: Author's searches for refinement and interpretation of the conceptual apparatus on the discussed issues.

Step 2: Collection of statistical information (based on the author's proposed conceptual apparatus) for conducting an economic study.

Step 3: Identification of incentives for limiting and reducing the quantities of residues and waste for economic entities along the supply chain.

5. CONCLUSION

Food production guarantees the food security of over 400 million Europeans. However, the problem boils down to the entrenched food model. On the one hand, over 50% of Europeans are overweight. On the other hand, it is necessary to reduce food loss and waste. The solution is sought in the reformation of the common European agricultural policy through the development of sustainable agricultural practices. In this direction, attention is directed to the implementation of the goals set in the 'from the farm to the table' strategy.

The limitations are in terms of indicators for measuring sustainability from production to consumption. There is a need to find ways to reduce food loss and food waste. The expected result is the achievement of a sustainable European food system – a modernized food chain, ensuring safe food and protection of people and nature.

Resources are put into food production. In the field of the agrarian sector, at the European level, measures are promoted for optimal use of resources in terms of food, water and nutrients.

Food waste is all food and inedible parts of food that have been removed from the food supply chain in order to be recovered or destroyed (including by composting, anaerobic digestion, incineration, landfill and others). They are a problem that has gained political and social importance in recent years.

Food loss and food waste have a negative effect on food security. To avoid the threat of growing food insecurity for the world's population, it is necessary to limit their quantities.

To prevent food insecurity at the European level, efforts are needed to reduce the amount of food waste, and more specifically:

- *First.* It is necessary to increase the level of awareness among the public and private sector, and civil society.
- *Second.* Correct interpretation of waste measurement definitions between sectors.
- *Third.* Development of guidelines for the utilization of surplus amounts of food, to prevent the formation of food waste, including unused and underutilized food.
- *Fourth.* Revision of the common European agricultural policy in its part of subsidizing production in the agrarian sector.

In conclusion, understanding the types of waste and debris is crucial to solving the problem. Proper disposal will reduce environmental pollution. Minimizing food loss and food waste is necessary to prevent food shortages. Knowing and distinguishing between residues, waste, wastage and losses from production and non-production activities is important for understanding and forming the real 'price' of food.

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Green Management Practices for Sustainable Whisky Production in Europe

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Sustainable Whisky Production;
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Abstract: *This paper explores the implementation of green management practices in whisky distilleries across continental Europe, aiming to identify key strategies used to reduce pollution, waste, and emissions. Utilizing a qualitative methodology, the study draws insights from interviews with internal stakeholders (marketing, production, quality assurance managers) to understand the drivers and challenges of adopting environmentally sustainable initiatives in a traditionally resource-intensive industry. The findings highlight innovative practices such as energy-efficient production technologies, closed-loop systems, waste valorization methods, and eco-conscious packaging. This research is unique in examining green management within the whisky industry, offering perspectives on how emerging distilleries align traditional craftsmanship with sustainability goals. Limitations include its focus on distilleries founded after 2000, which may not fully represent the broader industry's green efforts. The research contributes to the broader discourse on green management by providing insights into the practices shaping the European whisky industry.*

1. INTRODUCTION

Due to growing environmental challenges and rising societal expectations, sustainability has become a critical imperative in today's global business landscape. Organizations around the world recognize the importance of addressing issues related to resource depletion, biodiversity loss, and climate change. Green innovation has become a critical component of addressing the challenges facing industries today. This shift is based on green management, an approach that integrates environmental concerns into corporate strategies, operations, and decision-making processes. Green management stems from a natural resources-based perspective and emphasizes that companies seeking to maintain a competitive advantage frequently include environmental management in their core business plans (Gupta et al., 2024). The potential of green innovation to lower pollution is one of its main advantages. Cutting-edge technologies that reduce dangerous emissions and pollutants include waste recycling procedures, energy-efficient machinery, and renewable energy systems. From an economic perspective, green practices and innovations can lead to significant cost savings. Waste-to-value methods reduce raw material costs, and energy-efficient systems reduce electricity consumption. For example, companies that implement the circular economy have reported increased resource efficiency and reduced operating expenses. Because environmentally conscious consumers are more likely to support brands that engage in sustainable practices, companies that implement sustainable practices often gain a competitive advantage (Sołoducho-Pelc & Sulich, 2022).

Not long ago, excessive industrialization forced the United Nations to rethink its sustainable development goals to ensure environmental sustainability. Every business has adopted the idea of sustainable environmental practices to reduce waste, and the government and non-profit organizations are putting

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great pressure on them to reduce the amount of waste produced at the source. One of the most polluting industries is the food industry; food loss and waste hinder the sustainability of our food systems. Wasted food accounts for 38% of the energy consumed by the global food system (Nutrizio et al., 2024). This industry tries to embrace technologies that reduce energy and water use, reduce waste through composting, and recover nutrients through eco-friendly packaging and source separation to assure environmental sustainability. Additionally, it makes an effort to adhere to the stringent yet necessary rules set forth by authorities worldwide (Mastos & Gotzamani, 2022; Gupta et al., 2024).

Food waste is managed through prevention, recovery, recycling and disposal. In addition, it is essential to provide large and small producers, as well as consumers, with information about the food processing industry, food waste and losses (Nutrizio et al., 2024). Green food management aims to reduce waste and its effects throughout the food life cycle, from the use of natural resources and production to sales, consumption and decision-making regarding recovery or disposal. Recycling is the process by which waste is transformed into new and useful products without destroying the original materials. On the other hand, upcycling is the process by which waste is transformed into new and useful products. At each stage, smart and effective management, such as governance, social and environmental policies, must be included (Dabija et al., 2024; Nutrizio et al., 2024). Circular economy also aims to improve sustainable performance by reducing waste at every level of production, i.e. from top-down. Adopting green management and circular practices can improve resource and waste management, but technological advances have changed the way industries operate and helped to implement these practices more efficiently (Tanveer et al., 2022). Green practices are operations designed to reduce or eliminate harmful effects on the environment. Green practices that require complex models and approaches are usually associated with green management (Herrmann et al., 2021).

Whiskey is a grain-based spirit and is one of the most widely consumed alcoholic beverages worldwide (White et al., 2020). The whisky production process can be divided into six main stages: milling, malting, mash, fermentation, distillation, and maturation (Espitia-López et al., 2024). Due to its resource-intensive nature, the whisky industry, renowned for its rich heritage and traditional production methods, faces unique challenges in adopting sustainable practices. The whisky industry can lead the way in demonstrating how traditional industries can adapt and thrive in a more environmentally conscious world by implementing sustainable practices and embracing circular economy principles. The industry's sustainability profile has been significantly improved by managing by-products in accordance with circular economy principles, such as bioenergy production or reusing spent grain as animal feed (Chetrariu & Dabija, 2021). The sustainable use of organic waste and by-products has become one of the principles of the circular economy and one of the biggest challenges of food engineering in recent years. There are a lot of research projects that focus on valorizing the renewable resources obtained from whiskey production, by transforming these substances into biopolymers, fertilizers, energy, human and animal nutrition, and much more. The waste and by-products of this industry are an excellent source of proteins, minerals, fatty acids, fibers and bioactive compounds, which can prevent nutritional diseases and improve the physical and mental well-being of customers (Cappa & Cappa, 2017; Kang et al., 2020; Sahin et al., 2021; Duffy et al., 2023).

The global whiskey market, characterized by its extreme fragmentation and intense competition, comprises over 3,500 independent distilleries spread across 69 countries. In 2023, this dynamic industry was valued at an impressive USD 69 billion, highlighting its significant role in the global spirits market (Mordor Intelligence Report, 2024). Forecasts indicate that this market is set to expand further at a robust compound annual growth rate (CAGR) of 6.9% over the coming years. By 2032, the whiskey market is anticipated to reach a staggering USD 123.65 billion, reflecting growing consumer demand across multiple regions (Mordor Intelligence Report, 2024).

The diverse nature of this market is fueled by an array of producers ranging from small-scale craft distilleries to large multinational corporations, each contributing to its vibrant growth. Producers are innovating through sustainable practices, including environmentally friendly packaging, energy-efficient production processes, and the use of renewable resources, which aligns with the increasing focus on corporate social responsibility. These trends are expected to play a pivotal role in the market's development, making whiskey a continuously evolving and lucrative industry in the years to come.

The industry must come up with creative ways to reduce its environmental impact and adopt the ideas of a circular economy as the demand for whisky grows worldwide. The whisky industry can set the example for how conventional industries can adapt and prosper in a more ecologically conscious world by embracing the circular economy and sustainable practices. According to recent trends, distilleries outside of traditional whisky-producing nations are breaking new ground by using unusual ingredients, developing novel techniques, and questioning accepted wisdom (White et al., 2020; Dabija et al., 2024). Additionally, the development of new value chains can offer local communities surrounding whisky production facilities economic opportunities. The industry's sustainability profile has been greatly enhanced by managing by-products in a manner consistent with the principles of the circular economy, such as repurposing spent grains for the production of bioenergy or as animal feed. Additionally, whisky waste and by-products can be used by biorefineries to produce a variety of materials, chemicals, and fuels (Nutrizio et al., 2024).

There is growing pressure on the whisky business, which has historically been linked to craftsmanship and legacy, to address its environmental impact. Adoption of green management methods is required due to tighter regulatory frameworks and growing consumer demand for sustainable products. This article examines the difficulties faced by small-scale whisky producers in continental Europe. The study intends to add to the larger discussion on sustainability in the spirits sector by concentrating on their distinctive tactics.

This article uses case studies from 7 European nations to examine how green management techniques are used in the production of whiskey. These case studies offer a thorough understanding of how emerging distilleries adopt sustainable and energy-efficient production technologies, closed-loop systems, waste valorization methods, and eco-conscious packaging. The study focuses especially on how green management techniques can improve these initiatives' efficacy and efficiency, providing important information for academics and industry professionals alike.

2. METHODOLOGY

The study is part of a larger project that focused on risk assessment in the whisky industry and how the 9R framework refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, and recycle is applied in the business models of whisky distilleries that were founded in continental Europe after 2000. Qualitative data from interviews were coded and analysed thematically to uncover common practices, challenges, and innovations. This study examines the following research question: How do younger distilleries use green management practices to accomplish sustainable production?

Purposive sampling was used to choose distilleries from continental Europe that were founded after the year 2000. This ensured that the focus was on young companies that were less constrained by legacy systems and more able to adapt to sustainable practices. As a result, the number of possible distilleries was reduced from 580 to 275 (Dabija et al., 2024). Due to the limited public information available on privately-owned distilleries, invitations to participate were sent via email. Snowball sampling, in

which first respondents suggested others in their networks, was used to find additional participants. For this research, seven small distilleries that were founded between 2000 and 2016 were selected as the subject of the final case studies for conducting the interviews: the Netherlands (2000), Belgium (2004), Switzerland (2005), Austria (2009), Norway (2014), France (2015), and Germany (2016).

Data collection took place over a six-month period, from February to August of 2024. To ensure the credibility and reliability of the findings, researchers maintained a neutral stance during interviews, carefully avoiding leading questions or any form of influence that could introduce bias. The interviews were conducted remotely, either via phone or video conferencing, to accommodate the geographical dispersion of respondents. Each interview lasted an average of fifty minutes, providing rich qualitative data for in-depth analysis.

The recorded interviews were subsequently transcribed and analyzed using NVivo 15 (QSR International) software for Windows, a qualitative data analysis software that facilitates the systematic coding and interpretation of large text-based datasets. NVivo was instrumental in organizing, categorizing, and identifying patterns within the interview data, ensuring a rigorous and replicable thematic analysis. The software enabled researchers to code transcripts efficiently by assigning key phrases, words, and sentences to predefined or emerging categories. NVivo's automated text search, word frequency queries, and hierarchical coding were particularly useful in detecting recurring themes across multiple interviews, allowing for a structured approach to data interpretation (Kendall et al., 2019). Additionally, the query functions and visualization tools, such as cluster analysis and word clouds (Figure 1 below), provided further insights into relationships between themes and respondent perspectives.

The thematic analysis was framed within a project management approach to green management practices, with NVivo aiding in the identification of overarching themes related to sustainability across the entire product lifecycle. These themes spanned various stages, from raw material extraction and manufacturing to distribution, usage, and disposal. Through iterative coding cycles, NVivo facilitated the recognition of nuanced perspectives on sustainability, highlighting industry best practices and challenges. Figure 1 below shows the most frequently mentioned themes in the qualitative analysis, emphasizing core concepts such as energy efficiency, waste valorization, and eco-design.

Figure 1. Green Management Practices Word Cloud

Source: Own research

Several dominant themes emerged from the analysis, particularly those emphasizing energy efficiency, waste reduction, and circular economy principles. Many respondents discussed strategies promoting durability, reparability, and recyclability, aligning with broader sustainability goals. Additionally, sustainable supply chain management was a prevalent theme, capturing procurement, logistics, and supplier relations practices that integrate environmental considerations to reduce overall environmental impact. NVivo's cross-case analysis helped illustrate variations in supply chain sustainability strategies across different industries and organizational structures.

Furthermore, innovation and eco-design were consistently highlighted as essential aspects of green management, with a focus on the development of eco-friendly products and processes. NVivo's relationship mapping tools allowed for the visualization of interconnections between innovation, green management frameworks, and whiskey production, providing a holistic understanding of how distilleries are adapting to sustainability imperatives.

By leveraging NVivo's analytical capabilities, researchers were able to systematically extract, code, and interpret vast amounts of interview data, ensuring a structured and transparent approach to qualitative research. The software played a crucial role in validating the findings, offering deeper insights into the evolving landscape of green management practices across industries.

3. RESULTS AND DISCUSSIONS

The qualitative analysis of whisky distilleries in the Netherlands (2000), Belgium (2004), Switzerland (2005), Austria (2009), Norway (2014), France (2015), and Germany (2016) revealed a strong emphasis on green management practices aimed at minimizing environmental impact while maintaining the artisanal integrity of whisky production. NVivo 15 was used for thematic coding and pattern recognition, allowing for the identification of core sustainability strategies across the case studies. Table 1 shows the key themes emerging from the data, including energy efficiency, waste reduction, circular economy integration, sustainable supply chain management, and eco-innovation.

Table 1. Green management themes in sustainable whisky production in Europe

	Findings	Countries
Energy Efficiency and Renewable Energy Integration	Most prominent sustainability initiatives. • heat recovery systems • biomass boilers fueled by spent grain • renewable energy sources (hydroelectric, solar energy, wind energy)	• Austria • Norway • Germany • Switzerland
Closed-Loop and Waste Valorization Systems	Circular economy principles are widely adopted. • repurpose spent grains as animal feed • reduce water consumption through closed-loop systems • rainwater harvesting • anaerobic digestion systems to convert organic waste into biogas	• Belgium • France • Switzerland • Netherlands • Austria • Norway
Sustainable Packaging and Innovations in Eco-Design / Eco-Production	Eco-conscious packaging emerged as a strong sustainability focus. • lightweight glass bottles and bottle return schemes • paper labels • biodegradable corks • plant-based biodegradable materials • innovative fermentation and distillation techniques	• France • Belgium • Germany • Norway • Switzerland
Sustainable Supply Chain Management	Integration of sustainability criteria in supply chain management. • local sourcing of barley • adopting green procurement policies	• France • Norway • Netherlands • Austria • Switzerland

Source: Own research

Energy Efficiency and Renewable Energy Integration. Green management promotes energy efficiency measures, such as optimizing production processes, upgrading to energy-efficient equipment, and implementing energy management systems. Additionally, the transition to renewable energy sources, such as solar, wind, and biomass, is a critical component of sustainable production.

One of the most prominent sustainability initiatives among European whisky distilleries was the adoption of energy-efficient production technologies. Distilleries implemented heat recovery systems, reducing energy loss during distillation by capturing and reusing waste heat. Additionally, several case study distilleries incorporated biomass boilers fueled by spent grain, a byproduct of the whisky-making process, significantly lowering reliance on fossil fuels. A transition toward renewable energy sources was also evident, setting benchmarks for environmentally conscious whisky production in Europe. The Austrian and Norwegian distilleries were fully powered by hydroelectric and solar energy, while the German and Swiss distilleries integrated wind power into their operations. A German distillery has also invested in capturing and reusing carbon dioxide emitted during fermentation for food-grade CO_2 production. These initiatives resulted in lower carbon footprints and reduced operational costs over time, aligning with broader European Union (EU) sustainability policies.

Closed-Loop and Waste Valorization Systems. Green management supports circular practices such as recycling, remanufacturing, and the creation of closed-loop supply chains. Results show that circular economy principles were widely adopted, particularly in the areas of waste valorization and resource efficiency. Pollution prevention is a fundamental aspect of green management, focusing on reducing emissions, effluents, and waste generation at the source. Strategies such as process optimization, cleaner production technologies, and waste-to-energy initiatives enable companies to minimize environmental harm while creating value from waste. Effective waste management systems, including recycling and composting, further contribute to sustainable production.

Many distilleries repurposed spent grains as animal feed, collaborating with local farmers to create sustainable supply chains. Belgium and France's distilleries went further, implementing anaerobic digestion systems to convert organic waste into biogas, which was then used to generate electricity for production processes. In Belgium, innovative partnerships allow for the shared use of byproducts, where whisky and beer producers collaborate to optimize resource efficiency. In Netherlands, the Dutch whisky producer incorporates advanced fermentation technologies to reduce energy consumption and closed-loop systems are repurposing residual heat from distillation for other on-site uses, such as heating facilities or greenhouses. Another key theme was the reduction of water consumption through closed-loop systems. French distilleries such as those in the Cognac region producing malt-based spirits, use wastewater in irrigation systems for local vineyards, reducing water wastage and supporting agriculture. The Swiss and Dutch distilleries optimized water recirculation mechanisms, reducing wastewater discharge and enhancing overall resource efficiency. The adoption of rainwater harvesting in Austria and Norway further contributed to reducing water dependency, particularly beneficial in regions where water conservation is a growing concern.

Sustainable Packaging and Innovations in Eco-Design / Eco-Production. Eco-conscious packaging emerged as a strong sustainability focus, with distilleries transitioning to lightweight glass bottles, recycled paper labels, and biodegradable corks. The French and Belgian distilleries prioritized eliminating single-use plastics in their packaging, replacing them with sustainable alternatives such as plant-based biodegradable materials. Moreover, Germany's whisky producers pioneered bottle return and refill schemes, allowing customers to return used bottles for sterilization and reuse, significantly reducing packaging waste. Some distilleries also experimented with bulk whisky retail models, where customers could refill bottles at designated points, encouraging sustainable consumption practices.

France's whisky industry introduced low-temperature fermentation techniques, significantly reducing energy consumption while maintaining flavor complexity. Similarly, the German distillery

experimented with precision fermentation to optimize yeast efficiency, resulting in lower waste production. In terms of eco-design, Norway's distillery implemented modular distillation units, allowing for production adjustments based on demand, thereby reducing unnecessary energy use. Switzerland's whisky makers invested in carbon capture technologies, aiming to offset CO_2 emissions from fermentation and distillation processes.

Sustainable Supply Chain Management. Another recurrent theme across the case study distilleries was the integration of sustainability criteria in supply chain management. Green management emphasizes the importance of sustainable supply chain practices, including responsible sourcing, reducing transportation emissions, and collaborating with suppliers to improve environmental performance. By fostering transparency and accountability throughout the supply chain, organizations can achieve holistic sustainability goals.

The French distillery prioritizes organic certification, local, organic barley, ensuring supply chain sustainability while supporting regional farmers. and sustainable sourcing of raw materials. The Norwegian and Dutch distilleries emphasized local sourcing of barley, reducing emissions associated with long-distance transportation while supporting regional agriculture. Moreover, several distilleries adopted green procurement policies, ensuring that materials, from barley to casks, met environmental standards. The Austrian and Swiss distilleries formed partnerships with sustainable forestry initiatives to source responsibly harvested oak barrels, aligning with biodiversity conservation goals. Producers in Austria also noted partnerships with local farmers to ensure traceability and reduce transportation emissions.

4. FUTURE RESEARCH DIRECTIONS

The study highlights the critical need for future economic research in sustainability-driven transformations within the European whisky industry. Key areas include cost-efficient adoption of decarbonization, zero-waste production, and water stewardship, alongside regulatory harmonization to ease compliance burdens. High initial investment costs pose financial barriers, especially for smaller distilleries, necessitating research on innovative financing models and policy incentives. Consumer perception studies are also essential to mitigate resistance to sustainable packaging while maximizing eco-conscious branding as a competitive advantage. Ultimately, interdisciplinary research will be pivotal in ensuring that environmental responsibility enhances market competitiveness, economic viability, and long-term industry resilience.

Despite widespread adoption of sustainability initiatives, interviewees acknowledged several challenges in implementing green management practices. High initial investment costs for energy-efficient equipment and renewable energy installations were noted as significant barriers, particularly for smaller distilleries. Additionally, regulatory complexities in different European markets posed hurdles, requiring distilleries to navigate varying environmental compliance frameworks.

Consumer perception also emerged as a challenge, with some respondents indicating resistance to alternative packaging solutions due to concerns about product authenticity. However, marketing managers emphasized the growing demand for eco-conscious branding, suggesting that sustainability efforts would yield long-term competitive advantages. Consumer-driven sustainability and green branding will strengthen whisky brands' eco-conscious messaging through carbon footprint labels, direct-to-consumer refill models, and certified sustainability standards. As these trends unfold, whisky producers must ensure environmental responsibility enhances the authenticity and craftsmanship of their spirits.

5. CONCLUSION

European whisky distilleries have made significant progress in adopting green management practices, integrating energy-efficient technologies, renewable energy sources, waste valorization, and sustainable packaging while maintaining artisanal craftsmanship. Circular economy principles, local sourcing, and green procurement further reinforce sustainability efforts. Despite challenges such as high investment costs and regulatory complexities, the industry's commitment to carbon neutrality and eco-innovation signals a promising future. By continuing to refine these strategies, whisky producers can balance tradition with environmental responsibility, setting a precedent for sustainability in resource-intensive industries.

The integration of green management practices is no longer optional; it is a strategic imperative for businesses aiming to thrive in a rapidly evolving global landscape. Organizations that prioritize sustainability are better positioned to address emerging challenges, seize new market opportunities, and enhance their resilience to external shocks. Moreover, green management fosters a culture of innovation, encouraging companies to develop breakthrough technologies and business models that address environmental and social needs.

Beyond environmental benefits, such green management practices generate significant socioeconomic advantages. They foster job creation in emerging sectors such as renewable energy, waste management, and sustainable agriculture. These green jobs contribute to economic diversification and resilience, particularly in regions transitioning from traditional industries. Investing in green management also strengthens organizational resilience against external shocks, such as resource price volatility and supply chain disruptions. By diversifying energy sources, improving resource efficiency, and adopting sustainable practices, organizations can enhance their long-term stability and adaptability in a rapidly changing global landscape.

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Sustainable Development of Cities in Bulgaria by Renovating the Building Stock

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Abstract: *Demographic trends and increasing urbanization suggest an increase in demand and an increase in the construction of buildings and facilities, suggesting that energy needs and material use for the construction sector will increase by 50% by 2060. According to research, around 75% of the EU's building stock is energy inefficient, with 75% of the total energy consumed for heating and cooling and 25% for hot water and electricity. Improving the condition of the building stock can be a key factor in creating sustainable cities that contribute to sustainable development and a circular economy.*

1. INTRODUCTION

The construction of buildings and facilities is one of the main factors for environmental pollution, due to the consumption of many natural resources and energy, the generation of large amounts of waste. They are a major factor in the negative impact on the environment. The condition of the building stock is a prerequisite for the introduction of a sustainable approach to the design, construction and reconstruction of buildings. The essence of this approach is to achieve a balance between the economic, social and environmental aspects of buildings, as well as to increase the requirements for all activities related to the construction process and operation throughout the life cycle of buildings (Antonova, 2024).

Rapid urbanization implies an increase in the building stock in cities. This causes an increase in energy needs and the use of more materials for the construction sector by 50% by 2060. Environmental problems are increasing, such as air pollution, lack of oxygen, shortage of water resources, the formation of urban heat islands, lack of green areas, etc.

Existing buildings and the construction of new ones have a serious impact on the climate from the generation of harmful emissions as a result of energy production and consumption.

Energy and resource efficiency are essential in the different stages of the construction and operation of the building stock to achieve the ambitious 2050 carbon neutrality target set out in the European Green Deal and the UN Sustainable Development Goals.

The authors of this study aim to study the state of the building stock in Bulgaria, to identify some measures related to sustainable design and construction, and to give recommendations for their implementation in Bulgaria.

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2. BUILDINGS IN BULGARIA

A study of the building stock in the European Union (EU) shows that 75% of buildings in the Member States are energy inefficient, with heating and cooling costs accounting for 75% of the total energy consumed and 25% for hot water and electricity. According to the latest EU Global State of Buildings and Construction Report (GlobalABC, 2020), the construction sector is due to 40% of energy consumed and 39% of carbon emissions, taking into account the construction, renovation, use and demolition of buildings and facilities. For this study, we review the state of the building stock in Bulgaria. According to data from the National Statistical Institute (NSI), the issued building permits in the last three years are as follows (Table 1).

Table 1. Building permits issued in Bulgaria (2022-2024)

Type of building	2022 (count.)	2023 (count)	2024 count)
Residential	1911	2275	2113
Administrative	18	22	18
Other	1183	1261	1162

Source: National Statistical Institute (n.d.)

Table 2. Residential buildings in Bulgaria (1985-2023)

year	Total	in cities		in the villages	
		count (thousands)	%	count (thousands)	%
1985	1964	702	35,74	1262	64,26
……..					
2010	3804	2433	63,96	1371	36,04
……..					
2021	4 002	2 673	66,79	1 329	33,21
2022	4 283	2 927	68,34	1 356	31,66
2023	4 304	2 944	68,40	1 360	31,60

Source: National Statistical Institute (n.d.)

Table 3. Housing in Bulgaria for the period 2021-2023

Town	2021		2022		2023	
	Count	%	Count	%	Count	%
Total	4 001 873		4 282 656		4 304 231	
Cities	2 672 679	66,79	2 926 577	68,34	2 943 890	68,40
Village	1 329 194	33,21	1 356 079	31,66	1 360 341	31,60
Varna	269 748	6,74	283 617	6,62	286 816	6,66
Burgas	294 693	7,36	327 874	7,66	331 767	7,71
Stara Zagora	177 477	4,43	184 926	4,32	185 609	4,31
Blagoevgrad	142 536	3,56	163 648	3,82	164 875	3,83
Sofia total	800 258	20,0	939 544	21,94	946 343	21,98
Sofia	179 730	4,49	177 536	4,15	178 297	4,14
Sofia is the capital	620 528	15,51	762 008	17,79	768 046	17,84
Plovdiv	329 901	8,24	358 559	8,37	360 821	8,38

Source: National Statistical Institute (n.d.)

Table 2 presents information for a longer period (1985-2023), which shows a drastic increase in the number of residential buildings that have a major share in the building stock in Bulgaria. Data from the last census from 2021 and data for 2022 and 2023 show that the housing stock of Bulgaria consists of 4,304 thousand buildings (Table 2), with their percentage in cities - 66.79% for 2021, 68.34% for 2022 and 68.40% for 2023 - doubled.

Most newly built dwellings for the period 2021-2023. are registered in the big cities, including Sofia, Plovdiv, Burgas, Varna, Stara Zagora, Blagoevgrad and others. Table 3 presents information for cities where the number of newly built dwellings is over 150,000. With the largest relative share for 2023. are the newly built dwellings in Sofia - 21.98%, Plovdiv - 8.37%, Burgas - 7.71%.

Information on the number of newly built dwellings put into operation is presented in Table 4, and the data shows that the largest relative share for 2023. of 30.67% are in Sofia, 17.78% in Burgas, 14.70% in Varna.

Table 4. Newly built dwellings put into operation
(the first 4 big cities with over 1600 dwellings)

Town	2021		2022		2023	
	Count	%	Count	%	Count	%
Total	17 868		19 847		22 649	
Burgas	1 617	9,05	1 986	10,01	4027	17,78
Varna	3 547	19,85	3 369	16,97	3330	14,70
Plovdiv	1 398	7,82	1 938	9,76	2346	10,36
Sofia total	5 981	33,48	6 329	31,89	6947	30,67
Sofia	378	2,12	531	2,68	791	3,49
Sofia is the capital	5603	31,36	5798	29,21	6156	27,18

Source: National Statistical Institute (n.d.)

The current state of a large part of the residential building stock in the country creates conditions for very high energy consumption, as only about 10-15% of buildings are energy efficient or meet stricter standards. The share of residential buildings built before 2010. is significant, which suggests that they do not comply with modern regulatory requirements. The greatest heat losses are through the external walls (25-35%) and windows (55-65%). This requires taking measures for sustainable design and sustainable construction, both in the construction of new buildings and in the reconstruction and renovation of buildings.

3. SUSTAINABLE CONSTRUCTION

Sustainable construction is a set of approaches and practices, including technologies that aim to optimize the consumption of materials and raw materials, which leads to a reduction in the negative impact on the environment. And for sustainable construction, long-term efficiency and quality are a priority. It aims to reduce the environmental impact of buildings while optimizing their economic value and providing a better and healthier living environment. A building designed in a sustainable way minimizes the use of water, primary raw materials, energy and land throughout its life cycle, increases comfort and at the same time reduces the negative impact on the environment and increases economic sustainability.

At the heart of sustainable construction is the desire to improve the relationship that a person creates with his environment by: (1) the use of local and easily accessible building materials; (2) use of materials with a short production cycle and easy to recycle; (3) taking into account the local climatic conditions and relief; (4) optimised use of energies and energy sources for vital needs; (5) Optimized use of water and air.

The main principles of construction sustainability are presented in Table 5.

Table 5. Principles of sustainable construction

Principles	Meaning
Energy efficiency	Design and construction of buildings that use a minimum amount of energy for heating, cooling and lighting. This is achieved through the use of insulation, energy-efficient windows and smart energy management systems, etc.
Optimization of water resources	Installation of rainwater collection systems, use of water-saving technologies and optimization of water supply and sewerage.
Minimal environmental impact	The impact of each building on local ecosystems, such as changing air currents, shading, etc.
High living comfort	The comfort of buildings is determined by taking into account some parameters, such as temperature, speed, humidity and air purity, as well as the temperature of the surrounding surfaces.
Aesthetic appearance	Appropriate inclusion of the building or facility in the architectural ensemble of the place where the natural environment is built.
Long-term sustainability	Durability is a characteristic feature of construction sites. Anything that is created should have a long life and be easily repaired and recycled.
Maximum reuse of materials	A large part of the materials after repair or destruction turn into unusable construction waste that pollutes the environment. The ability to reuse them will provide economy and cleaner nature.
Safety and security of buildings and facilities	With regard to the safety, security and quality of buildings and facilities, accurate implementation of technologies and the use of quality materials are required.
High quality	With regard to the safety, security and quality of buildings and facilities, accurate implementation of technologies and the use of quality materials are required.
Room for improvement	It is necessary that each project provides for the possibility of building infrastructure for renewable energy sources, green roofs, winter gardens, etc.

Source: Developed by the authors

At present, sustainable construction in Bulgaria is still poorly developed due to poor awareness of the benefits and reluctance on the part of developers to implement green projects due to the higher initial costs.

4. MEASURES TO IMPLEMENT THE PRINCIPLES OF SUSTAINABLE CONSTRUCTION

Some of the measures to implement the principles of sustainable design and construction are:

(1) correct situation of buildings and simplification of their contour;
(2) design of dwellings in such a way as to achieve natural ventilation and all-day use of sunlight;
(3) use of materials that do not pollute the environment;
(5) installation of local heating systems that use local waste resources and systems that produce electricity and heat through cogeneration;
(6) passive and active use of sunlight through the installation of water heating collectors and photovoltaic systems for the production of electricity;
(7) provision of waste recycling systems;
(8) use of rainwater and reuse of water for domestic needs, etc.;
(9) the use of a new generation of innovative building materials;
(10) increase in green areas (green roofs, green facades, etc.)

Modern technologies and innovations allow a wide variety of opportunities for the implementation of non-standard but practical ideas, both in the design and in the construction and reconstruction of buildings (Rodrigues & Franco, 2020; Feofilovs & Romagnoli, 2021; Tong, 2021).

In accordance with the Integrated Energy and Climate Plan 2021-2030 (Ministry of Energy, 2020), the definition of measures for the modernization of the building stock, as the measures

are mainly from the point of view of improving the energy performance of buildings, including through: energy saving measures, measures for the construction of the building and the building installation; measures for the recovery of energy from renewable sources and recovery of waste heat; passive architectural techniques in the design of buildings.

The Plan envisages that by 2050 60% of the residential building stock and nearly 17% of the non-residential building stock will be renovated in Bulgaria. The area of the renovated buildings of the entire building stock will be over 45%, with about 29% being the area of state and municipal non-residential buildings.

The implementation of green projects in urban areas will contribute to improving sustainability, tackling air pollution, and global warming. The respondents who participated in the World Green Building Trend survey from 2021 (for global green building trends ranked the ten most important activities (approaches) to improve sustainability in cities (U.S. Green Building Council, 2021). As the most important practices, they identify the construction of zero and plus energy buildings (47%), the construction of passive buildings (31%), modular construction (31%), the use of generative and biophilic design (20%), etc.

Some of the measures that can be implemented in Bulgaria are:
- design and construction of sustainable buildings;
- improving the energy performance of buildings;
- renovation of the building stock (including panel buildings);
- use of innovative building materials;
- landscaping of roofs and facades of buildings.

The design and construction of sustainable buildings proves to be essential for the sustainable development of cities (ranked first by around 50% of respondents for sustainable buildings and third by around 38% for passive buildings who participated in the survey) (U.S. Green Building Council, 2021)..

According to Kovachev (2013), the main characteristics of sustainable buildings are: (1) efficiency in the use of resources – terrain, building materials, energy, water; (2) health of the environment – convenience, fresh air, daylight and as a result achieving high productivity, satisfaction of people and reduction of healthcare costs; (3) life-cycle economy by reducing the maintenance costs of buildings and the environmental impact. Under the current conditions, sustainable buildings are becoming safe and promising investments for both developers and users.

Improving the energy performance of buildings **-** the energy efficiency of a building is a balance between energy consumption and providing comfort to the occupants. The costs of heating, cooling, lighting, etc. depend on the specifics of the building structure and the ways of using the building. Over the past 30 years, as a result of the rapid pace of urban construction, energy consumption, The life cycle of buildings ranges from 50 to 100 years, and improving the existing building stock can be a major source of energy savings. Another problem, according to the European Energy Poverty Observatory (EPOV), is that almost 50 million European citizens are affected by energy poverty. Global Warming Potential (GWP) shows the overall contribution of a building to emissions and combines greenhouse gas emissions in building materials with direct and indirect emissions from the use phase. Therefore, the introduction of a requirement to calculate the life-cycle GWP of new buildings represents a first step towards a deeper consideration of the life-cycle performance of buildings in the context of the circular economy.

Taking measures to renovate the building stock is another imperative measure. One of the ways to renovate buildings is presented by Kovachev et al. (2011). With the model proposed by him, a new life can be given to panel buildings through: (1) renovation; (2) partial extension with one structural axis to the facades of the buildings through "pulsation" of part of the rooms in the individual apartments; (3) terraced superstructure of flat roofs; extension of new monolithic volumes to the "gable" walls; (4) spectacular roof and façade (vertical) landscaping.

This would lead to the structural provision of the buildings, an increase in the living area, the use of modern building materials, the achievement of high energy efficiency, solving the problems of infrastructure and construction and the construction of a new architectural image of the panel buildings.

The concept of giving new life to panel buildings can be presented in five main steps: (1) great solution potential in dead gables; (2) new rooms to the respective apartments; (3) winter gardens in the north, extended terraces in the south; (4) new extensions to the building; (5) application of a modular principle in solving the area around the block.

The renovation of panel buildings would lead to: (1) transformations in distributions; (2) the comfort of living is improved by transferring more area and space to the apartments; (3) improving climatic conditions while reducing energy consumption; (4) The occupants may remain in the dwellings as long as the reconstruction permits it, etc. A visualization of the project is presented in Fig. 1.

Figure 1. Project "New Life of Panel Buildings"
Source: Kovachev & kolektiv (2011)

The proposed model provides a conceptual architectural solution that has the potential to find mass application by demonstrating the indisputable qualities of panel buildings. The implementation of this idea is associated with a number of barriers, but as a result it would lead to high energy efficiency, the construction of a new architectural image of panel buildings and generally a better vision of urban spaces. Bulgaria is that 97.6% of the dwellings are privately owned, and nearly 60% of the population lives in buildings in condominium ownership. For the implementation of the project, it is necessary to temporarily remove the residents from their homes, as well as to obtain their consent. It would be easier to apply these practices first to public buildings, including schools, kindergartens, administrative buildings, etc.

Use of innovative building materials, incl. for thermal insulation – the aim is to replace the previously used thick layers of insulation (10-30 cm.) of polystyrene and polyurethane foams and mineral wool, which have proven their qualities, but can be harmful to the environment when buildings are demolished. but growing market share in Europe over the past fifteen years.

The integration of green infrastructure, such as green walls (vertical landscaping, vertical gardens) and green roofs in urban planning and infrastructure design. In our opinion, the landscaping of roof spaces, as well as the construction of green walls, is an insufficiently studied aspect of

the sustainable development of cities. This is a unique solution for providing greenery in cities without occupying ground areas. The installation of vegetation-covered surfaces helps to retain and store rainwater, thereby reducing water runoff and improving rainwater management. Green infrastructure can reduce the "urban heat island effect" by cooling buildings and their surroundings during the summer and helping to control the building's overall contribution to global warming.

Research done on the presence of urban green spaces focuses primarily on ground spaces (Zhang & Kim, 2023). The main benefits of green roofs and green walls include: (1) reducing energy consumption for cooling and heating; (2) carbon dioxide absorption and air quality improvement; (3) creating places for recreation for humans and habitats for wildlife; (4) rainwater absorption and management; (5) providing insulation and extending the life of roof structures; (6) regulation of temperatures, additionally increased due to radiation from concrete; (7) reducing urban heat islands; (8) creating the aesthetics of old concrete buildings; (9) increasing biodiversity; (10) sound insulation, etc.

A problem for the construction of green roofs and vertical landscaping is the difficult implementation of them on old reinforced concrete and solid buildings, as additional inspection of the buildings is needed and the possibilities for the old structures to bear the burden of the newly built roof facilities. This is rather applicable to the new construction of public, commercial and residential buildings, where it can be foreseen in the design of the buildings.

Good practices introduced in some EU Member States include:
- Green Savings Programme, Czech Republic (Nová Zelená Úsporám, 2021);
- Green bonds on the example of Sweden;
- Green Mortgage Program and Green Home Certificate, Romania (Romanian Green Building Council, 2014);
- Strategy for Energy Efficiency in the Public Sector, Ireland (Government of Ireland, 2020).

5. CONCLUSION

Based on the data presented in this article, we can draw the following conclusions:
- to improve the efficiency and environmental performance in the design and renovation of the building stock;
- separate collection and recycling of waste during the demolition of old buildings in order to protect the environment;
- promoting the benefits of implementing sustainable building elements in the existing building stock;
- transition of the construction industry to the use of natural and innovative materials;
- training of experts in the construction sector and development of programs for the implementation of sustainable construction;
- development of innovative and accessible financial instruments;
- introduction of lower taxes and lower garbage fees for renovated and new sustainable buildings, etc.

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Deseasonalization of Time Series – Application to Romania

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Abstract: *This paper examines the deseasonalization of time series in Romania, with a focus on its application in analyzing quarterly GDP data. Seasonal adjustment is a vital process that ensures consistency and comparability of economic indicators across quarters and years. By removing predictable seasonal variations, deseasonalization allows analysts to identify trends, turning points, and sectoral comparisons, facilitating robust economic evaluations. Romania's adoption of JDemetra+ software and the TRAMO-SEATS methodology since 2012 reflects the nation's commitment to aligning with the European System of Accounts (ESA 2010) standards. The challenges associated with data revisions, structural breaks, and outliers are addressed within this process. The findings highlight the effectiveness of deseasonalization in supporting accurate policymaking and economic analysis.*

1. INTRODUCTION

The accurate analysis of macroeconomic indicators, such as Gross Domestic Product (GDP), is essential for understanding a nation's economic performance. However, economic data often exhibits seasonal patterns, which reflect periodic fluctuations due to climatic conditions, holidays, or institutional practices. These seasonal variations, while predictable, can obscure underlying economic trends and hinder meaningful comparisons across quarters, years, and countries. The process of deseasonalization—removing these predictable seasonal effects—has become a critical tool in economic analysis, particularly in aligning national accounts with international standards (Cochrane, 2017).

In Romania, the regular publication of seasonally adjusted quarterly GDP series began in 2012 as part of efforts to align with the European System of Accounts (ESA, 2010). This alignment ensures comparability and consistency with other EU member states, particularly for monitoring macroeconomic convergence under EU economic governance frameworks, such as the Stability and Growth Pact (Eurostat, 2021). Seasonal adjustment enables policymakers, businesses, and researchers to analyze growth rates, identify economic turning points, and compare economic performance across sectors and regions (Hindrayanto et al., 2022).

Challenges persist in the deseasonalization process, including handling outliers, structural breaks, and major data revisions, which can affect the robustness of the adjusted series (Quintana et al., 2019). For example, revisions to annual national accounts often require corresponding updates to quarterly accounts, highlighting the importance of maintaining coherence between datasets. In

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Romania, the use of chain-linked volumes (CLV) has further enhanced the accuracy of real GDP measurements, providing reliable insights into economic dynamics (Matei, 2020).

Seasonal adjustment tools, such as JDemetra+ and the TRAMO-SEATS methodology, are critical in achieving these goals. Recent advancements in seasonal adjustment techniques, such as those highlighted by Proietti and Luati (2020), emphasize the importance of robust signal extraction methods in addressing nonstationary patterns. Furthermore, the integration of Big Data methods, as explored by Barigozzi et al. (2022), holds promise for improving macroeconomic nowcasting.

This paper focuses on the application of deseasonalization techniques to Romanian time series. By addressing challenges in seasonal adjustment and leveraging advanced methodologies, this paper contributes to improving the quality of economic data and its applicability in policy and decision-making. The next section elaborates on the methodology, including the data sources and deseasonalization techniques used in this study.

2. METHODOLOGY

2.1. Data Sources

The analysis relies on quarterly GDP data for Romania, obtained from the National Institute of Statistics (INS). These datasets are expressed in three forms:

1. **Current Prices** – Nominal GDP without adjustments for inflation, reflecting the actual economic activity in monetary terms.
2. **Prices of the Previous Year (PYP)** – GDP data adjusted to eliminate the effects of price changes within the reference period, ensuring comparability over short time frames.
3. **Chain-Linked Volumes (CLV)** – Real GDP data adjusted for inflation and expressed in constant prices, allowing consistent comparison across years and quarters. The reference year for CLV data in Romania is 2020, in line with Eurostat recommendations (Eurostat, 2021).

The datasets include both raw (unadjusted) and seasonally adjusted series, ensuring comprehensive coverage for analysis. Regular revisions are undertaken to align quarterly data with updated annual accounts, ensuring consistency across all reporting levels. This process follows ESA 2010 guidelines, which emphasize methodological harmonization within the EU (Matei, 2020).

2.2. Deseasonalization Techniques

Seasonal adjustment is performed using **JDemetra+ software**, a tool endorsed by Eurostat and widely adopted by EU member states for official seasonal adjustment. The software employs the **TRAMO-SEATS** methodology, which combines:

- **Time-Series Regression with ARIMA Noise, Missing Values, and Outliers (TRAMO):** Pre-adjustment addressing outliers, calendar effects, and other irregularities (Findley et al., 1998).
- **Signal Extraction in ARIMA Time Series (SEATS):** Decomposing the series into seasonal, trend-cycle, and irregular components (Gómez & Maravall, 2001).

The ARIMA Airline model (0,1,1) x (0,1,1) is typically used, reflecting its suitability for modeling GDP data with stable seasonal patterns. The seasonal adjustment is applied to CLV data, as this approach provides the most accurate depiction of real economic growth. Importantly, the adjustment process includes at least nine years of historical data, enhancing the reliability of the adjusted series (Hindrayanto et al., 2022).

2.3. Steps in the Adjustment Process

The deseasonalization process involves several stages to ensure accuracy and consistency:

1. **Data Preprocessing:**
   - **Outlier Detection and Treatment:** Irregular events, such as economic shocks or policy changes, are identified and treated to avoid distortion in the adjustment process.
   - **Handling Structural Breaks:** Economic transformations, such as shifts in industrial composition or significant policy reforms, are accounted for to maintain the integrity of the data.
   - **Calendar Adjustments:** Effects related to the number of working days, public holidays, or leap years are neutralized to avoid bias in quarterly comparisons (Matei, 2020).
2. **Seasonal Adjustment:** the TRAMO-SEATS methodology is applied to decompose the time series into seasonal, trend, and irregular components.
3. **Revisions and Coherence:** quarterly data is periodically revised to maintain coherence with annual national accounts. These revisions ensure that both raw and seasonally adjusted series reflect the latest methodological updates and data corrections (Eurostat, 2021).
4. **Validation and Quality Checks:** statistical diagnostics, including goodness-of-fit tests and stability assessments, are conducted to evaluate the reliability of the adjusted series.

3. CHALLENGES AND ADVANCES IN DESEASONALIZING QUARTERLY GDP DATA

3.1. Challenges in Deseasonalizing Quarterly Growth Rates

Analyzing data for macroeconomic indicators requires a robust approach to addressing seasonal patterns, particularly in quarterly growth rates. In Romania, quarterly national accounts exhibit strong seasonality, making it imperative to adjust for these effects to ensure accurate and meaningful economic analyses. This process, while essential, is fraught with challenges such as structural breaks, outliers, and anomalies in data.

One of the primary difficulties lies in comparing successive values within quarterly time series. Seasonal adjustment enables meaningful comparisons not only between consecutive quarters but also across sectors and countries. Such adjustments highlight general trends and potential economic turning points, thereby offering policymakers and analysts a clearer view of the economy's trajectory. These techniques also align with best practices under the ESA 2010 methodology, emphasizing the short-term economic developments critical to business cycle analysis.

3.2. Addressing Complexities in Deseasonalization

Deseasonalizing quarterly growth rates involves nuanced methodological choices due to the absence of a one-size-fits-all approach. The presence of structural breaks, such as those introduced during the COVID-19 pandemic, exacerbates these challenges. Outliers or sudden shifts in economic trends require tailored solutions to maintain the integrity of the adjusted series. For instance, studies such as Fuleky and Bonham (2020) demonstrate how structural breaks in tourism time series were effectively managed using hybrid models. Similarly, Proietti and Luati (2020) emphasize the importance of signal extraction methods in accommodating non-stationary seasonal patterns.

In Romania, the deseasonalization process utilizes nine years of historical data for adjustment. This practice ensures robust modeling even in stable economic periods, as consistent methodologies

allow for reliable trend analysis. However, periods of heightened volatility, such as the global pandemic, necessitate major revisions to ensure accuracy. These disruptions highlight the importance of adaptive methodologies that evolve alongside economic realities.

3.3. Major Revisions of Data Series

Major revisions of data series play a crucial role in the analysis and compilation of quarterly GDP data, ensuring accuracy and compliance with international standards. These revisions impact both the raw data and the seasonally adjusted (SA) series, necessitating the use of advanced techniques to maintain consistency and reliability.

To produce accurate seasonally adjusted estimates, the JDemetra+ software package is employed. This software, which adheres to European regulations, leverages methodologies such as X-13ARIMA-SEATS for seasonal adjustments. The SA methods are specifically applied to chained volume (CLV) data series to eliminate seasonal distortions, enabling a clearer understanding of underlying economic trends.

The chain-linking process, which ties data to a fixed reference year, serves as a purely statistical method. This approach preserves the integrity of raw national accounts data presented in current prices while standardizing the series for analytical purposes. Importantly, this technique does not affect growth rates but facilitates meaningful comparisons across time periods.

3.4. The Impact of COVID-19 on Seasonal Adjustment

As illustrated in the table below, the COVID-19 pandemic introduced significant outliers and structural breaks, prompting methodological revisions to ensure the consistency of GDP estimates. Notable changes include transitioning from the ARIMA Airline model to an automatic model in JDemetra+ v.2.2.3/v.2.2.4, and the shift from the TRAMO-SEATS to the X-13 ARIMA-SEATS methodology.

Table 1. Key parameters used in JDemetra, before and after COVID-19

Before COVID-19	**COVID-19 – Present**
JDemetra v.2.2.2	JDemetra v.2.2.3 / v.2.2.4
ARIMA Airline (0,1,1) × (0,1,1)	Automatic Model
TRAMO-SEATS	X-13 ARIMA SEATS
RO Calendar	No Calendar
Transitory change checked (Outliers)	Transitory change unchecked (Outliers)

Source: Own research

The revisions undertaken during this period underscore the necessity of flexible and adaptive models to address exceptional economic disruptions. By implementing these updates, Romania ensured that both raw and seasonally adjusted data remained robust, reliable, and aligned with international standards.

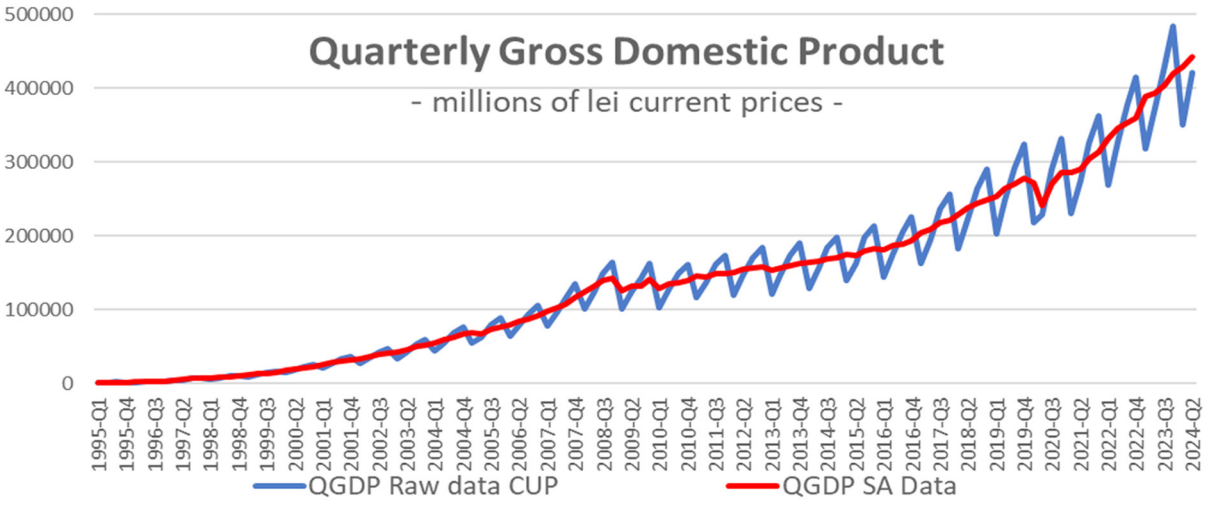
In conclusion, the revision of data series and the application of advanced SA methods are vital steps in preserving the relevance and accuracy of quarterly GDP estimates. These processes enable meaningful analysis even in the presence of significant fluctuations or structural changes, supporting compliance with European regulations and fostering a deeper understanding of economic trends.

4. RESULTS AND ANALYSIS

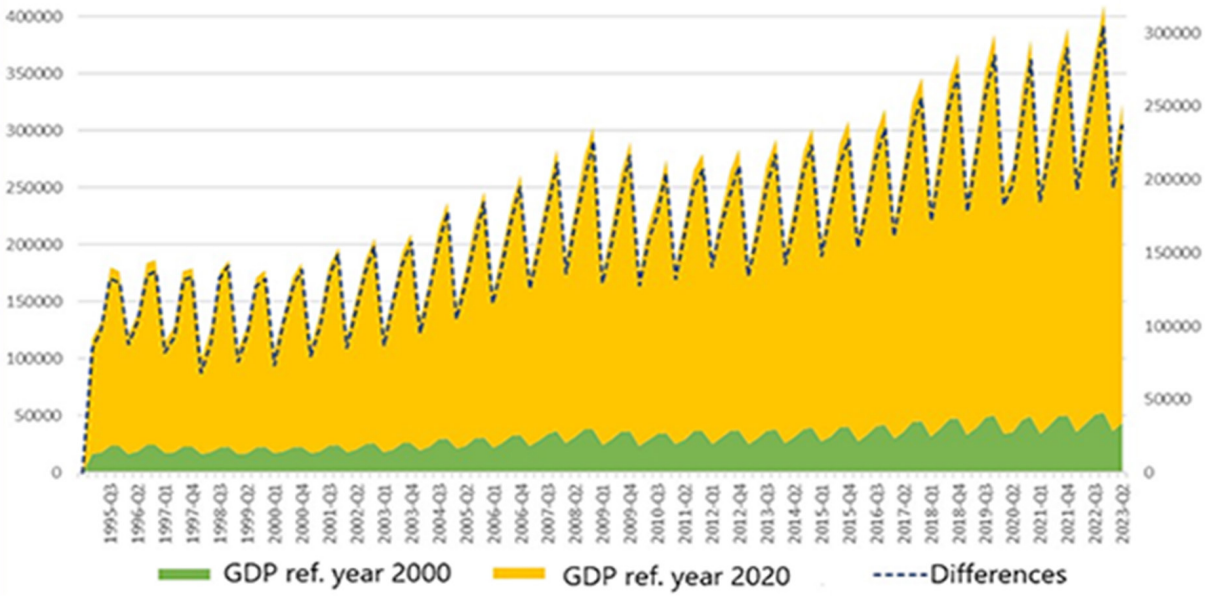
4.1. Evolution of Romania's Quarterly GDP

Graphical analysis of GDP trends reveals the significant benefits of deseasonalization in providing a clearer understanding of economic performance over time.

Graph 1 illustrates the evolution of Romania's quarterly GDP from 1995-Q1 to 2024-Q1, expressed in millions of lei at current prices. The blue line shows a consistent upward trajectory, reflecting nearly three decades of economic growth, with noticeable seasonal fluctuations recurring in quarterly cycles. In contrast, the red line provides a smoothed trend, removing seasonal variations to reveal a steadier representation of long-term growth. Starting at lower levels in 1995, GDP steadily increased, reaching its highest value in 2024-Q1.



Graph 1. Quarterly Gross Domestic Product (1995 – 2024)
Source: Own projections



Graph 2. Contrasts GDP figures with reference years 2000 and 2020
Source: Own projections

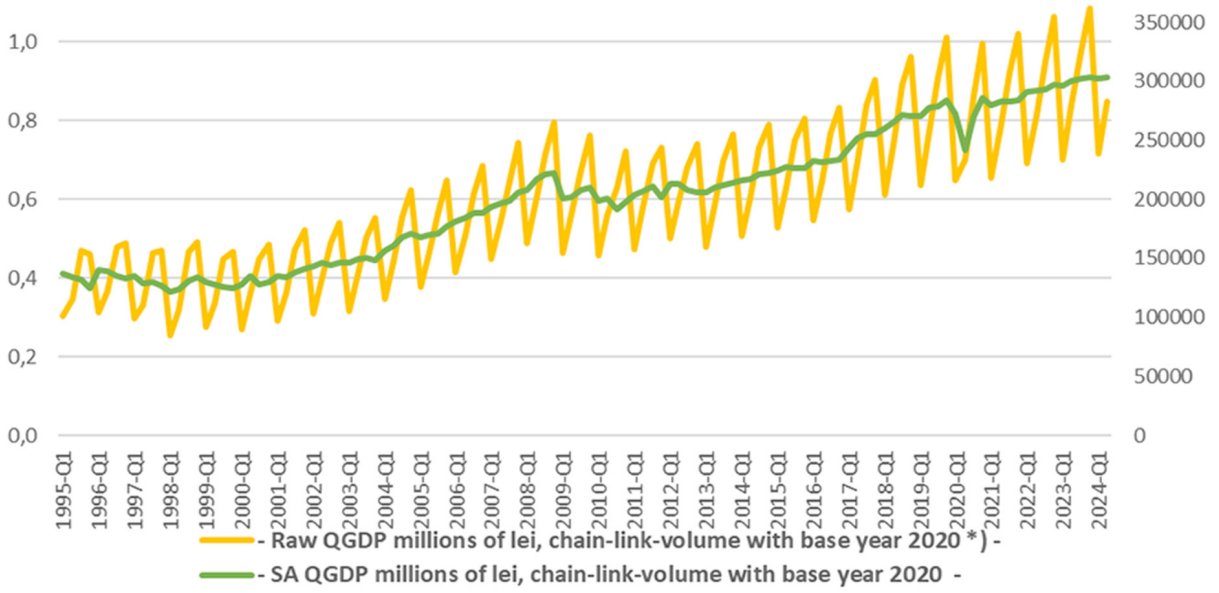
Graph 2 provides a comparative analysis of Romania's GDP values from 1995-Q1 to 2022-Q2, based on two reference years: 2000 (green zone) and 2020 (yellow zone). The green zone represents earlier economic evaluations, while the yellow zone reflects adjustments for inflation and economic changes over time. The black dotted line highlights the growing gap between the two calculations, illustrating the widening differences due to evolving economic conditions. The yellow zone consistently shows higher GDP values, demonstrating the impact of inflation adjustments and economic growth. This graph underscores the importance of periodic revisions to reference years, ensuring coherence between quarterly and yearly accounts, while maintaining the consistency and comparability of economic indicators across time.

4.2. Depicting Romania's Quarterly GDP After the Benchmark Process

The use of chained linked volumes (CLV) in compiling national accounts provides a robust framework for estimating real GDP and analyzing economic growth rates over time. Unlike nominal GDP at current prices, CLV eliminates the effects of inflation and price changes, enabling consistent comparisons of economic performance across different periods (Eurostat, 2021).

The benchmark process ensures that quarterly GDP (QGDP) data adheres to international standards, particularly under the European System of Accounts (ESA 2010). By focusing on the volume of goods and services produced rather than their monetary value, CLV provides a clearer representation of real economic growth (Matei, 2020). This method highlights actual changes in output and production, avoiding distortions caused by inflation or other price variations (Barigozzi et al., 2022).

Visual representations of Romania's QGDP after the benchmark process serve as essential tools for policymakers, economists, and analysts. These charts highlight long-term economic trends, seasonal variations, and significant turning points, providing valuable insights into the economy's performance. By focusing on real GDP growth rates, these visualizations facilitate better fiscal policy formulation, investment planning, and the evaluation of structural reforms (Hindrayanto et al., 2022; Silvestrini & Veronese, 2021).



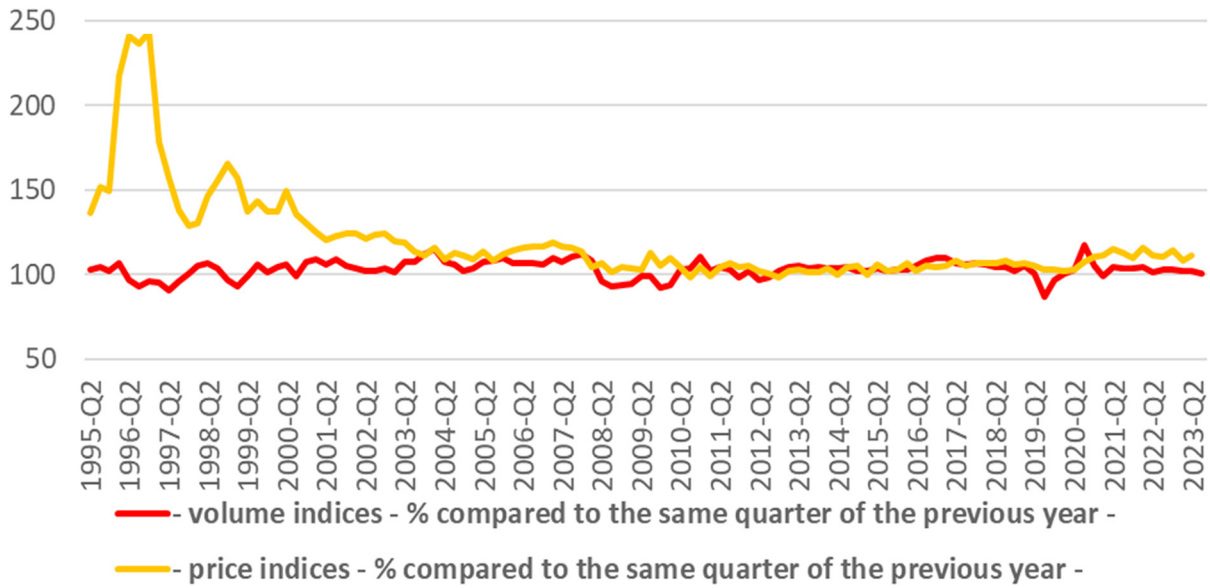
Graph 3. GDP after the Benchmark Process, using the chain-linking

Source: Own projections

In summary, the application of CLV in national accounts and the utilization of benchmarked QGDP charts ensure precise and reliable measurements of Romania's economic activity. This approach lays the foundation for analyzing economic trends and making informed policy decisions over time.

Graph 3 illustrates Romania's quarterly GDP (1995-Q1 to 2024-Q1) in millions of lei using the chain-linking methodology. The yellow line shows raw GDP values with seasonal fluctuations but an overall upward trend, reflecting consistent long-term growth. The green line smooths out seasonal variations, revealing a stable trajectory of economic progress.

The horizontal axis represents quarterly periods, while the vertical axes display normalized and absolute GDP values. This graph highlights Romania's resilience, capturing both seasonal dynamics and steady growth, serving as a key tool for analyzing long-term economic trends.



Graph 4. RO QGDP Raw data Q2_2024 contribution of economic activities to GDP, Current prices (RON)

Source: Own projections

Graph 4 provides an overview of Romania's economic performance from 1995-Q2 to 2023-Q2, focusing on trends in GDP volume and price indices compared to the same quarter of the previous year. It highlights key phases of economic evolution, including periods of instability, stabilization, and external shocks.

The red line, representing GDP volume indices, fluctuates around the 100% baseline, reflecting relative stability in GDP volumes with occasional deviations. Notable shifts, such as the sharp dip in 2020-Q2, align with economic disruptions caused by the COVID-19 pandemic. The yellow line, tracking price indices, displays significant volatility between 1995 and 2000, exceeding 200% in some periods. These fluctuations indicate inflationary pressures and economic adjustments. Post-2000, the price indices stabilize near 100%, reflecting improved economic control and price stability.

The chart captures Romania's transition from inflationary volatility in the 1990s to a stable economic growth phase after 2000. It also highlights the resilience of the economy in navigating external shocks, such as the pandemic. This visualization serves as a critical tool for understanding long-term trends in GDP volume and price stability.

5. FUTURE RESEARCH DIRECTIONS

Future research on seasonal adjustment in Romania should focus on:

- **Emerging Sectors**: Investigating seasonal patterns in rapidly growing sectors, such as information technology and renewable energy, to align economic strategies with global trends.
- **Regional Analyses**: Expanding deseasonalization techniques to regional GDP data to identify localized economic strengths and weaknesses, thereby enabling targeted interventions.
- **Advanced Models**: Exploring machine learning and Big Data techniques to enhance seasonal adjustment processes. For instance, hybrid models that integrate traditional statistical approaches with AI can improve the accuracy and efficiency of real-time data adjustments.
- **Global Comparability**: Benchmarking Romania's seasonal adjustment methodologies against international best practices to ensure ongoing compliance with EU standards while identifying opportunities for innovation.

By focusing on these areas, Romania can further improve the robustness of its economic analyses and strengthen its global competitiveness.

6. CONCLUSION

Seasonal adjustment represents a vital component of economic data analysis in Romania. By adopting advanced methodologies like JDemetra+ and adhering to international standards, Romania has significantly enhanced the reliability of its macroeconomic indicators. Deseasonalized data provides policymakers with a clearer understanding of economic trends, supporting effective fiscal, monetary, and structural policies.

The analysis of deseasonalized GDP trends, coupled with insights into sectoral contributions and the impact of major revisions, demonstrates the transformative potential of seasonal adjustment. Visual representations, such as deseasonalized GDP trends and sectoral treemaps, underscore the importance of eliminating seasonal distortions to reveal underlying economic realities.

Looking ahead, Romania's ongoing commitment to methodological improvements and alignment with global standards will be critical for sustaining economic growth. By incorporating adaptive technologies and expanding research into emerging economic areas, Romania can ensure that its seasonal adjustment practices remain at the forefront of international standards.

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The Aging Population of Romania: A Long-Term Process with Hard-to-Predict Effects

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Abstract: *In Romania, as in most European countries, one of the major issues is the continuous population decline driven by aging, decreasing birth rates, and increasing life expectancy. These are just a few of the significant aspects that characterize the demography in Romania, 35 years after the Revolution of 1989. In demographic terms, some of the consequences are reflected in a drastic reduction in the resident population of areas that are currently economically unattractive, as well as major imbalances in the population across the three key age groups, among others. The economic and social consequences are highly diverse, affecting both the labor market and the demand for healthcare and social services tailored to the specific age structure of the population or the distribution of residents across different environments.*

1. INTRODUCTION

The population decline over the past thirty-five years is a phenomenon present in most countries worldwide, but it has been significantly more pronounced in former socialist bloc countries. The demographic decline in Western European countries is counterbalanced by international migration, whereas the natural population growth component has an insignificant impact. As of 2023, only six countries in the European Union (Cyprus, France, Ireland, Luxembourg, Malta, and Sweden) recorded a positive natural increase (Eurostat, 2025). Moreover, in France, a country where population growth was largely driven by positive natural increase for an extended period, the year 2024 saw a low positive natural increase (INSEE, 2025). This phenomenon manifests not only through a continuous reduction of the resident population but also through dramatic changes in the population structure by age groups.

Romania's population dynamics over the last three decades follow this trend, and a turning point in the evolution of the resident population is far from being identified (Gheță, 2025). While international migration was the dominant factor in reducing the resident population during the first two decades, today, the natural component holds the greatest weight (Andrei & Gheță, 2023).

2. DEMOGRAPHIC EVOLUTION IN ROMANIA – GENERAL CHARACTERISTICS

The size and structure of a country's resident population are directly determined by a combination of economic and political factors. In Romania, political factors have played a crucial role in the evolution of the resident population. Political decisions or changes have had a profound impact

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on population size, leading to significant modifications in population structure over time. These can be assessed through the two age pyramids presented in Figure 1. The following section will address the most critical sudden changes in Romania's resident population dynamics based on the age pyramid of the resident population as of January 1, 2013:

- In 1957, a political decision liberalized abortion, leading to a slow but continuous decline in the number of live births until 1966. During this period, the average annual decrease in the number of live births was 3.2%. This trend is reflected in the decline in the number of people aged 56 to 45.
- The most severe political intervention in family planning occurred in 1966 when the Communist Party banned abortions. The impact was immediate, with the number of births increasing by nearly 93% in 1967 compared to the previous year. This phenomenon is visible in the 2013 pyramid through the significantly higher number of individuals aged 45.
- During the Communist period after 1966, additional political measures were taken to forcefully stimulate the birth rate, though their effects were considerably smaller.
- The political changes of 1989 marked the beginning of a new demographic transition in Romania. Over the past three decades, there has been a continuous decline in the number of live births and a significant decrease in the resident population due to international migration, as individuals gained the right to free movement.

We can assert that Romania's current demographic situation is, to a greater extent than in other regional countries, a direct result of political interventions and changes over the last 60 years. The characteristics of the age pyramid based on recent resident populations provide the best evidence of this. Major shifts in the contour of the pyramids from 2013 to 2023 correspond to generations born in the years preceding key political decisions regarding abortion regulation (1957 and 1966) or the political transition of 1989.

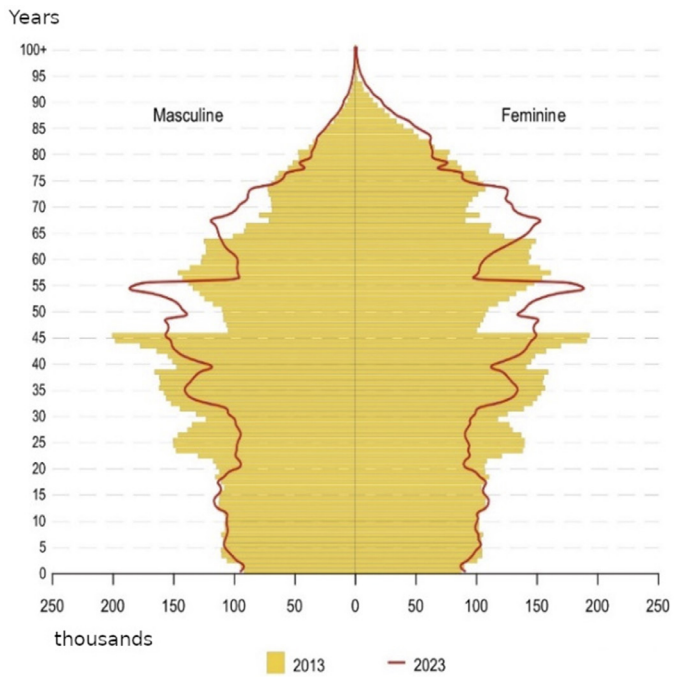

Figure 1. Age pyramid, years 2013 and 2023

Source: NIS (n.d.)

The brutal interventions of state institutions between 1966 and 1989 in regulating abortion, aimed at increasing Romania's population, as well as the restriction of free movement at the international level, created the conditions for a negative demographic trend following the political changes at the end of

1989. Once the factors that had driven population growth (birth control at the family level through the banning of abortion and at the macro level through restrictions on emigration) were eliminated, the country's population has been continuously declining over the past three decades (Figure 2).

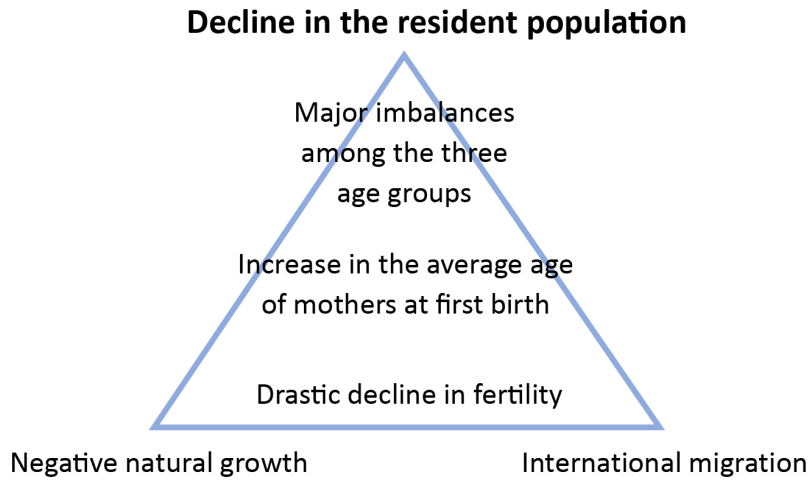

Figure 2. Demographic Decline – A phenomenon across former socialist bloc countries
Source: Author's illustration

In the period immediately following 1989, the number of births continuously declined due to:

- The legalization of abortion, which allowed families to regain control over family planning.
- Cultural changes in society, which led to a new approach among young people regarding the timing of their first child and the number of children they had.
- Freedom of movement and economic difficulties, especially in the early stages of Romania's transition to the EU, which encouraged large-scale international migration, primarily among young people. This significantly reduced the population's fertility potential.

As a result of these three factors, the fertility rate has dramatically declined over the past three decades. Several key birth rate values (live births per 1,000 inhabitants) recorded over the last 60 years illustrate how political interventions and societal changes have influenced Romania's population trends:

- 19.1 live births per 1,000 inhabitants in 1960, three years after the legalization of abortion.
- 21.1 in 1970, four years after abortion was banned.
- 18.0 in 1980.
- 13.6 in 1990, immediately after the political changes of December 1989, highlighting the strong influence of state intervention in family planning.
- 9.6 in 1990, before the COVID-19 pandemic, as a result of societal transformations and international migration.

These significant fluctuations in fertility rates have had—and will continue to have—a major impact on the size of Romania's resident population and its distribution across the three age groups.

3. THE EFFECTS OF MIGRATION

International migration is a demographic phenomenon that has affected and will continue to affect the size and age structure of the resident population. Today, over 4.1 million Romanians live abroad for more than a year. While international migration was the primary factor reducing the resident population in the first two decades after 1989, natural decline has become the predominant factor in

recent years. Since 1992, the annual number of deaths has exceeded births, but in the past decade, this imbalance has significantly widened. Between 1990 and 2011, international migration accounted for nearly 80% of Romania's population decline, while from 2011 to 2023, its contribution fell to less than 60%. In recent years, most of the population decline has occurred through natural decrease.

An essential aspect of significant migration, beyond the annual flow and stock over a given period, is the average age of those involved. In 2007, the number of Romanian emigrants was 544,000 (51.2% men and 48.8% women), with an average age of 29.7 years. The large flow of female emigrants in high-fertility age groups reduced the fertility of the resident population and increased the number of children born abroad to at least one Romanian parent. Consequently, after several years, Romanian emigrants have children born abroad, some of whom are also registered in Romania at birth or in subsequent years.

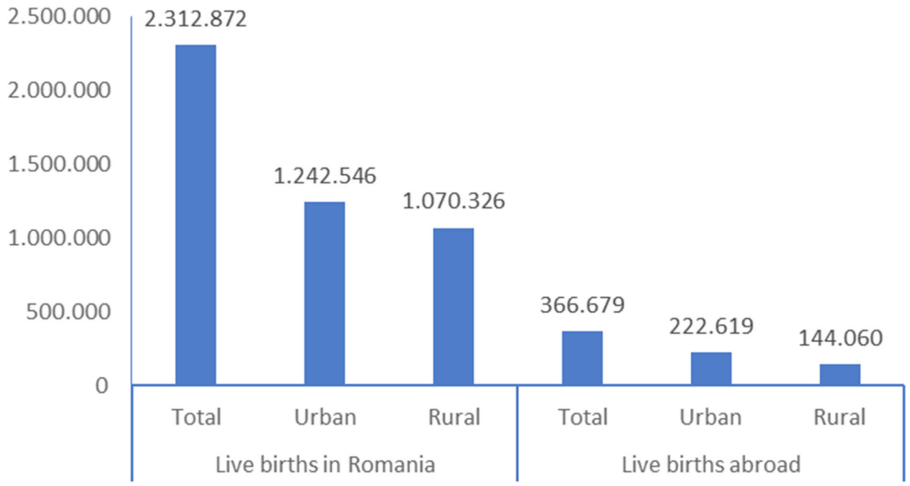

Figure 3. Total live births in Romania and abroad, 2009 – 2021

Source: Own calculations

Thus, one visible effect of the large stock of Romanian emigrants is the high number of children born abroad who have at least one parent with Romanian citizenship and are also registered in Romania (UNPD, 2024). Figure 3 presents the number of children born in Romania and those born abroad but registered in the country between 2009 and 2021.

What do these data highlight? First, they emphasize the significant number of children born outside the country who are still officially recorded in Romania. For every 63 children born in Romania, an additional 10 children born abroad were later registered in the country. This result underscores both the large scale of Romanian emigration and the strong cultural and economic ties that emigrants maintain with Romania over long periods.

The development of the economic environment in Romania could be a key factor in attracting a significant portion of this population back to the country. It is possible that some members of the first generation of Romanians born abroad to emigrant parents—particularly those whose families left during the transition period—might choose to return. Given that economic factors were a primary driver of Romanian migration, they could also serve as a motivating factor for return migration.

From a strictly demographic perspective, immigration from this population group could help mitigate age group imbalances within Romania's resident population.

4. POPULATION AGING IN ROMANIA

Between 1990 and 2023, Romania's population decreased by over 4.2 million people, affecting demographic structure, the labor market, demand for social and healthcare services, and the pension system. The primary issue concerning the resident population is not only its significant reduction over a short period but also the aging phenomenon and the deterioration of the age-group distribution. After 35 years of this demographic transition, severe consequences are emerging: declining fertility leading to a long-term population decrease, labor shortages in various sectors, increasing demand for social and healthcare services for the elderly, and ensuring the sustainability of the pension system.

Due to societal and economic changes, Romania's average age has continuously increased since 1989. In 1990, the median age was 34.5 years, rising to 42.2 years in 2020—an aging process of 7.7 years over 30 years, representing a 22.3% increase. On average, Romania's resident population ages by 0.7% annually. If this trend continues, the median age will reach 46.8 years by 2035 and around 50 years by 2045. These trends could lead to severe imbalances in the labor market, healthcare, social services, and the pension system.

Aging is more pronounced among women. In 1990, the average age for women was 35.6 years, while for men, it was 33.4 years. By 2020, these figures had increased by 8.3 years for women (an annual aging rate of 0.73%) and by 7.2 years for men. As a result, by 2020, the median age for women was 43.9 years and 42.2 years for men. If these aging rates persist, the median age for women will be 48.9 years and for men, 44.9 years by 2035. By 2045, these figures could reach 52.6 years for women and 48.0 years for men. Increased international immigration, typically composed of young individuals, could help mitigate Romania's median age and reduce imbalances among the three major age groups, significantly increased in the last three decades.

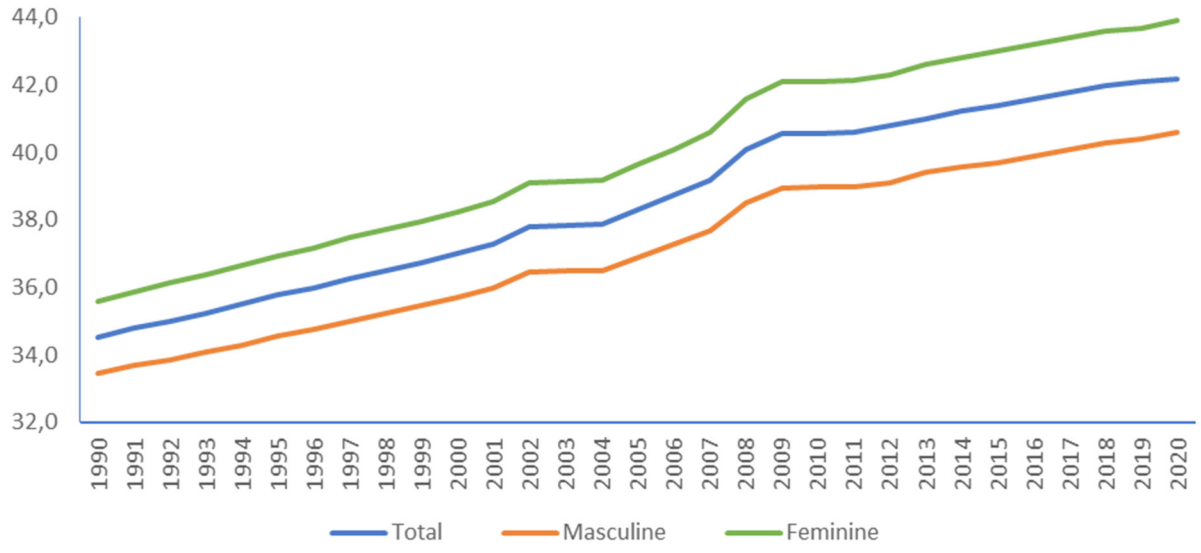

Figure 4. Evolution of the median age in Romania

Source: Own calculations

The age group distribution highlights an inverted demographic pyramid. Two key statistical indicators best illustrate the aging effect of Romania's population, which is currently unfolding and will continue for a long time: the Demographic Aging Index (DAI) and the Demographic Dependency Ratio (DDR).

Both indicators have shown negative trends over the past decade. In 2012, the DAI was 101.8 elderly persons per 100 young people, but by 2023, it had increased to 122.0. Moreover, as illustrated in Figure 5, the growth of this indicator has been constant throughout the mentioned period.

Similarly, the DDR has risen from 47.0 dependent persons per 100 working-age adults in 2013 to 56.0 in 2023. The evolution of this indicator further demonstrates the imbalances in the distribution of the population across the three main age groups.

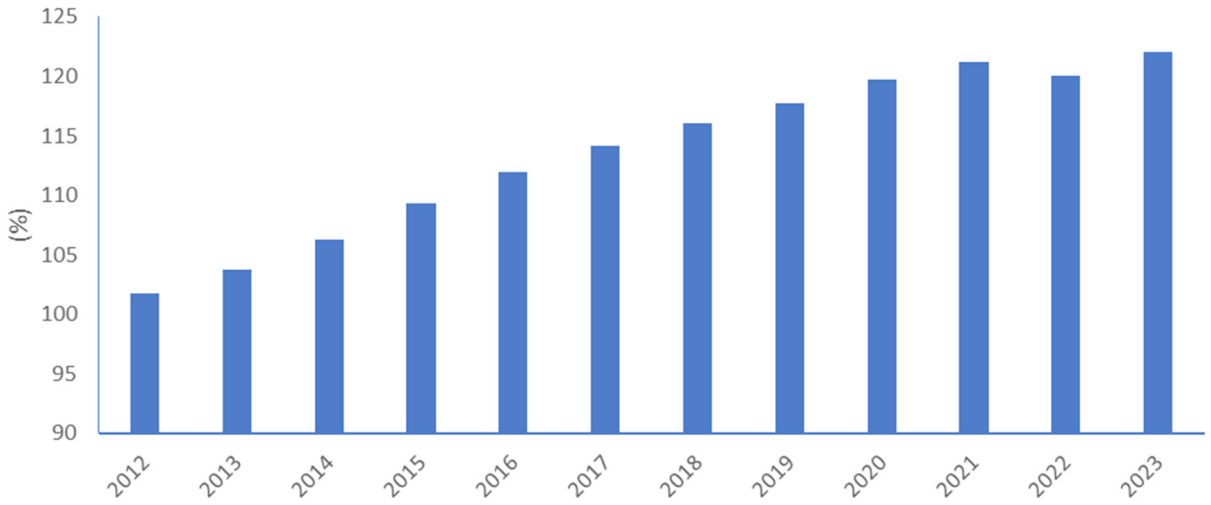

Figure 5. DAI in Romania, 2013 - 2023
Source: NIS (n.d.)

5. CONCLUSION

Over the past three decades, Romania has experienced a decline in its resident population of more than 4.2 million people. The major issues concerning Romania's resident population are not only related to this significant decrease but also to the severe imbalances in its distribution across the three main age groups: young people (aged up to 14 years), adults (aged 15 to 64 years), and elderly individuals (aged 65 and over).

The evolution of the population distribution across these three age groups over the past 35 years indicates that Romania's resident population is undergoing a rapid aging process. The effects of this process are already evident in the labor market, the demand for healthcare services, and the public pension system. In the long run, the aging of the resident population will lead to economic stagnation.

During the early stages of the post-Socialist demographic transition, international migration was the dominant factor in the decline of the resident population. However, in recent years, this decline has been largely due to natural causes. Throughout the entire demographic transition, there has been a continuous annual decrease in the number of live births and an increase in the annual number of deaths.

The assessment of massive international migration, as well as the economic and cultural ties maintained by emigrants, is also reflected in the large number of children born to Romanian parents abroad who are subsequently registered in Romania.

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Self-Assessment of Knowledge About the EU and Active EU Citizenship Among Youth in Croatia

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Abstract: *The extremely low turnout of Croatian voters in the European Parliament elections in June 2024 illustrates Croats' lack of involvement in EU matters. Croatian people's absence of interest in the elections could be attributed to a lack of information about the European Union, how it works, what EU citizens' options are, or how to engage in EU activities. 69 undergraduate and graduate non-English major students from the University of Slavonski Brod in Croatia participated in a pilot research aiming to determine the relationship between a lack of enthusiasm to actively participate in EU decision-making and their knowledge of the EU. Findings suggest statistically significant positive connections between participants' positive views towards the EU and how well informed they were about the EU's governmental, economic, geographical, and cultural features. The findings of this research should also be tested on a larger number of participants from the Western Balkans.*

1. INTRODUCTION

The European Union (EU) is a unique political and economic and social community that has a major impact on the daily lives of its citizens, including young people. With the introduction of the European citizenship institution and the introduction of common policies relating to education, employment, migration and environmental protection, the EU seeks to strengthen the active participation of its citizens in political life. Active citizenship within the EU means being informed, politically engaged and participating in democratic processes. Although young people in Croatia face numerous challenges in the process of socialization and civic engagement, research on their knowledge about the EU and attitudes towards active EU citizenship remains limited. The 2024 European Parliament elections revealed a significant issue in Croatia, with a voter turnout of only 21.35%, the lowest among EU member states, which highlights the lack of active engagement in EU matters among Croats. This paper therefore aims to explore the self-assessment of Croatian youth's knowledge of the EU and their motivation to become active EU citizens.

2. THEORETICAL BACKGROUND

Knowledge and awareness of political issues are crucial for the engagement of citizens in democratic processes. The exceedingly low turnout of Croatian voters in the most recent European Parliament elections, conducted in June 2024, reflects Croats' poor involvement in EU activities. Croatia had the lowest turnout of any member state, with only 21.35% of respondents participating in the elections (Izvješće o provedenim izborima članova u Europski parlament iz Rebublike Hrvatske, 2024). In contrast to the elections for members of the Croatian Parliament, where voter turnout was over 60%, little more than 30% of voters had yet turned out for the European elections in Croatia (Izvješće o provedenim izborima članova u Europski parlament iz Rebublike Hrvatske, 2024).

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The age structure of elected members to the European Parliament from Croatia reveals that there are no young people aged 20-30 in this body, but the majority of members are over 50 years old. There has also been a noticeable fall in voter interest in Croatia's easternmost regions. 22.68% of voters from the area of Požeško-slavonska county responded to the European elections, 19.89% from the area of Osiječko-baranjska county, 18.37% from the area of Brodsko-posavska county and 18.36% from the area of Vukovarsko-srijemska county (Izvješće o provedenim izborima članova u Europski parlament iz Rebublike Hrvatske, 2024). Resolution of the Council of the European Union and the Representatives of the Governments of the Member States (2018) encourages young people's participation in EU policy through active participation and equal access to educational, training, and employment opportunities. Nonetheless, according to Eurofound report (Eurofound, 2021, 2024), young people living in villages and rural areas are more likely to be unemployed, uneducated, or untrained (NEET), particularly in southern and eastern European countries (Caroleo et al., 2022; Rocca et al., 2022). Rural NEET youth experience higher uncertainty as they transition into adulthood, and compared to urban young people, they are more likely to live in economically depressed areas with fewer educational resources and work experience opportunities. According to Almeida and Simões (2020), individuals who enter the labor market early are more inclined to accept job offers that are uncertain or informal. Furthermore, young individuals who have previously been NEET are more likely to become so again, especially if they are women living in rural areas. NEET youth are more likely than other groups to experience social marginalisation, poverty, and financial insecurity, and they are routinely disregarded by support programmes (Moxon et al., 2021). Furthermore, NEET rates are highest in some southern and eastern EU member countries, including Romania, Bulgaria, and Croatia (European Parliament, 2022).

The notion of 'EU support and scepticism' originate from a comparison of two sets of assessments: how individuals evaluate the perceived benefits of their country's EU membership vs the perceived benefits of their country's non-EU membership. De Vries (2018) categorizes Eurosceptics (a phrase coined in the British media in the 1980s) into four types: exit sceptics, regime sceptics, policy sceptics, and loyal supporters. Regime Sceptics consider EU techniques, procedures, and functions to be less advantageous than quitting the EU, but they also feel that being part of the EU offers significant policy benefits. Policy sceptics criticize EU policies while maintaining the support of the system. Previous research on young people's understanding of the EU and civic engagement has identified a number of elements that influence their awareness and participation. According to research from other European nations, young people frequently have limited awareness of EU institutions, while attitudes about the EU vary based on education, political activism, and media exposure. The Economic Governance Support Unit created the briefing paper at the request of the ECON Committee, which reviews the policies addressing Pillar 6 - next generation, children, and adolescents - in National Recovery and Resilience Plans. The paper focuses on two Pillar policy domains: early childhood education and care and youth job support. According to the Recovery and Resilience Scoreboard data on the 25 NRRPs agreed on by the Council as of November 25, 2022, the estimated expenditure for Pillar 6 is EUR 49 billion, with just 11% (about EUR 5.4 billion) set aside for youth employment support. Eight countries were examined: Italy, Belgium, Germany, Finland, Ireland, Spain, Poland, and Croatia. In all eight nations, the different needs of young girls and boys are not clearly reflected in active labor market measures targeted at assisting the school-to-work transition. Young people are especially vulnerable, according to the findings of the 'Living and Working in the EU' survey, a longitudinal research that began during the COVID-19 outbreak. According to the April 2024 result analysis, young people in Europe, as well as those who are unemployed, reported the lowest levels of well-being, despite modest improvement since the pandemic began, and they continued to feel alienated from society and were at the highest risk of depression, demonstrating the negative effects of lockdown.

Findings of a recent survey suggest that youth in Southeast Europe and Western Balkans had a lack of interest in politics, as seen by their unwillingness to take on political responsibilities (Gvozdanović et al., 2024): about a fifth of the 717 participants reported they would be ready for taking up political function, but they are still unsure, and 57.1% are convinced that they are not eager for such a step. Lack of motivation to take up political tasks may stem from a perceived lack of political skill. In Croatia, 38.1% of young people rate their political knowledge as none or bad, 36.7% mediocre, and 24.1% very good or exceptional (Gvozdanović et al., 2024). The same research also implicated that young people in Croatia, as well as in other countries encompassed by the survey, trust the EU more (25%) than the government (10%). Supporting the hypothesis that a lack of awareness about the EU may result in a low motivation to participate in active EU citizenship among adolescents in the Western Balkans, a few additional research findings should be discussed. Turk and his colleagues investigated how well students at the Faculty of Teacher Education and the Faculty of Humanities and Social Sciences at the University of Rijeka in Croatia were informed about the European dimension through formal education (Turk et al., 2015). The findings of their study indicated that around 90% of participants obtained no actual understanding of the topics of the European component in education during secondary schooling, and the majority of them do not feel competent enough to debate and implement the European dimension in education. Since participants in that research were the future knowledge disseminators as teachers, the conclusion states that such findings serve as an alarm for poor implementation of EU dimensions in education in Croatia. A similar survey was conducted in 2018. When Kurečić and his colleagues (Kurečić, 2020) surveyed 174 students in Croatia about their opinion of the EU and found that they had a neutral opinion about the level of their information about the impact the accession to the EU. The attitudes and knowledge of young people in the Western Balkans were analyzed in a survey performed with the help of the Erasmus+ Program of the European Union as part of the Jean Monnet project 'EU TRaIN Module' (no: 610767-EPP-1-2019-1-RS-EPPJMO-PROJECT). According to Jovičić-Vuković and her colleagues (Jovičić-Vuković et al., 2022), young people in Serbia rate their awareness of the European Union as average (M = 2.51), and there is also a lower number of young people in Serbia who believe they are adequately educated about the EU (17.2%) than those who say they do not have enough real information about the EU (49.5%). Another Erasmus+ project, 'MEGA: Make Europe Great Again' (2020-1-FR01-KA201-080193) included partners from France, Croatia, Germany, Spain and Portugal. The project aimed to address the challenges of education about the EU in Europe. The survey conducted by the mentioned partners' consortium among secondary school teachers and students, as well as policy makers, revealed participants' moderately positive attitude towards the EU. However, the EU was only sporadically mentioned throughout the teaching of compulsory subjects, and headmasters reported being mostly self-taught about the matter (Bajkuša & Šarić, 2021). Teachers and headmasters also indicated that EU-related themes should be included in higher-level education to better prepare students for the dissemination/teaching process ahead.

3. METHODOLOGY

The study was conducted in November 2024 among 69 university students at the University of Slavonski Brod in Croatia, including 33 first-year undergraduate students of Economics, 21 third-year undergraduate students of Class Teacher studies, and 15 first-year graduate students of Early and Preschool Care and Education (Table 1). The majority of participants were women (81.2%). The youngest participant was 18 years old, and the oldest was 32 years old, with the majority of them falling between the ages of 19 and 22: 29% were 19, 8.6% were 20, 20.2% were 21, and 18.7% were 22. Twenty participants reported graduating from the Gymnasium, whereas 49 reported graduating from the School of Economics. A little more than half of them said their

family's financial status was average, around one-third said it was better than normal, and the rest said it was worse than average or refused to answer the question. Over 60% of the participants lived in rural Croatian areas.

Table 1. Participants' sociodemographic features

Study year	Sex	Highschool	Graduation grade	Financial situation	Residence
1st year undergraduate Economics 33 (47,8%)	Male 12 (17,4%)	Gymnasium 20 (29%)	A 6 (8,7%)	Worse than average 3 (4,3%)	Urban 43 (62,3%)
3rd year undergraduate Teacher studies 21 (30,4%)	Female 56 (81,2%)	Economy 49 (71%)	B 47 (68,1%)	Average 38 (55,1%)	Rural 26 (37,7%)
1st year graduate ECE studies 15 (21,7%)	Did not want to say 1 (1,4%)		C 12 (17,4%)	Better than average 22 (31,9%)	
			D 4 (5,8%)	Did not wish to say 6 (8,7%)	

Source: Own calculations

Participants completed the survey via Google Forms, and the data were analyzed using the SPSS statistical analysis tool (version 23). The questionnaire was divided into four sections: questions about participants' socio-demographic information, instrumentality-promotion (the IPro Scale) adapted from Dörnyei's L2MSS scale (Dörnyei, 1990, 1994, 2019; Dörnyei et al., 2006, 2016) and re-evaluated to better suit the post-COVID19 era (Fišer & Pongračić, in press), a scale measuring participants' attitudes towards the EU (the StavEU Scale), and a scale measuring how informed participants were about the EU (The InfoEU Scale). The InfoEU and the StavEU Scales were adopted from a similar study done in 2022 among Serbian high school students (Jovičić-Vuković et al. 2022). The InfoEU Scale was made up of six particles followed by a five-point Likert-like scale that measured participants' self-evaluation of how informed they were about the EU in general, what the EU was, EU government, EU trade, EU geographical aspects, and EU demographics. The InfoEU Scale's dependability was strong enough to warrant further investigation (Cronbach's Alpha=.811) (Table 2).

Table 2. The InfoEU Scale's statistics

Mean	Std. Deviation	N of items	N	α
2.833	.584	6	69	.811

Source: Own calculations

Two hypotheses were developed based on previous research findings (Bajkuša & Šarić, 2021; Gvozdanović et al., 2024; Jovičić-Vuković et al., 2022; Kurečić, 2020) and the results of the 2024 Croatian Parliament elections (Izvješće o provedenim izborima članova u Europski parlament iz Rebublike Hrvatske, 2024).

Hypothesis One: As students learn more about the EU, their attitudes toward it become more positive.

Hypothesis Two: Students' motivation for active EU citizenship is affected by their knowledge about the EU.

4. RESULTS AND DISCUSSION

In the third section of the questionnaire, participants were asked about how and how much they knew about the EU. When asked where they got their information about the EU, participants mostly chose media sources (TV, radio, newspapers, and Internet sites) and social networks, with school and university programs coming in third (Table 3). As may be deduced, the majority of their information about the EU comes from informal, out-of-school sources, with less than half of them learning about it during their official education.

Table 3. Participants' source of information about the EU

Source	N/ %
Formal education (school, university)	29 (42%)
Informal education (webinars, workshops, courses)	5 (7.2%)
Media (TV, radio, newspapers, Internet sites)	55 (79.7%)
Social networks (Facebook, X, Twitter…)	53 (76.8%)
I am not interested in such information	9 (13%)

Source: Own calculations

The mean score of participants' InfoEU Scale responses was moderately low (M=2.833), indicating that the majority of students had limited knowledge of the EU. Participants self-rated their knowledge of the EU and its features on a Likert-like scale ranging from 'I know nothing at all' to 'I am quite well informed', and the results showed that they knew the least about EU trade (M=2.07) and the most about what the EU was (M=3.49) (Table 4). It is troubling that they self-evaluated their general knowledge of the EU as being below average (M=2.75).

Table 4. Mean values of participants' answers to particles of the InfoEU Scale

Particle	Mean	Std. Dev.
How informed would you say you are about the EU?	2.75	.695
How informed are you about what the EU is?	3.49	.699
How informed are you about the EU government?	2.59	.846
How informed are you about the EU trade?	2.07	.863
How informed are you about the EU geographical features?	3.35	.937
How informed are you about the EU demographical features?	2.74	.816

Source: Own calculations

When the correlations of participants' answers to a question of how informed they would like to be about the EU and particles of the InfoEU Scale were examined, the analysis revealed significantly positive correlations between how much they wanted to obtain information about the EU and how informed they already considered themselves to be about the EU in general, about what the EU was, and about the EU government and trade policy (Table 5). Only knowledge regarding the EU's trade, geography, and demography appeared to be of less importance to participants.

To test the first hypothesis, a correlation was conducted between the mean values of participants' responses to InfoEU and StavEU Scales. The research revealed a significant positive connection between mean values of StavEU and InfoEU Scale ($r=.334$, $p < 0.01$), indicating that students who were better informed about the EU had more positive attitudes toward it. As a result, the first hypothesis was unquestionably defended. Table 6 shows a detailed analysis of the correlation between particles from the StavEU and InfoEU Scales. The findings show that students who were more interested in learning about the EU also had more statistically significant positive attitudes toward the benefits Croatia gained by joining the EU, such as a higher standard of living, the opportunity to learn about

other cultures and nations, better job opportunities, higher quality education, and greater opportunities for travel and friendship. The findings also suggest that the more students perceived they knew about the EU in general and what the EU was, the more positive attitudes they had toward almost all of the StavEU Scale particles (with the exception of education quality and military protection, which did not significantly correlate). Students who were more aware of EU governance had a statistically significant higher positive attitude toward better agricultural development, life standards, and educational quality within the EU than students who were less informed about the same subject. Furthermore, the better aware they were about EU governance, the more positive they felt about Croatia's agricultural, life, and educational qualities as an EU member state. Their understanding of EU geography was found to have a statistically significant positive correlation with how positively they felt about all of the StavEU Scale items except improved military protection and awareness of other cultures, religions, and nationalities. Only participants' knowledge about EU trade and EU demography showed a statistically significant correlation with their opinion about the benefits of Croatia joining the EU, as they only correlated with participants' favorable attitude about a higher standard of living within the EU. It appears that students' opinions on improved military security for Croatia within the EU and how membership in the EU positively affected their knowledge of different cultures, religions, and nations were least changed by the amount of information they obtained about the EU and its features.

Table 5. Pearson's correlations of participants' answers to particles about the knowledge of the EU

	How much do you want to get informed about the EU?	**How informed do you think you are about the EU?**	**How much do you know about what EU is?**	**How much do you know about EU government?**	**How much do you know about EU trade?**	**How much do you know about EU geography?**	**How much do you know about EU demography?**
How much do you want to get informed about the EU?	1	.604**	.332**	.436**	.352**	.195	.150
How informed do you think you are about the EU?		1	.435**	.503**	.472**	.292*	.118
How much do you know about what EU is?			1	.467**	.232	.453**	.332**
How much do you know about EU government?				1	.645**	.515**	.526**
How much do you know about EU trade?					1	.259*	.382**
How much do you know about EU geography?						1	.621**
How much do you know about EU demography?							1

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Source: Own calculations

Table 6. Pearson correlation of participants' answers to particles of StavEU and InfoEU Scales

How much Better…	interested in obtaining information	informed about the EU?	know what the EU is	know about EU governance?	know about EU trade	know about EU geography	know about EU demography
agricultural development	.383**	.430**	.405**	.290*	.155	.359**	.196
life standard	.314**	.465**	.407**	.306*	.285*	.345**	.238*
knowledge of cultures, religions, nations	.320**	.336**	.432**	.206	.120	.212	.117
employment opportunities	.252*	.362**	.516**	.221	.075	.286*	.179
education quality	.444**	.327	.408**	.340**	.141	.297*	.216
military protection	.225	.148	.303*	.177	.110	.315**	.222
travelling and making friends	.260*	.350**	.271*	.157	.010	.334**	.107

* Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

Source: Own calculations

The second hypothesis suggested that students' motivation for active EU citizenship would be dependent on their knowledge of the EU. Questions about Croatian European Parliament representatives' elections tested their active EU citizenship. When asked about the most recent EU Parliament elections, roughly half of the participants reported voting (43.5%), more than half of the participants did not know who the current Croatian EU Parliament representatives were (53.6%) or only partially knew (43.5%), and the majority of participants (66.7%) did not believe they would run for a seat in the EU Parliament in the future (Table 7).

Table 7. Participants' responses related to the latest EU Parliament elections

Did you vote in the last EU Parliament elections?	Do you know who Croatian representatives in the EU Parliament are?	Do you think you might candidate for an EU Parliament representative in the future?
Yes 30 (43.5%)	Yes 2 (2.9%)	Yes 4 (5.8%)
No 36 (52.2%)	No 37 (53.6%)	No 46 (66.7%)
Don't want to say 3 (4.3%)	Partially 30 (43.5%)	I don't know 17 (24.6%)
		Don't want to say 2 (2.9%)

Source: Own calculations

A one-way ANOVA revealed that there was no statistically significant difference in active EU citizenship (voting for Croatian EU Parliament representatives and deciding whether or not to run for such a representative in the future) between groups of students based on their level of knowledge about the EU or their attitudes toward the benefits they believe Croatia has as an EU member. Knowledge of who the current Croatian EU Parliament representatives are cannot be considered active EU citizens, unlike voting for such a cause or wishing to run for office, so the second hypothesis was not supported: students' motivation to be active EU citizens is unaffected by their level of knowledge about the EU.

5. FUTURE RESEARCH DIRECTIONS

Because only one hypothesis was defended (being informed about the EU positively affects students' favorable opinion about Croatia's benefits as an EU member state), the research findings suggest that there is still a lack of evidence of why Croatian youth is not more actively engaged in EU citizenship, such as voting, becoming a candidate for the European Parliament, or becoming more politically engaged in other ways, such as volunteering or joining political parties. According to the findings of this study, introducing more formal education about the EU at all levels of education in Croatia may increase positive opinion about Croatia's membership in the EU among Croatia's youth, which may, in turn, provide the boost they require to seize opportunities for more active EU citizenship. These findings should be tested on a larger number of participants in order to look into some almost significant results produced by this research but not included in the report. The findings are consistent with the ones obtained in previous research (Bajkuša & Šarić, 2021; Kurečić, 2020; Jovičić-Vuković et al., 2022; Turk et al., 2015) indicating that youth in Croatia still lack knowledge of the EU and are not fully engaged in its affairs. This study is unique in that it incorporates a variable of proactive behavior and attitudes toward the EU into the equation, which needs to be investigated further in order to identify the causes of youth's 'EU-indifference'.

6. CONCLUSION

This study aimed to see how well-informed Croatian students were about the EU, what their opinions were on Croatia's EU membership, and what motivated them to become active EU citizens. According to the findings, students receive the majority of their information about the EU from informal sources such as media and social networks, implying that EU subjects should be incorporated into secondary and tertiary-level formal education to provide them with clear definitions of all EU features on which they can form unbiased opinions. Although knowledge of the EU was shown to have a statistically significant positive effect on students' opinions of Croatia's benefits as an EU member, thereby supporting the first hypothesis, neither knowledge nor opinions were shown to have a direct effect on students' motivation to be an active EU citizen in terms of taking a proactive stance within EU governance. There is still a need to investigate what prevents Croatian youth from playing a more active position in EU citizenship, as well as what adds to their apparent EU skepticism

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Personal Attitudes Toward Sustainable Transformation (Results from a New Study on Bulgarian Citizens)

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Abstract: *Sustainable development requires changes at both institutional and individual levels, with the role of how people perceive their role in this process and the barriers they face being of key importance. This pilot study presents results from a recent survey on sustainability preferences conducted among 450 Bulgarian respondents, aged mostly between 14 – 45 in 2024. By measuring respondents' knowledge, attitudes and behaviours in economic, ecological, and social aspects, this study aims to provide an understanding of the attitudes of Bulgarian citizens towards sustainability transformation. The results reveal agreement with the sense of necessity to reduce waste and the necessity for stricter environmental laws. Participants express willingness to modify personal behaviour. Strong correlations were observed between individuals' beliefs in reducing consumption and the responsibility of companies toward sustainability, as well as between access to education and sustainable corporate behaviour. A gap between positive attitudes and actual outcomes is identified, evident particularly in terms of institutional trust. The results point to the need for fine-tuning of policy implementation and further research for the identification of barriers preventing broader success at the macro level.*

1. INTRODUCTION

In recent years, the topic of sustainable development, particularly its environmental dimension, has been the subject of extensive discussion within academia, among policymakers, businesses, and the public. Attitudes toward sustainability are diverse and vary significantly depending on the economic conditions of the specific regions, the level of public awareness, and the cultural characteristics of different countries. Despite recent trends towards scepticism and criticism of the sustainability paradigm within the public debate, there is still a growing global support for sustainability in production and consumption, especially in the context of climate change, resource depletion, and environmental pollution.

Monitoring key trends in public attitudes, particularly among young people, is an important and necessary process that provides crucial insight into the attitudes of society towards achieving transformative change.

The aim of the authors of this article is to examine, based on a survey, the trends in attitudes among Bulgarian citizens towards issues related to sustainability. The objective is to determine

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the extent to which the respondents are informed, how they perceive sustainability, and what is their willingness to adopt sustainable practices. The results from the study show high levels of awareness of sustainability-related issues among respondents, as well as a readiness to implement sustainable practices.

2. LITERATURE REVIEW

In recent years, the questionnaire developed by Gericke et al. (2019), known as the SCQ (*Sustainability Consciousness Questionnaire*), has been widely utilized as a primary tool for investigating attitudes toward sustainable transformation. Designed in 2018, the SCQ was first tested by its authors on Swedish students, demonstrating excellent psychometric properties. Since then, the questionnaire has been adapted and applied in numerous countries worldwide. For instance, Ahmed and El-Sayed (2024) conducted a study among nursing students in Egypt, highlighting the need for more frequent research into attitudes toward sustainable transformation across various educational contexts. Costa et al. (2023) validated the SCQ in Portugal, achieving results similar to those reported by the original authors. Tanaka and Yamamoto (2023) adapted the SCQ for the Japanese context and examined sustainability consciousness among Japanese students and pupils, with findings consistent with other studies. Ovais (2023) employed the SCQ to investigate sustainability consciousness among Indian students. This study provided an extension of the original questionnaire featuring questions aiming to measure respondents' locus of control and trust in institutions, noting differences compared to studies in wealthier countries, particularly regarding locus of control - Indian students predominantly exhibited an external locus of control (Ovais, 2023). Berglund et al. (2020) utilized the SCQ to compare responses between Swedish and Taiwanese students, revealing that Swedish students were more engaged in environmental protection and sustainable transformation through both attitudes and actions.

Gericke et al. (2019) designed the SCQ based on theories that integrate cognitive, emotional, and conative dimensions of environmental concern, building on earlier scales measuring environmental consciousness. Later, Olsson et al. (2020) proposed an alternative to the SCQ, the SPACS-Q, which will not be used in this study. Other researchers, such as Bohlerengen and Wiium (2022), Triantafyllidou and Zabaniotou (2022), and Golob and Kronegger (2019), have also introduced alternative questionnaires for assessing attitudes toward sustainable development. However, these instruments are less frequently used in the literature, and the findings of this study cannot be directly compared with those of previous research. Notably, the SCQ is designed to be adaptable - it can be used in its full form (49 questions) or a shorter version with similarly strong psychometric properties.

In Bulgarian academic literature, there is a notable lack of research encompassing all aspects of sustainable development or large-scale studies on public attitudes. Existing analyses predominantly focus on the environmental and economic dimensions (Gechev et al., 2013) and their impact on the competitiveness of the economy. Other studies examine business attitudes toward implementing environmental standards (Vasileva et al., 2024) and the barriers and challenges faced by Bulgarian companies regarding the green transition and green innovations (Ivanova & Slavova, 2018; Bezuhanova et al., 2024). These studies identify growing positive attitudes within the business sector alongside numerous difficulties and obstacles.

The most comprehensive study on corporate social responsibility (CSR) among small and medium-sized enterprises (SMEs) in Bulgaria highlights several challenges, including a lack of financial and human resources, insufficient state requirements, and limited support from owners or

clients (Stefanova, 2020). Another study of the top 300 employers in Bulgaria complements these findings, confirming that, unlike international companies that view responsible consumption and production (UN SDG 12) as key opportunities for advancement alongside economic growth, innovation, and health, Bulgarian large enterprises prioritize other goals, such as quality education and clean energy. However, they do not emphasize production practices or the transformation of consumer attitudes as primary objectives (Stefanova, 2019).

3. METHODOLOGY

The present study consists of a survey conducted among Bulgarian citizens and permanent residents of Bulgaria, which took place during the period February - July 2024. The survey is based on the established psychometric methodology developed by Gericke et al. (2019) in Sweden, which has been applied in Japan, Greece, India, and other countries. The study was conducted using a digital questionnaire administered via Microsoft Forms, which was disseminated to various communities and in more than 8 Bulgarian cities. The survey included 16 questions selected from the 49 used in the original publication, and two additional questions aiming to measure personal locus of control and trust in institutions. The questions included in the conducted survey are presented in Table 1.

Table 1. Questions included in the study, along with their corresponding codes and aspects.

Code	Aspect	Question
Q1	I	Reducing resource consumption is necessary for sustainable development.
Q2	E	Sustainable development requires us, as humans, to reduce all types of waste.
Q3	S	Improving people's chances of a long and healthy life contributes to sustainable development.
Q4	S	To achieve sustainable development, everyone worldwide must have access to quality education.
Q5	I	Sustainable development requires companies to act responsibly toward their employees, customers, and suppliers.
Q6	E	I think that using more natural resources than we need does **NOT** endanger the health and well-being of future generations.
Q7	I	Sustainable development requires people to understand how the economy functions.
Q8	E	I believe we need stricter laws and regulations to protect the environment.
Q9	S	I think that we, the people living today, must ensure that future generations enjoy the same or better quality of life than we do now.
Q10	I	I believe companies are responsible for reducing the use of packaging and single-use items.
Q11	I	I think people who pollute the land, air, or water should pay for the damage they cause to the environment.
Q12	E	Whenever possible, I choose to cycle or walk instead of using a motor vehicle.
Q13	E	I have changed my lifestyle to reduce waste (e.g., wasting less food or materials).
Q14	E	I support a conservation organization or an environmental cause.
Q15	I	I frequently buy second-hand goods online or in stores.
Q16	I	I avoid purchasing goods from companies with a poor reputation for caring for their employees and the environment.
Q17	LC	I believe that my actions can influence environmental conservation.
Q18	ID	If official institutions state that climate change is an important issue, then it must be so.

Legend of aspects - **I**: Institutional aspect; **E**: Environmental aspect; **S**: Social aspect; **LC**: Locus of Control; **ID**: Institutional Dependence.

Source: Own research

Question 17 is related to the participants' locus of control, while Question 18 measures their trust in the institutions of the Republic of Bulgaria regarding climate change. These are original questions designed to complement the survey. To all questions, participants responded using a standard

five-point Likert scale, ranging from "*Strongly Disagree*" to "*Strongly Agree*." The questions included in Table 1 describe the three dimensions of sustainable development: environmental (E), social (S), and economic (I). The grouping of questions is presented in the second column of Table 1.

This pilot study for Bulgaria employed the international methodology developed by Gericke et al. (2019) to provide an initial assessment of sustainability preferences among Bulgarian citizens and non-citizens residing permanently in the country. Conducted between February and July 2024, the study included a sample size of $n = 450$. However, the pilot sample is not representative of the entire country, as most respondents were from Sofia (the capital city). Additionally, the sample is not fully representative of all age groups, with most participants falling within the 14–45 age range. A graphical representation of the survey age distribution is provided in Figures 1 and 2.

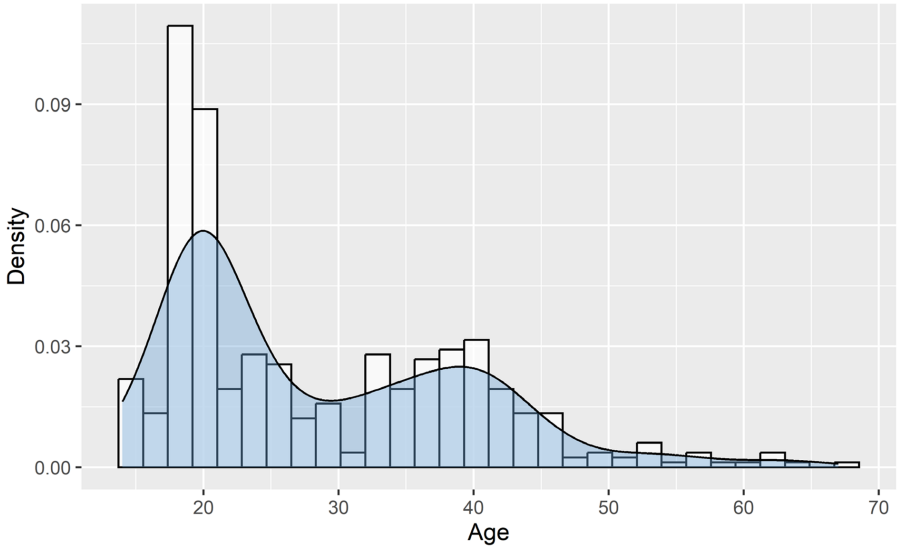

Figure 1. Age distribution of participants, n = 450

Source: Author calculations

The male-to-female ratio in the sample is 45% to 55%. The study is also subject to self-selection bias, where participants were invited to voluntarily complete the questionnaire. The results from this pilot study will be the basis for a wider and more representative investigation into the sustainability preferences of Bulgarian citizens.

4. RESULTS

All responses to the survey questions were exported from Microsoft Forms and processed using the R programming language. The Likert scale responses were converted to numerical values ranging from -2 ("*Strongly Disagree*") to 2 ("*Strongly Agree*") to facilitate the calculation of descriptive statistics and the testing of statistical hypotheses. No additional preprocessing of the data was performed. Each question's responses were treated as samples of 450 observations, allowing for the evaluation of various measures of central tendency and dispersion.

Table 2 presents the descriptive statistics for all questions. At the top of the table, three reliability measures are provided: Cronbach's alpha (α), McDonald's omega (ω), and Guttman's greatest lower bound (GLB). For each question, the table also includes the results of hypothesis testing to determine whether the mean response is statistically significantly different from zero (greater or lesser), where zero represents the neutral response on the Likert scale.

Table 2. Descriptive statistics for individual questions, reliability assessment, and comparison of sample means with zero (neutral response).

Cronbach's α = 0.86; ω=0.88; GLB = 0.88; n=450				
Code	Mean (μ)	Median	Standard deviation	H1: μ>0 (t-stat)
Q1	0.797	1	1.12	15.10***
Q2	1.283	1	0.91	29.87***
Q3	1.151	1	0.93	26.36***
Q4	1.318	2	0.91	30.85***
Q5	1.483	2	0.75	42.06***
Q6†	-1.122	-1	1.05	-22.64***
Q7	1.062	1	0.85	26.62***
Q8	1.185	1	0.91	27.56***
Q9	1.403	2	0.73	40.79***
Q10	1.305	1	0.86	32.07***
Q11	1.350	2	0.82	34.71***
Q12	0.815	1	1.11	15.57***
Q13	0.891	1	0.92	20.56***
Q14	0.664	1	1.10	12.81***
Q15	0.058	0	1.25	1.02
Q16	0.443	1	1.05	8.92***
Q17	1.180	1	0.87	28.69***
Q18	0.728	1	1.16	13.28***

Notes: † - the alternative hypothesis is H1: $\mu < 0$*, "***" – statistically significant difference between the mean and 0 significance level of* $\alpha = 0.001$.

Source: Author calculations

The study findings indicate that the participants responded to nearly all questions from Q1 to Q16 in a way that reflects predominantly positive personal attitudes toward sustainable development across the three dimensions of sustainability – economic, ecological, and social. This is evident from the fact that the sample means are statistically significantly different from zero, trending toward positive responses. The results demonstrate high reliability and internal consistency, confirmed by standard psychometric measures.

Of particular interest are the responses to questions Q17 and Q18. Question Q17 assesses the participants' locus of control, distinguishing between external and internal locus of control of respondents. The results indicate that the participants in the study predominantly believe that their behaviour is important for environmental preservation, reflecting an internal locus of control. The responses to question Q18 reveal a moderately high level of trust in institutions regarding the information they provide on issues related to sustainable development.

Figure 2 presents the correlation matrix of the individual responses. Only Pearson correlation coefficients that are statistically significant at a significance level of $\alpha = 0.001$ are displayed.

From the calculated correlation coefficients, more than 25 linear relationships are identified for which $r > 0.35$. These findings highlight key relationships between individuals' beliefs, corporate social responsibility, institutional trust, and sustainable practices.

The correlation between answers to Q1 and Q2 indicates a strong connection between the belief that reducing resource consumption is essential for sustainable development and the belief that

all people must take responsibility for reducing waste. This correlation provides insight into the perceptions of Bulgarian citizens towards sustainable resource management, indicating that in general they have a positive attitude towards accepting a higher personal cost in the present to maximise long-term sustainability of resource management. This observation provides evidence for potential behaviours towards collective action problems related to environmental issues. The correlation also aligns with SDGs 12, 13, 14, and 15, emphasizing sustainable consumption, climate action, and environmental protection.

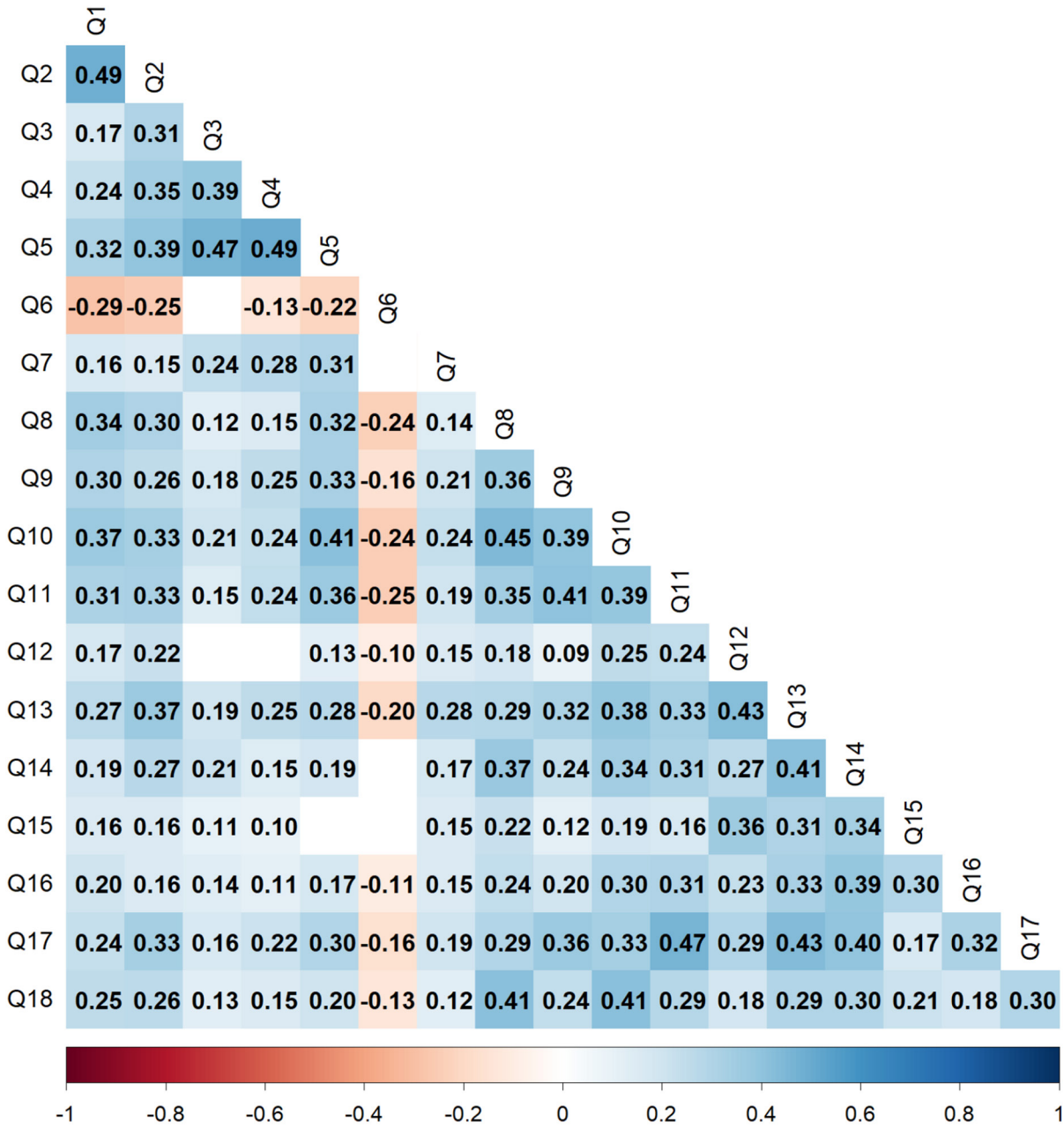

Figure 2. Correlation matrix – the separate elements are the correlation coefficients between the questions from the survey ($n = 450$). All coefficients shown are significant at $\alpha = 0.001$

Source: Author calculations

The findings highlight the interdependence between education, health, and corporate responsibility. Respondents who view good education (SDG 4) as critical to sustainable development also believe that companies should act responsibly toward their employees and clients (SDG 12). Similarly,

individuals who recognize the contribution of good health and well-being (SDG 3) to sustainable development express similar expectations of corporate responsibility (SDG 12). These insights underscore the integrated nature of social and economic dimensions of sustainability.

The data further suggest that institutional trust and personal responsibility are key factors in shaping attitudes toward sustainability. Participants with greater trust in institutions are more likely to advocate for stricter regulations to protect the environment. Conversely, individuals with an internal locus of control tend to support the "*polluter pays*" principle, which assigns accountability to those causing environmental harm.

These results collectively emphasize the interconnectedness of individual beliefs, corporate social responsibility, and institutional trust in advancing the sustainable development goals. By highlighting these correlations, the study offers valuable insights into how different dimensions of sustainability influence each other, providing a basis for targeted interventions and policymaking.

The results of the survey confirm the initial hypothesis of positive attitudes and awareness regarding sustainability-related issues. The respondents identify the negative consequences of climate change, pollution, and the overuse of natural resources as real problems and expressed a willingness to engage in actions that lead to behavioural change.

The responses also highlight growing public support for sustainable environmental practices in business, alongside an attitude favouring stricter penalties for companies that do not adhere to responsible practices. This finding is significant as it suggests that, in addition to increasing institutional pressure, market-driven demand for sustainable practices is also rising.

5. CONCLUSION

The modern lifestyle in Western societies remains centred on overproduction and overconsumption. This approach exceeds planetary boundaries, depletes natural resources, and accelerates climate change (Caesar et al., 2024). In response to this negative trend, research on (un)sustainable consumption and the associated attitudes, behaviours, motivations, and choices of individual consumers has been increasing. Many studies focus on collectively accepted standards and cultural practices in daily life, including product characteristics, symbolism, and cognitive elements (Backhaus et al., 2019).

This study is valuable in several ways. First, it can serve as a basis for a more extensive, nationally representative study on consumer attitudes toward the transformation to sustainable consumption. Second, the findings are comparable to results from similar studies conducted using the same methodology in Sweden, Japan, and Portugal, contributing to a better understanding of cross-cultural and national characteristics of different consumer groups. Finally, the authors are confident that the findings of this study will find practical applications in marketing and advertising campaigns aimed at establishing or deepening sustainable consumption practices in the Bulgarian market.

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Perception from the Industry and University Perspectives of the Barriers That Hinder the U-I Cooperation in Albania

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Abstract: *Innovation problems often result from the weak or missing connections between industry and academia. This is caused by several barriers, such as the mismatch between available skills and those required by industry, or the limited ability of firms to recruit and develop human resources. The purpose of this study is to analyze the factors that hinder "University-Industry (U-I)" collaboration, and to examine the perceptions of both the academic and industrial sectors in our country regarding the impact of these factors on cooperation.*

This study is based on a review of an extensive domestic and foreign literature. Based on the conclusions of the literature review, two structured questionnaires were developed—one for academia and one for industry. The questionnaires evaluate and analyze the perception in the academic sector in our country as well as businesses about the factors that hinder cooperation and the perception about the necessary measures for the positive progress of this cooperation.

1. INTRODUCTION

Global dynamics and socio-economic challenges have heightened the importance of research, development. They also stress the need to generate new ideas to respond effectively to these changes. Universities, as multidimensional technical and professional entities, play a key role in these developmental processes. They serve not only as centres for the dissemination of knowledge and scientific research but also play a crucial role in practical, functional, and collaborative aspects of the economy. One significant area of collaboration is with industry and business. Best practices and persistent challenges demonstrate that this cooperation is complex. Both participants must exert a mutual and continuous influence across all functional phases to remain in cohesion with the economic and social systems and to act as positive drivers within them. This cooperation manifests in various forms, such as joint research and development, technology transfer, practical applications, and entrepreneurial ventures. Repeated collaborations between the same university-industry dyad positively influence the creation of university spin-offs (Martínez-Ardila et al., 2023, p.10).

Kotiranta et al. (2020) identified three types of interaction: *educational interaction*, which includes conferences, seminars, corporate training programs, and thesis supervision; *research interaction*, which involves joint publications, research-related consultations, public research programs, and contract research; and *integrated interaction*, which consists of joint research in shared facilities and employment contracts with companies (p.1).

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Studying knowledge transfer as a collaborative format, De Wit-de Vries et al., (2019) stated that the factors influencing knowledge transfer are interrelated, trust is positively influenced by tie strength and shared goals, but negatively affected by organizational ambiguity and differences" (p.1242). The benefits of these collaborations are numerous, and over time, they have become vital to various societal systems. According to Lima et al. (2021) "the main socioeconomic impacts of these collaborations comprise three fundamental groups: economic, social, and financial" (p. 137). Fini et al. (2018) stated, "They emphasize the benefits in social well-being, including dimensions such as environmental, health, cultural, and quality of life through the products generated (p. 4). Universities and industry should not operate as separate entities. Their integration in growth and system development is stronger, and the impact is greater if they support each other in various links, not just traditional ones. The environment is challenging in terms of development, health, and digitalization. Major changes in automation and digitalization have impacted daily life. Referring to these transformations, Evans et al. (2023) identified five major benefits for academics "namely research impact, learning opportunities, improved teaching, financial benefits, and enhanced reputation" (p.10). They emphasis the UIC benefits related closely to the digital transformation.

University-industry cooperation has long-term effect that shows the need for combined long-term strategies that must be designed and implemented in policy. To build stimulating and efficient policies, we must consider not only successful practices but also the factors that have influenced them positively and negatively. These vary and are often subjective according to the current system. Their effect can be seen in different phases of this cooperation: creation, functioning, and monitoring the impacts on the system. The paper aims to present a theoretical framework regarding U-I, the obstacles that impede it, and identify them in Albania from the perspectives and experiences of the two main actors. The paper is organized into five sections: the first section defines the context by explaining UIC, exploring a theoretical framework, the second section investigates the challenges and factors that impede effective collaboration; the third section details the methodology employed in this study and the results; the fourth section presents the future research directions and the fifth section offers conclusions and recommendations for enhancing UIC strategies.

2. LITERATURE REVIEW

Academic-industry collaborations offer many benefits, but they also face challenges that can hinder their implementation, development, and success. Although considerable research has been conducted on UIC sets, a thorough understanding can be enhanced by focusing on the factors that hinder these collaborations, as they have evolved into two distinct hemispheres over the years, both structurally and purposefully. This paper surveys a developing economy that still has significant progress to make in this area.

It is very important to create strategies and policies that address these challenges, learning from past experiences. The solution to these problems may be beyond the control of the parties and depend on the collaborating institutions and their policies. Solutions to specific challenges related to one collaborating partner may or may not work for another partner, so it is almost impossible to arrive at a general solution to all challenges.

Universities and firms are different in focus, organizational structures, cultures, goals and motivations. Rossoni et al. (2024) classified "the comprehensive group of barriers into three categories: cultural, institutional and operational". (p. 1860). Also Bjerregaard (2010) found "cultural differences between firms and universities tend to impede knowledge exchange and impose challenges on project control if not properly addressed" (p. 100).

Universities and industries have different organizational cultures and objectives. Perkmann et al. (2013) analyze this aspect in more depth by giving the factors that hinder the collaboration in three categories "Individual as demographics, attitude, motivation, organizational, which includes IT support, departmental leadership climate, university/department quality, and institutional, that include scientific discipline, public policy regulation (p.430). Also, Alunurm et al. (2020) found that "differences in organisational culture remained a barrier, as did to some extent the low motivation of university staff to cooperate" (p.10). The differences extend beyond just the distinction between business and educational institutions. It is important to recognize that companies themselves vary and possess unique identities within these collaborations. They said "when collaborating with a large company, strategic differences often emerge as the primary challenge. Conversely, when working with a smaller firm, financial constraints tend to be the key barrier" (Alunurm et al., 2020, p. 10).

In institutional terms Amaral et al. (2011) found in the perception obtained through questionnaires addressed to academic staff and staff of organizations that "The researchers highlighted their low level of knowledge of university–industry interaction mechanisms and an absence of proactivity, companies indicated that did not know about the legal mechanisms involved in financing this type of investment" (p.7-8). On the other hand, the priorities of universities and industries differ, leading to what is known as the conflict of intellectual property. In line with the dissemination of knowledge, universities aim to publish the products they generate, while companies do not. Bruneel et al. (2010) said, "Although the 'classic' barrier to U–I collaboration – the university's long-term orientation – remains substantial, other factors are important in constraining collaboration, especially those related to IP and administrative procedures" (p.866). Structural differences, given that universities and industries are two distinct organizations with varying management and legal frameworks, can lead to bureaucratic barriers. These barriers often become obstacles, particularly when it comes to establishing collaborations, and may even cause scepticism about entering into such partnerships.

The ease and flexibility to adapt to changes to a joint product by the collaborating parties is a key element in whether or not these obstacles are overcome. Bruneel et al. (2010) found "many types of barriers plague collaboration between industry and universities – from orientation of the university and its researchers, to attitudes and behaviour of university administration and the TTO (p.866). The lack of infrastructure or specialized units often hinders these partnerships. Establishing positive precedents is vital to building credibility, encouraging businesses and firms to show interest in collaboration. Inherent conflicts can arise in university-industry collaborations due to differing goals, incentives, and time frames. Addressing conflicts of interest, especially between researchers and industry, is essential to ensure that these issues are resolved effectively and do not undermine the collaboration. In this regard, frequent communication and discussion to clarify the rules of the agreement are very helpful. Unequal commitment, uncertainty about the outcome, and lack of information lead to a lack of motivation, causing the parties to work independently rather than collaboratively. According to Schulze-Krogh and Calignano (2020) " the role and motivations of researchers influence the outcome of projects and the characteristics of regional innovation systems in which firms operate may represent an advantage or a barrier for satisfactory collaborations" (p.1). The system involving universities and industries should be integrative and motivating. Government policies are crucial in bridging the cultural and environmental gaps between them, helping to reduce scepticism and build trust for successful collaborations. Internal differences not only manifest in organizational structures but also significantly in the human capital within universities and industries. These differences in human capital can create barriers to successful partnerships. In their study, Muscio and Vallanti (2014) examined these perceptions regarding the relationship between universities and industry. Based on the results from the questionnaires,

they identified three main obstacles "mismatch of incentives, lack of procedures, and mismatch of goals which are revealed as real barriers that reduce efforts to foster collaboration between universities and industry." (p. 425)

Some of these barriers include: Credibility, shared goals, avoiding individualism, and establishing a system of common values that are respected in the behaviour of the individuals involved in the cooperation. In their research, Tootell et al. (2021) highlight that "the primary barriers to successful university-industry collaborations are human and organizational factors" (p.759). These can include misaligned priorities, communication issues, and institutional barriers that complicate knowledge sharing and innovation efforts. Barriers in collaboration change across different phases of a project, such as initiation, planning, execution, and evaluation. Early on, challenges like lack of trust, unclear communication, and misaligned goals may arise. According to O'Dwyer et al. (2023) " specific university–industry collaboration barriers and enablers emerge at different points in time, for example, strong lack of trust; strong fear of knowledge leakage, reluctance to share in the embryonic" (p. 900). As the collaboration progresses, these issues can improve, but new barriers may surface, like differences in work styles or resource challenges. Over time, teams need to adapt and address evolving obstacles through continuous communication, flexibility, and problem-solving.

3. METHODOLOGY

To achieve the objectives of this study, both primary and secondary data were employed. The methodology is diverse and incorporates various methods, including study, analysis, evaluation, and suggestion. While the University-Industry relationship might initially seem straightforward, it involves many complexities that require a deeper examination. This study employs both qualitative and quantitative methods. It relies on a literature review, examining works from a variety of authors. After reviewing the literature, the study identifies and lists the hindering factors that obstruct collaboration between universities and industries. Understanding these factors is crucial for identifying both the challenges and the opportunities that emerge during such collaborations. This methodological approach allows for a comprehensive analysis of the university-industry relationship and facilitates the creation of an appropriate questionnaire to gather additional data. Ultimately, this enables the author to draw concrete conclusions and offer actionable suggestions for improving future collaborations between universities and industries.

3.1. Data Collection and Representation

Based on the conclusions drawn from the literature review, two structured questionnaires were developed—one targeting the academic sector and one for the industrial sector. The questionnaires were designed to be similar in structure. The sample consists of 230 representatives of universities and industry in Albania. Interviewees from university staff are 134 participants, while interviewees from industry are 96 participants. The questionnaire was distributed randomly, through manual communication and electronic means such as email, within two main target groups: university academic staff and business representatives and participation was voluntary. This random distribution approach aimed to ensure diversity of representation across institutions and sectors, as well as to minimize the risk of bias in data selection, and also to create opportunities for inclusive participation. The questionnaire was completed voluntarily by respondents. The dataset comprises various qualitative factors, such as lack of funding, communication gaps, and geographic barriers, which are converted into numerical values for analysis. Each row represents different observations, while each column corresponds to a specific barrier affecting university-industry collaboration.

Each factor is assigned a score, typically on a scale of 1 to 5, which indicates the severity of the barrier. The key variables include: Existence of value or mission differences. Lack of academic competence in consultancy, low motivation among academics, weak entrepreneurial spirit, low commercialization potential, and (10 other factors listed in the dataset)

3.2. Correlation Analysis

This study employs Spearman's Rank Correlation Coefficient (ρ) to measure the dependency and strength of association between the barriers perceived by both university academics and industry representatives. This non-parametric method is superior to Pearson's correlation for Likert-scale (ordinal) data as it assesses the monotonic relationship—how consistently variables move in rank order—without assuming a linear relationship or normal data distribution (Vergara & Estévez, 2014).

Correlation values range from −1 to +1:

+1: Strong positive monotonic association (factors' ranks increase/decrease together).

−1: Strong negative monotonic association (factors' ranks move in opposite directions).

0: No monotonic association.

The analysis is conducted using Python, leveraging the pandas, numpy, and seaborn libraries for statistical computing and visualization.

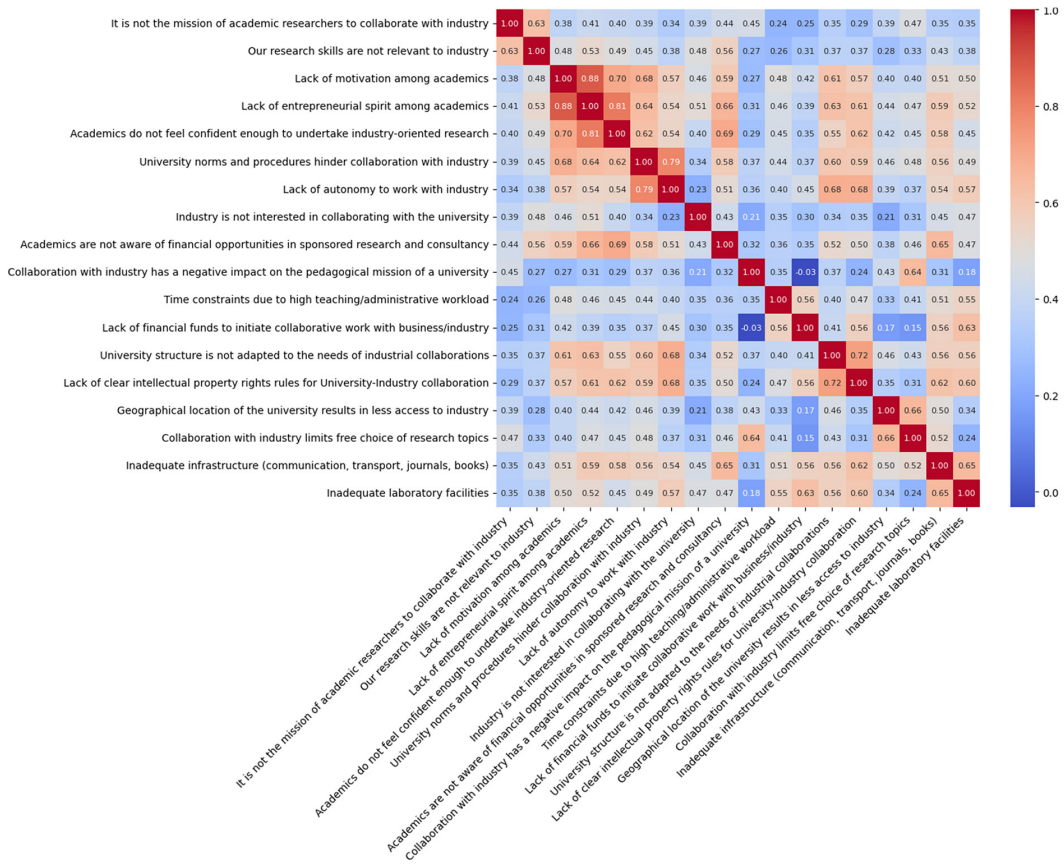

Figure 1. Spearman's Rank Correlation Matrix - University Perception of Barriers

Source: Own research

Key Findings from University Perception (ρ≥0.70) and Cultural/Motivational Link (ρ≈0.81−0.89). The analysis shows an exceptionally strong interlink between internal factors: Lack of entrepreneurial spirit, Lack of motivation among academics, Academics do not feel confident enough to undertake industry-oriented research, and Our research skills are not relevant to industry. This suggests that these issues are part of a deep-seated cultural and self-efficacy challenge within the university environment. Structural and Procedural Link (ρ=0.78): University structure is not adapted to the needs of industrial collaborations is highly correlated with University norms and procedures hindering collaboration with industry. This confirms that structural limitations and bureaucratic friction are two sides of the same systemic coin, requiring integrated institutional reform. Below is the matrix generated from the questionnaires distributed among the universities.

Key Findings from Industry Perception (ρ≥0.75):

The Competence-Interest Link (ρ=0.83): There is a strong association between Academics are not competent for consultancy and Universities are not interested in cooperation. This indicates that industry perception of university competence is tied to their belief in the university's willingness to engage. The Communication-Mechanism Link (ρ=0.88): The strongest observed correlation is between Poor communication between organizations and universities and No proper mechanisms for cooperation. This highlights that the lack of formal, structured processes (mechanisms) is the direct cause of, or is heavily compounded by, poor inter-organizational communication. Competence and Spirit Link (ρ=0.81): Lack of entrepreneurial spirit among academics is strongly tied to the perception that Academics are not competent for consultancy and that the research has Low commercialization potential (both ρ=0.81). For the industry, the entrepreneurial mindset is viewed as a prerequisite for both competence and market relevance.

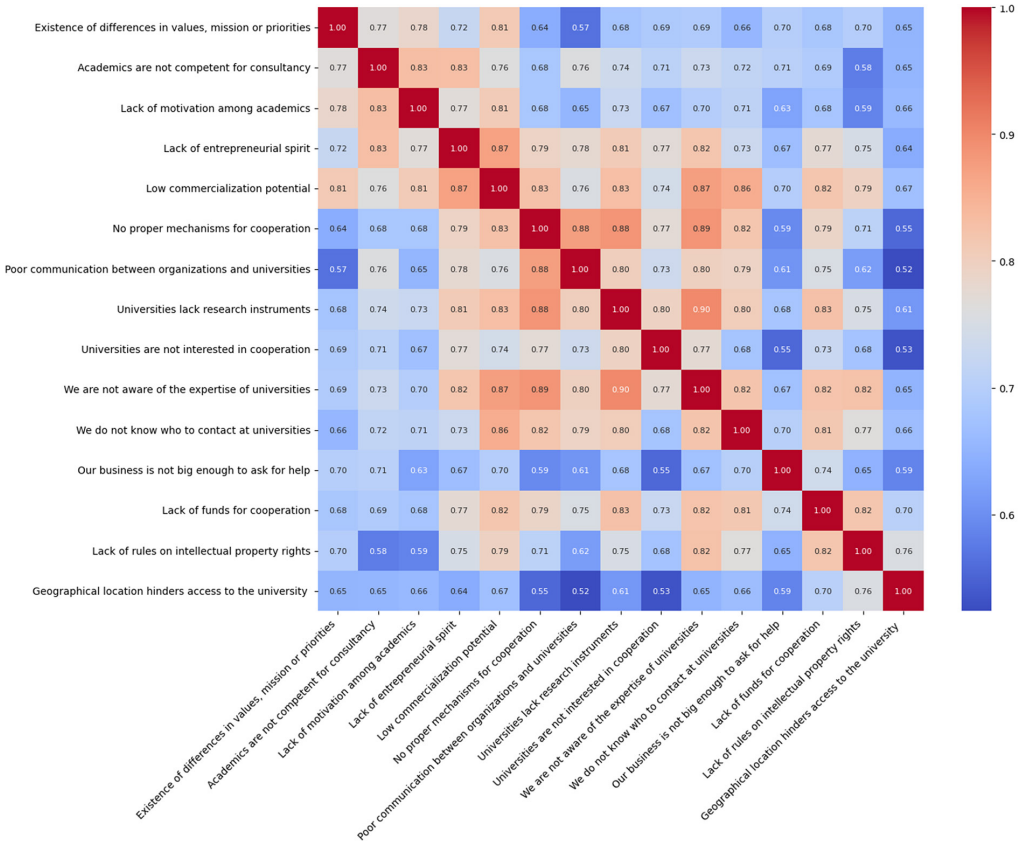

Figure 2. Spearman's Rank Correlation Matrix - Industry Perception of Barriers

Source: Own research

3.3. Results: Barrier Prioritization via Relative Importance Index (RII)

To effectively rank and prioritize the identified barriers based on the Likert-scale data, the Relative Importance Index (RII) was calculated. The RII transforms the ordinal data into a ratio-scaled metric for clear, quantitative prioritization, with a score closer to 1.0 indicating a greater perceived importance of the barrier.

$$RII = \sum w / A \times N$$

Where

w is the weighting of each response,
A is the highest weight in the scale (e.g., 5), and
N is the total number of respondents.

Collaboration with industry has a negative impact on the pedagogical mission of a university 0.763. The geographical location of the university results in less access to industry 0.751. Collaboration with industry limits free choice of research topics 0.739. The university perception data ranks cultural and mission-related barriers as the most significant, led by the fear of collaboration negatively impacting the pedagogical mission (RII 0.763). This reveals a primary internal resistance rooted in academic freedom and institutional identity.

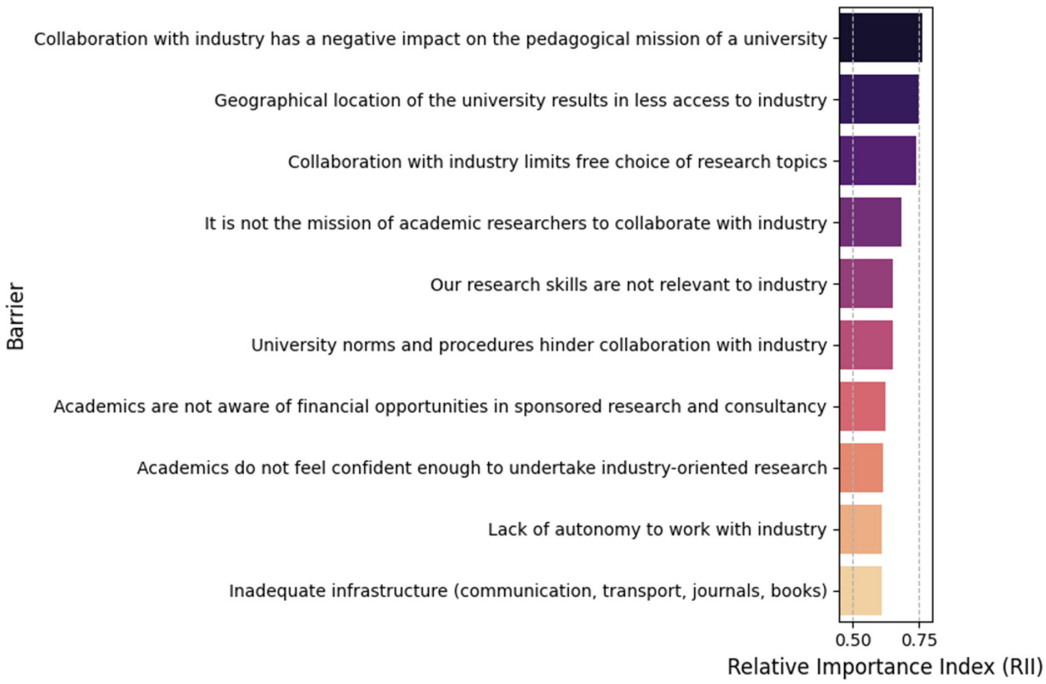

Figure 3. RII Ranking of University Barriers

Source: Own research

Geographical location hinders access to the university 0.792. Lack of entrepreneurial spirit 0.768. Academics are not competent for consultancy 0.766. From the industry perspective, the Geographical location emerges as the most critical barrier (RII 0.792), aligning with the University's concern (Rank 2). However, industry heavily prioritizes perceived academic capabilities and cultural barriers, specifically the Lack of entrepreneurial spirit (RII 0.768) and the perception that Academics are not competent for consultancy (RII 0.766), suggesting they view the collaboration barrier through the lens of practicality and professional relevance. The Lack of rules on intellectual

property rights, which was highly significant in the original analysis, ranks moderately high at RII 0.756 for industry, confirming it remains a major legal and trust issue. Overall, the data paints a multifaceted picture of the challenges faced in university-industry collaboration, confirming that a mix of structural (e.g., location, mechanisms), cultural (e.g., mission clash, spirit), and procedural (e.g., communication, IP rules) barriers must be addressed collectively.

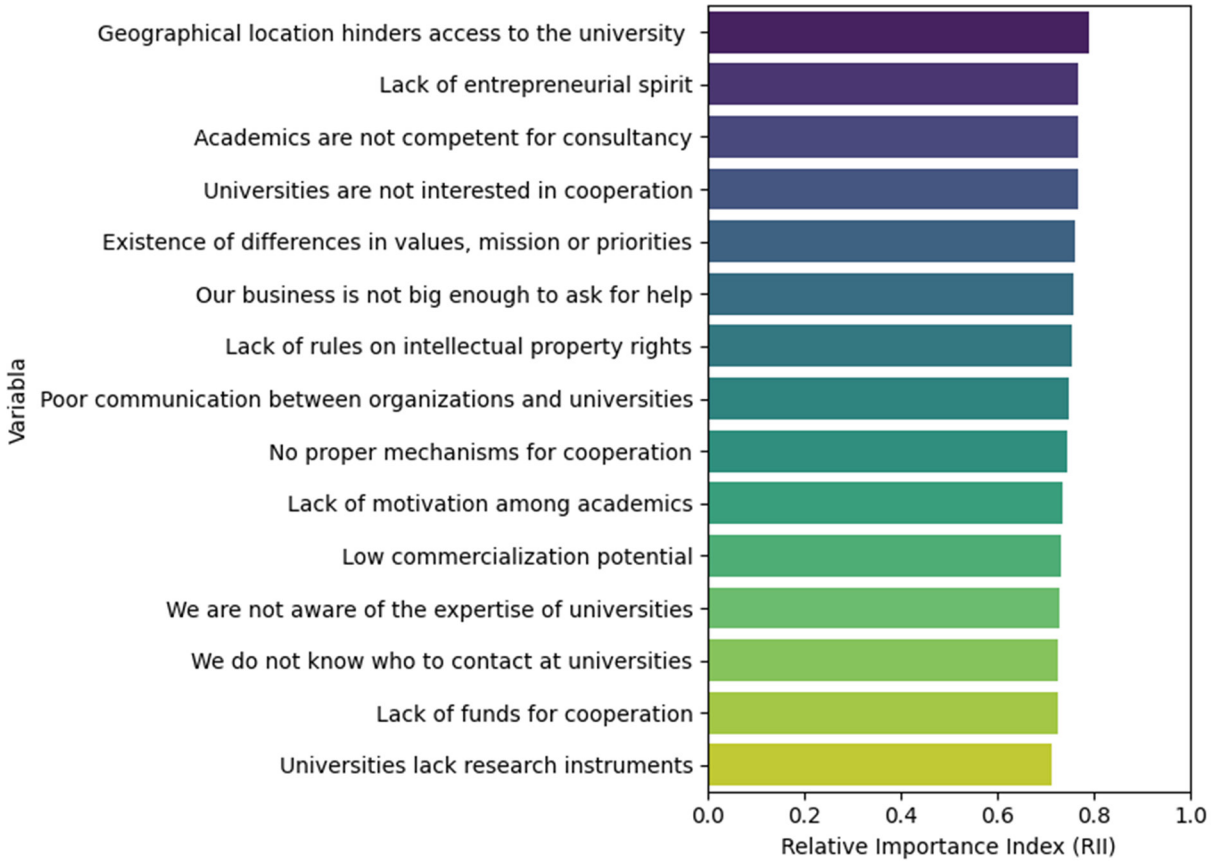

Figure 4. Variable Importance Analysis (Industry Perception) - Ranked by RII

Source: Own research

4. FUTURE RESEARCH DIRECTIONS

This study has focused on identifying the factors perceived as obstacles to the development of such partnerships. However, future research should examine the long-term sustainability and success of these collaborations, observing how they evolve over time in response to both internal dynamics and external pressures. A key direction for future research is to investigate the factors that facilitate successful university-industry partnerships. Understanding what drives these collaborations, and how they adapt over time, will be crucial in establishing best practices and strategies for improvement. Moreover, identifying the conditions under which these partnerships thrive can offer valuable insights for both academic institutions and industry stakeholders. In addition, future studies should focus on the policy implications of these findings. By pinpointing the factors that support effective collaboration, researchers can provide concrete recommendations for policy frameworks that encourage the initiation, growth, and optimization of university-industry partnerships. Ultimately, the continuation of this research will contribute to shaping more effective collaboration models, helping both universities and industries navigate the complexities of working together and ensuring mutual benefit over the long term.

5. CONCLUSION

This study used Spearman's Rank Correlation (ρ) and the Relative Importance Index (RII) to analyze the barriers to university–industry collaboration from both academic and industry perspectives.

The analysis shows that barriers are highly interconnected and mutually reinforcing. From a universities perspective, barriers are primarily cultural, motivational, and structural. High correlations ($\rho \approx. 0.81–0.89$) link a lack of entrepreneurial spirit, low motivation, and limited confidence in industry research, indicating deeply embedded cultural issues.

Structural barriers, such as an unadapted university structure and hindering procedures ($\rho \approx 0.78$), reinforce one another, signaling a need for comprehensive institutional reform. RII analysis confirms mission-related barriers (e.g., collaboration negatively affecting the pedagogical mission, RII=0.763) dominate. From industry perspective the strongest correlation ($\rho=0.88$) ties poor communication to a lack of formalized cooperation mechanisms, showing that communication failure is a structural problem. Perceptions of academic capability are closely linked to entrepreneurial spirit and the university's interest in partnership ($\rho \approx 0.81–0.83$). Industry's RII prioritizes geographical limitations (RII=0.792) and a perceived lack of entrepreneurial spirit (RII=0.768) and academic competence. In overall Implication intellectual property (IP) rights remain a significant shared concern (RII=0.756). The findings necessitate an integrated strategy that addresses these interdependencies: combining institutional reforms with the establishment of proactive communication frameworks, liaison centers, and IP clarity to foster an aligned, transparent, and entrepreneurially-minded partnership environment.

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Specific Educational Elements of the "Educated Romania" Project

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Abstract: *This paper aims to identify and analyse the key elements of the "Educated Romania" project and to assess their potential to contribute to the modernization and improvement of the Romanian education system. This study focuses on the initiatives proposed by the project, such as adapting the curriculum to the needs and requirements of the labor market, continuous professional training of teachers, creating a modern school infrastructure and promoting equity and inclusion in education. This article will highlight both the expected positive impact on the quality of education and the challenges encountered in the implementation of the "Educated Romania" project.*

This study will provide a clear perspective on the "Educated Romania" project and will suggest action directions that could support the efficient implementation of the project.

1. INTRODUCTION

"Education is the activity of disciplining, cultivating, civilizing and moralizing man, and the purpose of education is to develop in the individual all the perfection of which he is susceptible."

(Kant & Rădulescu-Motru, 1992)

The "Educated Romania" project is initiated by the President of Romania, Klaus Iohanis, to reform the education system, thus increasing the economic and social development of the country. It was launched in 2016, and the main objectives of the project include the following areas: teaching career, management and governance, financing of the education system, infrastructure, curriculum and assessment, quality inclusive education, functional literacy, digitalization, and resilience. (Presidential Administration, 2021)

"The draft does not represent in itself a new education law, but provides the necessary benchmarks for a coherent reform of primary and secondary legislation in this area." (Presidential Administration, n.d., p. 1)

The purpose of the "Educated Romania" project is to create a modern educational system, adapted to the current requirements of the labor market. The vision of this project is centered on inclusion, access to quality education, and the development of practical skills.

With a vision centered on inclusion, access to quality education, and the development of practical skills, the project aims to transform Romanian education by 2030.

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2. THEORETICAL ASPECTS SPECIFIC TO THE "EDUCATED ROMANIA" PROJECT

The objective of the "Educated Romania" project is to create an inclusive, high-performance educational system adapted to the needs and requirements of the current labor market.

The "Educated Romania" project was created in 2016, and the targets of the "Educated Romania" project are represented by:

- increasing the performance of the education system;
- access and quality to early education;
- increasing students' performance;
- increasing the quality and attractiveness of higher education. (Presidential Administration, 2021)

The targets of the Educated Romania project are presented in Figure 1.

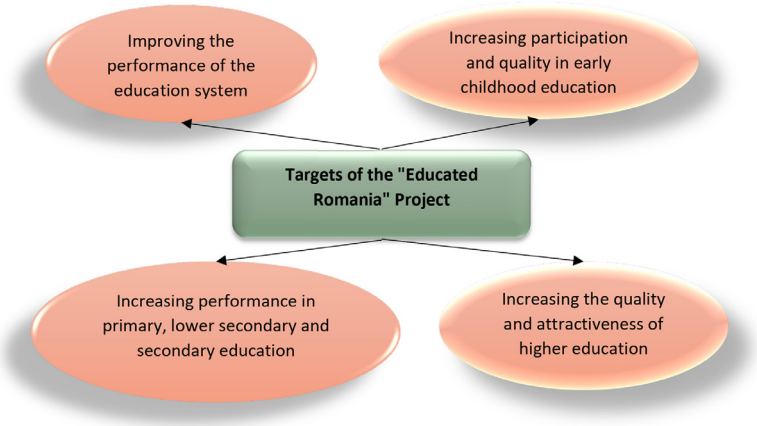

Figure 1. Targets of the "Educated Romania" project
Source: Own research

The key elements identified in the "Educated Romania" project are essential to understand how it aims to reform the educational system in Romania. The key elements identified within this project are:

- modernisation of the curriculum;
- review of the evaluation system;
- continuous training of teachers;
- modernization of school infrastructure;
- promoting inclusion and social equity;
- supporting digital education;
- community involvement in education.

Description and analysis of the key elements identified within the "Educated Romania" project:

a) Modernisation of the curriculum. The project proposes to update the school curriculum for the current requirements of modern society. Analyzing this aspect, changing the school curriculum is essential for the current labor market and within the "Educated Romania" project, emphasis is placed on the development of skills, such as critical thinking, digital skills, creativity, adaptability.

b) Review of the evaluation system. It was requested to review the evaluation system in order to have a broader picture in terms of students' skills, but also their performance. The revision of the evaluation system aims to move from the approach based on memorization to one based on the applicable skills of the students.

c) Continuous training of teachers. Continuous training of teachers is necessary for updating knowledge, but also for modern pedagogical methods. For a quality educational act, updating teachers' knowledge and improving their pedagogical skills are essential.

d) Modernization of school infrastructure. Another key element within the project is the need to modernize the school infrastructure in order to create an adequate learning environment. With investments in infrastructure, access to quality education will be ensured, especially in disadvantaged or rural areas. (Luta (Manolescu) et al., 2020)

e) Promoting inclusion and social equity. This key element contributes to offering equal opportunities to all students, regardless of the environment they come from. By promoting inclusion and social equity, the project aims to provide access to resources and equal opportunities for the personal and professional development of each student.

f) Supporting digital education. This key element is an essential one in education to ensure a learning system adapted to the needs of modern society. The aim is to integrate technology into the educational process, but also to develop the digital skills of students and teachers. Supporting digital education includes access to digital educational resources, online learning platforms, digital teaching materials, which contribute to the quality of education, but also to the flexibility of the educational system.

g) Community involvement in education. The project encourages community involvement in education. This involvement has the role of transforming the educational system, so as to prepare students for the demands of an ever-changing society. The involvement of the community has the role of quickly identifying the problems in the educational system, and the implementation of solutions that are adapted to the local context.

3. EVALUATION OF THE POTENTIAL OF THE KEY ELEMENTS TO CONTRIBUTE TO THE MODERNIZATION AND IMPROVEMENT OF THE ROMANIAN EDUCATIONAL SYSTEM

a) Modernisation of the curriculum. According to the Ministry of Education (2019), the curriculum for early education has been upgraded for children aged between 0 and 6 years. On the website of the Ministry of Education, there is a document "Landmarks for the design, updating and evaluation of the national curriculum", which aims to combine the three key components in the formation of a future adult: theoretical knowledge, abilities, and aptitudes, represented in Figure 2. The three components must work together in the learning process, as represented in the figure above (Ministry of Education, 2019, pp. 17-22). From the documents found on the website of the Ministry of Education, it can be seen that an attempt is being made to modernize the curriculum, adapted to modern society.

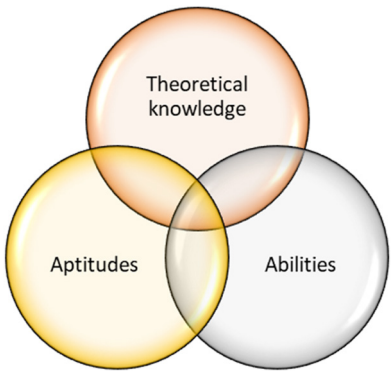

Figure 2. The concept of competence

Source: Own research

b) Review of the evaluation system. In present, the evaluation system is based on memorization, not on the evaluation of practical skills. There is no official document mentioning the attempt to revise the evaluation methods. Therefore, it can be said that this element of revision of the evaluation system has equal chances to be implemented or not within the "Educated Romania" project.

c) Continuous training of teachers. The emphasis on continuous teacher training existed even before the "Educated Romania" project. Currently, according to the Ministry of Education (n.d.), there are continuous training programs, and teachers are encouraged to participate in them.

d) Modernization of school infrastructure. According to the Ministry of Education (2018), there have been and are projects financed from the European fund for the modernization of school infrastructure. Unfortunately, according to the last project completed in 2023, 1,336 school units were included in the project. In present, exist another project is underway, according to the Project Management Unit for Modernizing the School and University Network (n.d.). From these statements, it can be seen that the modernization of the school infrastructure by 2030 is realistic and achievable.

e) Promoting inclusion and social equity. Promoting inclusion and social equity can be quite difficult. The project establishes the need for inclusion in the case of disadvantaged students, more precisely those who come from rural areas, those who have disabilities and minorities. This initiative aims to reduce school abandon and promote quality education. According to the National Institute of Statistics (n.d.), the school abandon rate among young people between 18 – 24 years is over 10%. Figure 3 shows the school abandon rate between 2016 and 2023. Promoting school inclusion is quite difficult and requires special involvement, but also well-trained teachers, so that they can help students from vulnerable groups not to be marginalized.

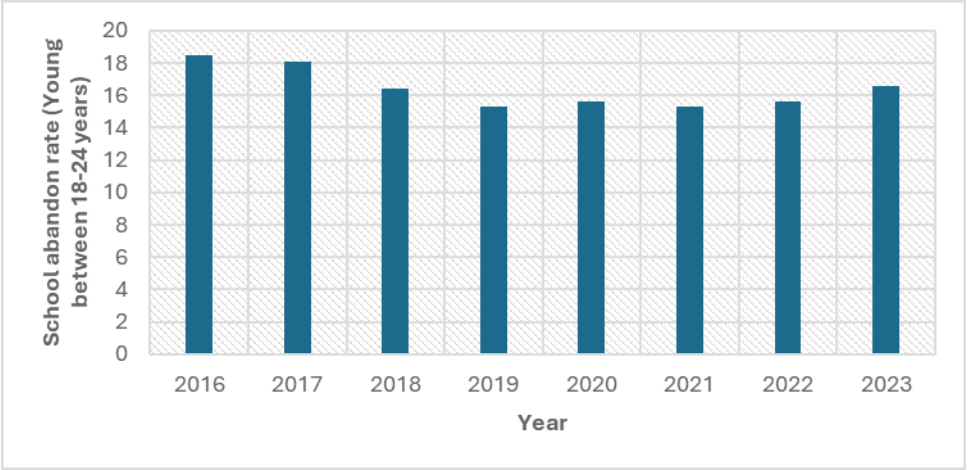

Figure 3. School abandonment rate among young people between 18 – 24 years

Source: Own processing

f) Supporting digital education. Supporting digital education is an essential element for a modern society, but there are many barriers to its implementation because:
- are many students who come from economically disadvantaged backgrounds and do not have access to digital resources,
- are teachers who are reluctant to use technology, there is probably a fear of change,
- lack of digital skills among teachers, but continuous training is organized for this.

Another rather important aspect is the allocation of funds to support digital education. At the level of the European Union there is an action plan for digital education, according to the European education area (European Commission, n.d.).

g) Community involvement in education. The involvement of the community in education can have a major impact, because partnerships can be established, the problems that exist in the educational system in relation to the labor market can be solved. In present, the community is not fully involved in the educational field.

4. CONCLUSION

The future research direction must be directed towards the implementation of the "Educated Romania" project, but also its continuous development. For the successful implementation of the "Educated Romania" project, the implementation part connected to the current reality in the education system should be described in detail.

In conclusion, the project is an ambitious one with real possibilities of realization, but also major challenges in its implementation. Among the major challenges identified are promoting social inclusion and equity, supporting digital education and community involvement in education. For the implementation of the "Educated Romania" project, a series of essential measures must be taken.

For social inclusion and equity there should be:
- Finance directed for eliminating the discrepancy between rural and urban areas, including scholarships for students from disadvantaged families, free transportation, a hot meal at school and digital equipment;
- Teacher training, through mandatory inclusive pedagogy programs;
- Continuous monitoring by creating an evaluation system for inclusion and equity.

To support digital education, the following measures can be taken:
- Creating awareness campaigns to inform parents about the benefits of digital education;
- Partnerships with technology companies, so they can take care of equipping schools with modern equipment and can also contribute to the training of teachers.

For the involvement of the community in education, the necessary measures are:
- Creation of local forums, where parents, students and community members can discuss educational needs and priorities;
- Organization of various activities with the support of the local community, in other words, public-private partnerships, between the school and various commercial companies.

The "Educated Romania" project has the role of transforming education in Romania, according to the society in which we live and with a correct implementation and collective participation, it can be the basis of a much better future for young people in Romania.

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Features of the Student Volunteer: Insights from Bulgaria

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Keywords:
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Family background;
Social engagement;
Third mission

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Abstract: *This paper presents preliminary findings from a survey conducted among the University of National and World Economy (UNWE) students regarding their volunteering activities. The main objective is focused on creating a volunteer culture, supporting the initiation of volunteer projects during university studies and involving young people in these types of activities. The paper reviews the demographic characteristics of students and attempts to discover the influence of family background on their participation in volunteering activities. It analyzes the relationships between income level, parental education, location, religion, possible good role models (friends, relatives, classmates) and participation in volunteer activities.*

1. INTRODUCTION

Universities are increasingly embracing their third mission - engagement with society. They are enhancing their image as academic institutions open to societal challenges: not only do they include national, local, regional and societal issues in the learning process and involve representatives of state and local government, business, NGOs, etc. in the teaching and research process, but they also create their own projects in order to achieve an impact on the community. This requires building lasting relationships with diverse social communities and encouraging organized volunteer and community service, not only for the sake of improving students' practical experience and skills but also for engaging stakeholders in collaborative knowledge creation and solving specific community problems. Noteworthy practices can be observed in universities in the USA and Western Europe, where students' volunteering experience is already screened and taken into account during the application phase. They get extra points towards their application and this influences their admission to certain courses. Special interviews are conducted to discuss the skills acquired through volunteering highlighting their significance in the academic journey. According to the regulations in Bulgaria and their implementation in a large business university such as the University of National and World Economy (UNWE), the application campaigns are clearly timed, and highly digitised and within these frameworks it is difficult to collect, process and analyze data on students' volunteering experiences. To this end, it is important to find appropriate ways through which to get to know and understand students better, respectively to explore their previous experiences, their overall attitudes and dispositions towards volunteering, as well as the factors that influence their (non-)participation.

2. LITERATURE REVIEW

In recent years, research in the field of volunteering has excited a number of authors. The main themes they address can be summarised in several groups: motivation and barriers to student

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volunteering, the role of universities in setting up volunteering programs, support for such activities, and social engagement in fulfilling the third mission and the impact of volunteering.

We should start with the international and national documents, studies, and reports that have addressed this issue for decades. International institutions have highlighted the role of volunteering in creating a responsible, sustainable, solidarity-based society (e.g., UN General Assembly Resolution A/RES/56/38, 2002; UN General Assembly Resolution A/RES/63/153, 2008; Transforming Our World: 2030 Agenda for Sustainable Development, 2015). They also establish a common framework for promoting, funding, regulating, and recognizing volunteering efforts through youth strategies (e.g., Engaging, Connecting and Empowering young people: a new EU Youth Strategy, 2018), as well as volunteering opportunities with the European Solidarity Corps in Europe and abroad - Your Europe (2025).

The authors Perić et al. (2021) provide an overview of the development of volunteering in the three compared countries - Croatia, India and Russia, defining the social and cultural context in them and describing the characteristics of Generation Z. Based on a survey conducted in five Central and Eastern European countries, Hajnalka et al. (2021) examine the mix of altruistic and career-related motives behind higher education students' volunteering, with the specific motivations varying based on individual and contextual factors. In their study, Rashid et al. (2023) explore the motivations of event volunteers, particularly university students, and how these motivations affect their quality of life in terms of satisfying desires for social connection, personal growth, recognition, and support.

Universities play a vital role in promoting voluntary work, aligning with their function in community leadership through teaching, research, and community service (Darawsheh et al., 2020). The researchers Wondimu and Admas (2024) suggest that volunteer activities should be integrated into educational curricula, with universities collaborating with institutions and organizations to engage students in their daily tasks through internships. Evans and Yusof (2022) underline that universities can help students develop transferable skills through volunteering. Day et al. (2022) suggest that universities use crowdsourcing to identify community-led solutions and assess community members' willingness to volunteer. Research on volunteering has focused on a variety of fields (medicine, law, education), including new terminology such as "occupation-related volunteering", proposed by Biermann et al. (2024).

There is a variety of research relating to students at a particular university, each focusing on different aspects of volunteering. Xu (2021) examined the motivations of Chinese students participating in a long-term volunteer teaching program in remote areas, finding that both altruistic and personal interests, along with external factors, influenced their decisions. Usheva et al. (2021) present how volunteering can foster reflective skills in university students by providing opportunities for self-assessment and problem-solving in socially significant activities. Other authors (Baryaeva & Gazieva, 2024) focus on preparing future teachers in the project of pedagogical universities of Russia and Azerbaijan for inclusive education through volunteering, emphazising practice-orientated tasks and seminars that develop skills for working with children with disabilities. Zinevich and Melekhina (2024) discuss how Russian university student volunteering can contribute to achieving sustainable development goals, noting that while there's government support for volunteering, its connection to sustainable development is not fully realized in practice. Abd Rahman (2022) examines the values that motivate university students to engage in environmental volunteering, categorising these values as egoistic, biospheric, and altruistic, and exploring how they relate to the intention to continue volunteering. Some paper investigates socio-medical volunteering in a

university where medical training isn't the focus, revealing the motivations and challenges faced by student volunteers and emphazising the need for better organization and support (Vandysheva, 2023). Interesting are the findings of a study on the perceptions and participation of university students in volunteering (Cívico-Ariza et al., 2020), which shows that although students generally view volunteering positively, this does not always translate into active participation. Wondimu and Admas (2024) focus on understanding the motivation and engagement of student volunteers at the University of Gondar in Ethiopia. A survey of students at the University of Jordan (El Kharouf & Rous, 2024) found that most students are eager to volunteer, particularly to help the poor, and seek to gain new skills and self-esteem, although they are hindered by a lack of promotion and awareness of volunteer opportunities.

3. RESEARCH METHODS AND DATA

A team of researchers from UNWE Sofia, Bulgaria is currently working on the research project "Volunteering as an Approach to Building Sustainable University Communities" (No. KP-06-H65/3, funded by the Bulgarian National Science Fund). The questionnaire was developed within the framework of this project and aims to explore students' overall attitudes and dispositions, motivations for participation, the influence of various factors on (non-) participation, the most common causes students tend to support, and the role of the university in building a volunteer culture.

In Bulgaria, as already discussed, data on the characteristics of student volunteers and research at the university level is very scarce. One of the tasks of the project is to understand students' family backgrounds and how they influence the decision to participate or not in volunteering. The insights gained from the survey will help to learn more about the students and also to identify follow-up measures to foster student involvement and boost their motivation to participate in volunteering programs. Based on the information acquired during the execution of the field research, the different profiles of the students who are participating or are willing to participate in volunteering activities can be defined. These profiles are sufficient for the process of designing the appropriate activities to motivate them to be volunteers.

The student survey was conducted via an online form between April and May 2024. Preliminary data show that it covers 530 participants with a representative sample from different university programs, levels of study, and modes of study.

One of the research hypothesis suggests that family background influences willingness to engage in volunteering. This article examines the results of the questions in Section 3 of the questionnaire related to the influence of family background and the relationships between income level, parental education, location, religion, possible possitive role models (friends, relatives, classmates) and participation in volunteer activities.

At a previous stage of the actual study, tests were carried out to check the presence of a normal sample as well as the reliability of the scales used. The results obtained proved the existence of a normal distribution of the sample, and Cronbach's alpha coefficient proved the high reliability of the measurement scales used.

The linkage between the related factors and attitudes to participation was also explored through correlation analysis, using Spearman's coefficient to examine how participation in a cause is related to different social relationships, such as work colleagues, friends, relatives, classmates and family members. This method was used because of the characteristics of the sample.

4. RESULTS

Out of the total 530 respondents, 522 responded, which is 98.5% of the sample, with 8 missing values (1.5%). Based on these valid responses, it is reported that 34.7% of the respondents are male and 65.3% are female. The mean age of respondents, derived as the median value of 502 valid responses to the question, is found as the average of the ages of 251 and 252 responses, which is 21. The mode shows that the largest cluster of identical responses is also aged 21.

Regarding the course of study, valid responses are 521, which is 98.3% of the total sample. The highest share of third-year students is 29.2%, followed by second-year students - 21.7%. First-year students make up 16.6% of all respondents, and fourth-year students 14.8%. Masters students who answered this question accounted for 15.7%.

As for the mode of study, the number of valid responses was again 522, or 98.5%. Of these, 437 students (bachelors and masters) are studying full-time, which is a share of 83.7%, and 85 students are studying at a distance (16.3%).

Participation in a volunteer cause: a new variable has been created in the work to reflect the presence of participation by respondents in a volunteer cause at this time. The variable is binary with possible "yes" and "no" responses. This question was answered by 507 respondents, which is 95.7% valid responses. The low proportion of missing responses (less than 5%) in addition to the number of respondents gives reason to consider this number of missing responses as insignificant and not affecting the results obtained. 394 persons, or 77.7% of the respondents, participated in volunteering initiatives, while 113 persons (22.3%) had never participated in volunteering initiatives. The focus of the research on exploring motives for participating in volunteer causes justifies the lack of need for a normal distribution of responses to this question.

Comparing the answers to this question with the answers to the question investigating the gender of the respondents, conclusions can be drawn for 503 respondents.

Men who had never participated in a volunteer initiative are 46 (41.07%) while women are 66 or 58.93%. Men who participated in volunteer initiatives are 130 (33.25%) and women are 261 (66.75%).

Participation in volunteer initiatives is mainly taken by full-time students - 84.14%. A higher proportion of respondents from distance education also take part in such causes - 81.25%.

There is no reported relationship between respondents' participation in volunteer causes and their (own) receipt of help/assistance from volunteers. 94.2% of the respondents had never received help/assistance from volunteers. However, 78.56% of them had participated in volunteer initiatives.

Table 1. Distribution Of Sample Respondents By Family Income

Participation in a volunteer cause	How would you define the income of the family you grew up in?					Total
	Far below average	Below average	About average	Above average	Far above average	
No	3	17	69	18	3	110
Yes	15	37	231	97	11	391
Total	18	54	300	115	14	501

Source: Own research

The majority of respondents involved in volunteering (391 people) came from middle-income families. This is 231 people, which is 59% of all those who participated in a cause.

Slightly fewer respondents who participate in a cause come from above-moderate income families (97 people, or 25%), but significantly fewer than those with very high incomes (11 people, 2.8%). In the context of participation in volunteering, there are also a small number who come from low-income families (not much below average and below average: 15 and 37 people, respectively), which may indicate that social engagement is not strictly dependent on family income.

For people who do not participate in a cause (110 people), the picture is more distributed by income group. Most of them come from middle-income families (69 people or 62.7% of those who do not participate in a cause).

Although volunteering involvement is more common among people who grew up in middle-income families, the percentages show that social involvement is not entirely limited by financial status. This may mean that factors such as personal motivation, social environment and education also play an important role.

Overall, these data show an intriguing correlation between family income and involvement in a cause, but they do not show a definite correlation, which may point us to other factors that may influence social engagement.

Table 2. Distribution of sample respondents by work during the secondary education

Participation in a volunteer cause	Did you work during your secondary education, including temporarily (during holidays / in your free time)?				Total
	No	Yes - due to family money difficulties	Yes - because I wanted to have my own money	Yes - because I wanted to gain experience	
No	51	5	24	4	84
Yes	174	20	94	23	311
Total	225	25	118	27	395

Source: Own research

The largest majority of respondents who worked during their secondary education did so because they wanted to have their means (118 people, or 29.9% of all respondents). The second most common reason was to gain experience (27 people, or 6.8%), while family money difficulties were the reason for working for only a small number of people (25 people, or 6.3%). It is interesting to note that there is some difference in the distribution of reasons for working among cause participants and non-cause participants.

Most people who do not participate in a cause work during their secondary education because they want to have their means (24 people, or 28.6%). For a small proportion, the reason is to gain experience (4 people, or 4.8%). Interestingly, there were only 5 people who worked due to family monetary difficulties (5.9%). For those who are involved in a cause, the predominant reason for working is the desire for their own funds (94 people, or 30.2%). The next reason was to gain experience (23 people, or 7.4%), with the reason for working due to monetary hardship being many times greater in the group of those involved in a cause (20 people, or 6.4%).

Greater social involvement (participating in volunteering) does not seem to be related to working because of family money difficulties. Those who worked due to financial difficulties were more likely not to participate in a cause. This may indicate that people experiencing financial hardship might be more concerned about their personal stability and resources than social engagement. There was no significant difference in the willingness to self-fund between those participating

in a cause and those not participating, suggesting that the desire for financial independence and self-reliance is a strong motivator for working during secondary school regardless of social activism.

A further question explored the relationship between participation in a cause and the type of locality in which people lived during their secondary education. Most respondents came from large cities (166 people, 32.9%) and the capital (171 people, 33.9%). Fewer respondents grew up in small towns (131 people, 25.9%) and villages (32 people, 6.3%). Only 5 people live outside the country, which is a very small percentage. Interesting observations are derived from the distribution in terms of participation in a cause.

For those who do not participate in a cause, most are from the capital (40 people, 35.7%) and large cities (31 people, 27.7%). Fewer respondents from small towns (27 people) and villages (12 people) also do not participate in a cause.

For those who do participate in a cause, the largest distribution is in large cities (135 people, 34.4%) and the capital (131 people, 33.3%). This indicates that people from these places have a greater propensity to participate in causes. Interestingly, small towns (104 people) also show high participation rates, which may indicate the presence of social engagement in smaller communities.

In addition, people living in villages were the least likely to participate in a cause, which may be related to lower social activism or fewer opportunities to participate in causes in these areas (only 20 people from villages participated in a cause). The prevailing trend is that cities and the capital have the highest rates of participation in a cause, which may be due to the greater supply of social participation opportunities in these areas, as well as the higher level of social engagement.

The purpose of a correlation analyzis using Spearman's rho is to examine how participation in a cause is related to various social relationships, such as work colleagues, friends, relatives, classmates, and family members. Stronger social networks with friends and classmates (from school and university) were associated with a higher likelihood of participating in a cause. We see that people who are socially active among friends and classmates (school/university) are more likely to participate in social causes. This may indicate that social networks that are active and dynamic encourage engagement with causes. Family members and work colleagues also play a role, but the relationship is weaker. Although there is a positive relationship between cause involvement and contact with family members and work colleagues, this relationship is not as strong as for friends and classmates. This may indicate that people who participate in causes have the support of people close to them, but social involvement seems to be more strongly related to socialisation outside of the family and work environment.

Regarding parental education and the relationship with participation in causes, it is evident that people with mothers with higher and secondary education are more likely to participate in social or charitable activities. Respondents whose mothers had a university degree had the highest participation in a cause (212), followed by those whose mothers had a high school degree (141). Respondents whose fathers had secondary education (186) and higher education (169) had the highest participation in the cause. These two groups are significantly larger than the others and indicate that people with fathers with these educational degrees are more likely to participate in causes. The lowest percentage was among respondents whose mothers had a PhD (17 people) or whose fathers had a PhD (12 people), but we cannot conclude as this group is very small.

Religiosity influences participation in a cause, but the relationship is not strong, which may be explained by the overall level of religiosity in society in Bulgaria.

The largest group (270 respondents), of which: 45 do not participate and 225 participate in volunteering, also represents the highest participation rate (about 83%) and these are families who are religious but do not strictly adhere to the precepts. The families who are not religious but perform traditions on major holidays enter the second large group (186 respondents) of which: 60 do not participate, and 126 participate in a cause. The last group representing very religious families is very small (26 respondents) of which: 2 do not participate, 24 are involved. The high participation (92%) can be explained by the religious values that often promote helping the community. In non-religious families: of the 20 respondents in this category, only 6 do not participate in a cause, while 14 do. This indicates a relatively high level of participation even among those who are not religious. To conclude, families with moderate or high religiosity are more likely to participate in volunteer activities. Moderate religiosity ("religious, but not strictly adherent") is most associated with participation. This may be due to values encouraging social activity without strict restrictions. Many religious families also show high levels of participation because they view volunteering as a moral or spiritual duty.

As far as self-determination and participation are concerned: orthodox Christians are the largest group and show a high participation rate (81%), while other religious groups (Catholics, Protestants, Muslims (78%)) also show high participation, despite their smaller numbers.

5. DISCUSSION

Based on the study, it can be summarised that the gender distribution of respondents shows that there is a higher participation of women in volunteering among the students of the UNWE, the average age is 21 years, with the highest proportion of third-year full-time students. Participation in volunteering is not determined by the mode of study, as the results show that, whether full-time or distance learning, the proportion of confirmed participants is almost the same.

The majority of participants in a cause come from middle-income families, a smaller portion of participants (25%) are from above-moderate income families, while only 2.8% come from very high-income families. Interestingly, the data also shows that social engagement is not entirely dependent on financial status, as a small number of participants come from low-income families.

Despite differences in reasons for working, it can be concluded that participation in a cause does not appear to be strongly associated with one or other reason for working, although lack of monetary hardship is more common among those who participate in a cause. It is possible that people with more financially stable families have more opportunities and resources to engage socially.

Participation in a cause seems to be more likely in large and urbanised places (capital and large cities), which may be the result of more accessible resources and more opportunities for social engagement. In villages and small towns, the percentage of those participating in a cause is significantly lower, which may indicate fewer opportunities to engage in social activities or lower interest in this type of engagement. This finding may be related both to the availability of opportunities for participation and to differences in social dynamics between different types of locations.

The results suggest that social relationships, especially with friends and classmates (school/university), play an important role in motivation to participate in volunteering. Interactions with family and work colleagues are also influential, but less so, suggesting that social engagement and willingness to participate in causes are strongly influenced by youth and friendship networks and predominantly outside the family.

Concerning parents' education for both mothers and fathers, higher education appears to be associated with higher levels of involvement in volunteering, but the exceptions (PhD degree) suggest that group size and other factors (e.g., personal interests or social background) also play a role. Parents with secondary education had high levels of both participation and non-participation, suggesting that social and economic factors may be more influential in these situations.

In both cases (family religiosity and self-determination) the correlations are weak but statistically significant. This means that religiosity and religious identification play a role but are not the only determinants of participation in causes.

It becomes clear that (not) ever receiving help from volunteers has no bearing on students' willingness to engage in such activities.

6. CONCLUSION

Volunteering is not only an opportunity for personal growth and acquisition of new skills, better adaptation and smooth transition to the labour market for students, but also a powerful tool to be used by universities to engage young people, build communities, co-create and impact on the environment.

Knowledge about the main factors that determine (not)participation in volunteering activities would help to design programmes and policies to attract students to such activities. Exploring demographic characteristics and family backgrounds allows for the discovery of interactions and relationships with which to plan future outreach and student involvement in volunteering, as well as the implementation of specific methods to attract students.

Due to the scarcity of such data, making the survey a regular periodic practice for universities would create a basis for tracking tendencies and adapting measures.

This study is the basis of a large-scale study on volunteering among students and the factors that influence their participation. The results presented here outline the guidelines for understanding the motivations and barriers to engaging in volunteering initiatives. The upcoming stages are focused on improving the understanding of perceptions of volunteering, the role of universities in its promotion and ways to increase student engagement.

The implementation of the research project lays the foundations for future research and initiatives to build a sustainable volunteering culture among students.

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Student Behaviour in a Course Learning Management System After Disruptions in Teaching and Learning

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Abstract: *Learning and teaching processes and methods can change in special circumstances, as was the COVID-19 pandemic. Such changes can be disruptive and affect all participants, including student behaviour and performance, possibly even after the teaching process and methods return to the same or similar mode. To investigate whether and how student behaviour related to online teaching resources changed after the pandemic and online classes, learning analytics of part of student online activity related to course materials in the Learning Management System was performed at a graduate-level course for the last academic year before pandemic (2019/2020), and two consecutive academic years after pandemic (2022/2023 and 2023/2024). The results show that online activity didn't return to levels before the pandemic. Student views increased in general but also decreased for lecture materials. When compared with grades, the higher percentage of students after the return of in-person classes passed the course, but they had lower grades than those who attended the course before the pandemic. Based on the results, further research will be carried out to connect specific grading elements and online activity with the purpose of improving student results.*

1. INTRODUCTION

During several years COVID-19 pandemic brought many changes to the teaching and learning process (Lee et al., 2022; Li & Lalani, 2020). Educational institutions at all levels of education had to implement new modes of online teaching with digital technologies, new methods of delivering information and presenting learning materials, as well as new ways of assessing the adoption of learning outcomes. Research has been done about adaptation to those changes, differences in study results, and also about the psychological impact of online teaching and learning during the pandemic (Biwer et al., 2021; Daniels et al., 2021; Drašler et al., 2021; Lee & Jung, 2021; Tavolacci et al., 2021). With the end of the pandemic, some institutions brought teaching back to the classroom and others kept some elements of distance learning. Since several generations of pupils and students had approximately two years of some level of online learning, the question is whether their approach to the learning process changed considering online activity and how it impacted their grades.

This paper focuses on the investigation of differences and similarities between the last generation of students who had classic education in the classroom before the pandemic in the academic year 2019/2020 and the first generation of students who again had lectures in the classroom in the academic year 2022/2023. Learning analytics (LA) is used to explore whether students' level of activity in the Learning Management System (LMS) has changed.

The organization of the paper is as follows. First is given the review of previous research on the use of learning analytics to improve teaching and learning processes. Then are described methods, including context, participants and data collection, which is followed by an explanation of conducted research. The results of the research are discussed and the conclusion is given at the end of the paper.

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2. LITERATURE REVIEW

Learning analytics is nowadays well known and established discipline that has been used and is developing continually and enables teachers to collect, measure and analyse data about learners (students) and then optimize their teaching and learning process and the environment used to improve the adoption of learning outcomes (Clow, 2013; Ferguson, 2012). In the cycle of LA that goes from learners to data collection and metrics and then to intervention for learners (Clow, 2013) various methods and tools are used, such as predictive methods and clustering techniques (Viberg et al., 2018). New artificial intelligence (AI) technologies, such as machine learning are also being used in student modeling to help adapt the teaching and learning process (Caspari-Sadeghi, 2023).

In higher education, LA use is growing and has large potential (Viberg et al., 2018) but for success, it needs leadership and strategical planning and monitoring, pedagogy-based approaches, training, engagement with different stakeholders, empirical evaluation of interventions and policies addressing privacy, ethics and other issues (Tsai & Gasevic, 2017), as well as human-centered approach and trustworthiness due to use of AI (Alfredo et al., 2024). LA is used both for enhancing feedback practices (for example, personalization, prediction, assessment, or recommendation) and for pedagogical purposes, such as academic performance, self-regulation, motivation, time management and satisfaction (Banihashem et al., 2022). It is also applied for user knowledge, behavior or experience modeling, user profiling, domain modeling, and trend analysis (Hernández-de-Menéndez et al., 2022). There are also valuable insights from LA used in the informatics field, for example, to better understand the process of learning programming (Omer et al., 2023) or to detect students who are at risk of not adopting learning outcomes and fail programming assignments (Azcona et al., 2019). Therefore, the use of LA can help teachers to better understand the student's learning process and according to it make adaptations in the teaching process to give better support to students (Viberg et al., 2018), which can result in achieving better academic results (Kohnke et al., 2022) and help in student retention (Hernández-de-Menéndez et al., 2022). Because of the value that LA adds to higher education improvement, an LA maturity adoption framework would significantly ease the tasks of development of LA, policy and strategy for LA adoption as well as its efficient use (Pažur Aničić et al., 2022).

This study aims to investigate the activity of students and their success in achieving learning outcomes before and after the COVID-19 pandemic with the use of LA, where the data is obtained from the LMS system that is used in the teaching process. The research question were: Are students after period of COVID-19 forced online study inclined to use online materials more? Are students after period of COVID-19 forced online study more active in LMS and how this affects their success in adopting learning outcomes? To obtain answers to these questions, an analysis of student activity and learning results is done in years that were not affected by COVID-19, one prior, and two after the pandemic, and then compared. This initial research took into consideration several of the available elements and data for LA.

3. RESEARCH

3.1. Context

University of Zagreb Faculty of Organization and Informatics (UNIZF FOI) offers study programs in informatics at undergraduate, graduate and postgraduate levels. The course in which research was done, "Knowledge bases and semantic web", is at the graduate level, at the second year in the winter semester. This is the last semester of the course study because students in the summer semester

only have four weeks of practice in their chosen company and write their graduate thesis. Of four graduate study programms, the course "Knowledge bases and semantic web" was obligatory at one and optional at three, so there was a variable number of students each year, from approximately 50 to 100. To achieve the grade through assessment of the adoption of learning outcomes during the semester, students could earn points from two midterm exams (60-55 points), seminar paper (20 points), practical assignment (included in the second midterm with 10 points), activity (15-20 points) and attendance (5 points). There was a slight difference in the number of points that could be obtained by elements that changed during the pandemic. In the academic year 2019/2020 there were 5 more points for the first midterm, and during the pandemic and in subsequent years those points were added to activity. Students who did not pass the course during the semester had to take an exam.

In the winter semester of the academic year 2019/2020, the course was classically taught last time in the classroom before the COVID-19 pandemic. In the year 2020/2021 it was taught fully online and in the year 2021/2022 delivery was combined in the classroom, online and hybrid (lecture in the classroom with parallel streaming). From the academic year 2022/2023 it was taught again in the classroom, and by then all courses had the option to have 20% of classes taught online as a consequence of new teaching technologies and methods implemented during the pandemic. Therefore, academic years 2019/2020, 2022/2023 and 2023/2024 were of interest to be researched. Also, from the academic year 2024/2025, the updated course started being taught in the updated version of graduate studies so this analysis provided useful information for new generations of students that enrolled in revised study programmes.

3.2. Participants and Data Collection

In the academic year 2019/2020, there were 48 enrolled students, 13 female and 35 male, in the academic year 2022/2023 there were 98 enrolled students, 36 female and 62 male, and in the academic year 2023/2024 number of students was 71, of which 30 female and 41 male. Just for comparison, in the academic year 2020/2021 there were 63 enrolled students (16 female and 46 male) and in the year 2021/2022 there were 88 enrolled students (25 female and 63 male). It can be seen that the percentage of female students was varying between 25 and 42. Students were in their last year of study, and well acquainted with the study process and UNIZG FOI rules. Since their future occupation is very sought-after, students often work through the student work service, some of them even from undergraduate study, and are therefore less interested in putting more effort for highest grades.

To compare student activity before and after the pandemic, learning analytics data from LMS Moodle was collected, LMS system is obligatory used for all courses at the UNIZG FOI and is called ELF. The system provides various data, such as data about general student activity per month, which includes views and posts. Those data were collected for the semester, from October until January, for all observed years. ELF also collected data for the semester about student views of individual learning materials most important to pass the course, specifically lectures and computer exercises, as well as seminar assignment descriptions. Points that students earned for grading elements during the semester were also entered in ELF, and they are automatically summed up.

4. RESULTS AND DISCUSSION

The number of enrolled students was bigger in the academic years 2022/2023 and 2023/2024 than in the academic year 2019/2021, and therefore the number of student views for those years was normalized according to the number of students in the academic year 2019/2020. Figure 1. shows

the total number of student activity (views and posts) for six years back from the end of academic year 2023/2024 (September 2024), where it can be seen that in general, the activity was higher during online and hybrid teaching years, also when compared to a number of enrolled students, but those years were not the object of this research. In academic years 2022/2023 and 2023/2024 activity was in general higher than in academic year 2019/2020, but also due to a larger number of enrolled students. Activity was very low or nonexistent in times when the course was not carried out.

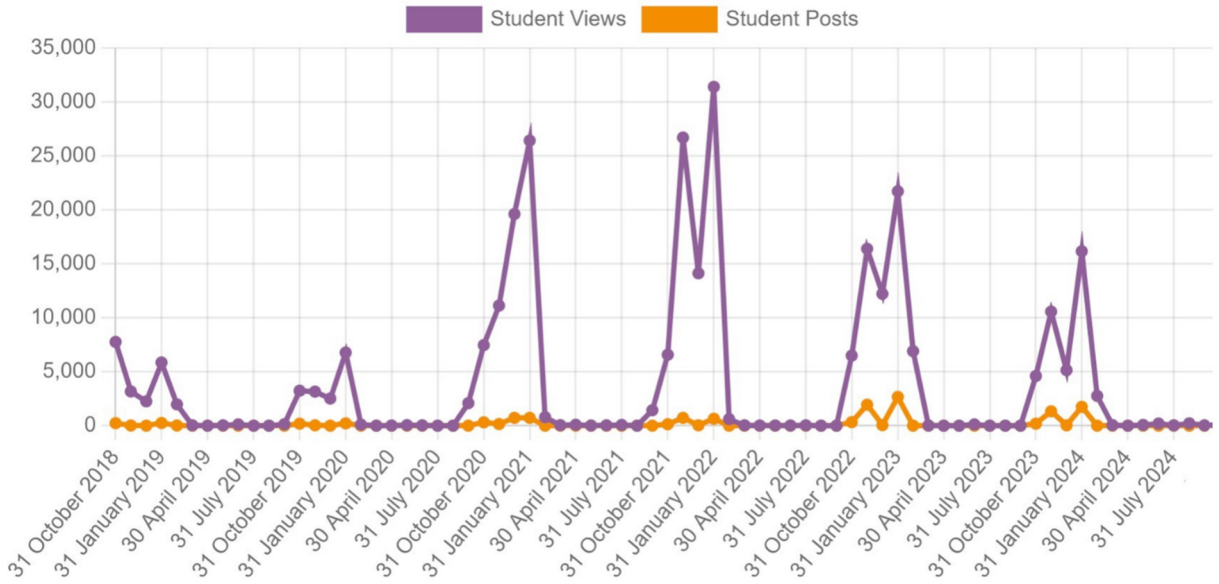

Figure 1. Distribution of student activity per month from October 2018 until September 2024
Source: University of Zagreb Faculty of Organization and Informatics (2024)

Views of the materials from lectures and laboratory exercises, as well as seminar instructions, are additionally analyzed for all observed years because they contribute to student success in passing the course. Number (N) of views for each activity and in total for academic years 2022/2023 and 2023/2024 were normalized for 48 enrolled students with proportions (for example, N of views 2022/2023: N of students 2022/2023 = Normalized N of views 2022/2023: N of students 2019/2020). For instance, in the first lecture in the academic year 2022/2023 the proportion is: 247:98=X:48, and normalized number of views is 121. Data for views per month are shown in Table 1 and data for views of materials important for students to be able to pass the course are presented in Table 2. The increase/decrease column shows the index for views in years 2022/2023 and 2023/2024 compared to the number of views in 2019/2020, where the reference value for views for months and learning materials in 2019/2020 is 100. For example, in October there were 1.78% fewer views, and in November 154.92% more views.

Table 1. Student views per month in academic years 2019/2020, 2022/2023 and 2023/2024

Month	N of views 2019/2020	N of views 2022/2023	Normalized N of views 2022/2023	Increase / decrease	N of views 2023/2024	Normalized N of views 2023/2024	Increase / decrease
October	3238	6493	3180	98.22	4599	3109	96.02
November	3147	16379	8022	254.92	10567	7144	227.01
December	2512	12215	5983	238.17	5141	3476	138.36
January	6766	21704	10631	157.12	16146	10916	161.33
Total	15663	56791	27816	177.59	36453	24644	157.34

Source: Own calculations

Table 2. Student views of learning materials in academic years 2019/2020, 2022/2023 and 2023/2024

Learning material	N of views 2019/2020	N of views 2022/2023	Normalized N of views 2022/2023	Increase / decrease	N of views 2023/2024	Normalized views 2023/2024	Increase / decrease
Lecture 1	108	211	103	95.69	250	169	156.49
Lecture 2	92	4	2	2.13	78	53	57.32
Lecture 3	162	11	5	3.33	138	93	57.59
Lecture 4	98	10	5	5.00	89	60	61.40
Lecture 5	103	7	7	6.80	94	64	61.70
Lecture 6	123	11	5	4.38	83	56	45.62
Lecture 6 - examples	131	170	83	63.56	160	108	82.57
Lecture 7	105	79	39	36.85	128	87	82.41
Lecture 8	78	68	33	42.70	94	64	81.47
Lecture 9	82	77	38	45.99	79	53	65.13
Lecture 10	64	66	32	50.51	71	48	75.00
Lecture 11	70	83	41	58.08	37	25	35.73
Seminars - instructions	205	403	197	96.29	258	174	85.08
Comp. exercises 1	198	329	161	81.39	291	197	99.36
Comp. exercises 2	115	256	125	109.03	231	156	135.80
Comp. exercises 3	104	220	108	103.61	180	122	117.01
Comp. exercises 4	100	179	88	87.67	216	146	146.03
Ontology example 1	67	171	84	125.01	83	56	83.75
Comp. exercises 5	98	207	101	103.46	117	79	80.71
Ontology example 2	56	121	59	105.83	84	57	101.41
Comp. exercises 6	112	255	125	111.52	166	112	100.20
Total	2271	2938	1439	63.37	2927	1979	87.13

Source: Own calculations

Student grades after classes and assessment of adopting learning outcomes during the semester for all observed years are shown in Table 3. Grade 1 is the lowest and means that the student failed to pass the course during the semester and consequently has to take an exam. Grade 5 is the highest.

Table 3. Students' grades after assessment during semester

Grade	Students 2019/2020		Students 2022/2023		Students 2023/2024	
	Number	Percentage	Number	Percentage	Number	Percentage
1	9	18.75%	13	13.27%	11	15.49%
2	6	12.50%	29	29.59%	24	33.80%
3	20	41.67%	45	45.92%	25	35.21%
4	12	25.00%	9	9.18%	10	14.08%
5	1	2.08%	2	2.04%	1	1.41%
Total	48		98		71	

Source: Own calculations

According to the results presented in Table 1 and normalized views, the number of views for academic years 2022/2023 and 2023/2024 was higher in all months except October. Since in academic year 2019/2020 semester started on the last day of September, there were also views in this month, and if they were added to those in October, the number of views for October 2019/2020 would be a bit higher. But in general, generations of 2022/2023 and 2023/2024 on average had from one and a half to double more activity in the sense of viewing the contents of the course in LMS Moodle ELF than the last generation before the pandemic. In all observed years number of views is high in November, before the first midterm exam and the highest is in January, at the end of the semester, when students have deadlines for seminars and practical assignments and also take the second midterm exam. This can also signal that students were not as agile in performing their tasks during the semester, and were

doing them at the last minute. As can be seen in Table 3, although the percentage of students who didn't pass the course through the semester was lower after the COVID-19 pandemic, the percentage of lower grades (2 and 3) was much higher, 75.51% of students in the academic year 2022/2023 and 69.01% in the academic year 2023/2024 compared to 54.17% of students in the academic year 2019/2020. Before the pandemic, high grades (4 and 5) were achieved by 27.08% of students, and after the pandemic only by 11.22% and 15.49% respectively.

If the normalized views of materials from Table 2 are important for learning the contents of the course (lectures), for writing a seminar (seminar instructions) and for practical assignments (computer exercises) are compared, there can be seen the difference for various types of materials. Generations after the pandemic had a smaller number of views of lecture materials that were more theoretical, with a very low number of views (only a few per lecture) in the first part of the semester for the academic year 2022/2023. On the other side, seminar instructions stayed at a similar level, and laboratory exercises and examples mostly had more views, especially materials for the first part of computer exercises. This implies that students were more concentrated on receiving points from the practical part of the course (seminar and practical assignment) than from theoretical knowledge. In addition to the practical assignment that students develop during the semester which is counted towards 10 points in the second midterm exam, students also have an additional practical assignment for 10 points during the second midterm exam. Students can pass the course if they perform well at practical tasks, but also must have some knowledge of the theoretical part. The difference in material views, especially for lecture materials, can be connected to lower grades in academic years 2022/2023 and 2023/2024, because of poorer knowledge in the theoretical part of the course.

5. RESEARCH LIMITATIONS AND FUTURE DIRECTIONS

Limitations of the research are in a small number of elements that are used for analysis and comparison, being the total number of student views per month and per learning material, as well as achieved grades. Due to a large number of available data, those elements were chosen for initial research that is carried out to give insight into changes in the behaviour of students in LMS, a possible connection with their academic achievements, and thus give direction for future research.

To verify whether the difference in lecture materials views can be and to which extent connected to lower grades in academic years 2022/2023 and 2023/2024, because of poorer knowledge in the theoretical part of the course, detailed analysis of points for each grading element and comparison with views of specific materials that are important for it is planned to be performed. It will also be analyzed whether more views of practical materials helped a higher percentage of students to pass the course, for example, because of more activity points or better solutions for practical assignments or seminars. Additionally, student behavior in LMS Moodle ELF and consequences on their academic performance will be monitored in specific timeframes connected to midterm exams and deadlines for seminar and practical assignments. This should enable optimization of the learning process in the future and better results in achieving learning outcomes.

6. CONCLUSION

Since there is a general concern about how the pandemic and different learning environments during it affected students, both psychologically and in their learning capacity, LA offers a possibility to analyze their behavior during the semester in great detail, to find obstacles and improve their performance with adaptation of the teaching process. Many elements can be observed at the

beginning, during, and at the end of the semester and compared to understand possible problematic content or period which can be adjusted so that students can better adopt learning outcomes. This initial research was specifically carried out to find out whether there are differences in student online activity before and after the pandemic in similar class settings and whether this affects their achievement in the course. Results showed that there is more online activity than before the pandemic, but also that there must be a more detailed investigation, because of differences in various learning materials. On the positive side, there was a lower percentage of students who failed the course after the pandemic, but their grades were significantly lower. According to the results, student behavior to achieve their goal (pass the course) may be different after the pandemic, more practically inclined. To verify this, additional research is needed.

LA is a very valuable tool and can be used for the benefit of both teachers and students with various methods and tools. The possibilities that a large amount of collectible data about the teaching and learning process can give for improvement of student results and their retention are a clear indication that higher education institutions should make full adoption of LA a part of their strategy.

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A Study on Students' Critical Thinking and Media Literacy Through the Flipped Classroom Method: Opportunities and Challenges in the Information Society

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Abstract: *In the context of the rapidly evolving digital age, society faces the challenge of adapting educational systems to develop students' critical thinking and media literacy skills, key competencies for the 21st century. This study examines the effectiveness of the flipped classroom method as a pedagogical approach to fostering critical analysis, independent reasoning and informed decision-making in an era dominated by vast information flows and digital media. The research focuses on the Critical Thinking and Information Skills (CTIS) project, which integrates flipped classroom techniques into higher education curricula to enhance students' ability to assess information credibility, recognize media biases, and engage in analytical discourse.*

The study was conducted among students from Burgas Free University, representing various academic disciplines such as social sciences, pedagogy, and psychology. A mixed-method research approach was used, including pre- and post-course assessments, surveys and qualitative feedback analysis. Results indicate that 91.1% of students perceive a significant difference between traditional teaching methods and the flipped classroom model, emphasizing higher engagement, motivation, and deeper understanding of course materials. Quantitative findings show that students' analytical skills and media literacy improved considerably, with 68% of participants demonstrating increased competency in identifying misinformation and critically assessing media content.

The study also highlights the challenges associated with implementing the flipped classroom model, such as unequal access to digital resources, the need for faculty training, and ensuring students' active participation beyond passive content consumption. However, the overall findings suggest that the flipped classroom method is a highly effective tool for fostering independent learning, media literacy and critical thinking in digital education.

Future research should explore the long-term impact of this model on students' cognitive skills, cross-cultural applicability, and its effectiveness in diverse academic disciplines. Additionally, expanding the CTIS methodology to non-formal education settings, including adult learning and media literacy workshops, could further contribute to developing an informed, critically engaged, and socially responsible generation.

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1. INTRODUCTION

In the rapidly evolving digital era, societies face the challenge of adapting their educational systems to develop future skills among students. These skills include critical thinking, the ability to assess the credibility of information, and the effective use of media platforms. They are not only essential for the individual success of young people in their professional careers but also for shaping informed and engaged citizens who can make well-founded decisions and actively participate in social and civic life (Facione, 2011; Hobbs, 2010).

Critical thinking and media literacy are among the most vital competencies that enable students to comprehend, analyze, and evaluate the information they encounter in their daily lives. In an era of increased media exposure and easy access to information, the ability to think critically provides a foundation for distinguishing facts from manipulative claims and misinformation, helping students develop well-reasoned perspectives (Potter, 2013). Media literacy, on the other hand, encompasses skills related to engaging with various media formats and platforms, which are crucial for communication and knowledge exchange in the digital age (Livingstone, 2004).

For educational systems, these developments necessitate the transformation of traditional teaching methods, encouraging interactive and practical approaches that prepare students for the challenges of the digital society. Fostering critical thinking and media literacy is fundamental to developing a new generation of informed and engaged citizens who not only acquire information but also analyze, synthesize, and critically evaluate it (Ennis, 1996).

The Flipped Classroom Method is an innovative pedagogical model in which students engage with course materials in advance through digital resources, while classroom time is dedicated to interactive discussions, group projects, and practical applications. This approach promotes self-directed learning and critical thinking, as students are required not only to absorb information but also to analyze, question, and apply it in different contexts.

Despite its advantages, the implementation of the flipped classroom model poses several challenges, which may hinder its successful adoption:

- Unequal access to digital resources – Some students may lack access to the necessary technology and online materials, potentially widening educational disparities.
- Need for pedagogical training – Educators require specialized training to effectively design and facilitate interactive learning sessions that go beyond passive content delivery.
- Risk of passive information consumption – If not carefully structured, flipped classroom lessons may lead to students engaging superficially with digital content, rather than critically analyzing and reflecting on the materials.

This study explores the potential of the flipped classroom approach as a catalyst for enhancing critical thinking and media literacy while addressing the challenges associated with its implementation. By examining the impact of this model within the framework of the CTIS (Critical Thinking and Information Skills) project, the research aims to provide empirical insights into the effectiveness of this method in fostering analytical reasoning, media awareness, and digital competencies.

2. THEORETICAL FRAMEWORK

The rapid advancement of digital technologies and the exponential growth of information flows present new challenges for individuals, requiring them to develop analytical, interpretative, and

critical thinking skills when engaging with media content. In this context, educational institutions bear the responsibility of cultivating citizens who can recognize misinformation, fake news, and manipulative communication strategies.

Critical thinking is defined by Ennis (1996) as a purposeful, autonomous, and analytical reasoning process, which involves objectivity, logical judgment, and informed decision-making. Facione (2011) further elaborates that critical thinking comprises a set of cognitive skills, including analysis, evaluation, and argumentation, which are essential for addressing complex problems and situations.

The development of critical thinking is particularly significant in the digital media era, where information is not only instantaneously disseminated but is often subject to manipulation and deliberate misinformation. Facione (2011) emphasizes that the ability to recognize cognitive biases and media manipulations is crucial for social engagement and democratic participation. In an information society dominated by algorithmically curated news feeds, critical thinking becomes a prerequisite for informed media consumption and rational decision-making.

In parallel, media literacy refers to the ability to analyze, evaluate, and create media content, incorporating skills for identifying media manipulation and critically interpreting information (Hobbs, 2010). According to Potter (2013), media literacy is not merely the ability to consume content but an active process of interpretation, critical analysis, and engagement with the media ecosystem.

While globalization and digitalization have increased access to information, they have also raised significant concerns regarding the reliability and quality of information sources. Livingstone (2004) argues that traditional educational methods are insufficient in preparing critically thinking citizens who can effectively navigate the complex and contradictory media environment. The prevalence of misinformation and fake news can influence public opinion, electoral processes, and democratic stability, highlighting the essential role of media literacy in modern education.

Educational institutions play a pivotal role in fostering critical thinking and media literacy. However, traditional teaching approaches often fail to meet the needs of contemporary students, who are active consumers of digital content. This necessitates the adoption of innovative teaching methodologies that encourage independent thinking, analytical reasoning, and active engagement in the learning process.

One of the most effective pedagogical strategies for enhancing critical thinking and media literacy is the Flipped Classroom Method. This approach enables students to familiarize themselves with fundamental concepts in advance, while classroom sessions focus on discussions, analyses, and practical exercises (Strayer, 2012). This inverted teaching model transforms the traditional role of the instructor, instead of being the primary source of knowledge, they become a moderator and facilitator of the learning process.

The Flipped Classroom Method is particularly well-suited for developing critical thinking, as it requires students to engage with content beforehand, allowing for deeper comprehension, structured debates, and critical evaluation. Additionally, digital technologies provide new opportunities for interactive learning. Platforms such as Renderforest (n.d.) and other multimedia tools enable students not only to consume information but also to actively create content, fostering the development of media literacy.

Critical thinking and media literacy are fundamental competencies that educational institutions must actively cultivate to prepare students for the challenges of the information society. As the digital landscape continues to evolve, the ability to critically assess and engage with media content

is no longer an optional skill but a necessary one. The Flipped Classroom Method represents an effective and innovative approach to addressing these challenges by empowering students to think independently, evaluate information critically, and actively participate in the digital discourse.

3. RESEARCH METHODOLOGY

The primary objective of this study is to analyze the effectiveness of the flipped classroom method as a pedagogical approach for developing students' critical thinking and media literacy skills within the context of the information society. The research focuses on both the opportunities and challenges associated with this model, particularly in enhancing students' analytical abilities and fostering conscious information consumption.

Object of the study: The research targets students from Burgas Free University (BFU) enrolled in social sciences, pedagogical, and psychological disciplines. These academic fields were selected due to the critical role of media literacy and analytical reasoning in their professional and societal engagement.

Subject of the study: The study examines the impact of the flipped classroom method on the development of critical thinking and media literacy among students, assessed through their ability to analyze, evaluate, and interpret digital information critically.

To ensure a diverse set of perspectives and experiences, students from various academic backgrounds were intentionally selected to participate in interactive learning activities within the CTIS (Critical Thinking and Information Skills) project. This initiative aims to enhance students' ability to critically assess media content and engage in informed decision-making.

The CTIS project employs the flipped classroom method as its core instructional strategy, actively engaging students in the learning process. This model consists of the following key stages:

- Students gain prior access to educational content in the form of interactive video lessons, developed using Renderforest software. These materials cover key topics, including: *Evaluating the reliability and validity of evidence presented in media; Digital skills, cultural cooperation, creativity and entrepreneurship; Active citizenship through social networks.*
- The video lessons incorporate interactive elements designed to encourage independent reasoning and analytical thinking.
- University classroom sessions emphasize interactivity, where students apply their knowledge through: *Discussions and analysis of real media publications; Case study exercises and critical evaluation of information; Use of online fact-checking tools (e.g., FactCheck.org, Snopes, Google Fact Check Explorer); These practical exercises aim to enhance students' analytical thinking and critical assessment skills.*

Each thematic module in the CTIS project is structured around specific hands-on learning activities:

- *" Evaluating the reliability and validity of evidence presented in media "* - Analyzing news articles to identify misinformation; Distinguishing factual from manipulative information; Using online tools to verify claims and detect bias.
- *" Digital skills, cultural cooperation, creativity and entrepreneurship"* - Developing multimedia content (e.g., infographics, videos); Utilizing software platforms for media content creation and editing; Evaluating visual communication and its impact on public perception.
- *"Active Citizenship through Social Networks"* - Analyzing the influence of social media campaigns; Designing media messages on socially relevant issues; Simulating online debates and evaluating argumentation strategies; Data Collection and Analytical Methods.

To assess the effectiveness of the flipped classroom approach, the study employs multiple data collection and analysis techniques, including:

- *Pre- and post-training assessments* – A quantitative evaluation of knowledge acquisition and the development of analytical skills, measured through a comparative analysis of students' results before and after the training sessions.
- *Classroom observations* – Monitoring students' level of engagement, participation in discussions, and interaction with learning materials.
- *Survey research* – Gathering qualitative feedback on students' perceptions of the flipped classroom method, their self-assessment of critical thinking improvements, and their level of media literacy awareness.

The collected data is processed using a mixed-methods approach, incorporating: *Qualitative analysis – Evaluating student discussions and open-ended survey responses; Quantitative analysis – Statistical processing of pre- and post-test results to determine learning outcomes.*

The following key findings are expected:

- Significant improvement in critical thinking skills – Students are expected to demonstrate an enhanced ability to analyze and critically argue information.
- Greater awareness of media manipulation – Upon completion of the training program, students are expected to be better equipped to identify misleading and manipulative media practices.
- Increased interest in civic engagement – The flipped classroom approach is expected to heighten students' awareness of the role of social media in shaping public opinion and civic participation.

This methodological framework aims to provide empirical evidence on the effectiveness of the flipped classroom model in fostering critical thinking, media literacy and digital competencies. The study contributes to the growing body of research on active learning strategies in higher education, highlighting the potential of flipped learning in preparing students for the challenges of the information society.

4. RESULTS

The study identified a significant improvement in students' ability to apply critical thinking and media literacy across various situations, following training sessions based on the flipped classroom method. After engaging with topics such as evaluating the reliability of information, critical reading and using digital tools for fact-checking, students demonstrated enhanced analytical reasoning, greater awareness of media manipulation, and a more critical approach to digital content consumption.

Quantitative Findings: Increased Engagement and Learning Outcomes
The quantitative data confirm high student engagement in the learning process and reveal notable improvements in their academic performance after completing the training sessions.

Out of 780 students who completed the pre-course assessments, 533 (approximately 68%) participated in the post-course evaluations. This participation rate indicates a strong commitment to the learning content and demonstrates that the flipped classroom approach effectively stimulates student engagement and enhances motivation for active learning.

Phases of the Study
The research was conducted in sequential phases, each focusing on specific aspects of education and the development of critical thinking and media literacy. These phases included: *Preliminary*

assessment of students' critical thinking and media literacy levels; Implementation of flipped classroom-based training sessions; Post-training evaluation of students' ability to critically assess and analyze information.

The results underscore the effectiveness of the flipped classroom model as a pedagogical strategy that equips students with essential analytical skills and a more conscious approach to media consumption.

4.1. Phases of the Study

The research was conducted in several sequential phases, each aimed at developing students' critical thinking and media literacy through the flipped classroom model. These phases ensured a structured learning process, transitioning from preparatory materials to active engagement and practical application.

1. Preparation of Educational Materials

This phase focused on the development of high-quality learning resources, which served as the foundation for the subsequent interactive sessions. The materials included:

- Video lessons created with Renderforest, designed to present information in an interactive and accessible manner.
- Supplementary textual and visual materials to support students' understanding of key concepts.
- Case studies and real-world media examples allow students to engage with practical scenarios of misinformation and media bias.

The creation of engaging and well-structured learning resources was critical to the success of the instructional process, as it laid the groundwork for later discussions, analyses and hands-on activities.

2. Preliminary Self-Guided Learning

In this phase, participants were granted access to video lessons and additional reading materials. This self-directed preparation enabled students to:

- Familiarize themselves with key topics in advance, ensuring more effective participation in interactive discussions.
- Engage more actively during in-class sessions by building on their preliminary knowledge base.

According to Zimmerman (2002), self-regulated learning plays a crucial role in fostering autonomy in the educational process. Empirical evidence suggests that students who engage in pre-session preparation demonstrate higher levels of participation and enhanced critical thinking skills during interactive discussions.

3. Conducting Classroom Sessions

The in-class training sessions, conducted in university lecture halls, were structured around interactive and problem-solving activities, including:

- Discussions and analysis of real media publications – The students evaluated the credibility of sources and learned to distinguish between factual information and manipulative content.
- Case studies and practical exercises – The participants developed strategies for identifying and addressing misinformation and fake news.

– Hands-on use of fact-checking software and digital tools – The students worked with Google Fact Check Explorer, Snopes and other verification platforms to assess the reliability of media claims.

This interactive approach ensured that students not only acquired theoretical knowledge but also practically applied their learning in real-world contexts. The combination of discussion-based learning, case analysis and digital tools enhanced the students' ability to critically assess, interpret and engage with media content in an informed manner.

By following this structured instructional process, the study effectively integrated critical thinking and media literacy into the learning experience. The progression from self-guided study to interactive sessions and real-world applications allowed students to develop essential analytical skills, enhance their ability to navigate digital media landscapes and apply critical thinking in evaluating information reliability.

4.2. Qualitative Outcomes of the Educational Courses with Students

1. Critical Thinking and Analytical Approach

Upon completion of the training course, the students demonstrated: *Enhanced ability to recognize media manipulation and critically evaluate the credibility of information; Improved skills in assessing information reliability through content analysis and fact-checking methodologies; Greater confidence in using digital tools for fact verification, enabling them to navigate digital environments more effectively.*

According to Hobbs (2010), critical thinking is a fundamental competence for informed civic engagement, and the results of this study confirm this assertion. Students not only developed theoretical knowledge but also applied it in practical scenarios, strengthening their analytical reasoning and argumentation skills.

2. Digital skills and creativity

The "Digital skills and creativity" module proved to be particularly effective, as students: *Created interactive digital projects using Renderforest and other multimedia platforms; Developed competencies in visual communication and critical assessment of multimedia messages; Refined their abilities in innovation and creativity within digital media environments.*

These findings support Livingstone's (2004) claim that media literacy extends beyond passive consumption to active content creation, empowering students to engage with digital platforms in a critical and meaningful way.

3. Active citizenship through social networks

The "Active citizenship through social networks" module encouraged students to: *Analyze the impact of social media on public attitudes and civic engagement; Develop their own social campaigns aimed at addressing pressing social issues; Identify mechanisms for the spread of misinformation and propose strategies to counteract it.*

The study demonstrates that leveraging social media for activism and societal change is a crucial component of modern digital education (Kellner & Share, 2007).

Findings from the CTIS project confirm that the flipped classroom model is an effective tool for developing critical thinking and media literacy. The combination of theoretical knowledge, interactive learning and real-world application enables students to analyze, evaluate and critically engage with information in a meaningful way.

Both quantitative and qualitative data indicate that targeted student engagement leads to sustainable educational outcomes. Moreover, the integration of innovative technologies and interactive methodologies significantly enhances student motivation and learning effectiveness.

This research provides a solid foundation for future studies and the expansion of the flipped classroom model across various academic disciplines and learning environments.

5. ANALYSIS OF RESULTS AND DISCUSSION

The findings of the study unequivocally demonstrate that the flipped classroom method significantly enhances critical thinking and media literacy among students. Compared to traditional teaching methods, this instructional model promotes higher engagement, autonomy and an analytical approach to information processing.

5.1. Impact of the Flipped Classroom Method on Student Engagement

According to the survey results, 91.1% of the participants reported a noticeable difference between traditional teaching approaches and the flipped classroom model. The primary advantages of this method, as highlighted by students, include:

- Self-paced preparation – The ability to study materials in advance enables a deeper understanding of the content before in-class discussions.
- Active participation in class sessions – Increased motivation to engage in discussions, analyses, and hands-on activities enhances critical thinking and problem-solving skills.
- Flexibility and adaptability – Students can learn at their own pace and focus on key aspects of the topics, allowing for a more personalized learning experience.

To assess the potential for expanding this method across other academic disciplines, students provided their evaluations using a five-point Likert scale. The results of this assessment are illustrated in Figure 1.

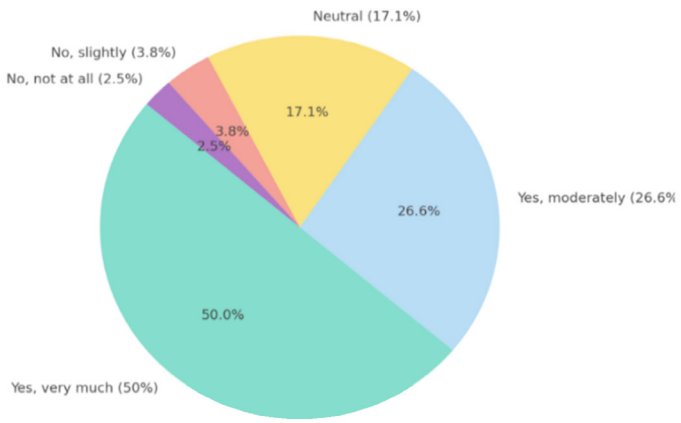

Figure 1. Students' Preferences for Applying the Flipped Classroom Method in Other Academic Disciplines

Source: Own research

Student Preferences for Applying the Flipped Classroom Method in Other Academic Disciplines:

- 50% of students gave the highest rating ("Yes, very much"), reflecting their strong desire for this method to be applied in other subjects.
- 26.6% selected a rating of 4, indicating a positive attitude and openness to experimenting with different educational approaches.
- 17.1% gave a neutral rating (3), suggesting moderate interest, possibly due to a preference for other forms of learning.
- 3.8% rated it 2, showing skepticism or lower enthusiasm toward the method.
- 2.5% assigned the lowest rating (1), likely favouring the traditional approach or having insufficient positive experience with the flipped classroom model.

These results demonstrate that 76.6% of students highly value the flipped classroom method and express interest in its broader implementation within the academic curriculum.

5.2. Qualitative Analysis: Student Feedback

In addition to quantitative data, students provided open-ended responses, offering valuable insights into their perception of the method. The key themes emerging from their feedback include: *The method is described as "interactive," "motivating," and "easy to understand," leading to better knowledge retention; "It pushes us out of our comfort zone" – Students highlighted that active participation in discussions enhances their confidence and analytical skills "It fosters creative thinking" – The approach supports both critical analysis and innovative problem-solving.*

5.3. Application of the Method in Specific Learning Modules

1. "Evaluating the Credibility of Information"

In this module, students are introduced to fact-checking techniques and media source analysis through video materials. After self-directed preparation, in-class sessions focus on analyzing real news publications, allowing students to: *Identify manipulative techniques in media content; Distinguish factual information from misinformation; Develop skills for critical reading and analytical interpretation of content.*

2. "Digital skills, Cultural Cooperation, Creativity and Entrepreneurship"

This module trains students in digital content creation tools, guiding them in developing their own videos and presentations on socially relevant topics. This process enhances: *Digital literacy and technical competencies; Creative thinking and experimentation with media platforms; A hands-on approach to multimedia production and innovation*

3. "Active Citizenship through Social Networks"

The objective of this module is to expand students' social awareness and civic engagement. Through the creation of social campaign projects, participants: *Analyze the impact of social media on society; Develop a critical perspective on digital platforms and their role in public discourse Simulate socially relevant debates to improve argumentation and social responsibility.*

4. "Developing Active Learning and Critical Reading Skills"

This module emphasizes systemic thinking and self-directed learning, as students: *Research additional materials and present individual analyses; Enhance their ability to understand interconnections between social, political, and cultural issues; One student remarked, "This module helped me develop a new perspective on the complexity of modern societal challenges."*

6. SUMMARY OF FINDINGS AND SIGNIFICANCE FOR THE EDUCATIONAL PROCESS

This study confirms that the flipped classroom method is an effective tool for developing critical thinking and media literacy among students. The analyzed data indicate that this model: Enhances student engagement and academic motivation; Stimulates an analytical approach to information; Promotes independence and active participation in the learning process. Moreover, educators report that the method: *Facilitates teamwork and fosters students' creativity; Develops argumentation and discussion skills; Leads to more sustainable knowledge retention.*

The flipped classroom approach can be successfully integrated into various academic disciplines, offering an innovative learning strategy aligned with the challenges of the digital era.

In today's world, where information is widely accessible, the ability of young individuals to analyze, interpret, and critically evaluate media content is not merely an educational objective but a social imperative.

This study provides compelling evidence that the CTIS project significantly contributes to the development of informed, critically thinking and socially engaged citizens, which is essential for the future of democratic societies.

7. RECOMMENDATIONS FOR PRACTICE AND FUTURE RESEARCH PERSPECTIVES

To ensure the successful implementation of the flipped classroom method and its impact on the development of critical thinking and media literacy, it is essential to design modular educational programs that are flexible, interactive, and practically oriented.

The key elements that should be integrated into such programs include: *Realistic case studies and contemporary examples based on actual media publications, aimed at enhancing students' ability to identify misinformation and manipulative content; Interactive tasks, such as news article analysis, fact-checking exercises, and discussions on media narratives; Project-based learning, encouraging students to create media content and critically assess its impact; Integration of diverse educational strategies, where the flipped classroom model is combined with digital tools, gamification, and collaborative discussions for optimal learning outcomes.*

Refining curricula with active learning methodologies will increase student engagement and better prepare them for critically analyzing and interpreting media content.

The flipped classroom method requires a fundamental shift not only in students' roles but also in the role of educators, who should transition from information providers to facilitators of learning.

To effectively implement this approach, educators must receive: *Specialized training in applying digital tools and interactive teaching methods; Access to online platforms and resources to facilitate structured self-study for students; Practical preparation for managing interactive class discussions, enabling them to foster critical thinking skills among learners; and Opportunities for exchanging best practices by establishing academic networks that support methodological adaptation across various disciplines.*

To enhance the effectiveness of teaching, educators should employ regular feedback mechanisms, such as questionnaires, group discussions and progress assessments, allowing for flexible adaptation of the methodology to meet students' needs.

Given the growing importance of critical thinking and media literacy in contemporary society, future research can focus on: The impact of critical thinking on social behaviour; The role of media literacy in preventing misinformation; The long-term cognitive effects of the flipped classroom; and Cross-cultural studies.

Further research in these areas will provide valuable empirical data, enabling the expansion of the methodology and its adaptation for a wider range of learners.

Findings from the CTIS project demonstrate significant potential for expanding its application across multiple academic disciplines and social settings.

Key directions for development include:
- *International collaboration* – extending partnerships with educational institutions across different countries to exchange best practices and adapt the method to cultural specificities.
- *Implementation in non-formal education settings* – applying the methodology in adult learning seminars, professional training programs, and community workshops.
- *Training for journalists and media professionals* – promoting ethical standards in journalism and fostering high-quality reporting through critical thinking and content evaluation techniques.

By adapting the CTIS across different educational and societal domains, it is possible to broaden the dissemination of critical thinking and foster an informed and resilient society capable of resisting manipulative influences.

8. CONCLUSION

The CTIS project clearly demonstrates that critical thinking and media literacy are fundamental to the successful integration of young individuals into digital society. These competencies play a crucial role in equipping students with the analytical and evaluative skills necessary to navigate the complexities of modern information ecosystems.

The flipped classroom method has proven to be an effective pedagogical approach, shifting the focus from passive knowledge acquisition to active engagement in discussions, analyses and practical exercises. Students not only acquire knowledge but also critically apply it in real-world scenarios, thereby enhancing their media awareness and analytical reasoning. The findings suggest that fostering these skills contributes significantly to students' ability to assess the credibility of information, detect manipulation, and engage in well-informed civic participation.

The findings of this study underscore several key avenues for further research and practical implementation:

Expanding the integration of the flipped classroom model across disciplines – Incorporating critical thinking training into diverse academic and professional fields to enhance analytical competencies.

Leveraging contemporary technologies – Developing online platforms and mobile applications to facilitate interactive learning and real-time engagement with educational content.

Increasing awareness of misinformation and media manipulation – Implementing civic education programs that prepare young individuals to critically evaluate news, digital content, and media narratives.

In a world where information is abundant yet often misleading, the ability to analyze critically and make informed decisions is not merely an educational objective but a social necessity.

This study, along with the practical implementation of the flipped classroom approach, provides empirical evidence that this pedagogical model cultivates sustainable and transferable skills, fostering critically engaged, well-informed, and socially responsible citizens.

Looking ahead, the integration of innovative educational methodologies will be essential in shaping a resilient, informed and engaged society—one that is capable of adapting to the evolving digital landscape and critically evaluating the information that shapes public discourse and decision-making.

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Marketing Research on Consumer Satisfaction of Students Majoring in Marketing at the University "Prof. Dr. Asen Zlatarov", Burgas, from the Lecture Process

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Summary: *The continuous dynamics of economic conditions, influencing the activities of the university, necessitates the need for the institution to achieve maximum consumer satisfaction to one degree or another. This process should be perceived by the management as a theory for strengthening the image of the university, as a driver for meeting consumer expectations and striving to achieve consumer loyalty by meeting and resolving complaints. Within the limits of the complexity of the issue under consideration, the main goal of this study is to build a theoretical framework for the essence and specificity of consumer satisfaction and on the pedestal thus built to carry out an empirical study of the opinion of 1st year students, majoring in Marketing, at the University "Prof. Dr. Asen Zlatarov", Burgas, regarding the lecture process. To achieve the main goal thus set, the following approaches should be applied: systemic and systemic-situational approach; inductive and deductive approach; transformation approach, internal and external analyses. The use of strategic methods, comparative methods, methods of analogy, including a combination of them, becomes significant. The marketing research conducted in this way leads us to the conclusion that in order to determine the level of consumer satisfaction, it is necessary to conduct periodic surveys, which would allow determining consumer expectations.*

1. INTRODUCTION

Marketing theory considers *customer satisfaction* as a necessary condition for ensuring long-term relationships with its customers. It can be noted that the enterprise's aspiration is to achieve maximum customer satisfaction, thereby achieving *customer loyalty*. This, in its essence, on the one hand, reduces the total costs of the enterprise, and on the other hand, puts the enterprise in a more advanced position in the competitive struggle.

The relevance of this study is associated with the postulate that attracting consumer attention is one of the key principles of marketing, aimed at maintaining and increasing consumer satisfaction. In this regard, surveys related to consumer satisfaction should be perceived by management not simply as a formal necessity, but as a real tool for the perceived quality of the products and services provided.

Within the limits of the complexity of the issue under consideration, the main goal of this study is to build a theoretical framework for the essence and specificity of consumer satisfaction and, on the basis of this, to conduct an empirical study of the opinions of first-year students majoring in Marketing at the University "Prof. Dr. Asen Zlatarov", Burgas, regarding the lecture process.

The subject of this study are the 1st year students, majoring in Marketing, at the University "Prof. Dr. Asen Zlatarov", Burgas.

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The subject of this study is the satisfaction of students and their attitude towards the educational process at the University "Prof. Dr. Asen Zlatarov", Burgas.

To achieve the main goal thus set, it is necessary to set the following research tasks:
- To develop questionnaires;
- To conduct two surveys;
- To transform the obtained results into information;
- To analyze the data obtained;
- To draw conclusions, summaries, conclusions and recommendations.

The thesis of this study is: the use of appropriate questions, integrated into a series of questionnaires, helps to justify and make decisions that increase the consumer satisfaction of 1st year students, majoring in Marketing at the University "Prof. Dr. Asen Zlatarov", Burgas, regarding the lecture process.

The following presentation seeks answers related to the consumer satisfaction of students majoring in Marketing, from the lecture process and the aspiration of the University "Prof. Dr. Asen Zlatarov", Burgas, in the person of its lecturers, to attract and retain their attention through the application of different teaching approaches. Tracking how this process is applied in practice is of current research interest.

2. THEORETICAL FRAMEWORK FOR THE ESSENCE AND SPECIFICITY OF CUSTOMER SATISFACTION

Consumer satisfaction can be defined as a topic that has been studied and analyzed by various specialists in different areas. The conducted marketing research shows that experts in the field of marketing, in general, perceive *satisfaction* as a function of expectations and actual performance characteristics of the product or service. In this regard, it should be noted that if the actual performance of the product does not match the consumer's expectations, then he feels disappointed. On the other hand, if the characteristics of the product or service match the consumer's expectations, then the presence of *satisfaction is established*. According to marketers, when the perceptions related to the quality of the product or service are exceeded, the consumer receives a high degree of satisfaction.

In the reflections of Zeithaml and Bitner (2016) noted that achieving customer satisfaction should be perceived as important not so much for the customer himself, but for the enterprise itself, since this determines its advantage over competitors. In confirmation of their thesis, the cited theorists point out the following most significant advantages:
- The formation of long-term relationships with the consumer that provide predictable income for the enterprise;
- Reducing the company's costs for attracting new customers, as satisfied customers spread their positive opinion about the company;
- Consumers who are satisfied with the quality of service from their previous purchase are considered more tolerant when a temporary decrease in the quality of services provided by the enterprise occurs. In this regard, economists point out that the enterprise is perceived as protected from the consumer switching to the services of a competing enterprise;
- Less satisfied consumers pay more attention to more attractive offers provided by competitors.

On the other hand, in the work of Anderson (2017) it is stated that the concept of *satisfaction* should be considered as the formation of loyal customers of the enterprise as a long-term basis for

the acquisition of profit. This creates the possibility of considering the so-called *"profit chain"* or *"relationship return model"*. To strengthen the position thus derived, the cited author presents the following simple model *"Relationship Benefit"* (see Fig. 1.).

Figure 1. Simple "Relationship Benefit" Model
Source: Anderson (2017)

Within the framework of the aforementioned development, the scientist comes to the following conclusion: simply satisfying consumer needs is not enough, but it is necessary for the enterprise to strive to exceed their expectations, which is possible only with full satisfaction.

According to the research team, Yashin et al. (2016), regardless of the product or service offered, it is imperative to determine all key expectations and needs of consumers, which should be taken into account when assessing their level of satisfaction. The cited work notes that if the expectations and needs of the users of a company differ significantly, this requires analyzing the satisfaction of all users. The starting point in the publication under consideration is connected with the thesis that the parameters by which *user satisfaction should be determined* can be formulated on the basis of an analysis aimed at studying the needs of users and how valuable the product or service is to them, including studying their expectations.

The information presented in this way provides the opportunity for Slazhnev (2018) to note that one of the adopted *satisfaction monitoring of users* is the periodic survey. In this regard, the cited researcher points out that the algorithm related to the assessment of *user satisfaction* can be divided into several stages (see Fig. 2.).

Figure 2. Stages of implementation of the work on assessing the satisfaction of enterprise users
Source: Slazhnev (2018)

For convenience, Slazhnev (2018) suggests that the obtained data be distributed by indicators and the results be plotted in a table with scores. When processing the obtained results, the author notes that in cases where the average *satisfaction scores of users*, on a given indicator, is lower than the average overall *user satisfaction score*, it is necessary to implement corrective actions in the processes responsible for this indicator. This can increase the level of *satisfaction of users* for the respective indicator and accordingly, increase the overall average score.

3. EMPIRICAL STUDY OF THE OPINION OF 1ST YEAR STUDENTS, MAJORING IN MARKETING, AT THE UNIVERSITY "PROF. DR. ASEN ZLATAROV", BURGAS, REGARDING THE LECTURE PROCESS

The present part of the marketing research refers to the thesis built by Dechev (2022), who notes that " in empirical research, the requirement for a specific organization of research work is highlighted, in which certain empirical data are obtained, classification and comparison of facts revealing the actual state of the studied phenomenon or process. It is directed at the object and is based on the data obtained from the research work. The results are expressed in the form of empirical generalizations, which are a system of certain scientific facts". In this regard, it can be noted that *the empirical research should be directed towards analyzing and comprehensively evaluating the results of a survey conducted among 1st year students, majoring in "Marketing", full-time and part-time forms of study, who are graduates of the University "Prof. Dr. Asen Zlatarov", Burgas.* The marketing research was conducted during the period September 2023 - May 2024 using surveys distributed via the *Google system Forms*. 37.1% of men and 62.9% of women participated in the survey.

The imposed principle statement of the present study requires presenting the first question included in the questionnaire, namely: *"Do you attend lectures on the discipline...?"*. The main purpose of this question is to determine the commitment of students to the educational process and their motivation for the disciplines studied. On the other hand, within the framework of his studies, Parygin (1999) states that the active participation of students, within the limits of the lecture process, also shows the organization of joint activities with other students and teachers, and his active participation in public relations, thus, the student is formed and improved. The summary of the results obtained from the conducted questionnaire survey are summarized in Table 1.

Table 1. Do you attend lectures on the subject…?

Do you attend lectures on the subject...?					
Discipline	*I always attend lectures.*	*I attend lectures almost always.*	*I attend lectures irregularly.*	*I rarely attend lectures.*	*I don't attend lectures.*
Applied Mathematics	75%	12.50%	6.30%	6.30%	0%
Microeconomics	66.70%	33.30%	0%	0%	0%
Management Fundamentals	88.20%	5.90%	5.90%	0%	0%
English language	51.60%	29%	6.50%	12.90%	0%
Philosophy	47.80%	21.70%	17.40%	8.70%	4.30%
Organizational culture	75%	25%	0%	0%	0%
Physical education and sports	69.20%	19.20%	3.80%	3.80%	3.80%
Macroeconomics	65.50%	20.70%	6.90%	3.40%	3.40%
Fundamentals of Law	75%	20%	0%	0%	5%
Introduction to Marketing	50%	46.40%	3.60%	0%	0%
Informatics	50%	40.60%	6.30%	3.10%	0%
Human Resources Management	50%	39.30%	7.10%	3.60%	0%

Source: Own research

The obtained information, presented in Table 1**.**, shows that for the most part, 1st year students attend lectures *"Always"* or attend lectures *"Almost always"*. This result should be perceived as evidence of a high level of commitment and responsibility among students who regularly attend lectures and strive for active participation in the learning process. The data from the conducted survey show the presence of students who attend lectures *"Irregularly"* or *"Rarely"*, which indicates the presence of reduced commitment to the educational process. Surprisingly, the presence of students who noted that *"They do not attend lectures" is established*. On the other hand, it is noted that this happens only for certain disciplines, namely: *"Philosophy"* (4.3%), *"Physical Education and Sports"* (3.8%),

"Macroeconomics" (3.4%) and *"Fundamentals of Law"* (5%). The lack of attendance at the specified disciplines may be due to various reasons, which may be the subject of subsequent research to determine the cause-and-effect relationships for the lack of attention to the specified disciplines.

The object of subsequent analysis is the question *"How would you rate the teaching methods in the discipline ...?"*. By asking this question, the aim is to determine the level of satisfaction of students with the teaching approaches used and what changes, if any, can be made to improve the educational process. The data obtained from the survey show that emphasis can be placed on the importance of student opinion on the quality of education. By its nature, the application of different approaches contributes to the easier perception of the taught material by students. And this, in turn, allows the perception of other people's experience, which can be refracted through the prism of one's own, and it can be constantly enriched by this. On the other hand, the information obtained can serve as a basis for making decisions and forming strategies for improving teaching methods. The summary of the processed results obtained from the survey can be systematized using a Table. 2.

The apparent complexity of the current issue is shown by the data presented in Table 2. can be perceived as a reflection of students' evaluations of teaching methods in the subjects taught. This, in turn, can be perceived as a value referring to the level of satisfaction and understanding of students aiming to determine the material provided and the way in which it is delivered.

Table 2. How would you rate the teaching methods in the subject…?

How would you evaluate the teaching methods in the subject…?				
Discipline	*The material is explained in an extremely accessible and understandable way.*	*The material is taught well.*	*The material is presented so complicated that I don't understand anything.*	*The material being taught has nothing to do with the topic*
Applied Mathematics	56.30%	18.80%	25%	0%
Microeconomics	71.40%	23.80%	4.80%	0%
Management Fundamentals	70.60%	23.50%	5.90%	0%
English language	61.30%	35.50%	3.20%	0%
Philosophy	30.40%	30.40%	0%	39.10%
Organizational culture	100%	0%	0%	0%
Physical education and sports	53.80%	38.50%	0%	7.70%
Macroeconomics	55.20%	44.80%	0%	0%
Fundamentals of Law	85%	10%	5%	0%
Introduction to Marketing	82.10%	17.90%	0%	0%
Informatics	59.40%	37.50%	3.10%	0%
Human Resources Management	78.60%	21.40%	0%	0%

Source: Own research

In essence, the data show that the answer *"The material is explained in an extremely accessible and understandable way"* occupies a significant place among the surveyed respondents for all disciplines included in the curriculum of 1st year students, majoring in "Marketing". It is noted that the discipline *"Organizational Culture"* receives 100% approval from students regarding the material taught. These results indicate the successful implementation of teaching methods that meet the needs and perceptions of students, ensuring clarity and comprehensibility of the teaching material. As a further assessment that students can give to the teaching methods, the answer that *"The material is taught well" can be* indicated. It can be noted that this assessment can be perceived as lower, but it still indicates some degree of satisfaction with the presentation of the teaching material. On the other hand, it can be perceived that there are some aspects that students may wish to improve.

It is important to note that there are respondents who perceive the taught material as *so complex that they do not understand anything*. This applies to the following disciplines: *"Applied Mathematics"* (25%), *"Microeconomics"* (4.8%), *"Fundamentals of Management"* (5.9%), *"English"* (3.2%), *"Fundamentals of Law"* (5%) and *"Informatics"* (3.1%). The question posed in this way creates the opportunity to determine whether there are disciplines whose material is provided in a way that causes dissatisfaction among students in terms of its relevance to the topic. In this regard, it can be emphasized that 39.1% of 1st year students, majoring in "Marketing", indicate that in the discipline *"Philosophy" "The material being taught has nothing to do with the topic*". The presence of such a large percentage of respondents who noted this answer raises the need to change the methods by which the material is provided in the specified discipline.

Within the scope of this study, the question is posed: *"Does the teacher of the discipline ... use interactive teaching methods?"*. The question posed in this way is of significant importance for determining, on the one hand, the influence of interactive teaching methods on students and, on the other hand, to what extent they influence the achievement of the set educational goals. This, in turn, can determine the quality of the educational process and, respectively, the satisfaction of students. An easier interpretation of the results obtained can be achieved using Table. 3.

Table 3. The subject teacher... Does it use interactive teaching methods?

Does the subject teacher … use interactive teaching methods?				
Discipline	*The teacher uses multimedia for presentations.*	*The teacher dictates the material orally.*	*The teacher writes on the board and explains the material.*	*The teacher only talks about the topic.*
Applied Mathematics	19%	18.80%	87.50%	6.30%
Microeconomics	92.50%	14.30%	14.30%	4.80%
Management Fundamentals	100%	29.40%	23.5%	11.80%
English language	32.30%	25.80%	61.30%	16.10%
Philosophy	13%	30.40%	13%	65.20%
Organizational culture	100%	25%	0%	0%
Physical education and sports	0%	11.50%	3.80%	88.50%
Macroeconomics	100%	20.70%	10.30%	3.40%
Fundamentals of Law	35%	60%	0%	10%
Introduction to Marketing	85.70%	21.40%	50%	10.70%
Informatics	90.60%	25%	37.50%	6.30%
Human Resources Management	96.40%	14.30%	14.30%	3.60%

Source: Own research

The question thus provided creates the premise for indicating more than one answer, which aims to determine to what extent the teacher in the respective discipline uses the different methods for providing the teaching material. In this regard, it is necessary to note that for obvious reasons the only discipline that does not use interactive teaching methods is *"Physical Education and Sports"*. On the other hand, it is noticeable that there are disciplines such as *"Philosophy"* and *"Applied Mathematics"*, for which, at least, students indicate that *they use multimedia for presentations*, with 13% and 19% respectively.

As an element of the modern way of providing educational material, interactive methods can be considered an effective way to engage students' attention, diversify their learning process and stimulate their participation in the learning environment. For this reason, it can be considered normal that teachers strive to use *multimedia devices* to provide educational material. The application of this teaching method allows for the visualization and enrichment of educational material with graphs, diagrams, video materials and other interactive elements, which can improve the

understanding and memorization of information by students. As another option for providing educational material and part of the survey, the option *"The teacher dictating the material orally"*. Although this method can be perceived as effective for transmitting the necessary information, it can also be defined as burdensome and limited in terms of active participation of students and the opportunity to ask questions, discuss and create discussions. According to the data obtained from the survey, for 60% of the respondents, the teacher of the subject *"Fundamentals of Law"* applies this teaching method, while for the other subjects the percentage varies up to a maximum of 30.4%, which is the percentage for the subject *"Philosophy". As an additional option for visualizing the material, the method "Writing on the board and explaining the material"* can be used. According to the reference provided in Table 3. This method is exclusively applied in the discipline *"Applied Mathematics"* (87.5%) and is not applied at all in the disciplines *"Organizational Culture"* and *"Fundamentals of Law "*. The last teaching method included in the survey is *"The teacher only talks about the topic"*. This method can be perceived as limited, in relation to the visualization of information and the possibility of interactive participation of students. For this reason, it can be perceived as normal that this teaching method is widely used in the discipline *"Physical Education and Sports"* (88.5%), where it is necessary to provide verbal explanations of the various physical movements in order to provide relaxation for the busy minds of students. It is important to note that the variety of methods used can offer a broader and more flexible educational environment that can respond to the different learning styles and preferences of students.

Within the framework of the information presented in this way, we cannot but agree with the statement of Bineva (2023), who emphasizes the premise that new information technologies offer innovative solutions for addressing various challenges.

Following the imposed principle of this study, the need arises to analyze and comprehensively evaluate the following question: *"How to evaluate, in general, the teaching of the lecturer in the discipline ... (in lectures)?"* Lectures in a given discipline can be presented as a basic element of the educational process and an important factor for the successful mastering of the learning material, and the lecturer - as the face of the discipline, in the eyes of the students. In this regard, it is of utmost importance to note that it is the lecturer who plays a significant role in the understanding, prospects and satisfaction of the students with the educational process being conducted. It is for this reason that this question creates prerequisites for directing attention to the general assessment of the students to the quality of teaching and, respectively, to their satisfaction with the lecturers of the individual disciplines. The constructiveness of the data obtained from the conducted survey can be traced in Table. 4.

The analysis of the data presented through Table 4. shows that the majority of respondents express a positive attitude towards the teaching of the lecturers in the studied disciplines. This, in general, speaks of the positive attitude that lecturers create in students. According to the received report, the lecturer in the discipline *"Organizational Culture" enjoys 100% approval*. The data obtained show that the majority of students indicate excellent grades for the other lecturers with values over 45%. This, in general, indicates the high level of satisfaction and recognition by the students for the quality of teaching. On the other hand, it is noted that 21.7% of students evaluate the lecturer in the discipline *"Philosophy" with an excellent grade*. The results show that the teacher of the specified discipline enjoys the approval of the students, mainly within the framework of the average grades, including 43% who indicate that *they are "Very satisfied with the teaching"* and 39.1% who note that *they "Evaluate the teaching as good"*. Within the limits of the conducted data evaluation, it is established that there are students who *"Evaluate the teaching as unsatisfactory"* within the framework of the following disciplines: *"Applied Mathematics"* (6.3%), *"English Language"* (6.5%), *"Philosophy"* (21.7%) and *"Physical Education and Sports"* (7.7%).

Table 4. How do you rate, in general, the teacher's teaching of the subject ... (in lectures)?

How do you rate, overall, the teaching of the professor in the subject ... (in lectures)?					
Discipline	*Excellent teaching*	*I am very satisfied with the teaching.*	*I rate the teaching as good.*	*More could be desired in terms of teaching*	*I rate the teaching as unsatisfactory.*
Applied Mathematics	56.30%	6.30%	18.80%	12.50%	6.30%
Microeconomics	76.20%	9.50%	9.50%	4.80%	0%
Management Fundamentals	82.40%	17.60%	0%	0%	0%
English language	45.20%	12.90%	29%	6.50%	6.50%
Philosophy	21.70%	43%	39.10%	13%	21.70%
Organizational culture	100%	0%	0%	0%	0%
Physical education and sports	46.20%	23.10%	19.20%	3.80%	7.70%
Macroeconomics	51.70%	24.10%	24.10%	0%	0%
Fundamentals of Law	60%	30%	5%	5%	0%
Introduction to Marketing	71.40%	21.40%	7.10%	0%	0%
Informatics	53.10%	18.80%	21.90%	6.30%	0%
Human Resources Management	57.10%	21.40%	17.90%	3.60%	0%

Source: Own research

The data from the complex analysis of the current issue show that, to their great credit, lecturers in the relevant disciplines enjoy the approval of their students regarding their teaching, which speaks of their high professionalism and competence.

Based on the information presented in this way, we cannot help but agree with the position adopted by Mihaleva (2023), which is associated with the axiom that the university not only knows how to create and produce, but it also knows how to form a clientele and satisfy its specific needs. On the other hand, the direction presented by Petrova (2020), is associated with the postulate that in today's competitive business environment, the university is faced with the search for stable development tools in order to be able to respond to the different, specific, and heterogeneous requirements of users.

4. CONCLUSION

On the basis of *the marketing research presented in this way on the consumer satisfaction of students majoring in Marketing at the University "Prof. Dr. Asen Zlatarov", Burgas,* the following conclusions can be drawn from the lecture process:

First, the marketing research conducted leads us to the conclusion that in order to determine the level of consumer satisfaction, it is necessary to conduct periodic surveys that would allow for the determination of consumer expectations.

Secondly, the conducted survey allows us to determine the level of attitudes of students majoring in Marketing towards the provided lecture material.

Third, the results show that a significant proportion of students attend lectures and are satisfied with the way the lecturer conducts them. The presence of lecturers with lower ratings requires a change in teaching methods in order to achieve increased student satisfaction.

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Learning Outcomes in Advanced Simulations Within Higher Education – A Systematic Literature Review

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Abstract: *Advanced simulations within higher education have the potential to outperform traditional teaching methods when it comes to learning outcomes. The purpose of the paper is to determine which learning outcomes are most prominently enhanced through advanced digital business simulations. The research design consists of a systematic literature review of empirical peer-reviewed journal articles from 2019-2024. The analysis is based on a classical framework that categorizes learning outcomes in three domains: cognitive, skill-based and affective learning outcomes. All the empirical studies evidenced acquisition of knowledge and understanding, i.e. cognitive learning outcomes, e.g. problem-solving abilities, critical thinking, and conceptual understanding. Most studies evidenced skill-based learning outcomes, also referred to as behavioral outcomes, e.g. teamwork and interpersonal skills. Finally, most studies also pointed to affective learning outcomes, e.g. learners' attitudes, motivations, and self-efficacy. Future research should explore strategies for higher education institutions to effectively implement simulations within their curricula.*

1. INTRODUCTION

The higher education system is under pressure as students are increasingly disengaged by old-fashioned teaching methods (Farashahi & Tajeddin, 2018). These methods, while foundational, often lack the structure needed to cultivate critical professional skills (Ingason & Eskerod, 2024). Lectures are useful for foundational knowledge and information, but cannot often allow students to experience the dynamic domain of cognitive learning, in which students are able to directly apply this knowledge (Farashahi & Tajeddin, 2018).

Meanwhile, the integration of advanced digital simulations in higher education is increasingly recognized for its potential to enhance student engagement and learning outcomes (Ingason & Eskerod, 2024). Simulations allow students to experiment without impacting real-world processes, providing an engaging way for them to learn about the effects of their decisions (Jones, 1995, as cited by Koltai & Tamas, 2022), which also contributes to the growing use of simulations in higher education. Simulation-based learning is shown to significantly enhance the development of a wide range of complex skills across various domains in higher education (Chernikova et al., 2020).

Games and simulations are not new within higher education. The role of management games within education was researched already in the 1960s (see e.g. Cohen & Rhenman, 1961), as well as the role of management simulations within education was researched in the 1990s (see e.g. Keys & Wolfe, 1990; Jones, 1995). However, since then, management simulation in higher education has started to grow (Chernikova et al., 2020; Ingason & Eskerod, 2024).

Farashahi and Tajeddin (2018), in their comparative study on learning outcomes, found that simulations surpass lectures and case studies in developing interpersonal skills and self-awareness.

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Additionally, Farashahi and Tajeddin (2018) state that both case studies and simulations outperform lectures in enhancing problem-solving skills, without a significant difference between the two. However, there are also studies that point to simulations being ineffective for improving learning (Silva et al., 2020). Furthermore, Silva et al. (2020) mention that there is a scarcity of scholarly studies on gamification in management education, with limited scope and inconclusive findings.

Given the increasing integration of simulation-based learning in higher education, it is critical to explore its specific impact on students' learning outcomes. There is a gap in literature when it comes to investigating how business simulations are supporting different learning outcomes. This leads us to pose the following research question:

RQ: *Which learning outcomes are most prominently enhanced through business simulations in higher education?*

The study aims to contribute to the existing literature on learning outcomes within higher education by examining how advanced simulations contribute to student development and engagement in the context of learning outcomes.

In the next section, we present the research methodology, followed by an analysis, findings and discussion section. Hereafter follows a section on the future research perspective based on our findings, as well as a conclusion.

2. RESEARCH METHODOLOGY

The research is conducted through a systematic literature review (Azarian et al., 2023). The objective of this study is to analyze empirical research on the use of advanced digital simulations within recent years, focusing specifically on variations in learning outcomes observed across different studies. To identify relevant academic literature, we conducted a systematic search using Google Scholar and EBSCO, targeting empirical peer-reviewed journal articles published within the last six years (2019-2024).

Given our emphasis on learning outcomes within the context of business education, we employed the following key search terms: *"learning outcomes"*, *"simulations"*, *"business simulations"*, and *"competences"*. These terms were selected to ensure coverage of studies explicitly addressing the educational implications of digital simulations in higher education. After narrowing it down to our specific criteria, our search yielded 13 relevant studies, all of which specifically pertain to or have a focus on learning outcomes associated with the use of digital simulations in business education over the past six years (2019-2024).

The analysis of the selected studies was guided by the framework developed by Kraiger et al. (1993), which has been further refined by Rubin and Martell (2009) for application in business education contexts. Kraiger et al.'s (1993) framework categorizes learning outcomes into three overarching domains: cognitive, skill-based, and affective outcomes. Each domain reflects distinct aspects of learning: Cognitive outcomes involve the acquisition of knowledge and understanding of relationships between knowledge components. In the context of simulations, cognitive outcomes often encompass problem-solving abilities, critical thinking, and conceptual understanding. Skill-based outcomes, often referred to as behavioral outcomes, focus on the development and demonstration of technical or motor skills. Within simulation studies, skill-based outcomes frequently involve teamwork and interpersonal skills due to the collaborative nature of many simulations. Affective

outcomes relate to learners' attitudes, motivations, and self-perceptions, such as self-efficacy, self-directed learning, and overall confidence in achieving learning objectives. The framework is also used by Farashahi and Tajeddin (2018) and Brazhkin and Zimmerman (2019) in their simulation studies.

By assessing the empirical studies, we aimed to evaluate the overall efficacy of simulations as a pedagogical tool within business education. See framework in Figure 1.

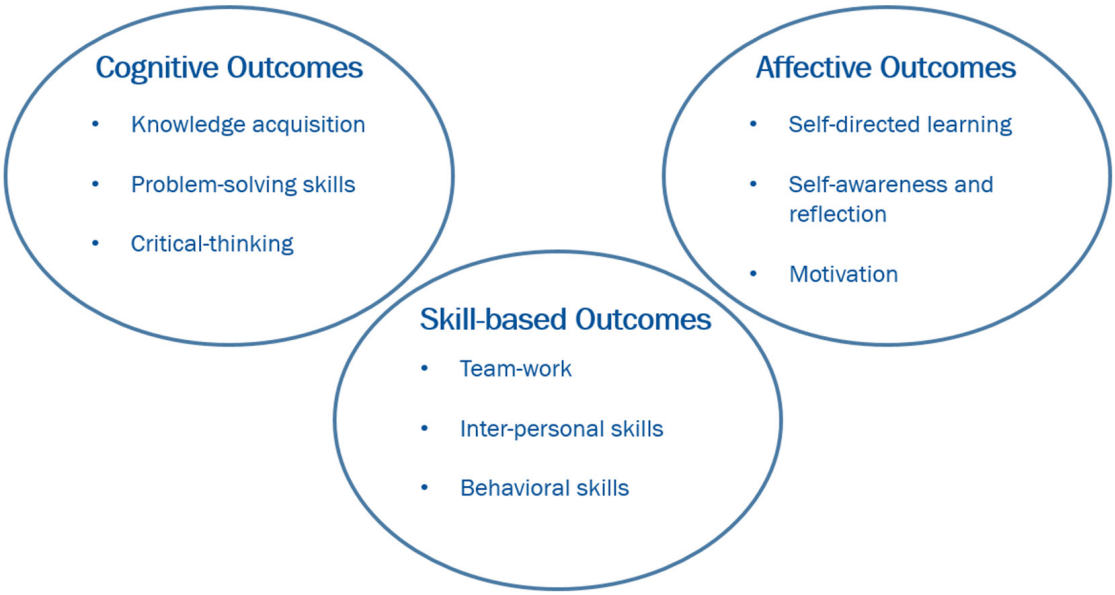

Figure 1. Analytical Framework
Sources: Kraiger et al. (1993) and Rubin & Martell (2009)

3. ANALYSIS, FINDINGS AND DISCUSSION

In this section, we describe the findings of each of the identified empirical articles. Hereafter, we show the result of our analysis based on the analytical framework offered by Kraiger et al. (1993) and Rubin and Martell (2009).

Brazhkin and Zimmerman (2019), under the framework of cognitive, skill-based, and affective outcomes, highlight the progression of students' learning outcomes over the course of a multi-round business simulation, in which most students were found to progress from novices to experts within the course of the game in all three types of outcomes. Students had a clear understanding of the relationships in the simulation, with the development of planning and analysis skills, enhanced collaboration and communication with the teams, alongside more assertive decision-making behavior, and were convinced of their satisfaction with the simulation.

Mohsen et al. (2019) evaluate the educational impact of simulation games (SG) in management education from learners' perspectives, focusing on their ability to enhance learning outcomes. Findings indicate that SGs effectively improve students' conceptual understanding of theoretical knowledge and enhance skills such as decision-making, problem-solving, teamwork, and strategic planning. Sierra (2020) also found that simulations are widely regarded by students as an effective teaching and learning method, particularly for enhancing cognitive outcomes like understanding theoretical knowledge, problem-solving, and critical thinking, as well as skill-based outcomes such as interpersonal communication and teamwork. These findings align closely with Lohmann

et al. (2019), who emphasized that simulations provide an authentic learning environment, allowing students to develop skills in collaboration, communication, and teamwork while enhancing problem-solving abilities and knowledge of real-world organizational challenges. Both studies underscore how simulations bridge cognitive and practical skills, highlighting their dual role in theoretical and applied learning.

Huang et al. (2022) expand on this by demonstrating how business simulation games (BSGs) foster engagement across cognitive, behavioral, and emotional dimensions. Like Sierra (2020) and Lohmann et al. (2019), Huang et al.'s (2022) study points to improved problem-solving and strategic application of theoretical knowledge. Additionally, interactive elements such as badges and points enhanced emotional engagement, a finding that complements Lohmann et al.'s (2019) observation of increased student enjoyment. Together, these studies show that simulations not only improve learning outcomes but also create engaging and satisfying learning experiences.

Dharmastuti et al. (2021) contribute further evidence of simulations enhancing competencies. Their study linked perceived usefulness, ease of use, and enjoyment of simulations to significant improvements in business competencies, such as decision-making, teamwork, and communication. These findings resonate with Wang (2023), who identifies strategic decision-making, teamwork, and learning-by-doing as key skills developed through simulations. Both studies highlight how simulations strengthen critical business-related competencies through dynamic, interactive experiences.

The connection between engagement and skill acquisition is further reinforced by Costin et al. (2019), who examine the development of entrepreneurial competencies using BSGs (Business Simulation Games). Their findings align with those of Dharmastuti et al. (2021) and Wang (2023), showing that BSGs enhance cognitive competencies such as decision-making and resource management, while also enhancing non-cognitive attributes such as entrepreneurial passion, self-efficacy, and adaptability. Costin et al.'s (2019) emphasis on resilience and tolerance for uncertainty offers an additional dimension, suggesting that simulations not only build technical skills but also shape attitudes crucial for career success.

A nuanced perspective on learning outcomes is provided by Boikou et al. (2022), who observed mixed impacts of BSGs across the SOLO (Structure of the Observed Learning Outcomes) taxonomy levels. While students showed significant improvement in basic understanding and higher-order cognitive skills, performance at the relational level—integrating and connecting multiple concepts—declined. On the other hand, Peterková et al. (2022) highlight the understanding of the dependencies between different economic variables as a learning outcome reported by the students, alongside the development in analytical skills, teamwork, and inspiration.

Grijalvo et al. (2022) discuss the acquisition of competencies and knowledge through the use of simulators in their study, in which they are said to develop competencies, such as strategic capacity, decision-making, and data analysis, as well as allowing students to gain knowledge from team interactions and self-reflection. The study highlighted the use of two simulations (Gestionet and GMC) that have differences in the way these competences are developed.

Finally, Płatkowska-Prokopczyk et al. (2024) address the relevance of simulations to labor market skills, emphasizing their ability to enhance analytical thinking, teamwork, and decision-making under pressure. These findings complement those of Wang (2023) and Dharmastuti et al. (2021), who highlight similar competencies, and align with Costin et al. (2019), who emphasize the

transferability of simulation-based learning to real-world entrepreneurial contexts. Together, these studies demonstrate the multifaceted value of simulations in preparing students for both academic success and professional challenges.

Similarly, Ingason and Eskerod (2024), in their study on the use of simulations in project management education, highlight the effectiveness of simulations in stimulating skills such as critical thinking through the consideration of factors such as stakeholder priority and decision-making consequences. The study also frequently highlighted the importance of collaboration in performing well within the simulation, especially in the context of project management, and the overall impact on the students' awareness of sustainability through the use of simulations (Ingason & Eskerod, 2024).

Together, the identified empirical studies demonstrate the multifaceted value of simulations in preparing students for both academic success and professional challenges. The findings categorized under the framework of cognitive, skill-based, and affective learning outcomes (Kraiger et al., 1993; Rubin & Martell, 2009) can be seen in Table 1.

Table 1. Meta-matrix analysis on the learning outcome analysis

Study	Cognitive Outcomes	Skill-Based Outcomes	Affective Outcomes
Brazhkin & Zimmerman (2019)	Understanding of the cause-effect relationships, planning and data analysis	Team communication and collaboration, assertive decision-making, risk-taking	Convinced satisfaction
Costin et al. (2019)	Understanding complex business environments, decision-making processes	Marketing, resource management, teamwork, leadership	Entrepreneurial passion, self-efficacy, resilience
Lohmann et al. (2019)	Management knowledge, strategic thinking, real-world challenges	Collaboration, communication, teamwork, role differentiation	Enhanced satisfaction and enjoyment
Mohsen et al. (2019)	Decision-making, problem-solving, strategic planning.	—	Engaging, motivating, stimulate excitement and active involvement
Sierra (2020)	Problem-solving, critical thinking, theoretical understanding	Teamwork, interpersonal communication	Enhanced satisfaction and usefulness
Dharmastuti et al. (2021)	Decision-making, synthesis of knowledge	Teamwork, communication, decision-making	Perceived enjoyment (PJ), motivation
Boikou et al. (2022)	Foundational knowledge (unistructural, extended abstract), generalization	—	—
Grijalvo et al. (2022)	Strategic capacity, decision-making, and data analysis	—	—
Huang et al. (2022)	Higher-order thinking skills (HOTS), market analysis, strategy application	Designing companies, revising strategies	Emotional engagement through badges and points
Peterková et al. (2022)	Understanding the dependence between economic variables, connection of theory with practice, analytical skills	Managerial experience, teamwork	Business inspiration
Wang (2023)	Strategic decision-making, data analysis	Communication, team spirit, competition/cooperation	Increased motivation and team spirit
Ingason & Eskerod (2024)	Critical thinking, problem-solving, stakeholder analysis	Teamwork, negotiation, project execution	Motivation, sustainability awareness
Płatkowska-Prokopczyk et al. (2024)	Analytical thinking, decision-making under pressure	Teamwork, business communication, teamwork	—

Source: Own research

The findings reveal that cognitive outcomes are widely addressed across all studies, with each offering unique contributions to understanding how simulations impact knowledge acquisition and higher-order thinking. Several studies emphasize the development of critical thinking, problem-solving, and decision-making abilities as central cognitive gains. Additionally, the synthesis and application of knowledge in practical scenarios are frequently highlighted, showcasing how simulations bridge theoretical understanding with real-world relevance.

In terms of skill-based outcomes, the studies predominantly reveal the enhancement of teamwork, communication, and practical business skills. Simulations are shown to foster collaboration and interpersonal communication, equipping students with essential competencies for dynamic and interactive professional environments. Moreover, specialized skills, such as strategic planning, leadership, and resource management, are also cultivated through simulation-based learning, further aligning with labor market needs.

Finally, affective outcomes are shown in the form of engagement, motivation, and satisfaction among students. Many studies highlight the emotionally engaging nature of simulations, attributing this to features such as gamification elements, including badges and points, which enhance enjoyment and sustained participation. These affective benefits are complemented by reports of increased motivation, team spirit, and positive attitudes toward learning, underscoring the holistic impact of simulations on student development.

The value of these findings is substantial, as they underscore the transformative potential of simulations in higher education. The consistent emphasis on problem-solving, strategic thinking, and teamwork highlights how simulations align with industry expectations for business graduates (Bhatti et al., 2023), making them an invaluable pedagogical tool. While some studies have less of a focus on skill-based and affective outcomes, all of them point to simulations being very effective in all three domains, with the most prominent being cognitive learning outcomes.

4. FUTURE RESEARCH DIRECTION

Future research should explore the effectiveness of simulations in specialized domains to gain a more nuanced understanding of how simulations support targeted learning outcomes in different contexts. The critique by Silva et al. (2020) regarding the scarcity of research on gamification within management education further emphasizes the need for broader, more conclusive investigations in this area. Furthermore, it is important to ensure that simulations are not only integrated seamlessly into curricula but also optimized to maximize student engagement and learning outcomes. Future research should explore strategies for educators to effectively implement these simulations within the curricula at higher education institutions.

5. CONCLUSION

This study set out to answer the research question: Which learning outcomes are most prominently enhanced through business simulations within higher education? The systematic literature review indicates that simulations are highly effective in achieving cognitive, skill-based, and affective learning outcomes, with most of them having similarities in the kind of outcomes achieved. All the empirical studies evidenced acquisition of knowledge and understanding, i.e. cognitive learning outcomes, e.g. problem-solving abilities, critical thinking, and conceptual understanding. Almost all studies also evidenced skill-based learning outcomes, also referred to as behavioral outcomes, e.g. teamwork and interpersonal skills due to the team-based nature of the simulations in the studies.

Finally, almost all studies pointed to affective learning outcomes in the form of e.g. learners' attitudes, motivations, and self-efficacy.

These findings provide valuable insights for educators seeking to integrate business simulations into higher education curricula. By understanding the specific learning outcomes that simulations consistently enhance, instructors can set clear objectives and align simulations with course goals more effectively.

However, this study has some limitations. The review was limited to empirical studies published in the past five years, primarily sourced from Google Scholar and EBSCO, which may have excluded relevant studies from other databases. Additionally, the analysis focused on business education simulations, meaning findings may not be fully generalizable to other disciplines where different learning outcomes may be prioritized.

Overall, simulations hold significant promise in transforming higher education by bridging theoretical learning with practical application. As technology advances, further research and innovation in simulation-based learning can ensure its continued evolution as an effective and engaging educational tool to prepare students for the dynamic challenges of the modern workforce.

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The Role of Social Responsibility in Building the Quality Image of Preschool Institutions

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Abstract: *Preschools must actively support social responsibility, environmental preservation, and the community in addition to offering high-quality services in the social and educational context of today. This essay explores the key elements of social responsibility that contribute to the formation of a positive perception of preschools and how this perception can be strategically used to attract parents, finance staff development, and adhere to regulations. Preschool institutions' success is impacted by factors other than the quality of childcare and instruction, though. Transparency in business, social inclusion, and environmental responsibility are becoming more and more important. This paper examines specific instances of community-building and image-building projects that preschools have undertaken, such as those about equality, family support, and environmental conservation. Institutions that successfully incorporate social responsibility into their strategies not only improve their reputation but also reap long-term benefits in the form of increased employee, parent, and child satisfaction and trust, especially in light of the growing competition and societal demands for ethical business practices. The principals of 352 preschools in the Republic of Croatia were surveyed to examine how they view and implement social responsibility in the process of enhancing their reputation for excellence.*

1. INTRODUCTION

In today's social and educational context, preschools are faced with the challenge of not only providing high-quality education and care for children, but also actively contributing to social responsibility, environmental protection and community. To be relevant and sustainable in an increasingly demanding social environment, these preschools must understand the importance of their role in a broader social context, which includes caring for the environment, promoting equality, social inclusion, and supporting families and the community. This paper explores key aspects of social responsibility, which not only contribute to a positive perception of preschools but also enable them to strategically position themselves in the educational services market. Following the above, social responsibility is becoming an important element in strengthening the image and trust among various stakeholders – from parents and children to employees and the wider community. Preschool institutions that implement sustainable, transparent and socially responsible practices can improve the quality of the services they provide, attract new users, secure better financial support for the development of their programs and staff, and adhere to legal and ethical guidelines. In addition to the quality of education and care, it is increasingly recognized that business transparency, environmental responsibility and active social inclusion are becoming

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key factors in assessing the success and reputation of a preschool institution. This paper places special emphasis on examples of successful initiatives and projects aimed at building a community and strengthening the image of institutions, among which those focused on equality, supporting families and preserving the environment stand out. The implementation of projects such as ecological initiatives, developing social awareness in children, organizing educational activities for parents, or implementing social inclusion programs not only contribute to better integration of preschool institutions into the local community but also creates added value for all participants in the educational process. This makes preschool institutions the center of the community, a place that not only educates but also actively contributes to social development and sustainability.

2. LITERATURE REVIEW

Early childhood and preschool education institutions are places where people live, learn, practice social skills and play. Došen–Dobud (2004) states that early childhood education institutions are one of the first environments for children. Moss and Pence (1994, p. 2) state that early childhood education institutions should become "comprehensive, integrated and coherent services that offer equal access to all children from birth to six years of age and their parents through their flexible, multifunctional and high-quality services" (Moss & Pence, 1994, p. 2). According to Hendrick (1997, p. 11), the organization of the institution has been unjustifiably neglected for a long time, and it needs to be reformed, restored as a "necessary, dynamic and constructive element". The Reggio pedagogical concept considers the entire organization of the context of the institution and subordinates it to the quality of the environment. They believe that the quality of learning, especially in a group, is closely related to the quality of the opportunities we create for the child to participate with others in the daily life of the institution (Edwards et al., 1998; Giudici & Rinaldi, 2002). Education is a key component in achieving the Sustainable Development Goals, as it provides a deeper understanding of problems, their causes and consequences, and possible solutions. As literacy increases, so does the motivation to change not only oneself, but also the wider community. The skills acquired through education lay the foundation for making responsible decisions, necessary for sustainable development. Responsible education for the future focuses on the development of critical thinking, awareness of environmental, social and economic issues, and encourages civic responsibility, thus enabling individuals to become active participants in creating a sustainable and just society. This form of education not only prepares people to make ethical and responsible decisions, but also empowers them to shape positive changes in the world that will inherit us and begins in early preschool age.

Despite the growing interest in the concept of sustainability at the international, national and local levels, research on education for sustainable development is still very limited (Davis, 2010). A relatively well-developed area is the collection of children's opinions on various phenomena in the environment. Longitudinal research from Great Britain shows that children as young as four years old are aware of their environment and demonstrate an understanding of the effects of environmental change and its impact on different habitats and people (Palmer & Suggate, 2004). Today's children are far from the romantic notion of childhood as a time of carefree play that places children in a context of safety and a happy life, untouched by the events around them. Since values, attitudes, patterns of behaviour, and skills are acquired already during early childhood, this is the period when education for sustainable development must begin (Pramling Samuelsson & Kaga, 2008). Today's children are faced with changes in society, with new challenges and opportunities. Environmental issues have been part of educational programs for the past four decades, initially under the name of environmental education. Sustainable development as a concept is understood more broadly as a form of development that meets the needs of the present without compromising

the ability of future generations to meet their own needs (Brundtland, 1987). Over the past decades, the concept of education for sustainable development has influenced educational policies at all levels – international, national and local. In an attempt to transform education for sustainable development into educational goals, Hägglund and Pramling–Samuelsson (2009) emphasized the intertwining of environmental, social and economic dimensions, but also added a value dimension. They highlighted the similarities between education for sustainable development and education for peace, democracy and citizenship.

Education for sustainable development is a challenging but crucial concept in today's society. Modern education systems are increasingly linked to global economic trends, and these trends shape education as a product that is influenced by the ideology of the global market. However, there is a need to redefine such a one-dimensional model of education, because the global economy does not recognize national and cultural boundaries. Instead of education being a path to employment, in many countries it becomes a mechanism that leads to unemployment, poverty and exclusion, because schooling is not in line with local needs and the specificities of the labor market. Therefore, it is necessary to harmonize domestic and international knowledge systems, based on traditional life skills, entrepreneurship, adaptability and risk-taking, with the active involvement of young people as a key resource for the future (Mbebeb, 2009). The third millennium, in which we live, should educate children in their culture, but at the same time provide competences that are needed at the global level. This phenomenon, known as glocalization, means finding the local in a global context. Formal education, therefore, must play a significant role in shaping practices that will promote a more sustainable approach to social challenges. Education for sustainable development should empower children and the community, providing them with the fundamental values and skills that are essential for the sustainability of our society. In order for education for sustainable development to be effective, it must be implemented in the real environment of children, teaching them through practical, life situations that encourage responsibility towards the environment, society and the community. This concept necessarily includes the implementation of socially responsible educational strategies from an early age, because children who acquire the values of sustainability, responsibility and togetherness from the earliest years become agents of change. Such an educational approach not only contributes to the development of awareness of environmental and social issues, but also directly affects the reputation and quality of services of preschool institutions from the perspective of parents. Namely, parents who recognize the importance of education that promotes social responsibility and sustainability are increasingly looking for institutions that adhere to these values, because they believe that such an educational approach contributes to a healthier, more responsible and more aware development of their children. Thus, preschools that successfully implement social responsibility strategies, while preserving the environment and promoting shared values, create the foundation for building a positive reputation, which is crucial for attracting parents, ensuring community trust and maintaining high-quality education. In this way, education for sustainable development not only affects the development of the child but also the competitiveness and success of educational institutions, as it also shapes the image of an institution that cares for the well-being of society and the environment, which has become increasingly important in the eyes of parents.

3. THE ROLE OF EDUCATORS IN THE REPUTATION AND IMAGE OF PRESCHOOL INSTITUTIONS

Educational institutions fall into the category of non-profit organizations, in which educators are a significant and the most numerous and fundamental part of the preschool community and the entire context related to the preschool institution. All segments are important for the image of an

educational institution: the basic culture of the institution, the personnel and administrative structure, verbal and visual elements, as well as the overall behavior and atmosphere of the institution itself (Vujičić, 2008). Vujičić (2008) notes that the culture of an educational institution is shaped by its history, context and the people in it. It is also influenced by external political and economic forces and changes in state or local educational policy. Recently, strategies have often been mentioned with the aim of long-term guidance and development of the institution. An extremely important element in the development of strategies is the determination of the mission and vision of the organization. In this regard, the image is extremely important because it symbolizes the mission of the institution in a way. The way it works and how the institution acts affects the way the public will perceive it. In order to harmonize the public's perception of the institution, the image of the institution should be carefully designed, correctly directed, and constantly managed. Most kindergartens in the Republic of Croatia operate on the basis of certain administrative and financial provisions. Parents pay a certain monthly subsidy for the kindergarten service, and in this respect, preschool institutions can be perceived as institutions with service activities.

In this respect, educators are the most visible representatives of the institution, who balance between two roles: the interests of the profession and the institution and the wishes and expectations of the children's parents. Educators are in daily contact with the children's parents, and are constantly in the position of presenting the service of care, nurturing, upbringing and education. If the teaching profession were placed in the context of marketing, teachers are in a position to perform "personal selling" on a daily basis. This term refers to "the process of informing and persuading consumers to purchase products through personal communication in an exchange situation." (Dibb et al., 1995).

The professional role of educators is crucially linked to the overall image of employees, and the way they present the institution through communication with parents largely depends on various characteristics, such as physical appearance, expertise, emotional intelligence, motivation, ethical values, and cultural approaches. In order for cooperation between educators and parents, as well as cooperation with the wider society, to be successful, it is important to understand that the identity of educators directly affects the way they communicate. Namely, the way educators communicate with the environment depends on their professional identity, and this communication, in turn, shapes the image of the institution and the profession. Preschool educators, through their attitude, professionalism, and communication skills, actively shape their personal image, but also the image of the institution itself, and the image of the educational profession as a whole. Their ability to foster a positive atmosphere, build trust with parents and the community, and provide professional support to children is crucial for improving the quality of services provided by the institution. Through such activities, educators also support the development of key competencies in children, which include skills, knowledge and attitudes necessary for lifelong learning. Using theoretical guidelines and the latest research in the field of preschool education helps educators to monitor standards and improve their work, promoting innovation in education, respect for diversity and social responsibility. In this way, they strengthen their professional status and contribution to the profession, which indirectly affects the strengthening of the reputation and image of the educational profession. The goal of successful communication between educators and parents should be focused on a clear and professional presentation of work with children, according to the principles of the pedagogical approach and taking into account the preschool education curriculum. One of the challenges that educators face is expressing their practical work in contact with parents, as many of them have difficulty articulating their observations about children's development and progress. Therefore, it is important for educators to develop communication skills in order to improve their professional presentation and thereby raise their reputation in the community. Although preschool institutions are not profit-making organizations, improving their image and

reputation directly affects the interest of parents in enrolling their children in such institutions. The financial stability of these institutions also depends on the participation of parents, which allows for further investment in improving services. Therefore, educators, by developing their communication skills and professional responsibility, not only raise their own image, but also contribute to the sustainability and quality of preschool institutions, which is crucial for their successful work and long-term development.

4. RESEARCH METHODOLOGY

A survey conducted among the directors of 352 preschool institutions in the Republic of Croatia provided insight into current practices and approaches to social responsibility in the context of strengthening the reputation of excellence. The data from this survey indicate various challenges that institutions face in implementing socially responsible strategies, as well as the recognized benefits that arise from their inclusion in everyday work. Different approaches to managing social responsibility show that institutions that successfully integrate these principles into their strategies are able to create long-term value – not only for children and parents, but also for their employees, which contributes to greater satisfaction, trust and engagement of all stakeholders. Increased competition in the preschool sector, as well as growing societal demands for ethical business practices, further underline the importance of a proactive approach to social responsibility. Preschool institutions that focus on building a positive social image, while ensuring high quality education and care, have the opportunity to position themselves as leaders in the sector in the long term, attract a larger user base, and ensure sustainability and stability in their business. The problem of this research concerns how preschool institutions in the Republic of Croatia integrate social responsibility into their daily activities and how this affects their reputation, quality of services and competitiveness in the education market. Although providing high-quality services for children is the basic function of preschool institutions, this paper explores the broader framework in which these institutions operate, emphasizing the importance of responsibility towards the environment, community and society. Within this framework, it is important to understand how social responsibility can positively affect the perception of preschool institutions by parents, employees and the wider community, as well as long-term benefits, such as increased trust, better financial development and adherence to legal and ethical norms.

The subject of this paper is the examination of specific initiatives and strategies of social responsibility implemented by preschool institutions in Croatia, as well as the analysis of their effects on the reputation and success of these institutions. Special attention will be paid to the roles of principals in the implementation of these strategies, and how their experience and leadership of institutions are reflected in the implementation of responsible business, environmental protection, and community building.

The problem of this research concerns how preschool institutions in the Republic of Croatia integrate social responsibility into their daily activities and how this affects their reputation, quality of services, and competitiveness in the education market. Although providing high-quality services for children is the basic function of preschool institutions, this paper explores the broader framework in which these institutions operate, emphasizing the importance of responsibility towards the environment, community and society. Within this framework, it is important to understand how social responsibility can positively affect the perception of preschool institutions by parents, employees and the wider community, as well as long-term benefits, such as increased trust, better financial development and compliance with legal and ethical norms. The subject of this paper is the examination of specific initiatives and strategies of social responsibility implemented by

preschool institutions in Croatia, as well as the analysis of their effects on the reputation and success of these institutions. Special attention will be paid to the roles of principals in the implementation of these strategies, and how their experience and management of institutions are reflected in the implementation of responsible business, environmental protection and community building. In accordance with the above, the following objectives were set in the research:

- To investigate how preschool institutions in Croatia implement social responsibility in their strategies, with an emphasis on environmental protection, social inclusion, and responsibility towards the community.
- To analyze the impact of social responsibility on the reputation of preschool institutions, especially in the context of attracting parents, ensuring quality staff, and adhering to legal regulations.
- To study how the experience of principals and their long-term practice influence the successful management of social responsibility initiatives within preschool institutions.

Hypotheses:

– Hypothesis H1: Preschool institutions that actively implement social responsibility strategies (such as environmental initiatives, equality, family and community support) record a better perception among parents and employees, which contributes to increasing their competitiveness and success in the educational services market.

– Hypothesis H2: There is a positive correlation between the experience of principals in managing preschool institutions and the successful implementation of social responsibility within these institutions.

– Hypothesis H3: Business transparency, social responsibility, and environmental initiatives have a positive impact on the financial stability and development of a preschool institution, as they enable better attraction of financial resources and community support.

The socio-demographic structure of the 352 preschool principals in the Republic of Croatia who participated in the survey provides a detailed insight into the characteristics and experiences of preschool leaders in different parts of the country. The survey covered principals from different cities and regions, and the largest number of responses was collected from urban areas, with an emphasis on the largest Croatian cities. The largest number of respondents comes from the city of Zagreb, which is the political, cultural and educational center of the country. This is expected given the high concentration of preschool institutions in Zagreb (89 principals, accounting for 25.28% of respondents), as well as the specific social and economic context of the capital. In Zagreb, preschool principals face challenges specific to the urban environment, including greater competition among institutions, the need for greater engagement in sustainability and ecology, and often greater social diversification of children and families. After Zagreb, a significant number of respondents come from the city of Rijeka, which is the second largest city in Croatia, located on the Adriatic coast. Rijeka, as an important economic and cultural central destination, also has a significant concentration of preschool institutions, although the number of principals is somewhat lower than in Zagreb. In Rijeka, principals (55 principals, accounting for 15.63% of the sample) often face challenges specific to the coast, such as a stronger focus on environmental projects, promoting social inclusion and supporting families facing economic difficulties. The third largest city in terms of respondents is Split, the largest city on the southern coast of Croatia, which also has specific needs and challenges in the area of education and childcare. Split is a city with a large number of preschool institutions that have to adapt to the growing population and

tourist conditions, which requires principals to balance the educational and social functions of these institutions (14.48%). In addition to these larger cities, responses were also collected from other, smaller cities and rural areas of Croatia. Although the number of respondents from smaller areas was not so large, these answers still provided important information about the specific challenges faced by principals in less urbanized areas, such as less availability of resources, challenges in hiring professional staff, and ensuring the quality of education in conditions of a reduced number of children. When it comes to the principal's work experience, the research showed that the majority of respondents hold the position of preschool principal for an average of four years. This indicates relative stability in the management of preschool institutions, but also the potential need for continuous professional development and adaptation to new challenges and changes in the educational system. The balance between experience and new approaches is essential for the successful management of institutions, as it enables principals to make informed decisions regarding innovations in education and work organization, while at the same time maintaining long-term stability and continuity. This socio-demographic structure of respondents also suggests that directors of preschool institutions in Croatia come from different socio-economic and cultural backgrounds, which contributes to the diversity of approaches, perspectives and experiences in managing preschool institutions. Different challenges and priorities in urban and rural environments are also reflected in the strategies that principals implement in their institutions, creating a complex picture of the educational reality in Croatia.

Table 1. The implementation of social responsibility in preschool institutions and its impact on the reputation and quality of the service

Reliability Statistics			
Cronbach's Alpha	Part 1	Value	,876
		N of Items	2[a]
	Part 2	Value	,678
		N of Items	2[b]
	Total N of Items		4
Correlation Between Forms			,723
Spearman-Brown Coefficient	Equal Length		,839
	Unequal Length		,839
Guttman Split-Half Coefficient			,829
a. The items are: V35, V36.			
b. The items are: V37, V40.			

Source: Own research

Listed and shown in Table 1, it includes specific initiatives of preschool institutions in relation to ecological approaches (recycling, energy efficiency, ecological education for children), social inclusion (equality, social integration of children from vulnerable groups) and responsibility towards the community (activities in the local community, support for families, cooperation with local institutions). As dependent variables the following are defined: (i) the reputation of the preschool institution, which measures the perception and general opinion of the institution among the wider society, including the local community, employees and other key stakeholders, and (ii) the quality of service, which measures the quality of education, childcare and engagement in the community, which is indirectly related to the implementation of social responsibility. The results of the instrument reliability study indicate high internal consistency, which is crucial for assessing the quality of measurement. Instrument reliability measures how consistent and stable the results are, which is important for ensuring accuracy in the research process. Various statistical methods were used to assess this reliability, including Cronbach's alpha, correlation between items, Spearman-Brown coefficient, and Guttman's Split-Half coefficient. First, the Cronbach's alpha for the first part of

the scale, which includes items V35 and V36, is 0.876, which shows extremely high internal consistency. This suggests that the items in this part of the scale measure very similar concepts and are related in a way that allows for accurate measurement. Given that Cronbach's alpha values greater than 0.7 indicate good reliability, this result confirms that the first part of the instrument can reliably measure the desired variable. For the second part of the scale, which includes items V37 and V40, Cronbach's alpha is 0.678. This value, although lower than the first, is still within acceptable limits of reliability. Although this part of the instrument is not as consistent as the first, it still provides useful information and can be used in the context of further research. The correlation between the two parts of the scale is 0.723, indicating a moderate relationship between them. This correlation shows that both parts of the instrument measure similar aspects, although with certain differences in internal consistency. This result confirms that the instrument as a whole can be effective in assessing.

In today's social and educational context, preschool institutions face challenges that require responsible and strategic management, not only in terms of the quality of education, but also in the context of social responsibility. The implementation of socially responsible strategies is becoming an increasingly important element in the business of preschool institutions, as it has a direct impact on many aspects of their work, including the perception of parents, the reputation of the institution, the quality of services and the image of the preschool institution. Principals, as key decision-makers in preschool institutions, play a key role in leading these initiatives and ensuring that they are incorporated into the day-to-day practices of the institution. Understanding the views of principals regarding the implementation of socially responsible strategies is important for insight into how these strategies shape institutional identity, the quality of the educational process, and relations with parents and wider communities. Principals are the ones who shape the guidelines and policies of the institution, and their approach to social responsibility can significantly affect the institution's reputation in the eyes of parents and the community. In addition, the way in which these strategies are communicated and implemented can have long-term effects on the quality of services, creating conditions for attracting and retaining parents, as well as for strengthening the institution's image as a responsible and transparent institution. In the context of these changes, it is crucial to understand how preschool principals perceive and apply socially responsible strategies in their practice, and how these strategies affect the wider perception of their institution. Researching the attitudes of principals can provide valuable information about how social responsibility is integrated into educational policies, which strategies they consider most effective, and how they see the impact of these approaches on the reputation and quality of their institution's services.

The table used in this study provides insight into various aspects of social responsibility in preschools through the responses of the principals. The results show that principals believe that their institution actively promotes environmental initiatives such as recycling and energy efficiency, with an average score of 3.98, indicating a positive attitude of the majority of respondents towards these initiatives. Although there is less variability among the responses, with a standard deviation of 0.965, the results show that principals recognize the importance of these initiatives, although the possibility that there are also differences in the way these initiatives are implemented in different institutions cannot be ignored. When asked whether preschools provide children with the necessary competencies to understand global social challenges, such as sustainability and social responsibility, principals gave an average score of 4.12, suggesting that most institutions implement educational activities that enable children to understand important global challenges. The smaller standard deviation (0.871) indicates less variability in the responses, which may mean that principals have a very similar perception of what is necessary for the development of these competencies. Principals also expressed a positive opinion about the perception of parents towards their commitment

to social responsibility and sustainable development, with an average score of 3.82. Although the score is close to 4, there is a more significant variability in the responses, as seen in the standard deviation of 1.018. The question about the institution's reputation among parents based on social responsibility also received a high score of 4.28, which shows that principals believe that their commitment to sustainable development positively affects the institution's reputation. Given the lower variability among the responses (standard deviation of 0.896), it can be assumed that there is a greater consensus among principals when it comes to the institution's reputation.

Table. 2. Descriptive statistics and Kolgomor's test on the implementation of a socially responsible strategy in preschool education institutions

Results	N	Min.	Max.	Average	Standard deviation	Coefficient of variation	Statistics	P value
Our preschool actively promotes environmental initiatives, such as recycling and energy efficiency.	352	1.00	5.00	3.98	.965	1.107	0.161	0.000
Our institution provides children with the necessary competencies to understand global social challenges, such as sustainability and social responsibility.	352	1.00	5.00	4.12	.871	.976	0.125	0.002
The parents of our institution recognize our commitment to social responsibility and sustainable development.	352	1.00	5.00	3.82	1.018	1.336	0.211	0.002
Our institution's reputation among parents is based on our commitment to sustainable development and social responsibility.	352	1.00	5.00	4.28	.896	.954	0.179	0.000
The quality of education at our institution is based on high standards of social responsibility and sustainable development.	352	1.00	5.00	4.02	1.129	1.211	0.179	0.000
Our institution has a positive image in the community due to its commitment to sustainability and social responsibility.	352	1.00	5.00	3.99	1.009	1.116	0.241	0.001

Source: Own research

The quality of education was also rated highly, with an average score of 4.02, highlighting the importance of social responsibility and sustainable development in educational practices. Principals believe that high standards of social responsibility are key to ensuring the quality of education, although there is greater variability in perceptions, as reflected in a standard deviation of 1.129. When asked about the institution's image in the community, principals also gave high scores (3.99), indicating that a commitment to sustainability and social responsibility positively shapes the public perception and image of institutions. Based on these results, it can be concluded that preschool institutions in Croatia recognize the importance of social responsibility and sustainability in their educational process, but there is a need for further improvement in the implementation and communication of these initiatives in order to achieve a consistent and uniform perception among parents and wider communities.

The implementation of sustainability strategies in preschools is increasingly becoming a key factor in shaping parents' perceptions, the institution's reputation, and the quality of services it provides. In today's educational context, preschools that actively implement environmental initiatives, social responsibility towards the community, and other sustainable practices not only contribute

to environmental protection and social well-being but can also significantly influence parents' opinions and the overall perception of the institution. Based on the analysis of correlations between different items, we can better understand how the implementation of sustainability strategies in preschools links independent variables, such as environmental and social initiatives, with dependent variables, including parents' perceptions, the institution's reputation, and the quality of services.

Table 3. Inter-Item Correlation Matrix of Social Responsibility Strategy Implementation in Relation to Parental Perception, Reputation, and Service Quality

	V35	V36	V37	V40
V35	1,000	,779	,751	,232
V36	,779	1,000	,823	,332
V37	,751	,823	1,000	,318
V40	,232	,332	,318	1,000

Source: Own research

The first link that emerges from the analysis concerns the high correlation between items V35 (implementation of environmental initiatives) and V36 (social responsibility towards the community), which is 0.779. This high correlation suggests that environmental initiatives and social responsibility towards the community often go hand in hand. Preschools that focus their efforts on environmental projects, such as recycling, energy efficiency, and environmental education for children, also tend to implement initiatives that include community support and social integration. These two components of sustainability have the potential to significantly influence parents' perceptions, as parents increasingly value institutions that are actively working towards environmental conservation and social responsibility. Ultimately, these strategies can have a positive impact on the institution's reputation, as demonstrating responsibility towards the environment and society contributes to creating a favorable image. Another important link in the analysis is the correlation between V35 (environmental initiatives) and V37 (quality of education and care), which is 0.751. This correlation suggests that preschools that integrate environmental initiatives may also have a better quality of education and care for children. Given that environmental strategies in educational institutions are often associated with innovative approaches to learning and upbringing, they can improve the educational process and provide children with a richer, more holistic approach to upbringing. Such an approach can positively affect the quality of service, which is crucial for parental satisfaction. Parents who see that their children are educated within sustainable, ecological practices may have greater confidence in the quality of the service provided by the institution. The third link in the analysis refers to the correlation between V36 (social responsibility towards the community) and V40 (reputation of the institution), which is 0.332. Although the correlation is lower than the previous ones, it shows that social responsibility can affect the reputation of the institution. Preschools that actively participate in projects that support the community, such as activities for the social integration of children from vulnerable groups or cooperation with local institutions, can improve their image in the eyes of parents and the wider community. This can result in greater trust and a stronger bond between the institution and parents, which is crucial for the long-term stability and success of the institution. In conclusion, the implementation of sustainability strategies in preschools has a significant impact on the perception of parents, the reputation of the institution and the quality of services. The high correlations between environmental initiatives, social responsibility and the quality of education suggest that sustainability is not only beneficial for the environment and society, but also for the educational institutions that implement these strategies. Preschools that successfully integrate sustainability into their daily practices can expect to improve their image, attract more parents who value environmental and social values, and improve the overall quality of services they provide to children.

5. CONCLUSION

The implementation of socially responsible strategies in preschools is an important step in shaping responsibility and awareness of social issues among children from an early age. By implementing various activities and initiatives that promote environmental responsibility, social justice, equality and solidarity, preschools create the foundation for the development of positive values in children. In addition, such strategies not only improve relationships within the preschool community, but also strengthen cooperation with parents and the wider society. Social responsibility in preschools can include various aspects – from environmental initiatives such as recycling and energy saving, to teaching children the importance of mutual respect and inclusion of all members of the community, to implementing approaches that provide equal access to educational opportunities for all children, regardless of their socio-economic background. In conclusion, socially responsible strategies in preschools not only contribute to the creation of a positive educational environment, but also prepare children to become responsible, empathetic and aware citizens, who understand their role in the wider social context and the importance of preserving shared values.

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User Experience with the Spotify Streaming Platform and Impact on the Music Industry*

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Abstract: *The development of new technologies has influenced the way music is consumed, which is now distributed predominantly through digital platforms. This has encouraged the global availability of diverse musical content, but has also influenced changes in the music industry, which is trying to find a balance between user habits and demands, as well as the wishes of artists and performers. One of the most popular streaming platforms is Spotify, which provides a personalized experience, ensuring an active role for consumers. This paper presents the results of a quantitative survey conducted on the general population, and its aim was to examine how digital platforms such as Spotify shape consumer habits and the music industry as a whole.*

1. INTRODUCTION

Music has always had an important place in human life, whether it is a way of communication, ritual ceremonies, or simply a way of entertainment and relaxation from the challenges of everyday life. With the development of new media and new technologies, music is becoming more accessible to a wide audience, and new genres are emerging with which authors are increasingly experimenting in an attempt to satisfy the affinities of the audience, but also to ensure better visibility for themselves (Oliver, 2023). At the same time, issues of copyright protection in music are also being raised (Albinsson, 2013; Watson et al., 2023), as well as intermediaries in the music industry, since musicians increasingly want to have control over the entire process (from the entire process of creating creative works to developing marketing and communication strategies for product placement) and independently decide how they will present themselves to the audience and find a way to the demanding market (Wikström, 2014). The Covid-19 pandemic has left a strong mark on the music industry due to the postponement of music events and festivals (Byun, 2024), and numerous government restrictions to prevent the spread of the dangerous disease have resulted in artists around the world (Ahmed, 2022) being hit hard by a lack of income (Browning & Darchen, 2024; Meyn & Albers, 2024), as well as their audiences in the context of changing music consumer preferences (Denk et al., 2022; Krüger Bridge, 2023). However, many musicians have found salvation in a virtual environment, live concert broadcasts and pre-recorded music records (Liang & Mao, 2022), and digital streaming platforms such as Spotify. Relying on playlists

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and nostalgia (Yeung, 2023) were a shelter for many during the first lockdown, but even with the return to the 'old' digital streaming platforms, they remained an important channel for distributing music content and communicating with the audience gathered in online fan communities (Ghaffari et al., 2023).

2. DIGITAL STREAMING SERVICES AND CHANGES IN MUSIC CONSUMPTION

Digital music distribution refers to the process by which music is delivered to users via various online platforms, enabling listening on a variety of devices. Artists and record labels digitize their music files and place them on streaming services such as Spotify, Apple Music, and Deezer. This distribution model allows not only global accessibility of music but also revenue generation through streaming and downloads (Johnson, 2023). The development of digital platforms has completely transformed the music industry, changing the way audiences consume music. The Spotify platform began operating in 2006, offering large libraries of different artists, albums, and songs. The globalization enabled by digital distribution has significantly increased the accessibility of music and created new opportunities for artists around the world.

The digitization of music has both advantages and challenges. Unauthorized copies often reduce sales of original releases, while on the other hand, the ability to listen to music before purchasing can increase audience interest in certain artists. Digital models also significantly reduce distribution, marketing, and promotion costs, allowing for more efficient audience outreach (Ahn & Yoon, 2009, p. 17). Streaming platforms, such as Spotify and Apple Music, have accelerated the decline of traditional sales, while digital downloads have experienced increasing success and profits. Digital models have become the primary source of income for many artists and record labels (Darvish & Bick, 2023). The changes brought about by digitalization require the industry to adapt to meet the needs of the audience (Aguiar, 2017), while at the same time ensuring fair and transparent conditions for artists. Social networks and online platforms have enabled artists to independently market their music (Patokos, 2008; Tabak, 2023), decentralizing traditional business models (Arnold, 2022). Internet-based entertainment has empowered and expanded the worldwide reach and exposure for all professionals in the music industry and has worked to create networking networks that revolve around the world's music scenes (Bodde, 2023, p. 5).

Streaming services have not only changed the way music is consumed but have also redefined its production and promotion (Chalaby, 2024). Spotify, for example, allows for personalized recommendations based on listeners' tastes, which significantly contributes to the popularity of individual artists. With more than 30 million songs available on this platform, audiences now have the ability to access a vast catalog of music with a single click (Butler, 2019, p. 1). The algorithms used by platforms like Spotify significantly influence the success of artists. Playlists like "Today's Top Hits" often have a larger audience than traditional radio shows, while personalized playlists allow listeners to discover music tailored to their tastes. Spotify has become a key tool for promoting new artists and songs, confirming its status as the "new radio" in the digital age (Bodde, 2023, p. 6). In addition to distribution, streaming platforms play a key role in the marketing and promotion of music. Artists use these tools to reach a wider audience, promote new albums, singles, or videos, and build a strong online presence. The digital age has allowed artists to create content that attracts audiences, including visuals, social posts and campaigns, tailored to specific platforms and target groups (Callaghan, 2024)

3. HOW HAS THE SPOTIFY STREAMING PLATFORM INFLUENCED THE MUSIC INDUSTRY?

Spotify, a Swedish music streaming platform founded in 2006 by Martin Lorentzon and Daniel Ek, has revolutionized the music industry. Its name, which combines the words "Spot" and "Identification," symbolizes access to music that is fast, easy, and accessible to everyone. The platform offers a Freemium service model – basic use is free with ads, while Premium subscriptions allow users to access additional features such as ad-free playback, offline listening, and better sound quality.

Spotify's main service is music streaming, and users can access a catalog of more than 70 million songs via the official app or web browser. This platform has enabled the transition from traditional CD sales and digital downloads to a model based on the number of streams. Artists on Spotify earn money based on the popularity, or the number of times their songs are listened to (Barhoum et al., 2018, p. 7). Spotify has revolutionized the way people consume music. While it used to be necessary to buy an album or an individual song, streaming technology allows playback without downloading files. „The number of songs streamed by online users in the United States increased by 50% between 2013 and 2014, while the volume of paid downloads fell by 13% in the same period" " points out Bouillot (2017, p. 7). In addition to music, Spotify has expanded its offering since 2015 to include podcasts, music videos, and even selected content from television programs, in collaboration with partners such as the BBC, Vice, and MTV. This diversity of content reflects the platform's long-term ambitions to attract a wider audience and further expand its subscriber base. Podcasts are particularly popular because they offer a variety of formats, topics, and levels of formality, allowing listeners a personalized experience (Clifton et al., 2020).

Personalization is a key strength of Spotify. Algorithms tailor recommendations to users based on their listening history and preferences. For example, the music curation feature automatically generates playlists that combine similar songs and artists, creating a seamless listening experience (Werner, 2020). In addition, users can create their own playlists and share them with friends via social networks, further promoting connectivity and interaction. To further enhance the user experience, Spotify invests significant resources in data analysis, artificial intelligence, and machine learning. These tools allow for detailed monitoring of user trends and preferences, keeping the platform competitive with major competitors such as Apple, Amazon, and Google (Sharma, 2021). Data analysis also helps develop new features and adjust services, ensuring long-term user loyalty. Spotify, with its innovations, has redefined the music industry. It has provided users with access to a vast catalog of music quickly and easily, while offering artists a new platform for distribution and monetization. Its success lies in its ability to adapt to market needs and technology, leaving a profound mark on the way we listen to and experience music.

4. RESEARCH METHODOLOGY

The subject of this research is the analysis of the role of the streaming platform Spotify in the transformation of the music industry, with a special focus on user habits, preferences and experiences. The research aimed to provide a comprehensive insight into how Spotify influences the music industry by adapting to user needs and expectations, and how its functionalities and marketing strategies contribute to its popularity and growth. Based on the results obtained, the research will offer guidelines for the future development and improvement of the platform, as well as for a better understanding of the dynamics of the digital music industry.

4.1. Objectives, Research Questions and Hypotheses

The main objective of the research was to investigate the role of the streaming platform Spotify in the transformation of the music industry, while the specific objectives were: to analyze the use of Spotify; to determine the perception of the diversity of the music catalog by users; to explain the concept of premium services; to investigate the use of other streaming platforms by users; to examine the ways of discovering new music; to investigate and describe the format of the audio content used. In accordance with the above, the following research questions were asked: How often do users use Spotify and which functions do they consider the most useful? How do users perceive the diversity of the music catalog on Spotify? What are the users' experiences with the Premium service? What other platforms do users use to discover new music and why do they prefer Spotify? What format of audio content do users most often consume and which features of the Spotify platform do they consider the most important compared to other music streaming services?

Based on the set goals and research questions, the following hypotheses were defined:

1. Users regularly use Spotify, with a high level of integration into their lives, and personalized recommendations are a key feature that attracts and retains users.
2. Songs are the most frequently consumed format, and personalized recommendations make Spotify more competitive than other music services.
3. Switching to the Premium service is motivated by disruptive advertising, and algorithm improvements are key to further improving the user experience.

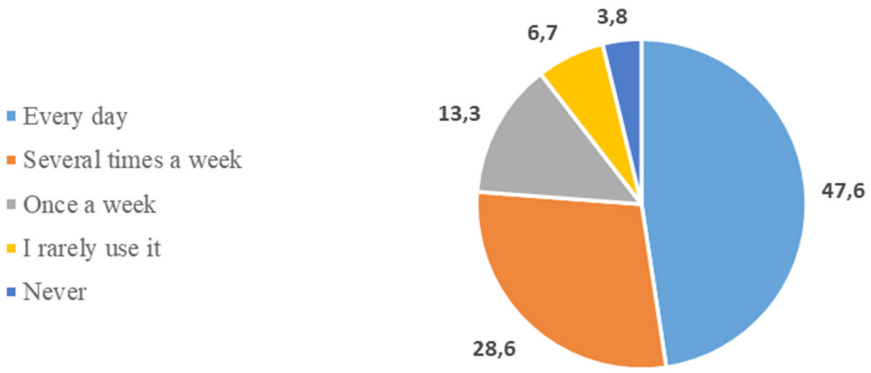
4.2. Method and Sample

For the purposes of this paper, a quantitative methodology was used, specifically the online survey method. The survey contained 12 questions related to various aspects of using the Spotify platform, according to a previously defined set of questions. The target population was Spotify platform users, and the research was conducted on a purposive sample of 105 respondents from July 11 to 25, 2024. The survey was created and conducted using the Google Forms platform, which enabled easy asking of questions, collecting responses, and their analysis. Invitations to participate in the survey were distributed via social networks (Facebook, Instagram) and the WhatsApp messaging application. In this way, the diversity of the sample was ensured with regard to the following indicators: gender, age, musical preferences, and regional affiliation of the respondents.

4.3. Discussion and Research Results

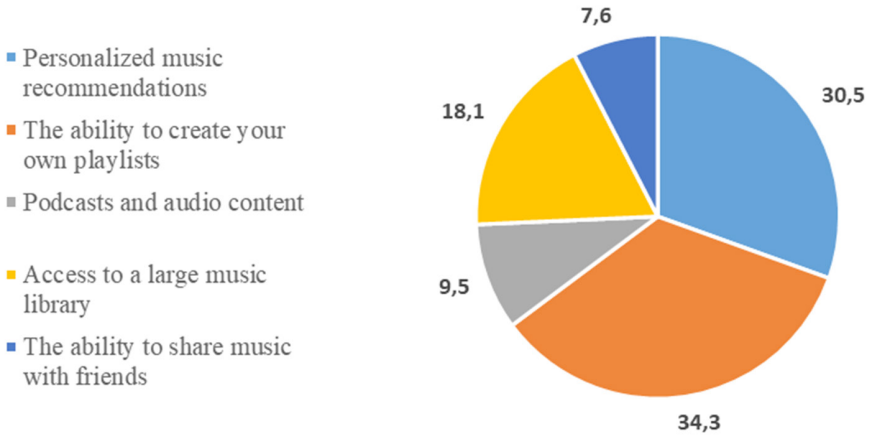
The results confirm that most users use Spotify daily or several times a week, which indicates a high level of integration of the platform into their lives. The frequency of use suggests that users recognize the value of the offered content and functionality. Although personalized music recommendations were not rated as the most useful feature – users more often emphasized the importance of creating their own playlists. These features emphasize the role of algorithms in attracting users, retaining their attention and strengthening their loyalty to the platform.

Songs confirmed their dominance as the main format of consumed content, which emphasizes the focus of users on the basic functionality of the platform – listening to music. Personalized recommendations, together with a rich and diverse catalog, further strengthen Spotify's competitive advantage over other music services. Users particularly appreciate the possibility of discovering new music tailored to their tastes, which the algorithmic recommendation system effectively enables.



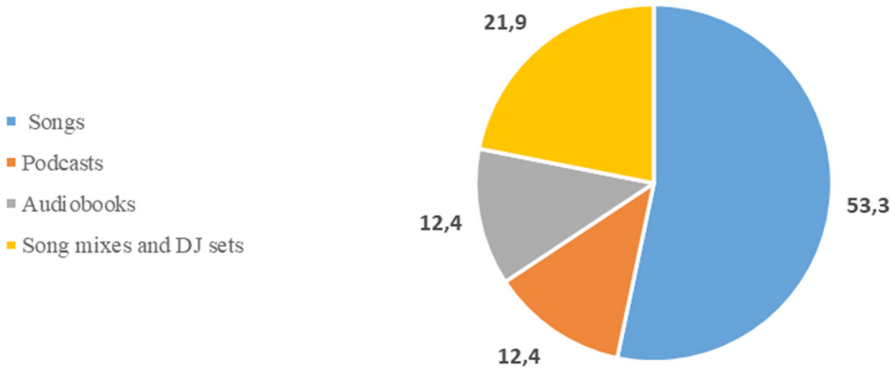
Graph 1. How often do you use the Spotify streaming platform?

Source: Own research



Graph 2. Which feature of the Spotify platform do you find most useful?

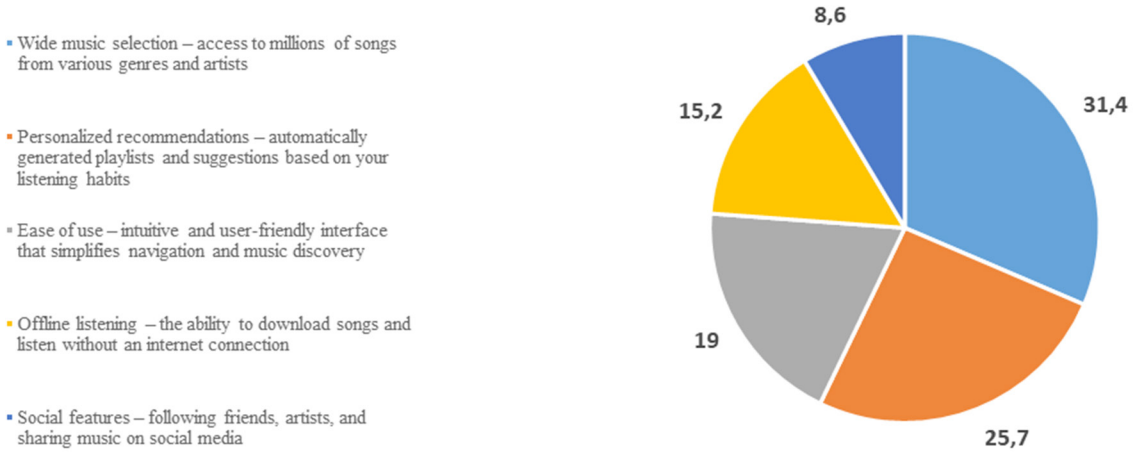
Source: Own research



Graph 3. What type of audio content do you consume most often on Spotify?

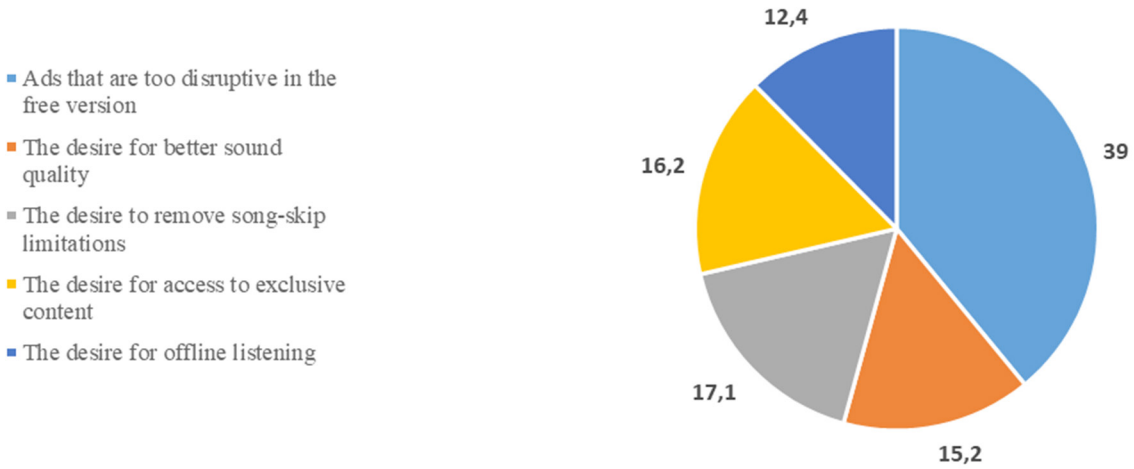
Source: Own research

Ads that interrupt the music experience are highlighted as the main reason for switching to the Premium service, which confirms users' need for an uninterrupted listening experience. This is an important indicator for further directing Spotify's marketing strategies towards emphasizing the advantages of the Premium service. At the same time, users believe that further improvements to recommendation algorithms would further increase their satisfaction with the platform. This feedback points to the need for continued development of personalization features to remain competitive and meet increasingly demanding user standards.



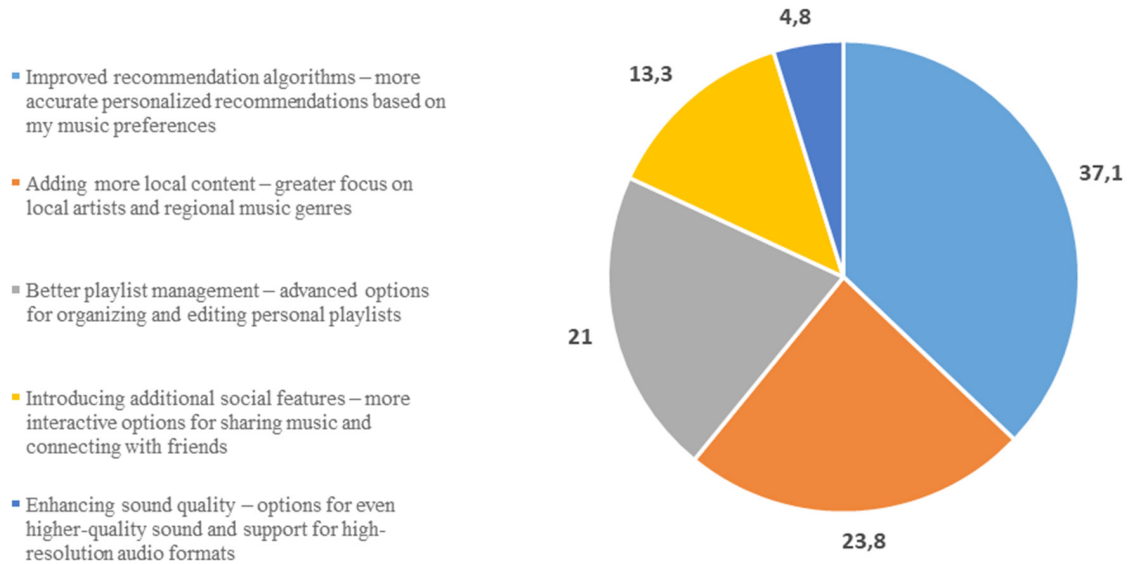
Graph 4. What are the main reasons you use Spotify?

Source: Own research



Graph 5. What motivates you most to switch to Spotify Premium?

Source: Own research



Graph 6. How do you think Spotify could further improve to better meet your needs?

Source: Own research

5. FUTURE RESEARCH DIRECTIONS

This topic served as a basis for analyzing the function of streaming platforms in the music sector and opened several questions for further analysis. Future works could focus on different areas, such as a comparative analysis of platforms such as Spotify and Apple Music; the impact of algorithms on musical taste; the promotion of local artists in relation to global trends – the list is currently endless with current topics. Future research could include interviews as a qualitative method with musicians, which would provide insight into some of the challenges and perspectives in this digital age. These directions will enrich the existing knowledge base and provide the music industry with expanded knowledge and the development of strategies for adapting the music industry in a dynamic digital environment.

6. CONCLUSION

The music industry has been transformed, and users' habits in consuming music content have changed due to the digital technology revolution, which itself became possible through the infrastructure of the internet and its applications. The research results indicate that Spotify is at the center of these transformations as it is one of the most influential streaming platforms. The platform allows artists to directly reach their audience to market and promote their music at significantly low distribution costs and on a global scale, while offering users a customized, flexible and intuitive listening experience. The intense level of engagement of the respondents, especially their daily use of the platform, indicates that the music industry has adopted the paradigm of always and instantly available content. Personalized playlists and recommendations create a feedback loop that strengthens the connection between the user and the platform and improves the user experience. This creates new market dynamics that require continuous refinement of algorithmic systems and adaptation of business models of artists, labels and intermediary services. Despite the well-documented advantages of digital streaming models, the results also identify a number of shortcomings. The required quality of user experience encourages the search for premium models, and also raises the question of how sustainable the income for artists will be in the long term, especially for those outside the mainstream music scene. Disagreements in revenue and distribution models and ethical issues related to the analysis of user data represent research opportunities that should be addressed. This analysis confirms that the further growth and impact of streaming services depend on their adaptability to the needs of different stakeholders, from users with more diverse musical preferences to artists who want to optimize the visibility and monetization of their content. Therefore, further research, especially in administering comparative studies of different services and algorithmic mechanisms in depth, will provide interesting insights into the development of the digital music industry, as well as the challenges and opportunities that lie ahead.

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The Trust Factor: Youth Perspectives on AI Tools for Cyberbullying Prevention

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Abstract: *In recent years, the rapid growth of digital technology has significantly influenced the lives of younger generations, particularly Generation Z. The study presented in this paper explicitly targets youth aged 15 to 18—an age group situated between adolescence and early adulthood. The authors employed a multiple linear regression model to explore the factors influencing youth trust in AI tools for cyberbullying prevention. The data for the variables were gathered using a structured questionnaire comprising seven questions. By focusing on this demographic, the authors aimed to capture authentic insights into how the younger generation perceives AI tools designed to protect them in online environments.*

1. INTRODUCTION

Thanks to the rapid advancement of new technologies, increasingly driven by artificial intelligence, the world has dramatically changed in the last two decades of this century. Information highways are driving economic progress in all countries. In such a turbulent environment, the most challenging task of all, which is to grow up into healthy individuals, is faced by generations that have grown up with new technologies because they are caught between new and old technologies and in undefined social systems that do not regularly follow the rapid development of new technologies.

In recent years, the rapid growth of digital technology has significantly influenced the lives of younger generations, particularly Generation Z (born between 1997 and 2012). As the first cohort to grow up with widespread access to smartphones, social media and other digital communication platforms, Generation Z has become highly engaged with the online world from an early age. Consequently, they are both the primary users and the most vulnerable targets of emerging online risks, such as cyberbullying. Research underscores that AI is increasingly being utilized to combat these challenges. For example, AI systems have been implemented to detect hate speech and foster online environments where harmful behaviors are mitigated (Emonds & Kaballo, 2024; Stahle, 2023).

The study presented in this paper explicitly targets youth aged 15 to 18—an age group situated between adolescence and early adulthood. This developmental phase is crucial for forming social relationships and self-identity, making young people particularly sensitive to peer interactions and digital influence. Because of their heightened involvement in online spaces, this age group often navigates a complex social landscape where both positive and negative interactions can have lasting impacts. Negative experiences, such as cyberbullying, can lead to significant emotional and psychological consequences, including anxiety, depression and a decline in academic

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performance. Addressing these risks with effective interventions is a critical need. Generation Z's unique position as digital natives makes them a pivotal group for understanding the efficacy and acceptance of such interventions. Negative online encounters, including cyberbullying, often lead to serious emotional and psychological challenges, such as anxiety, depression, and diminished academic performance (Vyawahare et al., 2024). This underscores the critical need for effective interventions to address these risks.

Additionally, recent findings show that bullying and cyberbullying are significantly associated with the inappropriate use of digital technologies, including excessive time spent on the internet, mobile phones, and video games—factors that may not only increase exposure to harmful interactions but also reflect deeper issues related to digital self-regulation (Moral-García et al., 2025).

Furthermore, bullying and cyberbullying have been empirically linked to a significant decline in the use of cognitive and metacognitive learning strategies among adolescents, indicating that these experiences not only harm emotional well-being but also impair essential academic skills and self-regulated learning capacities (Solas-Martínez et al., 2025).

By focusing on this demographic, we aimed to capture authentic insights into how the younger generation perceives AI tools designed to protect them in online environments. Studies highlight that advanced deep learning techniques and machine learning algorithms can effectively detect and mitigate cyberbullying on social media platforms (Litty et al., 2024; Arif, 2021).

As Chandrasekaran et al. (2021) point out, AI-based systems are evolving beyond reactive mechanisms and increasingly adopting proactive strategies that involve real-time detection and context-aware interventions, which are crucial for minimizing harm and enhancing user safety in dynamic online environments.

A particularly promising direction is the development of AI-driven systems that not only detect cyberbullying but also assess its severity based on user-specific contexts and provide interpretable outputs—allowing more tailored, transparent, and effective responses to individual cases of abuse (Prama et al., 2025).

However, these tools must be designed to resonate with young users, prioritizing transparency, accessibility and ethical considerations to foster trust and engagement.

Damiano and Franks (2023) emphasize that ethical implementation of AI in cyberbullying detection must balance safety with users' rights to privacy and autonomy, advocating for systems that are not only effective but also respectful of personal data and digital dignity.

In this regard, it is essential to recognize that youth are increasingly concerned about how AI systems access and use their personal data, demanding greater transparency, control, and explainability in digital interactions. A growing body of research shows that young people expect AI to not only protect them but to do so in ways that respect their privacy expectations and agency (Shrestha et al., 2024).

Understanding their perspectives is essential because their trust and acceptance of these tools will significantly shape the success of AI-driven solutions and future development in combating cyberbullying. Young users who lack confidence in AI-based systems or feel misunderstood by these tools may be less likely to engage with or benefit from them. Thus, evaluating their attitudes

can provide crucial feedback for improving AI systems' design, transparency, and ethical considerations. Moreover, fostering conversational courtesy through AI systems has been shown to reduce online harassment and improve user experiences (Stahle, 2023). Similarly, AI-driven solutions are being tailored to combat hate speech, illustrating their potential in creating safer and more inclusive online spaces (Emonds & Kaballo, 2024).

2. METHODOLOGY

The authors employed a multiple linear regression model to explore the factors influencing youth trust in AI tools for cyberbullying prevention. This model's dependent variable (**Y**) was the participants' degree of trust in these AI tools. We selected three independent variables to serve as predictors of this trust:

X1: Prior experience with cyberbullying and its intensity. This variable was designed to capture whether the respondents had been exposed to cyberbullying as victims and the extent of their experiences.

X2: The level of general knowledge of AI tools and trust in their efficiency. This variable measured the participants' familiarity with AI applications and their confidence in AI's ability to perform its intended functions effectively.

X3: The level of trust in AI tools to help with cyberbullying, including concerns such as privacy, efficiency, and data misuse. This variable gauged the participants' specific attitudes toward AI solutions for cyberbullying and any apprehensions they might have regarding the ethical and practical aspects of using these tools.

The data for these variables were gathered using a structured questionnaire comprising seven questions. The first two questions addressed respondents' personal experiences with cyberbullying and its perceived intensity, forming the basis for variable X1. The following three questions assessed the respondents' general knowledge of AI and their trust in its capabilities, constituting variable X2. Finally, the last two questions focused on participants' specific trust in AI tools for managing cyberbullying scenarios and any concerns they had regarding these tools, contributing to the formation of variable X3.

By integrating these independent variables into our regression model, we aimed to identify the key determinants influencing young people's trust in AI tools for preventing and addressing cyberbullying. The use of multiple linear regressions allowed us to assess the relative impact of each factor on the overall level of trust, providing a comprehensive understanding of how prior experiences, knowledge, and specific attitudes shape youth perspectives on the role of AI in creating safer online environments.

3. QUESTIONNAIRE

The data for the analysis were collected through a structured questionnaire comprising seven questions. The 1st to 4th grade students from the School of Building and Crafts and the School of Economics and Commerce from Čakovec answered the questionnaire.

The questions were as follows:

1. Have you ever experienced cyberbullying? (Yes/No)
2. If yes, how frequently have you experienced cyberbullying? (Once/ A few times/ Often/ Very often/ Never)

The answers to these two questions were transformed into numerical values, which formed the basis for variable X1, addressing respondents' personal experiences with cyberbullying and its perceived intensity. The answers were numerically coded and aggregated or averaged into a single value per respondent, producing a quasi-continuous measure capturing both occurrence and intensity.

3. How would you rate your awareness of AI capabilities on a scale from 0 to 10? (0 = Not aware at all, 10 = Extremely aware),
4. Are you familiar with the following AI applications (click all that apply)? The answers were: Chatbots (e.g., customer service)/ Personalized learning systems (e.g., adaptive learning platforms)/ Automated grading systems/ None of the above,
5. How effective do you think AI is in the previous applications on a scale from 0 to 10? (0 = Not effective at all, 10 = Extremely effective).

The answers to question 4 were transformed into numerical values, while the answers to questions 3 and 5 were normalized. These three questions formed the basis for variable X2, which assessed the respondents' general knowledge of AI and their trust in its capabilities. The answers were normalized by min-max scaling or z-scores and combined, yielding a continuous composite score of knowledge and general trust in AI.

6. On a scale from 0 to 10, how much do you trust AI tools to prevent cyberbullying? (0 = No trust at all, 10 = Complete trust)
7. What are your main concerns about using AI tools to prevent cyberbullying? (Select all that apply) The answers were: Privacy concerns/ Effectiveness/ Misuse of data/ Lack of human oversight/ Other/ None of the above

The answers to question 7 were transformed into numerical values, while answers to question 6 were normalized. Similar to X2, these values were normalized and combined into a continuous variable representing specific trust and perceived risk of AI tools in the context of cyberbullying.

Although some original questionnaire items were ordinal or categorical, all predictor variables (X1, X2, X3) were numerically coded and transformed into continuous-scale indices. These transformations enabled the use of multiple linear regression without violating its assumptions. Additionally, the dependent variable Y ("trust in AI to prevent cyberbullying") was measured on a 0–10 scale, already fulfilling the requirement of being continuous.

Initially, a pilot dataset of 45 responses was collected and used for:

- Model exploration,
- Training/testing split (30 for training, 15 for testing),
- Validation of regression structure and logic,
- Early R analysis and hypothesis testing.

Subsequently, we collected the full dataset of 145 responses, which served as the basis for the final model and are reported in the main results.

This final model, built using the complete dataset of 145 students aged 15–18, was used to derive the regression coefficients.

4. ANALYSIS AND RESULTS

The research implemented a multiple linear regression model to investigate the factors shaping youth trust in AI tools designed for cyberbullying prevention. This model's dependent variable (Y) represented the level of trust participants placed in these tools. Three independent variables were identified as predictors of this trust:

- X1: Prior experience with cyberbullying and its intensity
- X2: General knowledge of AI tools and trust in their efficiency
- X3: Trust in AI tools for addressing cyberbullying, including related concerns

The implemented model was as follows:

$$Y = a_1 \cdot X_1 + a_2 \cdot X_2 + a_3 \cdot X_3$$

It was assumed that the intercept a0 was equal to 0, i.e., $a_0 = 0$.

The hypotheses for the model and coefficients were the following:

Overall Model Significance:

H_0: $a_1 = a_2 = a_3 = 0$ (The model explains no variance in Y)

H_1: At least one $a > 0$ (The model explains some variance in Y)

Individual Variable Significance:

For X_1:

H_0: $a_1 = 0$ (X_1 has no effect on Y)

H_1: $a_1 > 0$ (X_1 has a positive effect on Y)

For X_2:

H_0: $a_2 = 0$ (X_2 has no effect on Y)

H_1: $a_2 > 0$ (X_2 has a positive effect on Y)

For X_3:

H_0: $a_3 = 0$ (X_3 has no effect on Y)

H_1: $a_3 > 0$ (X_3 has a positive effect on Y)

The starting data were obtained from the authors' responses to the questionnaire, which totaled 45 answers. The data was further split into 30 samples of training data and 15 samples of test data.

The analysis was performed using R. Figure 1 shows the results from R for the training data.

From the analysis of training data, the obtained coefficients were a1 = 0.9125, a2 = 1.2245, a3 = 0.9202, with model parameters $R^2 = 0.9733$ (Adjusted $R^2 = 0.9703$) and p-value < 2.2e-16 indicating strong predictive power.

All null hypotheses were rejected, and the training data confirmed that independent variables have a positive effect on dependent variable Y.

Figure 2 shows the results from R for the test data.

The obtained coefficients from the analysis of test data were a1 = 0.8446, a2 = 0.2837, and a3 = 1.7969. The model parameters $R^2 = 0.9878$ (Adjusted $R^2 = 0.9847$) and p-value 9.741 e-12 indicated strong predictive power.

All null hypotheses were rejected, and the test data confirmed that independent variables positively affect dependent variable Y.

```
> Y_lin_model_train <- lm(formula = Y~0+X1+X2+X3, data = Variables_train)
> summary(Y_lin_model_train)

Call:
lm(formula = Y ~ 0 + X1 + X2 + X3, data = Variables_train)

Residuals:
     Min       1Q   Median       3Q      Max
-0.50723 -0.19296 -0.01722  0.26779  0.48335

Coefficients:
   Estimate Std. Error t value Pr(>|t|)
X1   0.9125     0.1571   5.808 3.51e-06 ***
X2   1.2245     0.3535   3.464  0.00179 **
X3   0.9202     0.3146   2.925  0.00690 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2936 on 27 degrees of freedom
Multiple R-squared:  0.9733,    Adjusted R-squared:  0.9703
F-statistic: 327.5 on 3 and 27 DF,  p-value: < 2.2e-16
```

Figure 1. The R analysis of training data

Source: Own research

```
> Y_lin_model_test <- lm(formula = Y~0+X1+X2+X3, data = Variables_test)
> summary(Y_lin_model_test)

Call:
lm(formula = Y ~ 0 + X1 + X2 + X3, data = Variables_test)

Residuals:
    Min      1Q  Median      3Q     Max
-0.4303 -0.1178  0.1308  0.1654  0.2711

Coefficients:
   Estimate Std. Error t value Pr(>|t|)
X1   0.8446     0.1687   5.008 0.000305 ***
X2   0.2837     0.6633   0.428 0.676413
X3   1.7969     0.6394   2.810 0.015743 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2279 on 12 degrees of freedom
Multiple R-squared:  0.9878,    Adjusted R-squared:  0.9847
F-statistic: 323.2 on 3 and 12 DF,  p-value: 9.741e-12
```

Figure 2. The R analysis of test data

Source: Own research

The actual data were obtained from the students' responses to the questionnaire, totaling 145 answers.

Figure 3 shows the results from R for the actual data.

The obtained coefficients from the actual data analysis were a1 = 0.9099, a2 = 1.0961, and a3 = 1.0263. The model parameters $R^2 = 0.9779$ (Adjusted $R^2 = 0.9764$) and p-value < 2.2e-16 indicated strong predictive power.

All null h ypotheses were rejected, and the actual data confirmed that independent variables positively affect dependent variable Y.

```
> Y_lin_model <- lm(formula = Y~0+X1+X2+X3, data = Variables_quest)
> summary(Y_lin_model)

Call:
lm(formula = Y ~ 0 + X1 + X2 + X3, data = Variables_quest)

Residuals:
    Min      1Q  Median      3Q     Max
-0.4833 -0.1895  0.0076  0.2085  0.5017

Coefficients:
   Estimate Std. Error t value Pr(>|t|)
X1   0.9099     0.1151   7.903 7.65e-10 ***
X2   1.0961     0.2939   3.730 0.000569 ***
X3   1.0263     0.2689   3.816 0.000439 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2692 on 42 degrees of freedom
Multiple R-squared:  0.9779,    Adjusted R-squared:  0.9764
F-statistic: 620.7 on 3 and 42 DF,  p-value: < 2.2e-16
```

Figure 3. The R analysis of actual data

Source: Own research

Figures 4 to 6 show dependence of Y from the last model on individual variables.

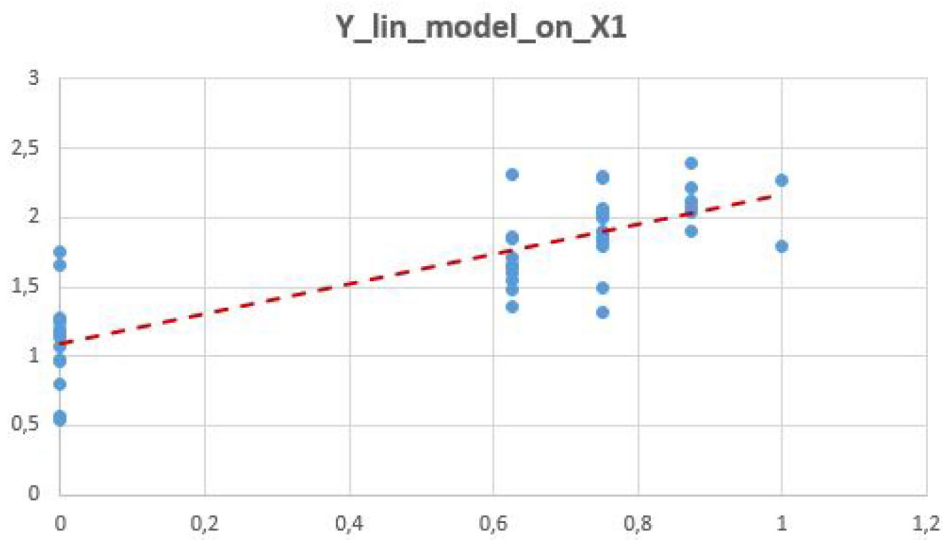

Figure 4. The dependence of Y on variable X1

Source: Own research

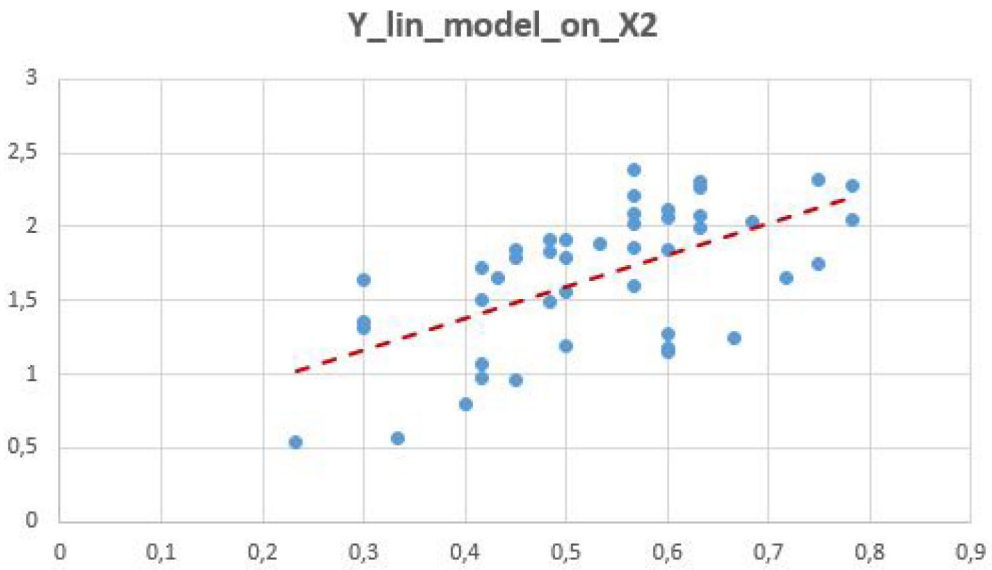

Figure 5. The dependence of Y on variable X2
Source: Own research

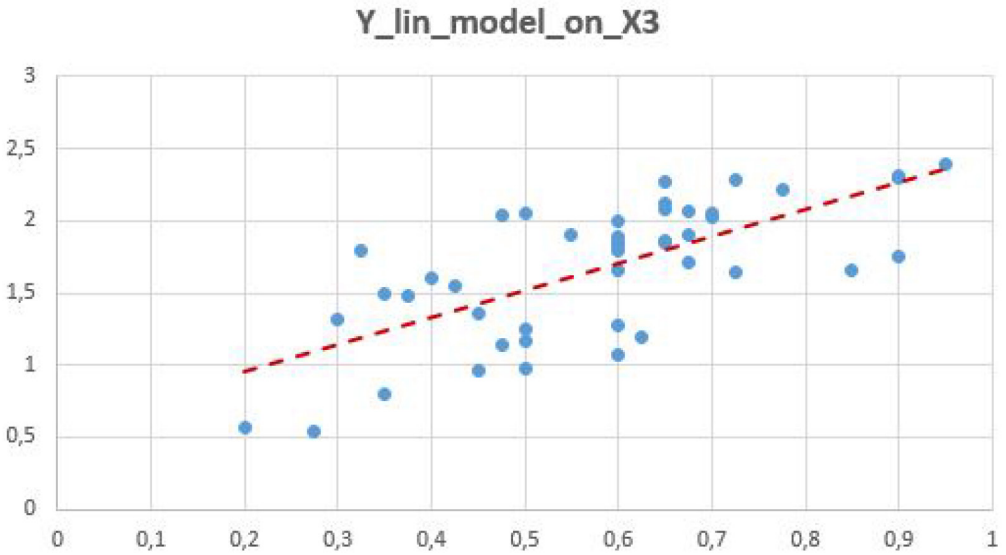

Figure 6. The dependence of Y on variable X3
Source: Own research

By integrating these independent variables into the regression model, the authors aimed to identify the key determinants influencing young people's trust in AI tools for preventing and addressing cyberbullying.

The use of multiple linear regressions allowed us to assess the relative impact of each factor on the overall level of trust, providing a comprehensive understanding of how prior experiences, knowledge, and specific attitudes shape youth perspectives on the role of AI in creating safer online environments.

Findings indicate that students who have experienced cyberbullying, possess a higher awareness of AI capabilities, and perceive AI as effective in other contexts and in cyberbullying prevention are more likely to trust AI tools designed to prevent and protect from cyberbullying.

5. CONCLUSION

AI tools hold a significant potential to enhance online safety, particularly in mitigating cyberbullying, but their success depends heavily on user trust and acceptance. The effectiveness of these tools hinges on several critical factors, including transparency, ethical implementation and the integration of human oversight. While AI systems can provide rapid responses and insights, they must be designed to accurately interpret context and minimize errors, especially in sensitive social interactions. Data collection and usage transparency are vital to foster trust, as users need assurance that their privacy and rights are protected. A robust solution must balance safety and freedom of expression, ensuring that technological interventions do not compromise fundamental online liberties.

The study presented in this paper specifically focuses on youth aged 15 to 18—a demographic uniquely positioned at the intersection of adolescence and early adulthood. This developmental stage is crucial for forming social relationships and self-identity, making individuals in this group particularly attuned to peer interactions and digital influence. As digital natives, Generation Z has a heightened presence in online spaces, often navigating a complex landscape where positive and negative interactions can have profound and lasting effects. Addressing the risks with practical, trustworthy interventions is a pressing need.

Focusing on this demographic provides valuable insights into how younger generations perceive and engage with AI tools designed for their protection. Their trust and acceptance of these tools are pivotal for their successful implementation. Without confidence in AI systems or a sense of being understood by them, young users may disengage or fail to derive meaningful benefits from these interventions. Understanding their attitudes allows for the refinement of AI tools to enhance design, transparency, and ethical considerations. Furthermore, as Generation Z continues to shape digital trends and societal norms, their perspectives on AI will influence the broader adoption of these technologies and their role in fostering safe and inclusive online environments.

By targeting this age group, the study not only explores the effectiveness of AI tools in combating cyberbullying but also provides a foundation for future developments in creating technology that aligns with its users' needs and values. Collaboration between technological solutions and human oversight remains essential to ensure that interventions are not only efficient but also empathetic and inclusive, thereby fostering a safer digital world for all.

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Building the Image of a Tourist Destination Through Digital Innovative Solutions

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Abstract: *In today's digital era, the tourism industry has undergone a profound transformation, with rapid advances in technology revolutionizing the way destinations are marketed, experiences are created, and tourists engage with the destination. The proliferation of interactive digital platforms and solutions has allowed consumers to better understand and engage with the destination they are visiting.*

This paper aims to present digital innovations that have an impact on shaping the image of a destination. To achieve this aim, the characteristics of a destination image and the main digital innovations that could be included in creating its positive image are outlined. As a result, effective digital marketing solutions are proposed to be used to build a positive image.

1. INTRODUCTION

Destination image plays a crucial role in influencing the decision-making process of potential tourists. Destinations that are able to cultivate a positive and distinctive image are more likely to attract visitors and encourage repeat visits.

Traditional methods of promoting a destination through advertising and media have been transformed by the rise of digital platforms, which have become a dominant force in shaping the image of a destination. The image of a tourist destination is now largely shaped and influenced by information and experiences shared on various digital platforms, such as social media, travel review sites and online forums. These digital channels have enabled tourists to actively participate in the co-creation of the destination image, sharing their personal experiences, perceptions and recommendations with a wide audience. As a result, the destination image has become more dynamic, interactive and responsive to the changing preferences and demands of modern travelers. Digital transformation has enabled destinations to leverage innovative technologies and engage with tourists in new and more effective ways, allowing them to continuously refine and enhance their brand image and positioning. By fostering a collaborative ecosystem with key stakeholders, destinations can develop a comprehensive digital marketing strategy that effectively communicates their unique offerings and creates a lasting impression on potential visitors.

The purpose of this paper is to present digital innovations that have shaped the image of the destination. To achieve this goal, the characteristics of the destination image and the main digital innovations that could be included in the creation of its positive image are outlined.

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2. THEORETICAL VIEWS ON DESTINATION IMAGE

Each country endeavors to cultivate and manage its public perception. The nation‘s brand is built upon the strategic governance of the image by which it aims to be recognized among other countries and populations.

When individuals, including tourists, choose a country to visit, they do not get to know the whole nation but rather engage with its discrete elements - tourist attractions, culture, history, and so forth. Tourists explore specific territories - cities, resorts, unique sites, and events - and lack the opportunity to fully immerse themselves in all that the country and its people offer. Consequently, the associations they form with the nation are shaped by the image constructed through their interactions with its components.

Tourism marketing at the national and regional levels, as a form of non-profit place-based marketing, primarily focuses on the formation and development of a positive image of the tourist destination. The favorable image of the tourist destination is an indispensable prerequisite for shaping a positive perception among prospective consumers - tourists. The destination‘s image, as outlined in the mind of the consumer, is a key factor determining the specificity and certainty of their travel decision-making (Nguyen et al., 2023).

According to certain scholars, the image of a tourist destination is a set of emotional and rational ideas that arise from a comparison of various destination advertisements, the experiences gained by tourists, and the impressions shared among them, all of which influence the creation of a unique image (Kiráľová & Pavlíčeka, 2015). These factors enable the immediate formation of a chain of associations linked to the destination upon its mention. The positive image of the tourist destination is an essential, fundamental prerequisite for establishing an appealing image of the destination in the minds of prospective tourists. Four key external factors can be proposed as having a significant impact on the image of the tourist destination (Pavlić et al., 2020):

- the overall image or reputation of the destination and its territory;
- external, uncontrollable influences;
- the communication policy of the destination towards the target market;
- the criteria, fashion trends, and preferences of potential tourists from the target markets.

Consumers rely on the established image of the tourist destination before deciding to visit it, which conveys importance in choosing the distinctive attributes, unique resources and exceptional experiences that distinguish it from other options. When a tourist considers their trip, the question „which destination should I choose?“ arises, and then the strong image of the destination plays a crucial role in answering this question. This image should be a set of emotional and rational advantages formed through a comparison of the characteristics of various offerings, the consumer‘s accumulated personal experiences, and the information received through communication channels.

The consumer‘s perception of a tourist destination is intrinsically linked to its overall image, encompassing socioeconomic, business, political, legal, and investment-related aspects. The image of a tourist destination is influenced by a multitude of positive and negative external factors (Ilieva, 2023, p. 155).

Negative external factors, such as conflicts, terrorism, epidemics, crime, and political and economic instability, can significantly impact the image of a tourist destination. These factors are often difficult to predict and control, yet their influence can be detrimental, affecting not only the development of tourism but also other economic activities in the region.

To change the perceptions of tourists, it is crucial to build a completely new and impressive brand through an active communication policy, innovative approaches, and the strategic combination of modern marketing and branding tools. This endeavor requires large investments and a dedicated personal attitude from specialists.

Conversely, positive external factors, such as the achievements of famous personalities associated with the destination, unpredictable events and phenomena, and the social development of the territory, can also have a beneficial impact on the destination‘s image. These favorable factors complement the construction of a positive image without necessitating substantial financial investments, as they are often the result of the aspirations and efforts of other industries or spheres of activity, indirectly influencing tourism development.

Theoretically, two primary types of tourist destination images are recognized: organic and constructed. The organic image is the perception formed by consumers, influenced by various physical factors. The natural image of the destination depends on its popularity, resources, and significance for a given market segment. The constructed image of the tourist destination is developed by commercial enterprises and tourism administrations through the implementation of targeted strategies and communication policies aimed at target markets.

Several existing destination image categories are identified (Ilieva, 2023, p. 156):

- Positive image: Examples are cities such as Venice, Singapore, and St. Petersburg, which are associated in consumers‘ minds with advantages like architectural heritage, financial stability, rich history, and high cultural level. This image does not require major changes but should be reinforced, with the message directed to diverse target market segments.
- Weakly expressed image: The destination may be relatively unknown to target consumers due to factors such as limited geographic scope, lack of competitive advantages, insufficient advertising, and the reluctance of the local population and tourism sector to attract and retain consumer interest.
- Overly traditional image: This image is based on long-standing, conservative traditions that have become rigid over time, preventing the construction of a new, modern, dynamic image. Maintaining a traditional image is not inherently negative, but the message will only resonate with a specific consumer group and may not cover all market segments.
- Contradictory image: Many destinations have both advantages and disadvantages, such as an unfavorable environment, pollution, traffic, crime, and unfriendly local population, leading to a conflicted perception.
- Combined image: This can be defined as a contradictory image, combining both positive and negative associations.
- Negative image: Some destinations, such as Detroit, Colombia, Lebanon, and Bangladesh, are associated with negative attributes like crime, drug trafficking, civil unrest, and poverty.
- Extremely attractive image: Destinations that have built and maintained a highly appealing image for visitors may resort to strict measures and systems to regulate and control tourist flows, as excessive, uncontrolled visits can have a detrimental impact.

The primary goal of image management is to build a specific and memorable image of the destination in the minds of tourists. This involves the creation, development, and dissemination of appropriate, controlled information that affects the emotional, psychological, and social levels of consumers, ensuring public recognition of the positive image of the territory.

Communication activities are the leading tools for creating the image of a tourist destination, as they guarantee transparency not only for residents but also for external visitors - tourists. These

activities allow for acquaintance with the territory and the establishment of contact with it, enabling consumers to not only trust the information about the benefits and goods of the territory but also to personally experience them.

To build a strong, positive, and memorable image of a tourist destination, it is crucial to utilize digital and innovative solutions that effectively convey the unique characteristics of the territory to potential visitors.

3. APPLICATION OF DIGITAL INNOVATIVE SOLUTIONS TO BUILD THE DESTINATION IMAGE

Digital innovation refers to the transformative process of developing and implementing new digital technologies and solutions to create positive change. This concept is distinct from digital transformation, which focuses on adopting and integrating existing digital technologies to improve current processes, operations, and business models.

Digital transformation aims to improve efficiency, streamline workflows, and gain competitive advantage through the strategic application of established digital tools. For example, a company might implement a cloud-based customer relationship management system to streamline customer interactions and improve service delivery.

In contrast, digital innovation focuses on creating entirely new solutions, products, or business models by using digital technologies in innovative ways. This approach seeks to disrupt existing paradigms, develop groundbreaking solutions, and unlock new opportunities for growth and value creation. An example would be the development of a search platform for personalized travel products powered by AI algorithms, revolutionizing the way consumers discover new destinations. This type of digital innovation is crucial for tourist destinations that strive to build a strong, compelling and memorable image.

At its core, digital transformation entails optimizing current operations by leveraging existing digital technologies, whereas digital innovation concentrates on pioneering approaches to create novel solutions and shape the future. Both concepts are essential for destinations aiming to enhance their competitiveness, deliver exceptional visitor experiences, and cultivate a distinct, positive, and lasting brand image.

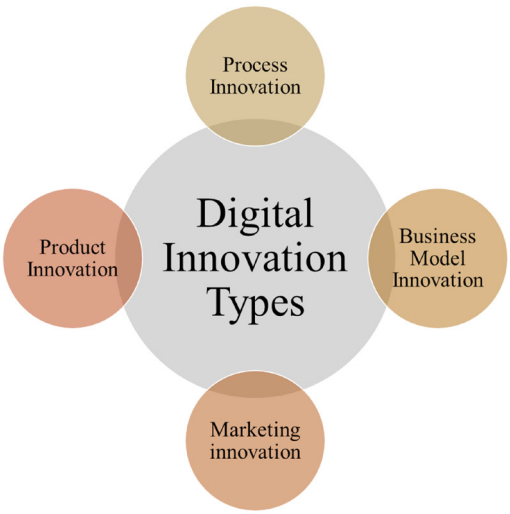

Figure 1. Digital Innovation Types
Source: Author illustration

Digital innovation can take many forms, each with the potential to disrupt and transform industries. As can be seen from Figure 1, the main types of digital innovation are (Ilieva, 2024; Ilieva et al., 2021, 2023; Ilieva & Todorova, 2023):

1. Product innovation – this approach involves creating entirely new products or significantly improving existing ones by applying digital technologies. For example, using AI as a tour guide or creating virtual reality simulations in tourist attractions
2. Process innovation – focuses on optimizing existing business processes by implementing digital tools and technologies to improve efficiency and effectiveness. For example, using robotic automation in restaurant service, using cloud-based collaboration platforms to streamline communication between tour operators and accommodations, and implementing blockchain technology to improve supply chain transparency.
3. Business model innovation – involves developing new business models by redefining the way businesses create, deliver and capture value through the inclusion of digital technologies. For example, the adoption of peer-to-peer accommodation platforms such as Airbnb.
4. Marketing innovation - involves the use of digital channels and technologies to reach new audiences, engage customers more effectively, and personalize marketing strategies. For example, using social media platforms for targeted advertising, using data analytics to personalize customer experiences, or implementing augmented reality technology to visualize historical facts in tourist attractions.

To promote the destination and shape its image, digital marketing innovations are of the greatest importance. Digital technologies and innovative solutions can significantly contribute to the development, promotion, and continuous enhancement of a positive, engaging, and memorable image of a tourist destination. By harnessing the power of digital innovations, destinations can effectively communicate their unique offerings, and showcase their attractions, cultural heritage, and experiences in a captivating and immersive manner, ultimately shaping a compelling brand identity that resonates with potential visitors.

The main areas for the application of digital marketing innovations are found in (Li et al., 2023; Ilieva, 2024):

Integrated digital marketing strategies: Destination marketing organizations and tourism enterprises should adopt comprehensive digital marketing strategies that integrate various digital channels and platforms to effectively reach and engage with their target audiences. This includes the strategic use of social media, search engine optimization, content marketing, email marketing, and mobile marketing to create a cohesive, impactful, and multi-faceted digital presence for the destination. By leveraging a diverse range of digital touchpoints, destination marketers can amplify their messaging, foster deeper connections with potential visitors, and ultimately shape a more compelling and memorable image of the destination.

Virtual and augmented reality experiences: Immersive technologies such as virtual reality and augmented reality can be leveraged to provide potential visitors with a unique and engaging preview of the destination. These technologies allow tourists to virtually explore the destination, experience its attractions, and gain a more vivid understanding of the destination‘s offerings, which can positively influence their image and perception of the place. By offering immersive virtual tours and augmented reality experiences, destinations can transport potential visitors to the heart of the destination, allowing them to interact with and experience the location‘s iconic landmarks, cultural heritage, and natural wonders. This helps to create a lasting impression and a deeper emotional connection with the destination, ultimately shaping a more positive and memorable image in the minds of the visitors.

The use of digital technologies can also help strengthen the image of a destination by highlighting its unique cultural and artisanal heritage. For example, the use of digital platforms to showcase local craftsmanship, traditional art forms, and cultural experiences can enhance the destination's authenticity and distinctiveness, contributing to the formation of a positive and memorable image.

Destination-specific mobile applications: Developing and promoting destination-specific mobile applications can significantly enhance the visitor experience and contribute to the formation of a positive, memorable image of the destination. These apps can provide users with real-time information, interactive maps, personalized recommendations, and seamless access to a wide range of tourism services, creating a more convenient, engaging, and enjoyable experience for visitors. By offering features like digital concierge services, augmented reality-powered navigation, and integrated booking capabilities, destination-specific mobile apps can empower visitors to better explore, navigate, and immerse themselves in the destination, fostering a stronger emotional connection and a more positive perception of the place.

The use of artificial intelligence and data analytics can also play a crucial role in building the image of a tourist destination. By analyzing user data, preferences, and behavior, destination marketing organizations can gain valuable insights to tailor their marketing strategies, identify target segments, and create personalized content that resonates with potential visitors, thereby enhancing the destination's appeal and image. Furthermore, the application of machine learning and predictive analytics can help destinations anticipate and respond to shifting market trends, enabling them to proactively adapt their strategies and maintain a strong, relevant, and compelling image in the minds of potential visitors.

The strategic application of digital innovative solutions can significantly contribute to the development, promotion, and continuous enhancement of a positive, memorable, and compelling image of a tourist destination. By harnessing the power of these digital technologies, destinations can effectively communicate their unique offerings, and showcase their attractions, cultural heritage, and experiences in a captivating and immersive manner, ultimately shaping a compelling brand identity that resonates with potential visitors and leaves a lasting impression in their minds.

4. FUTURE RESEARCH DIRECTIONS

Destinations need to adopt a holistic digital marketing approach to effectively build and communicate their brand image. This includes using a wide range of digital channels, such as social media, online advertising, influencer marketing and interactive content, to reach, engage and connect with potential visitors. By implementing a multi-faceted digital strategy that includes a variety of digital touchpoints, destinations can effectively showcase their unique offerings, encourage meaningful interactions and create a lasting impression with their target audience.

Destinations need to develop a robust digital marketing strategy that encompasses a diverse set of digital channels and platforms. This can include creating a strong social media presence, using targeted online advertising, collaborating with relevant influencers and creating engaging interactive content such as virtual tours, augmented reality experiences, and personalised digital concierge services.

To enhance the image of the tourist destination through digital marketing innovations, the following solutions can be proposed:

1. Optimizing the Destination Website: Search engine optimization involves enhancing the content, structure, and performance of the destination's website to improve its visibility in search

engine results pages. By optimizing the website for relevant keywords such as „cheap flights to Bulgaria," „mountain holidays," or „last minute deals," the destination's website is more likely to appear prominently in search results. This increased visibility can lead to higher website traffic and a greater chance of promoting the destination and attracting visitors.

2. Encouraging Local Tourism Organizations to Utilize Local SEO: Local SEO is an important digital marketing strategy for tourism businesses operating in specific locations. For instance, a hotel, tour operator, or travel agency can target travelers with relevant keywords like „restaurants near me," „best tours in Sofia," or „things to do in Vienna." This approach increases the chances of a local business appearing in search results when potential customers actively search for travel services in the destination. Local SEO involves optimizing the business's online profile, ensuring consistent information across platforms, and leveraging positive reviews to build trust with potential customers.
3. Creating Useful Blog Content: Providing informative blog content can help reach potential travelers during the planning stage of their next adventure. Travelers typically spend significant time consuming online content before booking, presenting an opportunity to showcase the destination compellingly. Relevant blog content may include travel tips, destination guides, seasonal travel ideas, trend-driven content, and client stories.
4. Producing Destination Video Content: Videos offer great potential for storytelling, bringing destinations to life and giving audiences a vivid sense of the experience. Destination-focused videos can highlight key attractions, popular itineraries, and travel hacks, and can be effectively shared on platforms like YouTube, Instagram, and TikTok to engage potential visitors.
5. TikTok Engagement: From 2021 to 2023, TikTok saw a significant 410% increase in viewership of travel-related content. Additionally, 71% of the platform's European users expressed a tendency to book a vacation based on recommendations they encountered on TikTok. According to a statement from the platform, the community is looking for content that ignites a passion for travel, showcasing unique destinations and experiences, recommendations and reviews. It is also worth noting that TikTok's audience reached a remarkable 1.92 billion users in 2023.
6. Leveraging Social Media Platforms: In addition to TikTok, other social media platforms, such as Instagram, Facebook, Twitter, and even LinkedIn, offer opportunities to connect with the target audience. Each platform presents unique avenues to engage with diverse audience segments and showcase the destination. Comprehending and adapting to social media algorithms is crucial, as consistent posting and regular interactions with followers can enhance visibility and promote content about the destination to a wider audience.
7. Influencer Collaborations: Influencer marketing is another effective digital strategy for building a positive brand image for the destination. Influencers are increasingly trusted by consumers when making travel decisions.
8. Fostering User-Generated Content: Initiating campaigns to increase user-generated content for the destination can be highly beneficial. UGC encompasses content such as photos, videos, opinions, and suggestions created by existing customers who have had positive experiences visiting the destination and its tourist attractions. This type of content is valuable due to its authenticity and ability to build trust with potential travelers.
9. Implementing Personalized Advertising: Personalized advertising campaigns can help establish a stronger connection with the target audience. This is achieved by tailoring destination-specific advertisements to the interests, behaviors, and preferences of individual users. For instance, sending targeted ads for a beach getaway to someone who has recently browsed beach vacation options is more likely to capture their attention. Personalized campaigns not only increase the chances of a destination visit but also foster a personal connection with the audience.

By adopting a holistic digital approach, destinations can effectively communicate their brand identity, highlight their distinctive features, and foster a stronger emotional connection with their target audience. Strategic use of these digital tools and technologies allows destinations to reach a broader and more diverse audience, fostering a more comprehensive and impactful destination branding strategy.

As the data suggests, strategic use of social media platforms can be particularly powerful in shaping a destination's image. Destinations can use these platforms to showcase their unique offerings, engage with visitors through interactive experiences, promote user-generated content, and foster a sense of community.

5. CONCLUSION

In the ever-evolving tourism landscape, the strategic use of digital innovative solutions has become crucial in building the image of a tourist destination. By leveraging a range of digital tools and platforms, destinations can create compelling and memorable experiences for visitors, fostering a positive and distinctive brand image that attracts more tourists and drives sustainable tourism growth. This approach enables destinations to effectively communicate their unique offerings, engage with potential visitors, and establish a strong emotional connection, ultimately shaping a more distinctive and impactful brand identity that resonates with their target audience. By integrating cutting-edge digital marketing innovations, destinations can further enhance their brand image by presenting it in an engaging and interactive way, so as to encourage tourists to explore the destination, both virtually and in person.

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Study of the Influence of Economic and Demographic Factors on Online Shopping for Tourism Products in the European Union

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Abstract: *This study presents conceptual views and statements on online shopping for tourist products and its dynamics and trends. Theoretical and empirical aspects of the development of this type of shopping carried out by European consumers are highlighted. The main objective of the study is to analyze and assess the state and specificity of the behavior of European consumers when shopping online for tourist products by significant economic and demographic factors, such as disposable income, gender, age, educational and employment status, and on this basis to deduce the emerging dependencies. Respondents to the study are individuals from the 27 Member States of the European Union. Analytical data on their budgets, demographic profile and online purchases of tourist products refer to the ten-year period 2013-2023. This allows us to track the dynamics and development of the studied economic phenomenon. The measurement of the relationships between online purchases of tourist products and the selected variables is carried out using computer processing software - IBM SPSS Statistics, and the Excel program. The methodology of the study includes the application of the linear regression and correlation method. The results obtained from the conducted study are useful for characterizing the changes occurring in online shopping of tourist products by consumers in Europe.*

1. INTRODUCTION

Online shopping, mediated by the level of Internet use, is transforming the state, structure and development of the tourism industry. In the modern digital world, the profile and behavior of consumers of tourism products are changing, which presupposes further studies on this research question. Rising consumer expectations and the use of the Internet network resonate with the structure of online sales of tourism products. Studies conducted by Buhalis and O'Connor (2005), highlight the economic benefits of adopting digital technologies and online commerce, leading to an increase in the market value of tourism companies, revolutionizing the distribution channels of tourism products, optimizing costs and increasing the efficiency of business activities. The integration of physical and virtual systems for the creation and marketing of tourism products into a single whole aims to ensure omnichannel, attract the attention of consumers, and enrich their experience. In this regard, as confirmed by a group of researchers led by Battisti and Brem (2020), the use of virtual reality is cited as an example of improving the user experience.

Evaluating the functionalities of mobile hotel websites in the m-commerce era, researchers such as Lei and Law (2019), conclude that in recent decades there has been a phenomenal growth in online shopping for ticket reservations, hotel accommodations, flights, attraction services, and car rentals. By studying the effects of interaction and trust on consumer behavior in co-creating values in online tourism communities, theorists Shen et al. (2018), understand that significant changes are occurring in the relationship between tourism product manufacturers and online consumers.

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The emerging emphasis is shifting towards consumers through features related to personalized content and web communities. In this way, competitive conditions are generated in the tourism market, which helps to expand online shopping opportunities.

Numerous research studies in the specialized literature analyze the impact of a number of factors on the process of online shopping for tourism products. Focusing on fundamental lines, specifically focused on consumers, is a basis for grouping the influencing factors and prioritizing those of an economic and demographic nature.

The main objective of this study is to analyze and assess the state and specificity of the behavior of European consumers when shopping for tourism products online based on significant economic and demographic factors, such as disposable income, gender, age, educational and employment status, and on this basis to deduce the emerging dependencies.

To achieve the outlined goal, research tasks are set, expressed in: systematization of conceptual ideas of online shopping for tourist products; bringing and analyzing empirical data on online shopping for tourist products carried out by European consumers, taking into account the dependencies on certain economic and demographic factors; formulating more important conclusions from the theoretical and empirical research thus conducted. The results obtained from the study refer to the ten-year period 2013-2023 and represent a reflection of the different possibilities of individual countries in achieving Europe's goals for digitalization and development of digital technologies by 2030.

The analysis and assessment of online shopping for tourist products carried out at the European level impose and require the introduction of certain limitations within the framework of this study, such as: clarification of the studied shopping through the prism of online purchases of tourist products through an empirical data set for the 27 Member States of the European Union over a certain period; dominant study of the dependence of online purchases of tourist products on selected variables, with the help of which the process of development of online shopping for tourist products in Europe is measured.

The presented work is structured in a total of seven paragraphs, namely: introduction; literature review on the factors affecting online shopping of tourist products; the third paragraph presents the adopted research methodology, which is implemented while observing the specifics of the application of the linear regression and correlation method; the following fourth paragraph presents empirical results from a study of online shopping of tourist products carried out by European consumers taking into account the change in certain economic and demographic characteristics of respondents from individual Member States of the European Union. Within this paragraph, the measurement is carried out using certain variables that take into account corresponding economic and demographic characteristics of the respondents. The geographical focus of this study is on individuals from the 27 Member States of the European Union. The fifth paragraph presents a discussion, which contains an interpretation and comparison with the results of other researchers published in the context of the studied problem. The sixth paragraph outlines future research directions. The last seventh paragraph presents conclusions aimed at the theoretical and practical significance of the research conducted.

2. LITERATURE REVIEW

Online shopping is gaining increasing economic importance for the evolution of the European tourism industry. Consumer patterns of searching and gathering information for planned tourist trips are changing. In this type of shopping, the tourism business communicates with consumers through

online marketing tools, social media, digital booking platforms and travel applications, and functionalities for searching and finding information about tourist destinations. In his research, Werthner and Klein (1999), dedicated to information and communication technologies and the changing landscape of global distribution of tourism products, adhere to the conceptual view that the tourism industry represents a hybrid system in which digital technologies merge with e-tourism services.

The development of digital technologies resonates with the acceleration of online shopping. In a study by Buhalis and Law (2008), the relationship between the development of digital technologies and changes in consumer behavior is studied. The cited authors arrive at determining the main changes in consumer behavior in online shopping for tourist products, leading to: transformation of the decision-making process for purchasing tourist products; use of mobile payment options; introduction of social network concepts and their application in tourist travel; sharing in virtual communities the experience gained from the carried out tourist trips and visited tourist destinations; personalization of the interaction between tourist enterprises and consumers; generation of innovative tools for tourism marketing management. Overall, the Internet network is transforming into one of the most influential technologies that define the behavior of consumers of tourist products. In this direction, a group of authors, including Tan and Leby Lau (2016), are united around the opinion that users express preferences for adopting the Internet and digital technologies because they provide maximum benefits and are easy to understand and use. Similar research positions are expressed by authors such as Blazheva (2023) and Atanasova (2024).

The review of the specialized literature allows us to establish that the research focuses on different groups of influencing factors - economic, demographic, psychological, cultural, social and others. There is also confirmation that the Internet network is becoming one of the most used marketing tools when choosing a tourist destination. The literature review allows us to systematize certain groups of factors or determinants of online shopping for tourist products. Compliance with the research goal set in this work requires a preferential emphasis on those groups of factors that are of an economic and demographic nature. In concrete terms, a part of the economic factors are defined as a foundation for conducting a macroeconomic analysis - here we can list: size of the Gross Domestic Product; Gross Domestic Product per capita; volume of produced tourist products. Other significant factors of an economic nature are reduced to: size of disposable household income; size of consumer spending; size of spending on purchasing tourist products.

In their scientific works, researchers such as Akpan et al. (2013), indicate such economic determinants as: the amount of wages, the amount of taxes paid, the total expenses of households, the amount of food expenses, etc. In the outlined research direction of studying economic factors, are the works developed by Xiong et al. (2021). These studies highlight various dependencies of the magnitude of consumer spending. By their nature, economic factors or determinants largely determine changes in consumer behavior. A similar position is defended and confirmed by a team of authors, including Petrova et al. (2022).

In their scientific work, a team of authors, including Kim et al. (2007), examine the impact of demographic factors. In their study, dedicated to gender differences in online search for information about tourist travel, the cited authors came to deduce more important consequences for marketing communications on the Internet. In similar scientific studies, among the factors or determinants of a demographic nature, the following stand out: the gender of household members, as well as the gender structure of households; the age of household members, as well as the derived variable age structure of households; the education of household members, the educational structure of households; employment status; marital status, and others. The scope of this group of factors can

also include: distribution of consumers by regions, districts, municipalities and settlements, i.e. the geographical affiliation of consumers of tourist products should be taken into account.

According to the research view of the theorist Schmitt (2001), when analyzing and evaluating the consumption of goods and services, which includes the consumption of goods and services of a tourist nature, it is necessary to consider the impact of other factors. This group of factors includes motivation, perceptions, brand loyalty, shopping experience, and others. Theorists Roy and Datta (2022) adhere to the interpretation that the factors determining the ability of consumers to perceive information based on their own requirements, beliefs and thinking are of importance. The belief stands out that in order to achieve the desired consumer satisfaction, it is necessary to take into account the characteristics of the offered goods with priority. The opinion expressed in this way is fully applicable to the tourism industry and the offered products.

The theoretical propositions presented so far in this presentation support the view that taking into account and assessing the influence of different groups of factors, including those of an economic and demographic nature, are useful for defining consumer behavior when purchasing tourism products. The highlighted factors also determine the level of online shopping.

3. METHODS AND METHODOLOGY

The research presented in this paper is based on data published by the European Statistical Office. These data are collected and summarized in order to monitor the level of progress and achievement of the European Union's digital goals by 2030. The usefulness of the data lies in their use in the realization of specific research objectives.

The methodological framework of this study covers measuring the dependence of online purchases of European consumers of tourism products on the following factors of an economic and demographic nature: disposable income, gender, age, educational and employment status. The respondents of the study are individuals from the 27 Member States of the European Union. The analytical data on their budget, demographic profile, as well as online purchases of tourism products refer to the period 2013-2023. The duration of the assessed ten-year period allows for tracking the dynamics and trends of change in the studied economic phenomenon.

The process of measuring the dependence of online purchases of tourist products made by European consumers on the highlighted factors is based on the use of computer processing software - IBM SPSS Statistics, as well as the capabilities of the Excel program. The method of linear regression and correlation is applied in the course of the study. The use of this method determines the strength of the dependence between "online purchases of tourist products made by individuals from the 27 Member States of the European Union" and the selected economic and demographic factors.

The research results measure the change in online purchases of tourism products made by European consumers, taking into account the variation in: disposable income, gender, age, educational and employment status. The conclusions reached have practical utility for determining the changing behavior of consumers in Europe when shopping online for tourism products.

4. RESULTS

The research focus on the characteristics of the identified economic and demographic variables allows us to determine the strength of their impact on the dependent variable – online purchases

of tourist products made by consumers from the 27 Member States of the European Union. The analysis of the data on the dynamics of changes in the magnitude of online shopping of tourist products by European consumers, as well as the magnitude of their disposable income, allows us to identify the emerging trends during the period 2013-2023, as visualized using Figure 1.

Figure 1 visualizes data characterizing the dynamics and trends of change in the number of online purchases of tourist products and the disposable income of European consumers during the period 2013-2023. The presented figure contains two axes, with the left axis illustrating the amount of disposable income of individuals from the 27 Member States of the European Union, and the right axis visualizing the change in the studied online purchases. The dynamics of online purchases of tourist products made during the analyzed period can be described by introducing three sub-periods - in the sub-period 2013-2019, an increasing trend is established, in the sub-period 2019-2021, a clear decline is reported, which to a certain extent can be explained by the impact of the factors of the Covid-19 pandemic and the imposed restrictions on tourist travel. In the next period, including 2022-2023, the direction of change changes again - towards a favorable increase. The reported coefficient of determination takes the value of 0.1633. This coefficient expresses the strength of the dependence of the magnitude of online purchases of tourist products on the variation of the variable of disposable income. Therefore, observing the value of the coefficient of determination allows us to conclude that nearly 1.63% of the change in the magnitude of online purchases of tourist products is explained by the change in the magnitude of disposable income of European consumers.

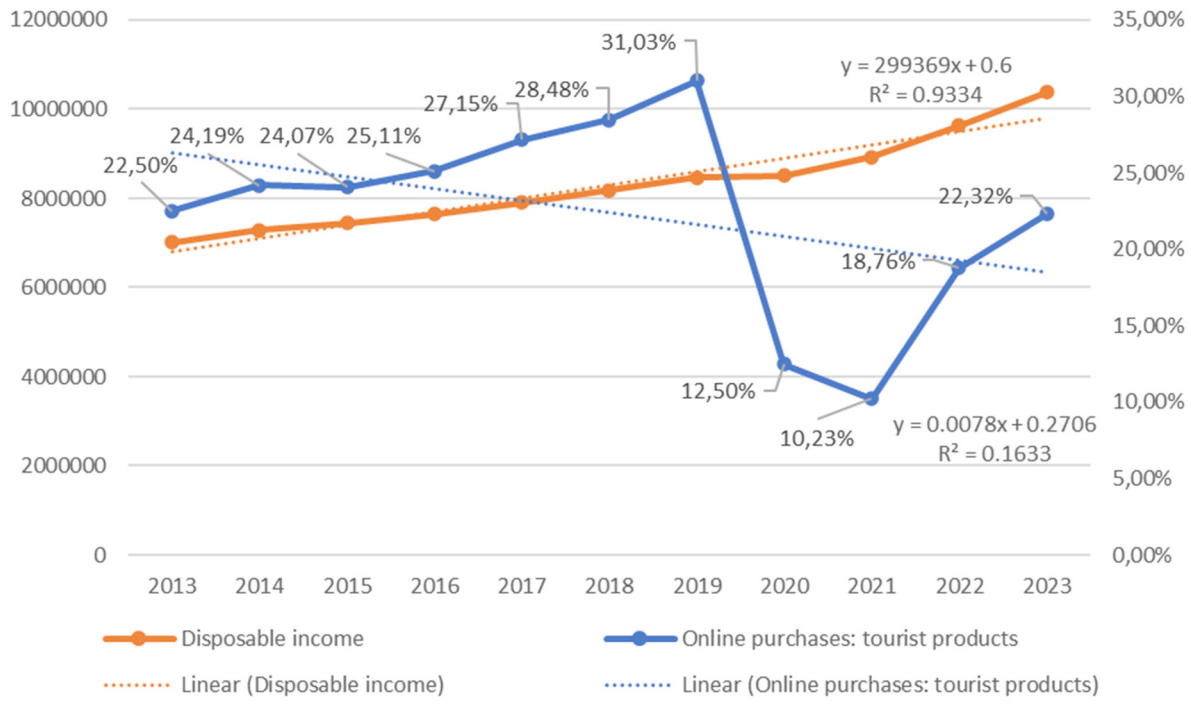

Figure 1. Dynamics and trends of change in online purchases of tourism products and disposable income of individuals from the 27 Member States of the European Union during the period 2013-2023

Source: Eurostat (2024)

The regression analysis performed aims to present and illustrate the existence of the relationship between the studied variables during the study period, as well as to assess the parameters of this relationship. The first section of the regression line, characterizing the trend of change in

the value of online purchases of tourist products, is at the value of 24.07%, reported in 2015, the second – at the value of 12.50% in 2020, and the third – at the value of 22.32% in 2022. Within the entire analyzed period 2013-2023, the change in each past year of online purchases of tourist products made by European consumers follows a decrease of about 0.78%, which is lower than one percent. To a large extent, the value thus reported can be explained by the adverse impact of the conditions of the Covid-19 pandemic, which manifested itself with particular force during the period 2020-2022. Over the ten-year period 2013-2023, the analysis of the amount of disposable income of European consumers shows that its variation follows an increasing trend. The reported values express a high share of change in the studied quantity.

The research conducted on online purchases of tourism products according to demographic factors - gender, age, educational and employment status – provides grounds to present their values in the last year of the research period – 2023: see Figure 2.

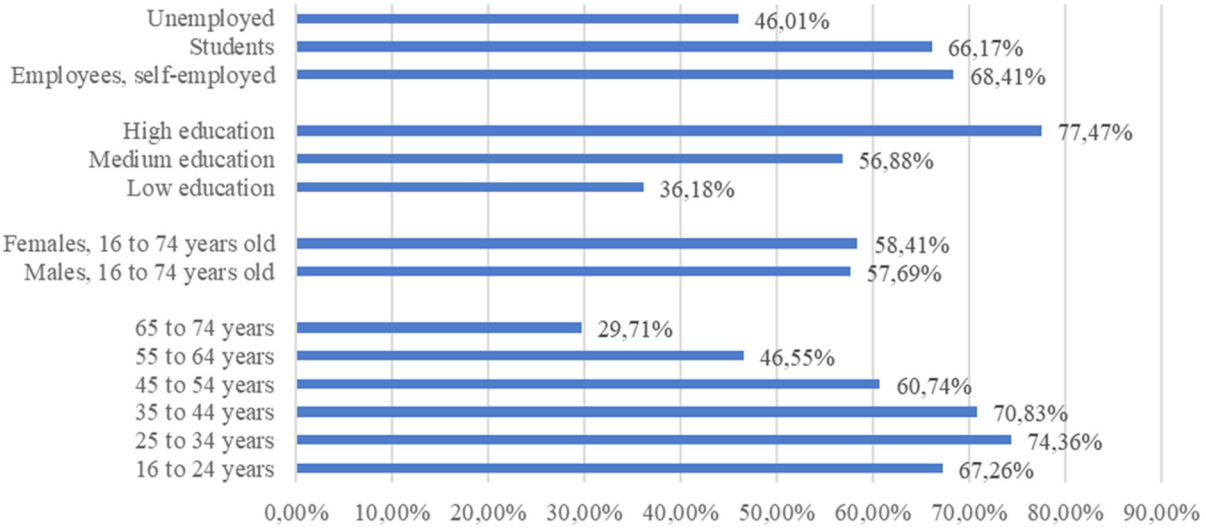

Figure 2. Internet users in the 27-member states of the European Union who bought or ordered tourist products in the previous 12 months, 2022 (% of individuals who used the Internet in the previous 12 months)

Source: Eurostat (2024)

As shown in Figure 2, according to the demographic factor - employment status, the relative share of employed and self-employed individuals who make online purchases of tourist products represents 68.41% of Internet users. The relative weight of students is close in magnitude, who make up about 66.17% of respondents. Among unemployed individuals, 46.01% use the online method for shopping for tourist products. Based on the other demographic variable - education, it is established that the relative weight of respondents with a higher level of education who shop for tourist products online amounts to 77.47% and exceeds by 20.59% the share of online users with secondary education. Therefore, more than 7 out of every 10 European users with a high level of education make online orders and purchases of tourist products. The relative share of individuals with low education who make purchases of tourist products via the Internet is lower and amounts to 36.18%. According to the demographic factor – age, European consumers aged 25 to 34, together with those aged 35 to 44, are more active in online shopping for the products studied compared to respondents from the other age groups. According to the data illustrated in Figure 2, the relative weight of women making online purchases of travel products is very close to that of men, exceeding them by less than one percentage point, only 0.72%.

The analysis of online purchases of tourism products by respondents in this study can be further explored by applying the linear regression and correlation method. This method helps to examine the relationship between "online purchases of tourism products made by individuals from the 27 Member States of the European Union" and the economic variable "disposable income". The results obtained from the study are visualized in the following tables: Table 1, Table 2 and Table 3. The analytical data cover the time period 2013-2023 and are published by the European Statistical Office – Eurostat. Table 1 provides a visualisation of the values of the correlation and determination coefficients.

Table 1. Model Summary of linear regression and correlation

R	R Square	Adjusted R Square	Std . Error of the Estimate
0.618	0.382	0.362	2.684
The independent variable is Disposable income.			

Source: Eurostat (2024)

The data illustrated in Table 2 helps analyze and evaluate the variance.

Table 2. ANOVA – analysis of variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	241.217	1	241.217	31.103	0.000
Residual	64.120	9	7.680		
Total	357.727	10			
The independent variable is Disposable income.					

Source: Eurostat (2024)

Table 3 visualizes data on the basis of which the analysis of the coefficients measured using the applied method of linear regression and correlation is carried out.

Table 3. Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Disposable income	8.017	0.000	0.906	6.321	0.000
(Constant)	24.237	8.305		2.543	0.022

Source: Eurostat (2024)

Analytical value for measuring the assessed dependence have the coefficients of regression, correlation and determination. According to the data in Table 3, the regression coefficient has the value 8.017 and is a basis for assuming that when the disposable income of individuals from the 27 Member States of the European Union increases by 1 euro, an average increase of about 8.017 euro is recorded in the amount of online purchases of tourist products. The reporting of the data visualized by means of Table 1 allows us to establish that the coefficient of variation R takes the value: $R = 0.618$. The analyzed coefficient is defined as a measure of the strength of the relationship between the two variables under study. Based on the references indicated in the specialized literature, at $0.3 < R \leq 0.7$, an average dependence is determined, i.e. a moderate degree of dependence is defined. Such a dependence is also defined as a moderate correlation between the two variables. The calculation of the coefficient of determination has a significant analytical value. The value assumed by this coefficient measures the relative share of the variation in the costs of consumers making online purchases of goods and services in the tourism industry. According to

the data illustrated in Table 1, the analyzed coefficient of determination assumes the value: R2 = 0.382. The reported result determines the assessment that nearly 38% of the differences between consumers of online tourism products from the 27 Member States of the European Union are explained by the differences between them in the amount of disposable income. The existence of a dependence between the two variables constitutes a basis for formulating the statement that the consumption of online tourism products is dependent on the changes occurring in the amount of disposable income of European consumers.

5. DISCUSSION

Thus, the results obtained in the course of this study allow us to analyze and interpret the impact of certain economic and demographic factors on the change in consumer behavior from the 27 Member States of the European Union when ordering and purchasing tourist products online. Some of the factors assessed in the study are economic, and some are demographic. In this research direction, there is an opportunity for discussion and comparison with results obtained by other researchers. For example, in their scientific works, theorists such as Kim et al. (2007), take research positions that different groups of determinants have a significant influence on decisions made for the consumption of products, including those offered by the tourism industry. The cited authors reach the point of prioritizing and preferentially highlighting certain determinants of an economic and demographic nature. For example, the economic determinant - real household income, stands out as one of the significant variables that presuppose the amount of consumption. Therefore, the considerations presented in this way should be taken into account when analyzing and assessing the ongoing changes in the behavioral patterns of European consumers.

6. FUTURE DIRECTIONS OF RESEARCH

Outlining the dynamics and trends of online purchases of tourist products made by consumers in the 27 Member States of the European Union during the period 2013-2023 is a challenge for understanding the main directions of their future development. For example, the cluster analysis method can be applied in further research. The capabilities of the specified method can help to highlight the existing similarities and differences between the individual Member States of the European Union in terms of the changes occurring in the online purchases of tourist products. Cluster analysis helps to form relatively homogeneous clusters of countries that report relatively similar characteristics according to selected determinants. The methodological approach of applying cluster analysis can also be justified by the possibility of measuring different aspects of the impact of digitalization on the individual sectors of the economies included within the Community. The research results obtained can be useful in determining the necessary measures to support and promote the digitalization of societies and economies in the European Union.

7. CONCLUSION

The analysis and interpretation of the behavior of European consumers when shopping for tourist products online allows for reaching corresponding conclusions and generalizations. Part of the processes of changing consumer behavior from the 27-member states of the European Union should be explained by the impacts of the ongoing digital transformation of the economy and society. Online shopping for products offered by the tourism industry is a kind of measure of the economic well-being of consumers in Europe. Its change is significantly influenced by factors of both economic and demographic nature, such as the amount of disposable income, gender, age, educational and employment status.

Analyzing the dynamics of online purchases of tourist products made during the period 2013-2023 allows us to outline the emerging trends. As a result of applying regression analysis, it is concluded that throughout the studied period, the change in each past year in online purchases of tourist products made by European consumers follows a decrease, which is lower than one percent. To a large extent, the value thus reported can be explained by the adverse impact of the conditions of the Covid-19 pandemic, which manifested itself with particular force in the period 2020-2022. At the same time, the assessment of the dynamics of the disposable income of European consumers shows that the trend followed is of annual growth. Nearly 1.63% of the change in the value of online purchases of tourist products is explained by the change in the value of the disposable income of European consumers. A moderate correlation is established between the two variables. Assessing the impact of demographic factors allows us to draw certain conclusions. Educational status has a certain influence. For example, it was found that more than 7 out of every 10 European consumers with a high level of education order and purchase tourist products online. At the same time, it was found that consumers aged 25 to 34, along with those aged 35 to 44, are more active in online shopping for the products under study compared to respondents from other age groups.

European online consumers demonstrate mastery of digital skills and comprehensive knowledge of omnichannel options for ordering and purchasing goods and services related to providing tourist experiences. From this point of view, it is of practical application and useful to continue research assessing the changes in consumer behavior patterns in order to outline relevant business strategies for the future development of the tourism industry.

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Segmenting Tourist Spending Behavior: The Influence of Demographic and Behavioral Factors on Expenditure

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Abstract: *This study utilizes 2024 survey data from southern Albania to examine the effects of demographic and behavioral factors on tourist spending, categorizing tourists into low, average, and high spenders. Demographic factors such as gender, age, education level, and employment status are analyzed alongside behavioral factors, including time spent, use of tourist packages, and type of tourist (individual versus family/group). A Probit regression and estimation using robust standard errors in SPSS is applied to segment tourist behaviors, ensuring accurate and reliable results by adjusting for any heteroscedasticity that might influence the estimates, given the diverse nature of tourism expenditure and demographic backgrounds. Results show significant differences in tourist satisfaction associated with spending behavior, particularly in relation to demographic and behavioral patterns. The findings of this analysis provide critical insights into the key factors influencing spending and help in the design of targeted tourist services.*

1. INTRODUCTION

Tourism is an important sector worldwide. Its contribution to global GDP in 2023, accounted for 7.6%, a 22% increase from the previous year (WTTC, 2024). Moreover, it has had a great impact on employment, the tourism industry has created 22 million new jobs in 2023, a 7,9% increase compared to 2021. This sector has overcome all the challenges that the COVID-19 Pandemic brought about by hitting it directly, it is even expected that in 2024 this sector will grow by over 2% compared to 2019 (UNWTO, 2024).

Albania, in recent years has emerged as an attractive tourism destination, according to UNWTO (2024), Albania was ranked 4th globally for the largest percentage increase in international tourist arrivals, with 10.1 million international arrivals in 2023 an increase of 26% from the previous year. From the economic perspective, international tourists account for 46% of total exports, and their spendings were 4.1 billion euros, about 1.3 billion euros more than in 2022 (Albanian Bank, 2024) reaching a value of 45% higher than the 2019 peak (WTTC, 2024). According to The World Travel & Tourism Council's, (WTTC, 2024) contribution to Albania's GDP reached almost 37% more than the previous high point in 2019, creating 269,000 new jobs in the country. Related to some demographic data, in 2023 according to the Albanian Bank average night spent in Albania was 6 nights, 50,6% are female and 49,7% are male, the majority of tourists belong to the 25-34 age group, about 22,9% (INSTAT, 2024). Given the importance of this sector and the role it plays in the economic development of a country, it is important analyzing the demographic and behavioral characteristics of tourists to develop and offer services that meet their needs and desires, thus increasing the attractiveness of the destination.

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There are several studies analyzing demographic factors and their impact on tourism, but there is a gap in the literature on analyzing tourism market segmentation based on spending patterns, this will give more information on targeting tourists based on demographics (Pulido-Fernández et al., 2021). Understanding what drives tourist spending is vital (Massidda et al., 2022) given that tourist expenditures directly affect the economic development of the destinations, making it important for businesses and policymakers to distinguish between high- and low-spending tourists.

In this article, we try to fill this gap by analyzing tourism demographics and their impact on spending behavior and give conclusions based on the results. The paper is organized as follows. In the second section, we described the theory and hypotheses development. The third section outlines the methodology followed by our analysis and results. In the final section, a description of discussions, implications, and limitations is described.

2. THEORETICAL PREMISES

2.1. Market Segmentation in Tourism

Market segmentation is a central concept in tourism research, where grouping tourists based on shared spending behaviors can enhance service delivery and financial performance. Kotler and Armstrong (2010) describe segmentation as a process of dividing the market into distinct groups with similar needs and behaviors. For the tourism industry, segmentation is critical as it allows destinations to focus on high-value customers and their specific needs, in this way building brand loyalty (Dolnicar, 2020). Segmentation based on spending behavior is not only a strategic tool for competitive advantage but also essential in building emotional connections with tourists, which can foster loyalty and drive profitability (Zopiatis & Pericleous, 2021). While segmentation has been well-documented in tourism literature, relatively few studies have focused specifically on spending-based segmentation, indicating an ongoing gap in the literature that could benefit from further research (Pulido-Fernández et al., 2021).

2.2. Demographic Factors and Tourist Spending

Demographic factors, including gender, age, education, and employment, play a significant role in shaping tourist spending behaviors by reflecting distinct preferences, motivations, and financial capacities (Bernini & Cracolici, 2015; Jurdana & Frleta, 2016). Gender differences highlight that women often prioritize safe, culturally enriching, and experiential activities, spending more on museum visits, craft shopping, wellness retreats, and souvenirs to share with others, whereas men tend to favor adventurous, recreational activities and allocate more of their budgets to meals, transportation, and entertainment (Choi et al., 2016; Sahoo et al., 2022). Age is another critical factor, with younger tourists (under 30) typically being budget-conscious, favoring affordable yet adventurous experiences (Rivera & Gutierrez, 2018). Middle-aged travelers (30–50) often have higher disposable incomes, spending more on comfort, convenience, and cultural experiences (Yu et al., 2024), while older tourists (over 50) tend to allocate the highest budgets to quality accommodations, fine dining, and organized tours, valuing comfortable travel (Hwang & Lee, 2019). Education strongly influences spending, as well-educated travelers are more likely to prioritize destinations rich in cultural heritage, seeking meaningful, knowledge-driven experiences and showing a willingness to invest in higher-quality services (Cheng & Chen, 2022; Sahoo et al., 2022; Sie et al., 2016). Employment status also significantly affects spending; individuals with stable, full-time jobs typically have greater disposable income, enabling them to travel more frequently and allocate higher budgets for premium accommodations, leisure activities, and international travel (Alegre et al., 2019; Bernini & Cracolici, 2015). Together, these demographic factors offer valuable insights for designing targeted tourism strategies and enhancing economic outcomes for destinations.

2.3. Behavioral Factors and Tourist Spending

Behavioral factors such as length of stay, the use of travel packages, and the type of travel companions significantly impact tourist spending patterns (Park et al., 2020). Length of stay is a critical determinant; tourists on longer trips tend to spend more overall as they explore beyond major attractions, engaging in activities like day trips, cultural tours, and local events (Gómez-Déniz & Perez-Rodriguez, 2021). Conversely, authors (Gedecho et al., 2023) argue that longer stay tourist tends to decrease their daily spending as they adopt more cost-conscious budgeting strategies over extended stays from the other hand short-duration tourists often exhibit higher daily expenditures, focusing on premium experiences, fine dining, and unique activities that maximize their limited time (Alegre et al., 2013).

The use of travel packages also influences spending behaviors, tourists who use packages tend to spend less since much of their spending is pre-planned and allocated toward accommodations, meals, and tourism activities (Zopiatis & Pericleous, 2021). This category of tourists comes with a planned spending plan, enabling them to reduce unexpected travel costs, while tourists who visit a destination without using a specific package are more flexible in their spending (Zopiatis et al., 2020).

The composition of tourist groups adds another dimension to spending behavior. Solo travelers often seek freedom and personalized experiences, directing their expenditures toward activities that align with individual preferences and transformative experiences (Yang, 2021). In contrast, family or group travelers prioritize shared experiences, comfort, and safety, often planning and structuring their budgets to meet the diverse needs of all members, particularly children (Wu et al., 2019). Studies indicate that family travelers tend to spend more overall compared to solo tourists due to their focus on comfort and the inclusion of activities for all members of the group (Park et al., 2020; Serra et al., 2015; Thrane et al., 2016). These factors collectively highlight the need for tourism businesses and policymakers to customize services and offerings that align with varied behavioral patterns.

3. METHODOLOGY

3.1. Data

This study utilizes survey data collected in 2024 from tourists visiting southern Albania. The dataset includes demographic variables such as age, gender, education level, and employment status, as well as behavioral factors like length of stay, use of travel packages, and type of travel (individual versus family/group). Tourists are categorized into low (€30-110/day), medium (€111-200/day), and high spenders (€201-300/day) based on their reported expenditures. These categories were defined using the distribution of total daily expenditures, divided into tertiles to ensure balanced representation of each segment. This segmentation is essential for understanding how different demographic and behavioral factors influence spending patterns, which is critical for targeting marketing strategies effectively (Zopiatis & Pericleous, 2021).

3.2. Method and Procedures

A Probit regression model with robust standard errors was employed to analyze the data. This method is suitable for examining the relationship between categorical dependent variables (spending categories) and independent variables (demographic and behavioral factors) (Zopiatis & Pericleous, 2021). The use of robust standard errors adjusts for potential heteroscedasticity, ensuring reliable estimates.

4. ANALYSIS AND RESULTS

The analysis was conducted using a Probit regression model to evaluate the impact of demographic and behavioral factors on tourist spending categories. The results are summarized in Table 1, which presents the coefficients, standard errors, and significance levels for each variable included in the model.

Table 1. Probit Regression Data Summarized.

Category	Variable	Coefficent (B)	Std. Error	Walt Chi-Square	Significance (p-value
Threshold	Spending Category = Low spenders	6.238	17311.8928	0.000	1.000
	Spending category = Medium and high spenders	7.628	17311.8928	0.000	1.000
Employment	Student	0.630	0.3840	2.691	0.101
	Retired	0.389	0.4327	0.809	0.368
	Employed	0.227	0.3075	0.543	0.461
	Self-Employed	-0.271	0.3326	0.662	0.416
Education	High School Education	0.321	0.1599	4.044	0.044
	Vocational Education	0.466	0.2008	5.390	0.020
	University Education	0.529	0.1353	15.302	<0.001
Tourist package	Tourist Package	-0.224	0.1811	1.531	0.216
Tourist type	Individual Tourist	0.164	0.1851	0.780	0.377
	Group Tourist	0a	-	-	-
Age	Age (Log Transformed)	-0.204	0.2090	0.951	0.329
Length of stay	Length of Stay	-0.434	0.0879	24.406	<0.001
Gender	Gender	0.044	0.1018	0.185	0.667

Source: Own calculations

Tourists aged 30-50 and those over 51 show a significant positive relationship with higher spending categories ($p < 0.001$). This finding aligns with literature indicating that middle-aged travelers often have higher disposable incomes and prioritize comfort and cultural experiences (Zopiatis & Pericleous, 2021).

Female travelers are more likely to spend in higher categories compared to their male counterparts ($p = 0.005$). Research suggests that women often prioritize safe and culturally enriching activities, spending more on experiences that enhance their travel (Dolnicar, 2020).

Higher education levels correlate positively with spending ($p < 0.01$). Educated travelers tend to seek meaningful experiences and are willing to invest in higher-quality services, reflecting a preference for destinations rich in cultural heritage.

A significant positive relationship exists between the length of stay and spending ($p < 0.001$). Tourists on longer trips engage in more diverse activities, which increases overall expenditure, as they often explore beyond major attractions.

The use of travel packages does not show a significant association with spending categories ($p = 0.216$). This suggests that pre-planned budgets may limit discretionary spending, as tourists utilizing packages often allocate their expenditures toward accommodations and meals.

Tourists traveling with family or in groups tend to spend more ($p = 0.004$), reflecting the need for shared experiences and comfort. Family travelers often prioritize activities that cater to all members, leading to higher overall expenditures compared to solo travelers.

The analysis highlights significant relationships between demographic and behavioral factors and tourist spending categories. The findings underscore the importance of understanding these factors for effective market segmentation and targeted marketing strategies.

4.1. Goodness-of-Fit and Model Validation

The model demonstrates a strong fit for the data, as indicated by several key metrics. The Deviance/df ratio (0.632) and Pearson Chi-Square/df ratio (0.916) suggest minimal unexplained variability, aligning with the recommendations of Hosmer et al. (2013), who identify these statistics as reliable measures of model adequacy. These low values indicate that the model sufficiently captures the patterns present in the data, minimizing residual discrepancies. Further support for the model's complexity and predictive accuracy is provided by Akaike's Information Criterion (AIC = 923.409) and Bayesian Information Criterion (BIC = 993.085). These criteria confirm the balance between model complexity and predictive accuracy, with lower values reflecting better model performance. The results indicate that the model achieves this balance effectively, avoiding overfitting while maintaining predictive strength.

Table 2. Goodness of Fit Model Statistics

Statistic	Value	df	Value/df	Interpretation
Deviance	858.176	1357	0.632	Indicates a good fit of the model to the data.
Pearson Chi-Square	1243.220	1357	0.916	Minimal lack of fit, suggesting strong model adequacy.
Akaike's Information Criterion (AIC)	923.409	-	-	Lower AIC supports better model performance.
Bayesian Information Criterion (BIC)	993.085	-	-	Confirms the model's balance between complexity and accuracy.

Source: Own calculations

5. FINDINGS AND CONCLUSION

This section synthesizes the findings from the analysis, discusses their implications for destination managers and policymakers, and outlines the limitations of the study. The insights gained from the analysis of demographic and behavioral factors on tourist spending patterns provide valuable guidance for effective market segmentation and targeted marketing strategies.

The analysis identified significant relationships between demographic factors (age, gender, and education) and behavioral factors (length of stay, travel packages, and group composition) with tourist spending categories. Middle-aged (30-50) and older tourists (over 51) were found to spend more, likely due to higher disposable incomes and a focus on quality and convenience in their travel decisions (Jang & Ham, 2009).

Female travelers exhibited higher spending tendencies, which aligns with broader trends indicating that women often allocate more resources toward experiences and services they perceive as enhancing their travel (Dolnicar, 2020). Similarly, higher education levels were strongly associated with increased spending, reflecting a greater willingness to invest in high-quality services and experiences (Richards, 2011).

Behavioral factors were also significant. Tourists staying longer were more likely to spend more, as extended trips provide opportunities to explore additional attractions and activities (Yang, 2012). On the other hand, the use of travel packages did not significantly influence spending, likely

because such packages often focus on pre-planned and fixed expenses, leaving limited room for discretionary spending.

Group composition emerged as another important factor, with families and groups spending more than solo travelers. This finding suggests that shared experiences and group-oriented services often result in higher overall expenditures (Lehto et al., 2009).

These findings highlight the diverse factors influencing tourist spending and provide a foundation for tailoring strategies to different demographic and behavioral profiles.

Age-Specific Experiences: The analysis indicates that middle-aged travelers (30-50) and older tourists (over 51) exhibit higher spending patterns. Destination managers should develop targeted marketing campaigns that highlight comfort, convenience, and cultural experiences tailored to these demographics. This aligns with findings suggesting middle-aged travelers prioritize quality accommodations and organized tours (Jang & Ham, 2009).

Catering to Female Travelers: Female tourists are more likely to spend in higher categories compared to males. Destination managers should design travel products emphasizing safety, wellness, and cultural enrichment. This approach aligns with research showing that female travelers value culturally immersive and safe experiences, leading to higher spending (Dolnicar, 2020)

Education-Based Segmentation: Tourists with higher education levels are more likely to belong to higher spending categories. Destination managers should focus on promoting educational and cultural experiences, such as guided heritage tours and premium culinary events. This strategy aligns with evidence that educated tourists seek meaningful and intellectually stimulating travel experiences (Richards, 2011).

Encouraging Longer Stays: The length of stay is positively associated with higher spending. Destination managers should promote multi-day itineraries and offer discounts for extended stays. Research shows that longer trips lead to higher levels of engagement and expenditure (Yang, 2012).

Group and Family Travel: Tourists traveling with family or in groups tend to spend more. Destination managers should develop family-friendly and group-oriented offerings, such as shared recreational activities and group discounts. This aligns with findings that families prioritize activities catering to all members, driving higher expenditures (Lehto et al., 2009).

Incentivizing Longer Stays: Tourists staying longer tend to spend more. Policymakers should implement measures such as multi-day visa incentives and tax benefits for long-stay packages. Evidence suggests that extended stays significantly boost local economies (Gössling et al., 2010).

Supporting Family and Group Tourism: Family and group travelers exhibit higher spending patterns. Policymakers should create initiatives to support family-friendly tourism infrastructure, such as larger accommodations, child-friendly facilities, and grants for businesses catering to groups. This approach aligns with findings that family tourism is a growing and lucrative segment (Nickerson & Jurowski, 2001)

Flexible Travel Packages: Travel packages do not significantly influence spending, likely due to pre-planned budgets limiting discretionary expenditures. Policymakers should encourage businesses to design flexible packages that allow tourists to customize their experiences. This strategy aligns with research indicating that personalization enhances satisfaction and spending (Neuhofer et al., 2015).

While this study provides valuable insights, it is essential to acknowledge its limitations. The data is based on a specific geographic area (southern Albania) and may not be generalizable to other regions or countries. Additionally, the reliance on self-reported spending may introduce bias, as tourists may not accurately recall their expenditures. Future research should consider longitudinal studies and broader geographic samples to enhance the robustness of findings.

In conclusion, the study highlights the importance of understanding demographic and behavioral factors in shaping tourist spending patterns. By leveraging these insights, destination managers and policymakers can develop targeted strategies that enhance visitor experiences, drive economic growth, and foster sustainable tourism practices. Future research should continue to explore the nuances of tourist spending behavior, particularly in the context of evolving market trends and consumer preferences.

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Commercial Space Stations: A New Era in Orbital Tourism

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Abstract: *As commercial space tourism is growing in popularity, the demand for commercial destinations in space is also rising. Therefore, the main objective of this work is to examine this new area of commercial space habitats in low Earth orbit by investigating the development of commercial space stations as a key factor for the shift from governmental-owned space stations to commercial contractors. This development is investigated by analyzing literature about the past six decades of human space flight as well as specialized literature for commercial space tourism. Together, these methods have been used to investigate two formulated hypotheses regarding commercialization and its impact on low Earth orbit space habitats.*

1. INTRODUCTION

In 1967, the hotel chain Hilton Hotels proposed the idea of a "hotel on the Moon" which was later mirrored in the media, e.g. in the movie 2001: A Space Odyssey, in which a rotating space station is shown as a destination in Low Earth Orbit (Rollock et al., 2023). Even though in 1967 it was still early for the ideas of having space habitations for tourists in Low Earth Orbit, nowadays scientists and engineers can make these visions become a reality.

The change within the space industry from government-owned space stations to commercially owned space stations is constantly moving forward. Since the space race in 2021, the space industry is booming (Bergan, 2022). Because space tourism is also gaining in popularity, the demand for orbital space stations is increasing. As the International Space Station ISS is supposed to be deorbited in 2030 (Kulu, 2023), new destinations for touristic space missions are essential. Especially the Low Earth Orbit is remarkable for tourists as well as for investors as it offers a suitable destination for short-term touristic missions to space. Therefore, this research aims to show the connection between the development of space stations in the past to the commercial space stations that are being developed within the industry today. Furthermore well known accommodation companies like e.g. Hilton, are also investing in commercial space stations, making their proposed idea of a hotel on the Moon might one day become a reality.

2. THEORETICAL FRAMEWORK

To understand the new area of commercial space stations in human space flight, it is first imperative to understand the different kinds of space tourism that exist. Commercial tourism in space can be divided into two major categories, suborbital and orbital tourism (Gerzer, 2022b). Suborbital tourism uses a different way of traveling into space than orbital tourism. As the term suggests, suborbital tourism refers to touristic activities below orbit, with the word sub meaning below/under. There are

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two major companies offering suborbital flights for tourists as of January 2025. One is Virgin Galactic, which is owned by Sir Richard Bransson, and the other company is Blue Origin founded by Amazon founder Jeff Bezos (Pallathadka & Pallathadka, 2022). Both have been transporting tourists to the edge of space in the past few years. When booking a suborbital tourist flight, the tourist will assent to a height between 80km and 100km and can experience weightlessness for a few minutes. During the flight, the tourist also has the opportunity to see the curve of the Earth (Gerzer, 2022b). By viewing the Earth from above, astronauts and orbital tourists experience a cognitive change described as the "Overview Effect" by Yaden et al. (2016). that cultivates a renewed sense of responsibility for the planet. This effect has also been described by suborbital tourists.

In orbital tourism, the way of traveling is changing. As the word orbital implies, during orbital tourism, the tourist will enter an orbit around the Earth. As a result, the tourist must ride in a rocket in order to gather enough thrust to reach space. This type of tourism differs in height and duration from sub-orbital space tourism, which accounts for the significant price difference. Orbital tourists who visit the International Space Station (ISS) typically travel for two weeks. Because the ISS crosses at around 400 kilometers above the Earth's surface (Gerzer, 2022a), the entire tourist trip typically lasts 16 days, including one day of docking and one day of undocking from the International Space Station.

Another kind of orbital space tourism is possible when the crew does not travel to a designated destination within e.g., the Low Earth Orbit, but stays within their vehicle for the whole duration of the trip. Two examples of these have been the Inspiration 4 Mission or during the Polaris Dawn mission of the company AXIOM (Ferra et al., 2023).

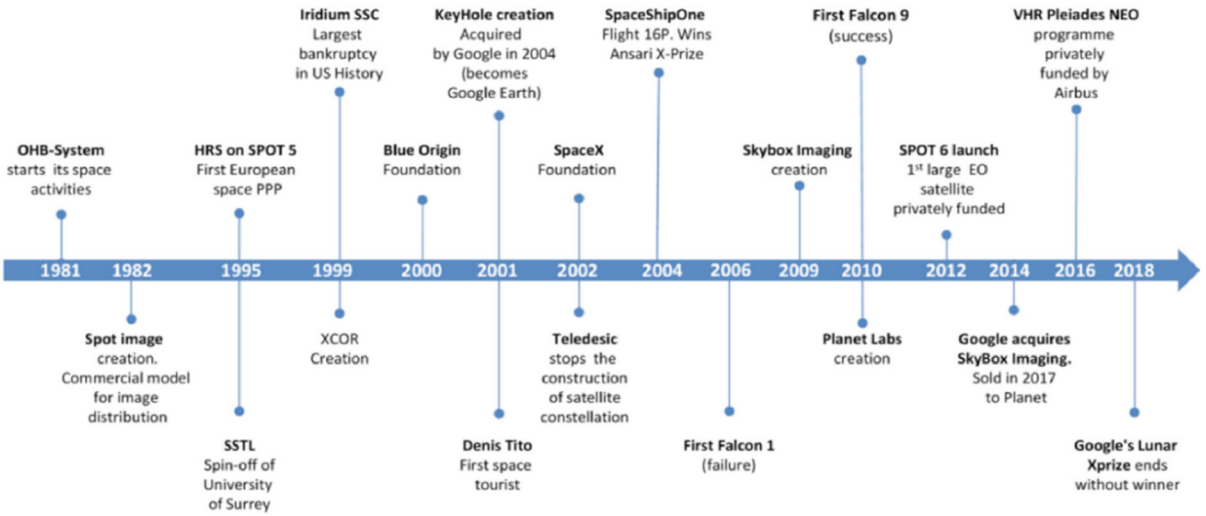

Figure 1. Innovation in space – Some milestones
Source: Denis et al. (2020)

The figure shown above, Figure 1, is an example of some of the innovations in the space sector that have been implemented until 2018. Especially significant are the founding of Blue Origin in 2000 and SpaceX in 2002 as well as the first-ever space tourist, Dennis Tito, in 2001 (Denis et al., 2020). For a general overview about the innovations in space, the book Astronautical space fare by Rupert Gerzer can be helpful (Gerzer, 2022b). It also gives a detailed overview of past space stations.

The following table 1 lists significant space stations between 1971 and the present. The Soviet Salyut program (1971-1991) included seven stations that progressed from single to multi-module, with the longest stay of 237 days. The United States Skylab (1973-1974) was an experimental

station built with Apollo spare parts that could accommodate three missions for a maximum of 90 days. The first multi-module station, Russia's Mir (1986-2001), allowed for year-long stays. The International Space Station (1998-present) is a multinational, multi-module station that is still operational. Bigelow Aerospace developed Genesis I and II prototypes from 2006 to 2007. China's Tiangong-1 (2011-2018) was a single-module spaceflight testing station.

Table 1. Space Stations Then- The Shift from Pilots to Scientists

On-orbit	Name	Ownership	Of Special Note
1971-1991	• Salyut Stations	• USSR	• Seven iterative missions from single- to multi-module, longest stay 237 days
1973-1974	• Skylab	• United States, NASA	• Experimental using "spare parts" from Apollo´s launch vehicle and other spare parts; designed for a crew of 3; total of 3 scientific missions; longest stay -90 days
1986-2001	• Mir	• Russia	• Multi-module, 1-year visits
1998-Present	• ISS	• Multi-national: United States, European Space Agency, Canada, Japan (then-USSR 1998)	• Multi-module
2006-2007	• Genesis I, II	• Bigelow Aerospace	• Prototypes
2011-2018	• Tiangong-1	• China	• Single module

Source: Stover and Bukley (2024)

All in all, space tourism describes the ability for private individuals (tourists) to travel into space for recreational, leisure, or adventurous purposes (Tiwari, 2021). Previously, the Russian space agency Roscosmos used space tourism to fund its space program (Aliberti & Lisitsyna, 2019). Denis Tito, the first space tourist, traveled into orbit in 2001, as shown in Figure 1, with the Russian space agency Roscosmos (Seedhouse, 2024a). Following that, the Russians assigned one of the three seats on the Soyuz capsule to paying passengers to transport them to the International Space Station and return them to Earth. These seats cost between $20 and $35 million USD (Cole, 2015).

Roscosmos discontinued selling tourist seats after 2009, citing the need for astronauts to take advantage of every available flying opportunity. Furthermore, the United States discontinued the Space Shuttle program in 2011 due to a number of issues (Houston, 2013). One issue was the exorbitant expense of the Space Shuttle program (Pielke & Byerly, 2019). The second setback was the Space Shuttle program's two disastrous accidents: the Challenger in 1986 and the Columbia in 2003 (Tucker & Alewine, 2024). Because the Orbit Shuttle program had ended, American astronauts needed a spacecraft to travel to orbit and the International Space Station (ISS). This is why the Russian space agency stopped selling seats to private citizens, because the National Aeronautics and Space Administration purchased tickets for the tourist seats so their astronauts could fly to the ISS alongside the Russians (Li, 2022).

Furthermore, the US government previously prohibited commercial space activities, however, this changed in 2019 with the passage of the NASA Authorization Act (Sherborne, 2022). Since then, space tourists can travel with both Americans and Russians. In 2021, there was a space race between private corporations, including Virgin Galactic, SpaceX, and Blue Origin (Mukherjee & Jain, 2021). One of the topics discussed around this period was the height that space visitors must reach to be deemed astronauts or even space tourists (May, 2021). The International Federation of Aeronautics defines the Kármán line, which is approximately 100 km long (Lamy & Saint-Martin, 2024) as the height that tourists must reach to be considered tourists. According to Overbey et al. (2024), 647 people have flown into space as of 2024.

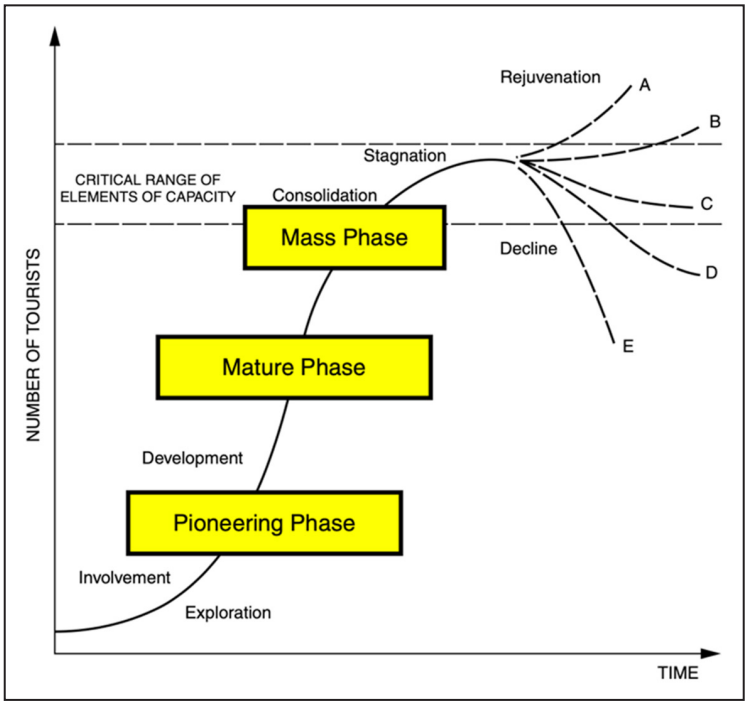

Figure 2. Space Tourism Life Cycle
Source: Cole (2015)

Overall, space tourism is growing in popularity (de Zwart & Lisk, 2024), although it is still at the pioneering stage when viewed via Butler's life cycle as shown in Figure 2 above (Cole, 2015; Butler, 2006). With an increase in the number of launches, space tourists will have more opportunities to fly into space for recreational purposes. As the number of launches increases (Olya & Han, 2023), so will the demand for space tourism. Therefore, hypothesis one looks at whether the rise of Commercial Space Stations will significantly lower the cost of orbital space tourism. Building rockets that can land on Earth and be repaired for future trips would cut the cost of rocket launch, lowering the barrier to space travel and making it more accessible to a wider range of visitors (Watson, 2024).

Hypothesis One: The rise of commercial space stations will significantly lower the cost of orbital space tourism.

Hypothesis Two: Commercial space stations will enhance private companies to invest in the space industry.

3. METHODOLOGY

To show the development of orbital space stations of this research project, data have been collected in two different phases. The first method included collecting quantitative literature data studies to use the information to show the developments of space stations in the past and their contributions to commercial space stations today. Secondly, the database of Web of Science was used together with the other specialized data sources to obtain secondary data collected within the field of the space tourism industry, showing actual developments of commercial space tourism stations.

By combining both literature analyses, this research project aims to provide a comprehensive overview of how human space flight has developed through space stations and how orbital space

stations have evolved into commercial space stations. Furthermore, their role in the growing sector of commercial space flight is shown by obtaining a table with all relevant commercial space stations, which will be significant for the following years of human space flight.

By presenting the current state of the in-space economy and possible future changes, Erik Kulu is offering important data for the space tourist industry (Kulu, 2021, 2023). Furthermore, E. Seedhouse's book "Commercial Astronauts: The Next Generation of Spacefarers" examines the roles and training of commercial astronauts and provides a comprehensive overview of the changes brought about by the space industry's privatization (Seedhouse, 2024b).

Finally, in relation to space tourism's effects on the environment because of the carbon emissions and resource consumption involved, space tourism cannot be a part of sustainable tourism, according to Peeters' paper "Why space tourism will not be part of sustainable tourism" (Peeters, 2018). The book Sustainability in Space Tourism by Anette Toivonen was utilized to gain a further understanding of sustainability in space tourism (Toivonen, 2020). Furthermore, for legal aspects, the book Space Law by Schladebach (2020) has been used. Furthermore, articles about the topic have been researched using Web of Science and Google Scholar by entering the keywords "commercial space stations", "space tourism" and "orbital space".

All in all, this methodological approach ensures a comprehensive examination of both technological innovations as well as perspectives for the commercial space industry, contributing to a deeper understanding of the potential for sustainable and economically viable space tourism in the coming years.

4. RESULTS

The findings of this study highlight the significant progress in the development of orbital space stations and their increasing role in commercial space tourism. The analysis of historical space station development shows a clear trajectory from government-funded projects, such as Salyut 1 and Skylab, to the establishment of more advanced stations like the MIR and the International Space Station (ISS). These past efforts have laid the foundation for the current emergence of commercially operated space stations.

Secondary data collected from industry sources reveal that private companies are actively investing in the commercialization of orbital destinations. Companies such as Axiom Space and Blue Origin are developing space stations designed to support both scientific research and tourism, as shown in Table 2. These projects aim to reduce operational costs and enhance accessibility for space tourists, thereby increasing demand for orbital stays.

Additionally, the results suggest that the demand for space tourism is evolving beyond suborbital experiences, with more tourists expressing interest in extended stays in Low Earth Orbit (Clément et al., 2022). The emergence of commercial space stations is expected to facilitate longer-duration space tourism, making space travel a more immersive and accessible experience. Hypothesis One contended that the emergence of commercial space stations will lower the cost of orbital space tourism by raising competition, improving operational efficiency, and leveraging economies of scale. As more companies invest in space tourism, improved infrastructure and demand are likely to push prices down.

Table 2. Space Stations Planned for Longer-term Human Habitation (Selected List)

Space Station	Origin	Funding	Proposed Purpose	Design Features	Of Special Note
Axiom Station	• Axiom Space • MOUs with ESA, NZ and other international organisations	• NASA-funded • Firm-fixed-price contract, indefinite-delivery/ quantity • Initially $140 million	• Private citizen launches to ISS currently using SpaceX Dragon	• Late 2026 • Comparable to ISS • Capacity: 4 modules of 4 crew each	• Contract content being renegotiated January 2024 • Initial ISS rendezvous, then free-flying
Orbital Reef	• Blue Origin and Sierra Space • Boeing Transport, Redwire Labs, Amazon	• NASA-funded • 2021 Space Act Agreement PPP	• "Mixed-used business park" for science and tourism with sports facilities	• Baseline by 2027 • Free-flying • Capacity: baseline 6 people	• $172 million as of January 2024
Starlab Space	• Nanoracks/ Voyager Space, Airbus Defence and Space, Mitsubishi Corporation, and MDA Space Ltd. (U.S. majority-owned)	• NASA-funded • 2021 Space Act Agreement PPP	• Privately operated, First free-flying habitable, includes a "science park" • Partners include Hilton, Northrop Grumman	• Could launch late 2028/2029 • Free-flying, rotating artificial gravity • Single launch inside Starship • Capacity: 4 people	• $217 million as of January 2024 • Global joint venture network • Northrop Grumman pulled out
Haven-1	• Vast Space (Long Beach, CA)	• NASA unfunded SAA • Part of NASA CCSC-2 program	• Tourism; all-commercial crew	• End of 2024 • Spinning artificial gravity • Capacity: 40 people	
Think Plaatform-3	• Think Orbital	• Privately funded • Part of NASA CCSC-2 program	• Depot, ISAM, then research and tourism	• Spherical, scalable • Capacity: 40 people	• Includes additive manufacturing for large-scale in-space fabrication
Pathfinder	• Sierra Space	• Privately funded • Part of NASA CCSC-2 program	• Standalone version end of 2026	• Large Integrated Flexible Environment LIFE, technology is inflatable, scalable	• First missions set for biotechnology
Starship	• SpaceX	• Privately funded • Part of NASA CCSC-2 program			• Already planned for crew and cargo transport
Tiangong Space Station	• China Manned Space Agency	• Government of China	• Crewed on-orbit scientific research facility	• Operational • Currently 3 modules with plans to add 3 more	• Occupied nearly 3 years • Crew of 3
Indian Orbital Space Station, Bharatiya Antariksha Station BAS	• Indian Space Research Organisation ISRO	• Foreign civil government agency with potential private and public partnerships		• Design phase as of June 2024; part of India´s Space Vision 2047 • First module launch 2028; completion by 2035	• Modular, in-space assembled, permanent escape module included • Capacity: robotic initially
Russian Orbital Station ROS	• Roscosmos Agency	• Foreign civil government agency with potential private and public partnerships		• Roadmap for development announced for July 2024 • Phase deployment 2027 to 2033 • Crewed and uncrewed options	• Modular, in-space assembly, gyroscopic power generation, autonomous enabled

Source: Stover and Bukley (2024)

Hypothesis Two asserted that the creation of commercial space stations will increase private investment in the space industry by providing economic opportunities and encouraging innovation. As the space sector evolves with more commercial actors, the possibility for return on investment will stimulate additional funding and participation from private companies.

Overall, the study confirms that the growth of commercial space stations will significantly impact the future of orbital tourism by increasing affordability, enhancing comfort, and expanding the possibilities for long-term habitation in space. These findings support the hypothesis that commercial space stations will drive down costs and enable a more sustainable and inclusive space tourism industry.

5. FUTURE RESEARCH DIRECTIONS

Future research on commercial space stations should concentrate on cost-cutting measures and the economic viability of extended orbital stays. Market competition, economies of scale, and technological advancements, such as reusable launch systems, modular station designs, and shared launch services, could all help to reduce operational costs and make space tourism more affordable. Further research into automated maintenance and in-space resource use is critical for reducing costs and guaranteeing long-term station viability. Furthermore, research into the adaptation of effective cost-cutting techniques from industries such as aviation and telecommunications may provide useful insights for the space tourism industry.

Aside from financial constraints, substantial research is required to overcome the obstacles of long-term human residence in space. Studies should look into developments in closed-loop life support systems to improve resource efficiency, as well as the viability of employing locally sourced materials for station maintenance. Psychological and physiological research into the effects of extended microgravity, isolation, and confinement will be crucial in establishing well-being strategies for space tourists. Furthermore, policy and legal studies must consider the changing role of private firms in space, such as revisions to international treaties, liability frameworks, and regulatory control. Understanding the societal impact, such as public perception, employment generation, and technological spillover, will be critical in predicting the industry's future growth.

6. CONCLUSION

Ultimately, the growing popularity of commercial space tourism has resulted in increased demand for commercial space destinations. This paper investigated the burgeoning subject of commercial space habitats in Low Earth Orbit, namely the development of commercial space stations as a critical aspect in the shift from government-owned to privately run space infrastructure. Furthermore, commercial space stations represent a significant shift in the accessibility and sustainability of orbital space tourism. While technological developments, competition, and modular designs may reduce costs, issues persist in life support, long-term residence, psychological well-being, and regulatory control.

To ensure that commercial space tourism becomes a sustainable and long-lasting enterprise, future research should focus on enhancing sustainability, lowering operational costs, and improving governance structures. Collaboration among governments, business enterprises, and academic institutions will be critical in influencing the future of human space exploration. Therefore, this study assessed two main hypotheses about commercialization and its impact on low Earth orbit habitats by examining six decades of human spaceflight history and specialized literature on

commercial space tourism. The findings offer important insights into the changing landscape of space exploration and the role of the private sector in defining its future. Finally, with NASA's Artemis program and the development of commercial space stations, the hotel on the Moon, which was only a dream in 1967, is becoming more of a reality in the near future.

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The Contribution of Drones to the Safety of Tourism

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Abstract: *In recent years, drones have become a key tool in many industries, including tourism. In the security sector, it has brought numerous advantages in terms of monitoring, surveillance, prevention, intervention and effective response to crises. Given the advancement of technology, drones have proven to be highly effective in many security segments, including facility protection, public safety, crime-fighting, crisis management, and large-scale event monitoring. This contribution can be analyzed through different aspects, from physical security to digital protection and logistics. In the tourism industry, drones provide numerous advantages for both tourists and tourism organizations. Drones make it possible to capture incredible visual content, such as panoramic views and spectacular shots of hard-to-reach or natural locations. These recordings can be used in the promotion of tourist destinations through videos, images and virtual tours, which contributes to attracting more visitors. Drones make it possible to capture high-quality and attractive promotional videos and photos that can often show a destination from a perspective that would be impossible or too expensive to achieve with traditional methods. Given their advanced technological capabilities, drones have a significant impact on increasing the safety of tourists, efficiency in responding to emergencies and improving the protection of natural and cultural resources. Drones have the potential to improve tourism safety on many levels – from accident prevention and emergency response, to crowd monitoring and protection of natural and cultural resources. Their role in ensuring the safety of tourist destinations is becoming increasingly important, as they enable better control, faster response and more effective coordination among emergency services. This paper explores the main ways in which drones contribute to tourism safety, analyzing specific applications in different types of tourist destinations. Special attention is paid to their use in surveillance, emergencies, protection of cultural assets, crime prevention and ecosystem protection. Available sources of professional literature and secondary research were used in the paper. Through the analysis of practical cases and current applications of the technology, the paper provides a deeper understanding of the benefits and challenges related to the use of drones in tourism.*

1. INTRODUCTION

Drones are unmanned aerial vehicles used in various industries and for various purposes, and their technology and application have become crucial in modern society. They are considered semi-autonomous vehicles that fly without the need for a human crew. Even so, they already have a huge impact on many industries, and their application continues to grow as technology evolves. Through improvements in batteries, sensor systems, and regulations, drones are expected to become an even more important tool in all aspects of modern society. The technology that enables their operation includes several key contributions: they enable faster and more accurate data collection, reducing the need for human labor and reducing operational costs. Such as in agriculture, where

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drones speed up the process of crop inspection and pesticide application. Then it enables the monitoring of hard-to-reach areas or dangerous situations without endangering human lives. In the military and security agencies, drones reduce the need for human presence in dangerous operations. The use of advanced sensors and technologies, such as lidar and thermal cameras, enables the collection of extremely precise data, which is crucial in industries such as geodesy, cartography and environmental monitoring. The emergence of drone technology has opened the door to new markets, such as package delivery, drone taxis and aerial tourist tours. These markets are growing rapidly and bringing new business models and innovations (Gligorević et al., 2024).

Tourism is one of the most important industries, due to its ability to contribute to the economy, create jobs and promote cultural exchange. However, today it faces increasing challenges related to the safety of tourists, the protection of resources and the prevention of criminal activities. The reason for this is a number of factors, including the growth in the number of tourists, changes in the global security situation and the impact of technology. Tourism in many countries has taken precedence as a branch because it contributes to economic growth and cultural exchange, but it faces great challenges, one of which is certainly the safety of tourists. Given the speed of tourism growth, it is important to develop strategies that include improving safety, sustainability and regulation to ensure that tourism continues to be beneficial, but in accordance with environmental and social norms (Agapito, 2020).

In recent decades, the number of international tourists on the global scene has grown significantly. Only according to data from the World Tourism Organization, the number of international tourist arrivals in 2019 reached almost one and a half billion. This growth puts a lot of pressure on the infrastructural and environmental resources of destinations. Overcrowding of popular destinations can create problems regarding the safety of tourists, but also negatively affect the local community and the environment. The safety of tourists is the most important point in modern tourism, especially in light of terrorist attacks, natural disasters and political instability (Sánchez-Amboage et al., 2024). Tourists often become targets of criminal groups, fraudsters, and terrorists. Also, pandemics, such as COVID-19, present new challenges regarding the health and safety of tourists, while destinations must implement health protocols and safety measures. Tourism can increase the risk of various forms of crime, such as theft, violence, human trafficking and sexual exploitation (Zhu et al., 2021). Criminals use tourism as an opportunity to commit illegal activities, and tourists, due to their ignorance of local laws and customs, often become vulnerable. One of the key challenges facing tourism is the sustainable use of natural resources. Services offered to tourists can have serious impacts on ecosystems, including pollution, habitat destruction, overhunting or harvesting of plants and animals. Popular tourist sites, such as national parks or cultural monuments, often face problems of over-visitation that threaten their survival. In response to these challenges, more and more people are talking about sustainable tourism, which implies responsible management of resources and minimizing negative impacts on the environment and the local community. Sustainable tourism promotes the protection of cultural, natural and social values, in order to preserve destinations for future generations. This approach also includes better education of tourists about responsible behavior, use of resources and respect for local laws (Matter & Potgieter, 2021).

2. DRONES IN TOURISM IN GENERAL

Drones have become an important tool in the tourism industry in recent years, providing numerous advantages for both tourists and tourism organizations. By enabling the capture of incredible visual content, such as panoramic views and spectacular shots of hard-to-reach or natural locations. These recordings can be used in the promotion of tourist destinations through videos, images and virtual tours, which contributes to attracting more visitors. Also, they enable the recording of high-quality

and attractive promotional videos and photos that can often show the destination from a perspective that would be impossible or too expensive to achieve with traditional methods (Agostinho et al., 2020).

Drones can directly improve the experience of tourists in certain destinations or during specific activities. In some tourist destinations, they can be used as interactive guides. By having visitors follow the drone itself, it provides information via audio or visual cues as they explore the location. And the most common contribution is that they allow people to experience landscapes and locations that are otherwise difficult to access, such as high mountains, difficult terrain, or places on water. Tourists can enjoy aerial shots of locations they would not be able to visit easily. A new form of activity has also appeared, such as the so-called "drone tourism" - some tourist operators offer tours that include drone flights, where tourists can operate a drone and take their own photos and videos from a height, which provides them with a unique experience. Given the popularity of aerial photography, travel agencies often organize specialized drone photo and video tours. These tours allow tourists to chronicle their travels from a perspective previously unavailable (Mirk & Hlavacs, 2014).

In the tourism industry, drones can be used for logistical purposes, facilitating delivery, monitoring or even helping with organization (Sintela, 2024). In remote or hard-to-reach tourist destinations, drones can transport necessary equipment, such as props for sports activities or food and drinks. They can even be used as an inspection for the maintenance of tourist infrastructure such as bridges, hiking trails or other buildings, thus improving safety and maintenance. The use of drones can reduce the need for traditional methods of transportation and filming, thereby reducing carbon dioxide emissions. For the same reasons, I also contribute to the reduction of the negative ecological impact of tourism on the natural environment, because it allows filming and research without the need for an excessive physical presence at the location (Berbeka, 2022).

3. DRONES FOR SURVEILLANCE AND RECORDING

Most drones use electric motors that drive rotors or propellers. Fixed-wing drones usually use turbine or conventional engines. They are equipped with various sensors, including GPS, accelerometers, barometers, cameras, lidar (detection by light and radar waves), infrared sensors and many others, which enable precise navigation, obstacle avoidance and data collection. They are managed through remote controls, advanced software systems, and in some cases autonomous systems that use algorithms to make decisions. Based on the data from the sensors, the drone can perform missions autonomously or be monitored by the operator. They use different types of batteries, the most common of which is lithium-ion. Energy is a key factor as it is needed to propel the drone and extend the duration of the mission. Drones also use radio frequencies or 5G mobile networks to transmit data and communicate with operators or other drones in the network. The most commonly used types of drones, usually with four, six or eight rotors. They are popular for their stability and ability to hover in one place. These drones are more efficient for longer flights because they use aerodynamic lift, but they do not have the ability to take off and land vertically (Chen et al., 2015). They combine the characteristics of multirotors and fixed-wing drones, allowing them to take off and land vertically, then transition to horizontal flight for longer distances. In this case, what we are most interested in is that drones use different types of cameras, which differ in functionality, recording quality and purpose. Drones equipped with cameras enable a wide range of applications. Security is certainly among the primary ones. There's also high-quality video and photo recording, for specialized functions like thermal detection. The most common cameras used by drones today are: standard high-resolution cameras (RGB cameras) these cameras are most common in commercial and recreational drones. They are most often used in shooting aerial photos, movies, tourism promotion, inspections of buildings and infrastructure, as well as in recreational shooting. Thermal cameras (IR cameras) enable heat

detection, which is useful for many specialized tasks, such as search and rescue, infrastructure inspection and environmental protection. Also, they are used to monitor wild animals, to protect natural resources, or to monitor environmental changes. Multispectral cameras capture images in several different parts of the light spectrum, enabling specialized analyses. Multispectral cameras are used in agriculture for precision agriculture, crop health monitoring, soil quality assessment, and vegetation monitoring to protect natural resources (Spalević et al., 2023). They are also used in ecology and geology for soil mapping and analysis.

LiDAR (Light Detection and Ranging) technology uses light waves (laser) for precise mapping of terrain and objects. LiDAR is often used in geodesy, construction industry, forest survey, mining industry and to create topographic maps. Using drones to create 360° video content and virtual tours allows potential tourists to "visit" a destination from the comfort of their own home before deciding to visit it live. Drones with 360° cameras allow recording of the entire scene around the drone in all directions, creating video and images in panoramic format. They are used to create interactive maps, virtual tours, movies and real estate promotions, as well as to monitor specialized facilities and infrastructure. FPS (frames per second) cameras are designed for recording faster movements or conditions where high-motion scenes need to be recorded, such as sports activities, speed tests, security surveillance or research. They are used for recording action scenes, and sports events, testing fast vehicles, as well as for analysis in security situations. UV (Ultraviolet) Cameras can detect UV light that is invisible to the human eye but is useful in specialized industries such as investigating materials or damage that can only be seen in UV light. They are used to test quality frames or to find micro-cracks in constructions.

4. USE IN TOURISM SAFETY AND ENVIRONMENTAL PROTECTION

In forests, drones are used to monitor the health of forest ecosystems and detect diseases, insect attacks or other threats that may threaten the plant and animal community. Drones with sensors and high-precision cameras make it possible to identify damage to trees that are difficult to see from a distance or the ground. Which can be useful for a timely response, such as the application of pesticides, the removal of infected trees, or even for the planning of forest protection activities. One of the most important applications of drones in forested and mountainous areas is in the prevention and fight against forest fire (Ilić et al., 2024). Drones with thermal cameras enable rapid detection of fire outbreaks, which can significantly reduce the response time of rescue teams. They are also used to monitor areas after a fire to assess damage and track further fire activity. In areas that are difficult to reach for human intervention, drones can enter high-risk zones and perform tasks such as filming or even delivering minimal amounts of equipment. Of course, there is also research on wild animals in mountainous and forested areas, without the need for direct contact with the animals or their habitats, which can reduce the human impact on the environment. They can be used to monitor the migration, abundance and health of animal populations, such as bears, wolves, deer, or birds. Therefore, they are used to research endangered species that are difficult to monitor due to their isolation or tendency to hide. With high-precision cameras, they enable fast and detailed mapping of hard-to-reach mountain and forest areas (Stojanović et al., 2018). This type of mapping allows the generation of digital elevation models, 3D maps and orthophotos, which are used for infrastructure planning, erosion analysis or to create precise topographic maps. This is particularly useful for geographical surveys and urban planning, but also for preparing for emergencies such as floods. In mountainous areas where soil erosion or landslides are a serious problem, drones monitor soil changes and identify potentially dangerous areas. Using multispectral cameras, drones can spot even tiny changes in the ground that indicate the risk of landslides. This data can help in making decisions about preventive measures and ensuring safety for local communities (Al Taie & Schwerha, 2024).

They are also used to combat illegal logging and poaching, especially in remote areas where patrolling with human resources is limited (Bubanja, 2024). Drones with high-resolution cameras can monitor forest areas and detect illegal activities, such as wood harvesting or hunting of protected species. Information from drones enables timely intervention by authorities, which reduces the illegal exploitation of natural resources. In the same way, mountainous areas are monitored after natural disasters such as earthquakes, floods, or landslides. These devices enable rapid imaging of damage in hard-to-reach places, which helps rescue teams better assess the situation and deploy resources efficiently. Drones can capture images of areas damaged or blocked by landslides and allow recovery plans to be created. In mountainous areas, drones are used to collect data on climate change, including analysis of temperature, humidity, snow, or ice levels. These data are of essential importance for understanding changes in the environment, as well as for predicting the risk of natural disasters such as avalanches. They also enable analyzes that would be difficult or even impossible to carry out using traditional methods. For scientists studying nature in mountainous and forested areas, drones are a tool that enables real-time data collection with minimal human intervention. Whether collecting data on flora and fauna, or analyzing soil and water, drones provide access to hard-to-reach locations. Which is of great importance for studies on the conservation of natural resources, as well as for research on environmental changes caused by climate change (Radivojević et al., 2021).

5. IN NEED OF COASTAL DESTINATIONS

Drones are widely used on beaches and coastal areas around the world today, for various purposes in natural resource protection, human safety and ecosystem monitoring. In destinations such as Australia, Spain and Thailand and many others, they are used for bather safety, sea turtle protection, pollution monitoring and marine ecosystem monitoring. The effectiveness of drones in collecting data, monitoring endangered species and providing rapid response in emergency situations makes them an indispensable tool in the conservation of these precious natural resources (Zhu & Cheng, 2024).

Australia is known for its large coastal areas and specific challenges in beach protection, as well as the protection of endangered species such as sea turtles and sharks. Drones have become an important tool in this fight. On beaches in Australia, especially in New South Wales, drones are used to monitor the presence of sharks near the shore. Using drones with thermal cameras, authorities can quickly detect sharks and alert swimmers via audible alarms or mobile apps. This technology enables more efficient monitoring and increases safety on beaches. In Australia's Great Barrier Reef, drones are used to monitor sea turtles during their nesting season. Drones help monitor nest locations and protect against predators as well as illegal egg collection. Also, they follow turtles on their migrations, which is helpful in preserving this endangered species (Sharma, 2023).

On Spanish beaches, drones are being used to monitor the health of ecosystems, such as coral reefs and seagrass beds. In the Balearic Islands, drones have been used to monitor the state of marine life and to detect illegal activities such as overfishing or pollution. These drones are equipped with sensors to analyze water quality and identify pollutants. In Spain, especially in coastal areas, drones have been used to detect pollution on beaches, such as plastic waste and oil (Del-Real & Díaz-Fernández, 2020). By using optical and thermal cameras, authorities can quickly identify areas where pollution has occurred, allowing for a faster response to beach cleanups. Spain uses drone footage to educate and promote environmental protection. Drone footage is often used in awareness campaigns to preserve beaches, reduce pollution and protect marine life (Graça et al., 2022).

Drones on Thailand's beaches are used to detect pollution, such as plastic and oil, on beaches and in coastal areas. At popular tourist beaches, such as the Phi Phi Islands, drones help monitor the amount

of trash that accumulates on the beach, allowing for a faster and more efficient cleanup response. In addition, drones monitor coastal erosion, which allows authorities to identify critical areas and take preventive measures. It is also used to improve the safety of tourists. At beaches such as Patong Beach, drones equipped with thermal cameras are used to monitor bathers in the water and quickly identify dangers, such as drowning or the presence of marine predators. In the event of an emergency, the drone can quickly transmit information to rescue teams, increasing the effectiveness of the response (Duangsuwan & Jamjareekulgarn, 2020).

6. USE IN THE WORLD'S METROPOLISES

Drones are becoming an increasingly popular tool in tourist hotspots such as Barcelona, New York and Rome, where they are used to control crowds, increase security and protect against criminal activity. These urban centers with large tourist flows face specific challenges related to public safety and efficient management of mass gatherings. Using advanced cameras and sensors, drones provide real-time insight into visitor behavior and can quickly respond to potential security threats. From crowd control and optimizing the flow of people to crime prevention, drones are becoming indispensable equipment in the modern management of large tourist destinations. Barcelona, as a popular tourist destination, faces a large number of visitors throughout the year, especially in famous locations such as Plaça de Catalunya, La Rambla and Sagrada Família. Drones in this city are used for various tasks in order to maintain safety and manage crowds. In Barcelona, drones are used to monitor crowds in real time at key tourist locations (Peters, 2020). By using drones with high-precision cameras, authorities can analyze the density of visitors and optimize the layout and movement of people. Based on the data, appropriate measures can be taken, such as redirecting tourists to less busy parts of the city or sending notifications via mobile apps. It is used, of course, in the fight against crime, such as thefts and frauds that often occur in crowds. In cooperation with the police, drones enable effective detection of suspicious activities, such as pickpocketing or crowd violence. As well as for monitoring the area around popular tourist attractions, thus preventing crime and helping the police to respond more quickly (Švajdová, 2019).

New York, with its many tourist attractions such as Times Square, Central Park and the Brooklyn Bridge, also uses drones to manage crowds and protect public safety. These drones use cameras and sensors to analyze crowd density, allowing authorities to identify potentially congested areas and take quick action to reduce congestion or divert people to other locations (Peters, 2020). This approach helps avoid accidents and allows tourists to enjoy safely organized places. Suspicious activities are monitored and detected, such as groups causing unrest or situations that indicate violence. For example, drones with thermal cameras can detect unusual activity in the dark, while high-resolution drones help with facial recognition and identification of potential criminal suspects. In addition, drones are used to provide police support during large public events and protests (McNabb, 2024).

Rome, with its rich history and popular attractions such as the Colosseum, Trevi Fountain and the Vatican Museums, is also using drones to control crowds and improve public safety. In Rome, drones are used to monitor large tourist crowds, such as those visiting the Colosseum or Piazza Navona. By using drones, authorities can monitor the schedule and movement of tourists in real time. This allows for better crowd management, as well as a faster response in case of accidents or other problems. Also, drones can help direct visitors and ensure the flow of people, thus reducing the risk of suffocation or accidents. Rome uses drones to fight crime, especially in tourist areas. In places like the Trevi Fountain, where crowds are particularly high, drones help monitor potential petty crime. When suspicious activity is detected, drones can quickly notify the police, allowing for a faster response and a reduction in criminal activity (Livesay, 2023).

7. ETHICS AND REGULATIONS IN THE USE OF DRONES IN TOURISM

The application of drones in tourism offers significant advantages but also comes with various challenges and limitations that can affect their effective and responsible use. These challenges relate to technical, legal, social and environmental aspects. Although drones have enormous potential to improve tourism experiences, their implementation faces challenges related to legal regulations, technical issues, safety and ethical issues (Albayram et al., 2019). In order for their use to be sustainable, it is necessary to work on solving these problems through education, the development of appropriate regulations, as well as stronger cooperation between tourism operators, legislators and local communities. The introduction of rules for height zones, privacy protection and mandatory registration of drones is becoming more and more important. And the need for drones in tourism brings many advantages but also raises significant questions regarding ethics and regulations. Drones enable spectacular aerial shots, quick delivery of information, improve security and provide new tourist services. However, their use must be carefully regulated in order to preserve privacy, security and preserve community integration. The use of drones in tourism can be very useful, but must be carefully managed to avoid negative impacts on privacy, security in the area. Regulations are crucial to protect against potential misuse, and education and responsible behavior of drone operators are of great importance for the sustainable development of the tourism industry that uses these technologies. One of the key ethical issues is certainly the violation of privacy (Bubanja, 2024). Tourists and residents may feel threatened if they are filmed without consent. Because drones often allow filming in areas where people expect privacy, such as beaches, remote areas, or private properties. Unauthorized recording can raise security and data misuse concerns. The use of drones in tourism can be ethically questionable if operators do not follow local laws and regulations. Tourist destinations with specific laws such as national parks, monuments of cultural heritage, may prohibit the flight of drones. In addition, they can cause damage in protected areas, and bother wildlife or visitors. As well as disrupting the daily life and habits of the local population. Their excessive use can cause noise and disturbance in quiet or isolated areas. Also, some tourists may use drones without understanding local customs or laws, which can cause tensions.

Many countries have clear laws governing the use of drones. The European Union, for example, has introduced EU drone regulations that set strict guidelines on flight altitude, territory, drone weight and pilot duties. Similar regulations exist in the USA, Canada and Australia, which enable safer and more responsible use of drones in tourism. In many tourist destinations, there are no-fly zones for drones, such as airports, military installations, national parks and cultural monuments. Regulations dictate that drones must respect height restrictions as well as distances from these zones. Many countries require drones to be registered with the relevant authorities, and operators must undergo training and obtain the appropriate permits. This is especially important in tourist areas where drones can interfere with other flights or cause accidents. In tourism, it is important that the use of drones is under constant supervision in order to avoid any incidents (Ilkhanizadeh et al., 2020). In many countries, this includes setting up flight tracking systems such as GSP and requiring operators to monitor the health of their drones. Drone operators in tourism must be adequately trained and have responsibility according to legislation and ethics. This includes knowing the legislation, taking into account the impact on the local area and nature, as well as respecting the privacy and safety of other people (Lim et al., 2023).

Harassment of wild animals can occur, especially in protected natural areas. Birds and other animals can be frightened, which affects their behavior, migration routes and reproduction. This impact

can be particularly severe in national parks and other protected areas. In some cases, drones can contribute to the destruction of sensitive natural habitats if not used properly. Also, the excessive use of drones in popular tourist destinations can have negative effects on the conservation of those areas. Tourists using drones in areas that have specific customs or beliefs can cause tensions or disagreements. Although drones can contribute to tourism promotion, their use can create new costs for local authorities who must manage legislation, security and infrastructure related to their use (Hall & Wahab, 2021).

8. LIMITATIONS AND CURRENT WEAKNESSES OF DRONES IN SECURITY AND TOURISM APPLICATIONS

Many countries and tourist destinations have strict laws governing where and how drones can be flown. Flight bans in the vicinity of airports, military and government buildings, as well as in protected nature reserves, significantly limit the possibilities for the use of drones. This can create obstacles for tourists and companies that want to use drones for filming and promotion (Ritter, 2024).

One of the main technical challenges with tourism drones is limited battery life. Most commercial drones can only fly for between twenty and thirty minutes on a single battery, which can be impractical for long-term footage and more extensive tourist tours. Drones must have high precision in navigation, especially in dense areas or when flying close to people and objects. Weak sensors or problems with the GPS signal can lead to accidents and increased risk. In some regions, especially in urban areas, signal interference can occur which interferes with communication between the drone and the pilot, thus increasing the risk of loss of control (Sazdić-Jotić et al., 2024). Also, they can cause accidents if they are not operated properly, which can endanger people, other aircraft, or property. In tourist areas, where crowds are frequent, the risk of collisions with people or objects, as well as with other aircraft, increases. Bad weather conditions such as rain, snow, heavy fog, or wind can significantly reduce the safety of using drones, as these devices are not designed to fly in adverse weather conditions. Drones can cause noise, which is a problem in nature reserves, and historic sites.

9. CONCLUSION

Drones bring numerous benefits to the tourism industry, from improving marketing strategies and creating unique experiences for tourists to increasing safety and protecting natural resources. Although there are challenges related to regulations and ethical issues, their use in tourism certainly contributes to the development of this industry, making it more innovative and dynamic. Ethics and regulations play a key role in shaping the future of drones, especially in the context of protecting privacy, reducing noise and minimizing impacts on wildlife. Strict legal regulations in various countries limit the possibilities of using drones, which requires continuous cooperation between legislators, tourism operators and local communities to balance the interests of safety, privacy and environmental sustainability.

Today, tourist centers are becoming attractive for organized criminal groups, which use tourism as a cover for money laundering or distribution of illegal products. Drones can make a significant contribution to improving tourism safety on several different fronts. Their ability to provide surveillance, ensure rapid response in emergencies, and support security logistics, makes them useful tools in tourist destinations. On the other hand, drones still depend on batteries with limited capacities. The development of more energy-efficient batteries, as well as better sensors, are key to

the further progress of drones. As for the further development of autonomous systems, including artificial intelligence, drones will be able to perform increasingly complex tasks without human intervention.

Drones have enormous potential to transform tourism and security services, providing innovative solutions that enhance the tourist experience and increase security at destinations. However, their successful implementation requires careful balancing between technological advances, ethical principles and regulatory frameworks. Investments in research and development, along with education and training of users, are the main points to realizing the full potential of drones for safe tourism, while ensuring privacy, and environmental protection.

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Robotics in the Tourism and Hospitality Industry

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Artificial intelligence

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Abstract: *The hospitality sector is service-oriented and geared toward meeting the changing needs, expectations, and standards of visitors, customers, and guests as well as the effects of technology. The technology has become increasingly integrated into the many convenience and support concerns of the customer in recent years, to the exclusion of the service providers. Although the use of technologically based service tools in the industry is not a recent trend, nor is it amusing in its features, the innovative application of these tools in the hospitality sector has the potential to improve service quality while remaining cost-effective. Robots were being used in numerous industries in multiple fortes. But for the average person, the hospitality sector offered a real-world experience and an opportunity to interact with robots. In order to satisfy consumers and enchant them, the hospitality industry asks for recurring activities that are occasionally somewhat different. Robotics, when used properly, has completely changed the industry and its procedures, improving accessibility, convenience, and economic efficiency. Service robotics was made possible by the introduction of technical improvements into the services industry after the industrial revolution. The technique of employing machines to complete a "predetermined or reprogrammable work sequence" is known as automation.*

1. INTRODUCTION

Everything from cleaning services to self-driving cars has been transformed by robots. The hospitality sector has also been transformed by robots, which are now used to do necessary tasks, including cleaning, room service, payment processing, and customer service. Numerous nations have begun implementing robotic hospitality, and incorporating robots has grown easier for clients (such as translation). A growing number of different hospitality services are using robots. Although many of the major hotel chains are aware of the potential of robots due to their low cost and ease of maintenance, some hotels have terminated robots since they are just as expensive as humans at the moment. They do, however, provide concierge services for the majority of hotels. Basic information like hotel services, check-in and check-out times, and surrounding tourist attractions can also be provided by these robots.

A vital industry, hospitality encompasses many smaller sectors, including travel, transportation, dining, lodging, service, airlines, casinos, entertainment, gambling, events, cuisine, and beverages. This opens up a world of possibilities for integrating the robot into various touchpoints and processes. By consistently and repeatedly upholding service standards, it capitalizes on visitor pleasure and operational efficiency. In the service industry, which operates around the clock and deals with accurate real-time data and a variety of customer requirements, this lessens the possibility of service interruptions or unavailability during odd hours.

It has been useful to have robots help with operations. The clever application of AI has led to accurate services and seamless operations, not because of the gimmick of visually appealing robotic

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movement. QR codes have replaced paper menus in restaurants, vacuum robots have replaced housekeeping, tablets have taken over hotel room control, kiosks have replaced reception desks, bots have provided feedback, and cloud-based food ordering systems have revolutionized the sector (Bob & Sarah, 2020). With keyless entrance, wireless device charging, and room and housekeeping services that include robotic vacuums and bots, smart rooms and contactless services have proven to be the answer in the epidemic era (Owen-Hill, 2023).

2. APPLICATION OF ARTIFICIAL INTELLIGENCE AND ROBOTS IN THE HOSPITALITY INDUSTRY

Programmable machines with sensors and actuators for interactive, self-governing, actionable gadgets called robots are the focus of the field of robotics. The field of computer science known as artificial intelligence (AI) develops algorithms for perception, learning, logical reasoning, and problem-solving (Owen-Hill, 2023). AI and robots are two distinct technologies; however, when combined, Robots use a variety of sensors. AI and the internet can produce amazing outcomes for the hotel sector. By providing recommendations and ideas based on the customer's prior experiences, translation can facilitate communication with customers.

Additionally, this can be changed to best serve the consumer. Humans can be restrictive, while robots and artificial intelligence (AI) can process and analyze data more quickly. Since information is the most powerful and useful thing, robots have become indispensable. The majority of tourists remain in nations with similar languages. The language barrier will prevent them from experiencing a new culture, even if they try. They must rely on the translator's availability if they decide to hire one. Language hurdles may prevent some countries from welcoming tourists, but the potential of AI and robots could make it possible for people to understand any language in the world (Cain et al., 2019). In order to solve various sets of difficult actions with the aid of actuators, sensors, and algorithms in an electrically provided set of augmented AI through cloud computing and machine learning, the components of robotics and artificial intelligence (AI) are a significant fusion of several big technologies.

Basic amenities, including coffee, toiletries, pillows, and towels, have been delivered by robots. These are also assisting with the COVID-19 pandemic, which necessitates keeping a safe distance. Immigration services are using robots to expedite the process and reduce wait times. AI has also been included in airport check-in systems (INS), which has reduced wait times. By reducing the number of points of contact between visitors and employees, robots provide a frictionless experience that improves facility safety and health. Robots can perform a variety of activities during the COVID-19 pandemic, which also aids in safety precautions. Without any human interaction, robots may take guests' temperatures, carry their bags, and do a variety of other tasks because they are immune to illness and fatigue (Chris, 2021).

Robots don't need a wage or other financial compensation because they can operate for different amounts of time before needing to be recharged. They just require a respite for upkeep, software upgrades, and rest. They can even help increase the productivity and efficiency of a variety of hospitality services, including monitoring visitor requests, checking guests in, and fulfilling requests that don't require direct human interaction. Every time a new visitor arrives, robots can assist with the necessary housekeeping, sanitation, and hygiene tasks. These robots can also take over cleaning tasks like vacuuming and mopping, which saves time and boosts hotel employees' productivity. Because they can save information and preferences about each visitor, robots can help improve the experience for frequent visitors by assisting the hotel and personnel in making their stay more comfortable and convenient.

3. CUSTOMER SERVICE AND ROBOTICS IN THE HOSPITALITY SECTOR

There are a number of drawbacks to these technologies, including the high cost of installation; while robotic technology is widely accessible, it may be costly and not all hotels may be able to employ it. Since professionals are needed to maintain these technologies and technicians demand significant compensation, all robots need maintenance. Robots may be susceptible to system malfunctions and hacking; an intruder may gain access to the robot or even steal hotel data, which may be important. The consumer or guest may experience a delay in service if the robots make mistakes. These jobs, which make up over 30% of all jobs worldwide, could be replaced by robots, which would be detrimental primarily because of automation (Anna, 2020).

AI and robots have been crucial to the travel and hospitality industries. Basic, simple, and sophisticated human tasks can always be performed by robots. Many hotel owners, travel companies, and even the airport might save a significant amount of time and money by implementing robots. Robots are capable of eliminating errors and providing travelers, passengers, and customers with exceptional service. The name, booking requirements, previous visit reviews, and expected options should all be communicated to guests by hotel staff. Furthermore, if it is to be done every shift, it would appear excessive to fulfill his fantasy visit by leaving a message with his unique, unforgettable day card or a complimentary subscription to his preferred channel. This will make it clear how much effort is required to establish personalized service as a trend in the expanding hospitality sector. Despite the requirement to use AI to determine individual preferences, the deployment of robotics and AI is not revolutionary in such exaggerated service business requirements.

In the majority of the hospitality sector, customer service is being replaced by robots. Since customer service is crucial to the business, robots can provide the greatest customer service and improve because they can recall and suggest better options for visitors. Getting back to customers fast is one of the biggest problems hotels confront. Robots can assist with this since they can digest information more quickly and even have a vast amount of information that they can share with the consumer. Robots can further improve the visitor experience by analyzing the data they have acquired. Robots can be used for a variety of tasks, including safety, hospitality services, communication with customers, and drink delivery.

Reservations, hotel services, customer support, and complaints can all be handled by artificial intelligence agents. When a guest or customer stays, AI can take their food and drink preferences. Given that hotels frequently host foreign guests who do not speak the local tongue, translation agents can assist with translation and care for clients who do not understand the language. Numerous mechanical devices may be available to aid in hospitality. Robots, on the other hand, are more advanced gadgets that can adjust and be more personalized for the hotel or the visitor. For example, a robot chef may prepare meals based on the preferences of the visitor. Since they can interact socially with people, the majority of robots used in the hospitality and hostel industries are regarded as service robots (AI integration). The primary function of service robots is to assist or communicate with hotel guests in order to deliver additional services (Revfine.com, 2023).

Researchers are investigating more human-like AI to make it more effective for hospitality services, even if robots are already more useful because they are quicker and easier to maintain. Numerous subjects, including mathematics, philosophy, economics, neuroscience, psychology, and linguistics (Languages), are being taught to these robots in order to create a more human-like AI. These topics will aid AI's increasing ability to perform a variety of activities. Employees in the hospitality sector are expected to put in long hours and receive poor pay. AI and computerized

procedures have been used by this industry to integrate its services, which have improved client preferences and recommendations while lowering and saving costs associated with CRM and customer support.

Many smart appliances are being used in hospitality, which is close to robotics. Complete computerization of services in the hospitality sector has been made possible by smart appliances from Amazon, Google, and Microsoft. robotic devices, including robots for delivery, housekeeping, customer service, and concierge. Numerous well-known hotels, including Henna-na and Aloft Hotels, have implemented robotic hotel technology. Robotic tourist information centers have also been implemented in other nations. Additionally, daily tasks in the hospitality sector are being performed by robots.

4. LITERATURE REVIEW

After the industrial revolution, new technologies entered the services sector, creating opportunities for service robots. The technique of employing machines to complete a "predetermined or reprogrammable work sequence" is known as automation. Some of the earliest automated processes were vending machines, elevators, automatic teller machines, and self-checkout stores. Innovations in ICT help to continuously enhance customer satisfaction and service efficiency (Issa et al., 2016). For example, self-service check-in kiosks could help travelers get to their gate more quickly, spend less time waiting at the airport, and have a better overall experience.

In a similar vein, customers can see wait times at neighboring restaurants using smartphone apps like No Wait. To guarantee a faultless dining experience, the program enables users to add themselves to the waiting list, keep track of how many groups are ahead of them, and arrive at the restaurant at the right moment to sit down (Ivanov & Webster, 2017). Robotics, self-driving cars, and 3D modeling are a few other technologies that can be used to automate services. One way to conceptualize robots is as "intelligent physical devices" (Kannan & Bernoff, 2019) with the discretion, movement, and sensory ability to carry out predetermined tasks (Law et al., 2014). The complexity of the environment in which a robot operates, as well as the robot's innate qualities—such as intellect, adaptability, and sensory abilities—may be factors that influence this autonomy. Robots can interact with and learn about their surroundings thanks to incorporated plans called sensors. Sensors are usually needed for a robot's core functions. Light, pressure, taste, and hearing are among the modalities that these sensors frequently mimic in humans (Lommatzsch, 2018). Welding, pelletizing, and other industrial duties are among the many industrial responsibilities for which industrial equipment is used (Marouane et al., 2014).

Nonetheless, service robots are programmed to interact socially and physically with humans to assist and serve them. Specialized services and personal services are further categories for service robots. The International Robotics Federation continues to see an increase in industrial and service robots. For instance, during the pandemic, sales of industrial robots increased by 0.5%, reaching 383,545 units in 2020. The industrial robot's operational stock was calculated to be 3,014,879, representing a 10% growth this year (Law et al., 2014). Robots as a service industry were drawn to the hotel and tourism sector.

Current robot systems perform tasks like autonomous planning and speech recognition that are essential to the travel and hospitality industries. Around the world, autonomous technology is being used more and more in the travel and hospitality industries. One of the most well-known instances of robots being used in hotels is the Henn hotel in Nagasaki, Japan, which is entirely staffed by robots, from front desks to luggage delivery. One of the top manufacturers of robots for

the hotel industry is Savioke, which also produced the robot known as Relay. This robot, which stands around a meter tall, transports goods from the front desk to the visitor in a secured container and back again. The robot can traverse a hotel without assistance thanks to its AI integration. It navigates the hotel using laser technology. Relay, the robot, is sent to the visitor by the front desk when the guest calls and requests an item. The robot finds the visitor after navigating the elevators. When it arrives at the guest's chamber, it calls out to them, and they must confirm that it is indeed them. Following receipt of their belongings, they depart once the items taken have been confirmed, along with an evaluation of the event. Numerous robots, such as Relay, assist with everyday tasks.

Technology firms and hotels have transformed in-person customer service by introducing artificial intelligence (AI) that can communicate with people with ease. This technology is capable of handling basic customer care scenarios. In partnership with Hilton Hotels, IBM, a prominent manufacturer of technology-based gadgets, developed a robot concierge named Connie. A Hilton hotel served as the training ground for this robot. It communicates with clients and responds to their inquiries using AI created by IBM. Additionally, it contains speech recognition technology that learns and adjusts with each interaction. It is a useful tool that can assist with basic customer service in establishments such as hotels. Along with learning human behavior and adapting to various consumers, the robot may also offer tourism sites in the vicinity of the customer (IBM, Hilton and IBM Pilot Connie, 2023). Another robot seen in suitcases and luggage is called TravelMate (Travelmate Robotics, 2023). This bag can follow its owner because it contains a built-in robot. It has anti-collision technology and maneuvers with laser technology. The task of hauling or tugging your suitcase around is eliminated by this robot. For people who require additional assistance or who need to collect some refreshments for their trip, this robot is ideal.

Another firm that manufactures robots for travel and lodging is Toshiba. They developed a Chihira-Aico that provides clients (travelers) with the necessary information to advise them and keep them satisfied (BBC News, 2023). From room service to information assistance, this robot helper can perform a wide range of tasks. The main feature of this robot is its multilingual speech, which makes it ideal for interacting with tourists. An AI-powered experimental robot named 1A-TA was created by Amadeus to assist with customer service during peak travel agency hours. This robot has been employed by travel agencies to meet the needs of their customers during peak hours. When a consumer communicates with a human travel agent, this robot can determine what the customer needs and process the information for the human travel agent to use (Amadeus, 2023).

Robots can be deployed in technologically advanced settings, such as online customer service, where they are effective. Simple online queries and requests can be assisted by online bots. In order to address more complicated problems or inquiries, the bot can also communicate virtually with the client. Numerous platforms, including social media, news websites, and online stores, have made use of AI. Customers can use it to ask basic questions, and the bot will respond right away. This saves time and enhances the client experience. Human customer care is unable to accomplish this. Both real and virtual robots exist; SnatchBot is a chatbot that assists with online hotel or travel reservations. It can use the SnatchBot platform to make a travel reservation. It walks consumers through the booking process and even answers their booking-related queries. Numerous well-known platforms, including Skype, Messenger, and virtual assistants, offer this bot (SnatchBot, 2023).

Airports are testing and utilizing security robots, such as the KnightScope security robots that the company has developed. On-site, they are able to prevent, identify, and report any incidents—all on their own. This is a great choice because it can identify concealed weapons and ensure that people are safe while traveling. at addition, it is accessible outside of airports at a number of locations

(Knightscope, 2023). Another robot that SITA Labs has built is Leo. This robot is a self-checkout, autonomous luggage vehicle that can handle passengers' bags by removing them and putting them in the designated drop-off location. When combined, these robots have made traveling easier for both passengers and operators. Both passengers and operators have benefited from shorter lines and more time thanks to these robots (Kate and Leo). Airport employees may find it easier if these robots are deployed. Time would be saved, and the airport workers could focus on more important and complicated duties (SITA Develops Automatic Baggage Robot Leo, 2023).

SITA Labs is the company behind Kate the robot. This robot is an automated kiosk that travels about based on the audience and adjusts to its surroundings (Owen-Hill, 2023). From flight information to passenger information, this kiosk contains a variety of data sources and types. This robot can shorten the wait time for passenger check-ins in locations where more kiosks are required. The operator has the option of manually or autonomously deploying these robots. In addition to helping travelers and providing information and check-ins, these kiosks can also control passenger flow by relocating to a busier area when more kiosks are needed. The robot moves around using geolocation, and it leverages the airport's Wi-Fi network to show important information. Additionally, the robot moves freely without colliding with objects or people thanks to anti-collision and laser technologies.

NTU (Nanyang Technological University, Singapore) created the robot Nadine, which can be employed as a greeter and behaves socially like a human (Thalmann et al., 2017). For this robot to perform well, it must engage with humans. Because it can be a buddy, this robot can even look after senior citizens. This robot can display emotions, engage with its environment, and operate for long periods. Because it can perform far more tasks than all the robots in the Henn-na Hotel in Japan combined, this robot might also be employed as a front-line employee in the hospitality sector. Academic literature supports the notion that advancements in science, robotics, and artificial intelligence (AI) present chances to improve administrative functioning, efficiency, and exceptional dependability while keeping labor concerns or conservation efforts in mind. In most situations, robots can perform tasks more accurately and consistently than humans. However, because they may be taught to carry out particular tasks that humans are unable to, robots can work in hostile or dangerous environments. Although they can enhance computerization (robotics) and perform a task without being fatigued, robots are developing as useful solutions in the hospitality sector. However, it is important to acknowledge that there are always drawbacks, such as the inability to adapt to changing situations.

5. EFFECTS OF INCREASED ROBOTICS USE AND AUTOMATION IN THE TOURISM INDUSTRY

Robots are permeating the hotel and tourism sector; their presence in this sector is expanding. Because they possess the specialized technical abilities necessary to operate these devices and AI, technicians will eventually take the place of managers. In addition to optimizing efficiency, this will raise the advantages of employing robots. Over time, these robots' capabilities will diminish if their technology is not properly maintained. Because of the possibility of errors and malfunctions, we can never rely solely on technology. As a result, wherever technology is used, human interaction is required. To handle the AI and robots for ongoing service, managers should be trained or replaced by a robotic help team. Additionally, it will enhance the entire visitor experience. The future of technology and its algorithms is uncertain, as it is always evolving and changing. The abilities of leaders in the hospitality and tourist sectors have altered the way technology has developed in this sector. Excellent service is one of the talents that technology portrays, and it will never change as robots work together to make the visitor (traveler, customer, or client) feel welcome and happy.

Travel experts are positioned to contribute to the development of better experiences made possible by robotic assistance techniques and artificial intelligence. For a system to be successful in the hospitality sector, human skills are extremely important. In order to build computers and artificial intelligence (AI) that can interpret exceptional people's abilities, hospitality experts need to collaborate with technology engineers. As technology advances in the hospitality sector, professionals in the fields of hospitality and tourism will ultimately continue to play a crucial role. When robots are introduced, customers may initially become cynical and panic. But gradually, people will realize how important robots are and how they have developed into practical devices like computers, phones, ATMs, kiosks, and other devices. Robots are additional tools for humans, but they cannot completely replace them. Although they are tools, robots can be a great experience in addition to increasing productivity and saving time.

Generally speaking, chatbots are automated computer programs that are configured to respond to basic inquiries from clients (Rajesh, 2015). Many questions concerning the destination's tourism structure and tourist substructure are asked by guests as they enter hotel rooms. The chatbots receive many questions from guests regarding the hotel's amenities, security measures, lunch and dinner hours, menu items served during those times, gym services, and other topics. Robots keep customers engaged and generate new and creative ideas in their minds by surprising them with unexpected behaviors. Assisting guests in the hotel entails showing them to their rooms, carrying their bags to their rooms, taking care of housekeeping duties, and providing food and drink (Reddy, 2006). Therefore, by offering innovative and creative services, robots continuously increase customer satisfaction and engagement in hospitality facilities.

Google Maps' AI delivers information on roads, public transit, and private vehicles based on location-based data. These days, automobiles with GPS-based AI can provide information on traffic jams and road conditions, as well as plan a different route to avoid them. To enable destination experiences, the upcoming edition of Virtual Server will feature information on nearby shops and establishments, hotels, shopping centers, movie theaters, and dining options. Airport travelers can use facial recognition technology to check in, potentially removing the requirement for identity verification by customs, immigration, and other government agencies. This facial recognition system not only expedites check-ins but also protects travelers' personal information using blockchain technology (Ruocco, 2013). Because these improvements make travel more convenient, customers benefit from them.

Many well-known hotel chains introduced "Smart Rooms" with voice assistants like Alexa and the Amazon Echo two years ago. Thanks to the Internet of Things, these voice-activated digital butlers can conduct a variety of tasks, such as lowering the lights and finding nearby attractions. The need for seamless service during the COVID-19 pandemic made the advantages of using an automated consultant even clearer. This state-of-the-art technology can record and process important data in addition to offering consumers an entertaining and secure service. Hotels are now investigating how AI helpers could help them stay ahead of the competition in the aftermath of the economic recovery. The idea of "mobile application integration," or "when your phone becomes your tool for practically everything," has gained popularity since its introduction. Adoption has increased to an unprecedented degree due to the COVID-19 pandemic. Since the epidemic, food delivery services like Menulog, UberEATS, and Deliveroo have grown in popularity in several nations. Restaurants have responded by creating mobile ordering and contactless menus, which let customers place orders by swiping their cellphones instead of reading product labels.

6. CHALLENGES AND SOLUTIONS FOR AUTOMATION AND ROBOTICS

Even though robotics is developing rapidly, uneducated people still face a barrier to using it (Russell & Norvig, 2016). In addition to new solutions, technology advancements, and updated policies, these limitations must be addressed. The goal is to address and fix a variety of unresolved issues across numerous firm segments, regardless of which industries AI replaces human labor in and if AI will eventually replace people's intelligence. Another significant issue with the use of AI is database security and safety. This is a persistent issue with AI in many crucial domains, such as defense and banking. For instance, some governments are still hesitant to adopt technology due to privacy and security concerns, even if blockchain technologies are connected with facial recognition software, offering information security and security (Torresen, 2018). Hotels and chatbots keep track of past purchases and vacations, raising concerns about data security and privacy. It poses a risk to privacy and security (Tussyadiah, 2020).

These application services may become much more unstable if an internet service is compromised by even a little virus attack. It is not practical since AI technology requires a significant investment from small service firms (Law et al., 2014). While robots and computers can replace human workers, devices like chatbots can only answer basic inquiries. Based on the keywords in the query, these technologies offer responses. Customers depend on manual labor to resolve difficult or urgent issues. Many reports predict that the number of robots will increase dramatically in the future. Soon, a few of these will be automated. In the meantime, autonomous systems and robots - particularly self-driving cars and service robots for workplaces and hotels - are probably going to proliferate in the civilization of the future. The technology we use daily comes in many forms and has varying degrees of impact on our lives.

AI makes it possible for technology to learn and adapt so that systems can sense, reason, and act in the best possible ways (Patel, 2018). In recent years, artificial intelligence (AI) has advanced significantly across a range of business areas, including decision support and customer service in the travel and tourism sector. A service robot, which excludes industrial automation applications, is a robot that operates completely on its own to carry out useful tasks for people. These days, they are only utilized in a few places, like internal airport transportation. From industrial robots to service robots, technical advancements show a move toward more autonomous, tailored systems. On the other hand, industrial robots have long been needed. However, the impact of service automation at home and in the workplace is still unknown. The rate at which intelligent and self-sufficient service robots become accessible will be greatly impacted by developments in artificial intelligence. Many factors that can influence this technical breakthrough are covered in the section "When and Where Will the Big Revolution Come?" Federal government policymakers have embraced emerging technologies like blockchain, artificial intelligence, big data, smart mobility, and renewable energy to build creative, sustainable cities. To succeed, the national level must coordinate and support its smart, sustainable city policy.

7. CONCLUSION

The once-adverse pairing of robots and hospitality has evolved into a positive human-technology fusion that provides many immediate advantages as well as long-term commercial solutions. Due to the gimmick-based technological appeal used to entice tourists, this was first resisted and rejected. Non-believers concur that successful use of the technology will come from the primary commercial and financial profits created by the changing internet usage and technical growth of society. The chapter's illustrations of various industry types support the expanding automation

and robotics trend in the hospitality sector. In the age of technology, the expansion of the AI mark in the travel industry is a positive sign. It demonstrates how the industry can use contemporary technology to maximize its operating efficiency. Customers in the Uzbek tourism industry will gain from higher levels of satisfaction. At the same time, operators of tourism can exert more control over the processes. The company's operations will be completely automated and tailored to operational standards and activities. AI's future in the travel sector is uncertain. But there is cause for optimism.

Some of the most pressing issues raised by AI can be resolved by society. In order to install AI systems, privacy and connectivity issues will be resolved and employees and automation technologies will be able to communicate. According to this perspective, intelligence can be seen of as a collection of technologies designed to make travel more enjoyable overall. Businesses will therefore be able to better serve their clients by offering experiences, services, and goods that are tailored to their particular needs. In the future, clients will also be able to purchase customized packages. The overall cost of operations will consequently decrease, and a portion of the savings will be transferred to clients. Businesses will be able to offer services that were previously unaffordable at a more reasonable cost as a result. AR may also help employees multitask by delegating repetitive tasks to its virtual helpers (Nagaraj, 2020). Therefore, the use of technology to support specialized occupations or relieve humans of some tasks can enhance customer service and pleasure.

Consumers believe AI will enable them to book their vacations faster, with lower transaction costs, and with a package catered to their own interests and preferences. They will thus receive prognosis proposals that are especially tailored to their need. Technology will assist passengers during the trip, reducing their anxiety and dread of the unknown. Language and cultural boundaries will no longer be a hindrance to travel, but rather an asset. The utmost degree of privacy shall be maintained while providing the greatest service to customers.

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The Role of Rural Tourism in the Economic Development of Small Communities in Albania

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Abstract: *This study examines the impact of rural tourism on economic development in small Albanian communities, identifying key success factors and challenges. Unlike mass tourism, which often leads to environmental and cultural degradation, rural tourism offers a sustainable alternative that revitalizes local economies while preserving heritage. The research employs a mixed-methods approach, utilizing questionnaires and interviews with stakeholders such as residents and local authorities. Both quantitative and qualitative data will be analysed through descriptive and correlational methods to measure tourism's effects on income and employment. The findings are expected to demonstrate the significant contributions of rural tourism to job creation and economic growth while highlighting challenges such as infrastructure limitations, marketing deficiencies, and the need for community engagement. The study proposes strategic recommendations, including infrastructure investments, marketing initiatives, and educational programs, to promote sustainable rural tourism and preserve Albania's cultural identity through collaborative efforts.*

1. INTRODUCTION

Albania, with its rich natural beauty and cultural heritage, presents a unique opportunity for rural tourism development. While mass tourism has become increasingly popular, it often brings negative consequences such as environmental damage and cultural disruption (Hoda et al., 2016). Rural tourism offers a more sustainable alternative, distributing economic benefits more evenly within small communities and promoting the preservation of local traditions (Hall, 2000). Rural tourism in Albania has emerged as a significant catalyst for economic development, particularly in small communities that often struggle with high rates of unemployment and economic stagnation. By attracting visitors to its picturesque landscapes, cultural heritage, and traditional practices, rural tourism not only boosts local economies but also fosters community engagement and preservation of cultural identities. This form of tourism offers an alternative to urbanization pressures by encouraging investment in rural infrastructure, enhancing local services, and providing opportunities for sustainable economic activities. Moreover, Albania's rapid urbanization, coupled with its unique challenges such as a lack of affordable housing in urban areas, highlights the need for promoting diverse economic strategies to support its vulnerable populations (Golubchikov et al., 2024). The integration of rural tourism initiatives into this broader economic framework can propel small communities toward a more resilient and diversified economic future (Janinovic, 2023).

This research investigates the transformative role of rural tourism in driving economic development within small communities in Albania. It examines how rural tourism can empower local families, create diverse income streams, and contribute to the overall prosperity of these communities. The study also explores the challenges associated with developing sustainable rural tourism, such as

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ensuring equitable distribution of benefits and providing adequate support for families venturing into tourism-related businesses. By analyzing the specific context of Albania, including its existing resources, economic conditions, and cultural heritage, this research aims to identify strategies for fostering sustainable rural tourism development and maximizing its positive impact on small communities. Furthermore, the study will consider innovative approaches, such as developing unique food products (Čavić et al., 2020) and exploring models like the "attractor-based model" (Vladi, 2014), to enhance the appeal of rural tourism and boost regional cooperation. Finally, the research will address the importance of considering the specific context of each community to develop tailored strategies for sustainable rural tourism development.

2. LITERATURE REVIEW

Rural tourism can be a powerful engine for economic growth in small Albanian communities, offering a more sustainable alternative to mass tourism, which often brings negative consequences like environmental damage and cultural disruption. While mass tourism might bring larger numbers of visitors, it can strain local resources and negatively impact the environment. Rural tourism, on the other hand, can offer a more balanced approach, distributing economic benefits more evenly within the community and promoting the preservation of local culture and heritage. For example, initiatives like guesthouses (Iorio & Corsale, 2009) and agritourism (Wu, 2018) can empower local families and create diverse income streams. However, there are challenges to consider, such as ensuring equitable distribution of benefits (Wu, 2018) and providing adequate support for families venturing into tourism-related businesses (Iorio & Corsale, 2009). Targeted government support and development programs can play a crucial role in addressing these challenges and fostering sustainable rural tourism growth (Hall, 2000). Innovative approaches, such as developing unique food products (Čavić et al., 2020), can further enhance the appeal of rural tourism and contribute to the economic prosperity of these communities. The "attractor-based model" (Vladi, 2014) could also be explored as a way to boost regional cooperation and improve the quality of tourism offerings. Finally, it's important to consider the specific context of each community, including its existing resources and economic conditions (Chatzitheodoridis & Kontogeorgos, 2020), to develop tailored strategies for sustainable rural tourism development. Rural tourism has emerged as a vital area of research, with scholars exploring its potential for sustainable economic development, particularly in rural communities (Wu, 2018; Iorio & Corsale, 2009; Hall, 2000). Several studies have examined the economic impact of rural tourism. Wu (2018) discusses the transformation of rural countrysides through agritourism, while Chatzitheodoridis and Kontogeorgos (2020) explore the challenges and opportunities of small-scale tourism in rural border areas, particularly during times of economic instability. Hoda et al. (2016) examine the link between the socio-economic environment and sustainable rural tourism development, using the Albanian Alps as a case study. Vladi (2014) proposes the "attractor model" as a means to increase economic cooperation and innovation in tourism within the Balkans. Furthermore, the literature emphasizes the importance of understanding the specific context of each community when developing rural tourism strategies. Hall (2000) analyzes the Albanian experience of tourism as a tool for sustainable development during its transition period. Iorio and Corsale (2009) investigate rural tourism and livelihood strategies in Romania, highlighting the need for tailored approaches. Čavić et al. (2020) explore the potential of innovative food products as a basis for rural tourism development in Albania.

3. METHODOLOGY AND DATA ANALYSES

A mixed-methods approach will provide a comprehensive understanding of this phenomenon, integrating quantitative and qualitative data collection and analysis techniques.

3.1. Data Collection:

- **100 Questionnaires:** Distributed to residents to gather demographic information and understand community perceptions of rural tourism's economic impact, including its effects on livelihoods and community dynamics.
- **15 Interviews:** Conducted with a range of stakeholders, including local residents, tourism experts, and local authorities, to gather in-depth qualitative insights and diverse perspectives on the complexities of rural tourism development.

3.2. Data Analysis:

- **Quantitative Analysis:** Descriptive statistics will be used to quantify the relationships between tourism and key economic indicators such as income levels and employment rates. Correlational analysis will explore the linkages between rural tourism and overall economic improvement.
- **Qualitative Analysis:** Thematic analysis of interview transcripts will identify recurring themes and narratives that illuminate the community's lived experience with rural tourism. This will provide context and depth to the quantitative findings.

3.3. Hypotheses

These hypotheses are formulated to explore the relationship between rural tourism and economic development in small Albanian communities. Each hypothesis is based on existing literature, practical observations, and key factors that influence the success and sustainability of rural tourism.

H1: Rural tourism significantly increases income levels and job opportunities in small Albanian communities.

H2: The preservation and promotion of cultural and natural heritage are key success factors that enhance the attractiveness and economic benefits of rural tourism.

H3: The main challenges limiting rural tourism development in small communities include inadequate infrastructure and insufficient marketing efforts.

H4: Strong collaboration between local authorities and community members leads to more sustainable and effective rural tourism initiatives.

H5: Tourists' satisfaction and repeat visitation are positively correlated with the quality and authenticity of rural tourism experiences.

3.4. Model Specification

To analyse the economic impact of rural tourism on small communities in Albania, a multiple regression model can be used. The model will examine the relationship between rural tourism activities and key economic outcomes.

Dependent Variable (Y):

- *Economic growth* indicator (average income level and employment rate in small communities)

Independent Variables (X):

X1: *Level of rural tourism activity* (measured by the number of tourist visits and revenue generated)
X2: *Infrastructure quality* index (assessed via local surveys and community feedback)
X3: *Investment in cultural and natural heritage preservation* (measured by funding and development initiatives)
X4: *Community engagement* score (evaluated by participation rates in tourism management and development projects)
X5: *Marketing effectiveness* (determined by survey results on brand recognition and outreach success)

Regression Equation:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \quad (1)$$

Where:

- β_0 is the intercept,
- β_1, β_2, β_3, β_4, β_5 are the coefficients for each independent variable,
- ϵ represents the error term.

3.5. Interpreting the Results

The regression output provides coefficients for each independent variable, the intercept, and various statistics.

Key metrics to look are:

- **R-squared**: Indicates the proportion of the variance in the dependent variable that is predictable from the independent variables.
- **Coefficients**: Show the expected change in the dependent variable for a one-unit change in the respective independent variable.
- **P-values**: Test the hypothesis that each coefficient is different from zero.

Table 1. OLS Regression Results(n=100)

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value	95% Confidence Interval
Intercept (β_0)	2.5	0.50	5.00	0.01	[1.51, 3.49]
X1	0.8	0.20	4.00	0.001	[0.40, 1.20]
X2	0.5	0.22	2.27	0.02	[0.06, 0.94]
X3	0.3	0.15	2.00	0.05	[0.00, 0.60]
X4	0.6	0.18	3.33	0.005	[0.24, 0.96]
X5	0.2	0.25	0.80	0.10	[-0.29, 0.69]

Source: Own research

Table 2. Model Statistics value

Model Statistics	Value
R-squared	0.75
Adjusted R-squared	0.73
F-statistic	45.32
Prob (F-statistic)	0.000
Residual Standard Error (RSE)	1.25

Source: Own research

Statistical Test:

- **Omnibus Test:** 2.45 (p = 0.29) – No significant deviation from normality.
- **Jarque-Bera Test:** 1.89 (p = 0.39) – Residuals follow a normal distribution
- **Skewness:** 0.10 – Residuals show slight asymmetry but are approximately symmetric
- **Kurtosis:** 3.05 – Close to normal distribution kurtosis (3.0).
- **Condition Number:** 25.4

Below is a detailed explanation of the key components:

- **R-squared (0.75):** The R-squared value of 0.75 suggests a strong model fit, meaning that independent variables explain 75% of the variance in in economic growth, which is a good fit.
- **Adjusted R-squared (0.73):** Adjusts the R-squared value for the number of predictors in the model. An adjusted value of 0.73 still indicates a good model fit, accounting for the number of independent variables.
- **F-statistic (45.32):** The high F-statistic value indicates the overall model is statistically significant.
- **Prob (F-statistic = 0.000):** Indicates the p-value for the F-statistic. A p-value of 0.000 is statistically significant, meaning the overall regression model is meaningful.

Based on our output, we interpret the results for each hypothesis:

X1: The positive and significant coefficient ($\beta1 = 0.8$, $p = 0.001$) supports H1, indicating that increased tourism activity is associated with higher economic growth.

X2: The positive and significant coefficient ($\beta2 = 0.5$, $p = 0.02$) suggests that better infrastructure is linked to higher economic growth.

X3: The positive coefficient ($\beta3 = 0.3$, $p = 0.05$) provides weak support for H3, suggesting a potential positive relationship between heritage preservation and economic growth, but further investigation is needed.

X4: The positive and significant coefficient ($\beta4 = 0.6$, $p = 0.005$) supports H4, indicating that stronger community engagement leads to better economic outcomes.

X5: The coefficient for marketing ($\beta5 = 0.2$, $p = 0.10$) is not statistically significant, suggesting that marketing efforts, as measured in this example, do not have a significant impact on economic growth. This might be due to how marketing was measured or other factors.

3.6. Analysis and Interpretation of Interviews on Rural Tourism Development in Albania

The interviews reveal that while rural tourism in Albania is gaining recognition, the sector faces policy fragmentation and poor implementation. Local authorities acknowledge existing national programs but cite insufficient funding as a key barrier to progress. Stakeholders agree that enhanced collaboration between government bodies, businesses, and communities is crucial for effective policy execution. This indicates a need for a comprehensive and well-implemented national strategy that integrates both public and private stakeholders.

The primary challenges identified by stakeholders include:

- **Infrastructure Deficiencies:** The most cited issue (by 10 out of 15 interviewees) relates to poor road conditions and a lack of essential services, which deter potential visitors. Addressing infrastructure gaps is critical to improving accessibility and visitor satisfaction.
- **Sustainability Concerns:** Experts warn against the risks of uncontrolled tourism development, which may threaten Albania's cultural heritage and environmental integrity. Sustainable practices and planning are necessary to ensure long-term viability.

- **Financial Limitations:** Tourism operators struggle with access to funding for new projects, which hinders business expansion and innovation. Supportive financial mechanisms need to be established to facilitate business growth in the sector.

The interviews highlight significant growth potential in the following areas:

- **Eco-tourism and Agro-tourism:** These sectors are seen as major opportunities for Albania's rural tourism, leveraging the country's natural landscapes and agricultural traditions.
- **Authentic Experiences:** Stakeholders believe there is strong demand for traditional experiences such as local cuisine, handicrafts, and cultural festivals, which can differentiate Albania from competing destinations.
- **Community Involvement:** Encouraging local participation is considered crucial to creating authentic and sustainable tourism experiences. Empowering local communities with training and resources will be key to achieving sustainable development.

Overall, the stakeholders express optimism about the future of rural tourism in Albania, recognizing its potential to boost economic development if key challenges are addressed. Collaboration between the government, businesses, and local communities will be essential to ensure sustainable growth and preserve Albania's cultural and natural heritage.

4. FUTURE RESEARCH DIRECTIONS

Based on the findings and insights derived from the analysis of rural tourism in Albania, several areas for future research can be identified to further enhance understanding and support sustainable development in this sector.

Expanding the scope of rural tourism studies. Future research can explore rural tourism in different regions of Albania to compare development patterns, challenges, and opportunities. Conducting comparative studies with neighboring countries that share similar socio-economic and cultural contexts could provide valuable insights into best pr*actices and policy improvements*

Assessing the long-term economic impact. A longitudinal study examining the long-term economic effects of rural tourism on local communities can help policymakers and stakeholders better understand the sustainability of the sector. This would involve tracking employment rates, income growth, and infrastructure improvements over time.

Role of digital technologies in rural tourism development. With the growing influence of digital marketing and smart tourism solutions, future research can investigate how digital platforms, mobile applications, and social media influence tourist behavior, destination promotion, and overall economic impact. Evaluating the effectiveness of e-marketing strategies and digital tourism solutions could provide actionable recommendations for stakeholders.

Community participation and empowerment strategies. Further studies should explore the role of local communities in tourism decision-making and assess the effectiveness of community-driven initiatives. Understanding the challenges faced by local entrepreneurs and residents in tourism-related businesses can help design better policies to encourage local participation.

Sustainable tourism practices and environmental impacts. Investigating the ecological footprint of rural tourism activities is crucial for ensuring environmental sustainability. Research should focus on eco-friendly initiatives, waste management, and conservation strategies that align with tourism growth while preserving Albania's natural heritage.

Cultural heritage preservation in the context of tourism development. More research is needed to analyze how rural tourism can contribute to the protection and promotion of Albania's cultural heritage. Studies could explore the balance between commercialization and preservation, ensuring authenticity while meeting the expectations of international visitors.

Tourist satisfaction and behavioural analysis. Future research can adopt advanced analytical techniques such as sentiment analysis and machine learning to assess tourist satisfaction and predict future behavior. Understanding factors influencing repeat visitation and destination loyalty can help develop targeted strategies to enhance visitor experiences.

Infrastructure development and investment needs. Evaluating the specific infrastructure requirements for different rural areas and identifying potential funding sources, including public-private partnerships (PPPs), can provide insights for future planning and investment strategies.

By addressing these future research directions, stakeholders, policymakers, and researchers can work together to create a more resilient and sustainable rural tourism sector in Albania, benefiting both the economy and local communities.

5. CONCLUSION

The conclusions drawn from the hypothesis testing and regression analyses highlight critical insights into the role of rural tourism in driving economic development in small Albanian communities. These conclusions reflect the significance of the tested relationships and the broader implications for rural tourism development:

- Rural tourism significantly contributes to income growth and job creation in small communities. Increased tourist activity drives demand for local services such as accommodation, food, and guided tours, creating direct and indirect employment opportunities. This economic impact underscores the importance of rural tourism as a development tool for boosting local economies and diversifying income streams in rural areas. (H1)
- The preservation and promotion of cultural and natural heritage are key factors in enhancing the attractiveness of rural tourism. Destinations offering authentic cultural experiences and pristine natural environments are more likely to attract tourists and generate economic benefits. Heritage conservation efforts not only enrich the visitor experience but also ensure the sustainability of rural tourism initiatives.(H2)
- Inadequate infrastructure, such as poor road conditions and limited basic services, significantly hinders rural tourism development. Similarly, insufficient marketing and promotional efforts reduce the visibility of rural tourism destinations, limiting their ability to attract international and domestic tourists. These barriers highlight the need for targeted investments and strategic marketing initiatives.(H3)
- Strong collaboration between local authorities, community members, and tourism operators plays a critical role in fostering sustainable rural tourism initiatives. Community involvement ensures that tourism development aligns with local needs, while cooperative governance promotes effective planning, resource allocation, and problem-solving. Collaborative efforts lead to more inclusive and sustainable tourism models.(H4)
- Tourist satisfaction and repeat visitation are strongly correlated with the quality and authenticity of rural tourism experiences. Positive experiences with local culture, hospitality, and outdoor activities encourage tourists to return and recommend destinations to others. This reinforces the importance of delivering high-quality services and preserving the authenticity of rural attractions.(H5)

Most tourists perceive their visits as having a positive impact on local communities, emphasizing the potential of rural tourism to promote social and economic well-being. Investments in community-driven tourism initiatives can further enhance these positive perceptions and strengthen local support for tourism development. The findings indicate that uncontrolled tourism development risks harming Albania's cultural heritage and natural environments. Adopting sustainable tourism practices, including eco-tourism and community-based tourism, is essential for ensuring the long-term viability of rural tourism in Albania.

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Aspects of Social Sustainability in the Management of Cultural Events in the Post-COVID Scenario

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Abstract: *Cultural events stimulate creative industries, enhance the attractiveness of cities, and promote social cohesion. This is what the authors aim to highlight in this work, which represents the case of a small town in southern Italy: Putignano, "home of Carnival." The event begins on Boxing Day and continues until Mardi Gras, blending the sacred and the profane. The city is famous for its Carnival, and its residents are so proud that they strongly identify with this event. However, the COVID-19 pandemic forced the suspension of the Carnival for two editions (2021, 2022). Through an empirical investigation, including a survey of residents, interviews with stakeholders, and the analysis of reports, this study explores the meaning of "losing" an event so deeply rooted in the territory, even for a limited period. The results provide original insights into the connection between social impacts and the dynamics of social sustainability related to cultural and tourism events.*

1. INTRODUCTION

The organization of a cultural event aimed at attracting tourists to a specific destination represents one of the most used methods for promoting the image of a city at the local, national, and international levels and allows for sustainable tourism development. According to the World Tourism Organization (WTO), cultural events attract so-called cultural tourists who travel for study purposes and religious reasons, visit art cities, or attend food and wine events, festivals, conferences, and exhibitions. Moreover, these visitors are attentive and respectful of the surrounding environment, strengthening this type of tourism. In recent decades, events in Europe have grown in popularity and number, and since all events are different, it can be assumed that each type of event produces different impacts. For example, various cultural events present culture through different nuances. Following the idea that other kinds of events may generate several impacts, it can be argued that "each event generates an action, stimulating social changes and effects, including political, economic, and cultural impacts. The cultural ones may differ from the political and economic ones in terms of their content, as they are related to culture, such as knowledge of culture, interest in culture, respect, and cultural acceptance, among others" (Colombo, 2015, p. 7).

As early as the 1970s, large Western cities began to perceive the cultural and creative sector as an essential opportunity for socioeconomic revival and a tool for revitalizing post-industrial areas. It became increasingly clear how event tourism could generate enormous economic benefits for destination communities and influence local economies (Dhariwal et al., 2023).

Europe appears globally as a territory characterized by localism and diversity. This is even more true for Italy and, even more so, for the Italian regions. The theme of cultural identity emerges as various Italian cities increasingly strive to attract investments to create an image that they can identify with. It is crucial to analyze the location, that is, the venue of the event, which consists of the physical

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structure, the setups, the furnishings, and the external environment. It is an essential element for the event, without which it could not exist. Its uniqueness makes the event experience unique and inimitable. This has a significant social impact, as what is emphasized is precisely the uniqueness of the event, which creates a shared sense of community and belonging among organizers, the host city, and residents (Oshimi & Harada, 2019). Since, from a sustainability perspective, the social dimension is usually the least analyzed in event studies, with sustainability often being associated more with reducing negative environmental impacts (Mair et al., 2024), the objective of this work is precisely to study the impact and sustainability of cultural and tourism events, particularly from a social perspective. Many cities are so strongly identified with the events they host that they are defined as "Eventful Cities." This could be considered the case of a small town in southern Italy: Putignano, the birthplace of one of the oldest Carnivals in Europe. The connection between the city and the cultural event is so strong that the city is often identified with its Carnival.

Based on the assumptions outlined, this work provides, in an original manner, an analysis of the social aspects in the management of a cultural event in the post-pandemic scenario, as the COVID-19 crisis can be seen as a potential amplifier of the social consequences of events, particularly in contexts where it led to cancellations, downsizing, or reconsideration of the events themselves. This study sought to analyze the social impacts of the Putignano Carnival in an unprecedented pandemic context. In 2021 and 2022, thanks to strategic planning and the organizers' efforts, the event was conceptualized in a revised format, returning to its traditional version in 2023 and 2024. The empirical research conducted on residents provided crucial data for analyzing the social impact of the event, highlighting how an unexpected and negative situation like COVID-19 can profoundly influence the perception of the inhabitants of a destination that has hosted a cultural event for centuries.

The work is structured as follows: Section 2 examines the literature on the social sustainability dimension of a cultural event; Section 3 describes the research methodology adopted; Section 4 presents the results obtained from the empirical analysis; Section 5 discusses the results; finally, Section 6 provides the conclusions of the work.

2. LITERATURE REVIEW: THE ROLE OF CULTURAL EVENTS

All events have or create an impact on people, places, and environments (Biaett & Richards, 2020). Today, events play a key role in the planning and development decisions of the places that host them, contributing to the formation of the image and positioning of the brand because, in many cases, people tend to associate events with the places that host them (Cudny, 2019; Hahm et al., 2019). Many studies have shown how events and tourism are cultural phenomena intertwined with daily life, through which it is possible to establish and manage social networks that were previously unavailable, allowing for the development of social sustainability even in rural contexts and on a small scale (De Jong & Varley, 2018).

Events can have profound social effects that enhance integration, promote diversity, and strengthen cultural value. The social effects of events can be observed from various perspectives:

1. **Promote social inclusion**: Events often serve as platforms where people from different backgrounds can come together, interact, and engage, helping to break down social barriers and foster a sense of belonging for all participants. By providing opportunities for diverse groups to connect, events are crucial in creating inclusive environments that celebrate diversity.
2. **Support inclusiveness:** They support inclusiveness by ensuring accessibility and equal participation for everyone, regardless of their social, cultural, or economic status.
3. **Strengthening cultural identity:** By celebrating traditions, art, and heritage, they enable communities to express their unique cultural narratives, fostering pride and cohesion.

Considering these basic concepts, a key point to analyze may concern the absence of a cultural and traditional event for a community. This absence can have profound consequences beyond the simple lack of a celebration. When a tradition is lost, the community experiences a loss of identity, as such events are often the pillars that connect people to their history, roots, and culture (Reverté & Pérez, 2017). Canceling a traditional event interrupts the collective bond that forms a sense of belonging and social cohesion.

Additionally, the absence of traditional events can lead to declining social relationships. Opportunities for gathering, exchanging, and celebrating are fundamental moments for strengthening ties between community members and creating spaces for sharing that foster inclusivity. When these opportunities are lost, the chances for interaction also decrease, leading to increased isolation and reduced cohesion between generations.

These aspects took on unique characteristics during the COVID-19 pandemic. It is important to emphasize how the spread of the pandemic changed travelers' behavior, as they avoided overcrowded and mass tourism destinations, preferring lesser-known and more remote locations. The virus prompted tourists to avoid travel or anything that seemed unknown, thus fueling the so-called "tourist xenophobia." Several studies have shown how safety has been a decisive factor in their choice, as tourists showed greater interest in acquiring information and in destinations with a cultural offer. Furthermore, over 43% of tourists stated that they would continue to be interested in interacting with the local population (Rodrigues Soares et al., 2020, pp. 13-17). This is also a possible source of nostalgia and sadness among the locals, who can suffer from the absence of that traditional sense of sharing and social inclusivity that the event organization typically fosters. Another tangible effect of this absence, caused by COVID-19, is the decline in tourism and local economic activities. Studies show that international arrivals have decreased, major tourism events have been canceled, and hotel occupancy has dropped (Matikiti-Manyevere & Rambe, 2022). Indeed, several studies emphasize the value of cultural events in increasing local spending, creating jobs, and driving economic development. A relevant point to analyze is the growth of economic opportunities associated with cultural events (Hemmonsbey et al., 2024).

Besides being important for culture, traditional events are often a driver of development for local businesses, attracting visitors and tourists. The absence of these events can reduce the flow of people, undermining the local economy. On an emotional level, losing a cultural event can generate frustration and nostalgia. Community members, especially those actively involved, may experience a strong sense of emptiness and disorientation. These feelings can contribute to a sense of disconnection and dissatisfaction, even toward all attempts to organize alternative events that may somehow try to recall the traditional event. Finally, the lack of these events also reduces opportunities for learning and sharing among residents. Cultural traditions and community events are occasions for passing on knowledge and stories from one generation to the next. Without these events, the cultural heritage risks fading, and with it, the chance to educate new generations about what makes that community unique. Cultural events create spaces for communicative action, bringing people together in a shared cultural context to engage in dialogue, exchange knowledge, and develop mutual understanding (Rutagand, 2024). The absence of cultural and traditional events can lead to a profound change in a community's social, economic, and emotional fabric. Their revival becomes essential for the return of a strong collective identity, the growth of social relationships, economic revival, and strengthening the bond between generations.

The research question of this work is related to investigating the social consequences, specifically related to social sustainability profiles, of the absence of a cultural event for the resident population.

The paper, taking advantage of the opportunity to analyze a case in which the temporary cancellation of a significant cultural event, such as the Putignano Carnival, occurred due to the crisis caused by COVID-19, therefore seeks to conscientiously assess whether the effects and impacts of a social nature related to the realization of an event are missed in the absence of the event itself.

3. RESEARCH METHOD

This study focuses on the case study of the "Putignano Carnival" as it is one of the most attractive events in the Puglia region, and one of the most important nationally, attracting over 25,000 visitors every year. The choice of this specific case study is based on several relevant motivations: the intention to focus on the cultural sector, which was particularly affected by the Coronavirus, highlighting how it managed to adapt and create new opportunities (Rahman et al., 2022), and analyzing, as the focus of this research, the social sustainability impact in the management of this cultural event. Additionally, there is curiosity about how an event with a centuries-old tradition, deeply rooted in the local population's culture, managed to reinvent itself and survive due to the crisis caused by the virus. This study aims to analyze the social impact of COVID-19 on a destination that hosts a highly identity-driven cultural event like the "Putignano Carnival."

To highlight how the COVID-19 pandemic affected the event's organization and, consequently, to analyze its social impact on the local population, the methodology used was based on a qualitative research approach, focusing on "How?" and "Why?" questions. The research was conducted using semi-structured interviews consisting of five open-ended questions to allow more flexibility for the interviewees. Furthermore, the interview structure was slightly adapted based on the participants' specific expertise and roles. A questionnaire was administered to the residents of Putignano, consisting of twelve questions mainly related to four macro-themes. Finally, the methodological protocol followed was supported by the analysis of web channels, study materials, and sources provided by institutional representatives of the Foundation. Specifically, the interviews were primarily conducted through online video calls lasting one hour via the "Google Meet" platform, except for a single in-person interview conducted at the University of Bari Aldo Moro, lasting one hour and thirty minutes. The semi-structured interview format proved productive as it allowed interviewees to express their opinions more freely and delve deeper into specific aspects of the research. The questionnaire, titled "The Impact of Covid-19 on the Social Sustainability of the 'Putignano Carnival' Event," was created using "Google Forms" and, before being distributed to residents, was tested to adjust the questions based on the participants' feedback. This feedback was particularly valuable since some of the testers included papier-mâché masters and professionals who were more familiar with the events and the various challenges surrounding the festival. The methodology used for the questionnaire employed the "Likert Scale," a rating scale consisting of a series of pre-filled response options. This satisfaction scale ranges from one extreme to the other, in this case: not at all; slightly; moderately; very; extremely. The evaluation technique provided detailed feedback, highlighting the varying opinions of the respondents. Moreover, the research was conducted through two methods of response collection: online via the Facebook group of Putignano residents and through direct response collection. On October 20, 2022, the research team visited Putignano to administer the questionnaire to residents who had not yet participated online. The research involved all age groups, as the respondents' ages ranged from under 20 to over 60, revealing generational differences in how they approached the event. A total of 131 residents participated, the majority of whom were female, representing 80% compared to 20% male participants. However, both those who responded through the Facebook group and those who participated via direct collection proved to be interested and attentive, providing their perspectives and additional details. Finally, thanks to reports, research, and the official website of the Foundation, a more detailed analysis of the strategic and organizational elements was conducted.

4. RESEARCH RESULTS – THE PUTIGNANO CASE: BETWEEN TRADITION AND INNOVATION

The Putignano Carnival, one of the oldest and most significant events in Italy, represents an exemplary model of social sustainability. From a social perspective, this event not only celebrates deep-rooted cultural traditions but also plays a crucial role in building and strengthening the sense of community. Its ability to engage citizens, fostering a strong sense of belonging, is one of the most significant aspects in terms of sustainability. Indeed, many studies highlight how, from a territorial marketing perspective, these significant events become a tool used by the area to improve and reposition its image. In addition to ensuring tourist attraction and entertainment, they have a significant social impact on the host community, contributing to the formation of a strong sense of belonging to that place (Pepe A., 2018). In this regard, it emerged as a very delicate issue for the people of Putignano, as there were individuals interviewed who had always been involved in the organization of the event, participated as performers, or volunteered in its preparation. For this reason, they felt an even stronger connection to the event, which has become a symbol of the city. Very few residents, in contrast, showed indifference to the event. Therefore, when asked, «As a resident of Putignano, do you believe that the 'Putignano Carnival', which characterizes and distinguishes the city, creates a strong connection with the local population?», 22.9% of respondents answered "extremely"; 40.5% answered "very"; 28.2% answered "moderately"; 9% answered "slightly"; and only 1.5% answered "not at all." This is an event that, while requiring continuous improvement, is so deeply embedded in the Putignano tradition that it has always been an integral part of the city's history, such that no one has ever known Putignano without it. The strong cultural identity of the local population has also strengthened the sense of belonging and solidarity among community members, all of whom are committed to preserving the memory of this ancient yet still vibrant event. Respondents, therefore, feel a strong connection to their territory and express a willingness to be active and collaborative citizens in local decision-making. This is also due to the favorable opinion they hold of the event, which helps promote the image of their city, even on a national level, as a city that hosts one of the most famous Carnivals in Italy. Indeed, it is up to the local community to find the right balance between preserving its traditions and promoting tourism, between safeguarding its identity and embracing innovation, and between protecting its local environment and increasing visitor influx, all while maintaining a continuous dialogue between residents and tourists. One of the central elements of the Putignano Carnival is its ability to ensure that the economic benefits generated by the event benefit the local population, which is in some way involved in the celebration. Residents who took part in the survey mentioned that the event had a significant impact on their work activities. Moreover, the tourist activities the Carnival attracts, such as the influx of visitors, stimulate the local economy, benefiting not only large companies and merchants but also small family-run businesses or those operating in traditional sectors of the area. Therefore, the event contributes not only to inclusive economic growth but also to the preservation of traditions that are essential for maintaining the cultural identity of the community. The absence of the "traditional" Carnival in Putignano due to COVID-19 had a significant impact. On the one hand, it allowed for the organization of a series of alternative events during the summer, making it possible to promote year-round tourism by implementing visitor distribution policies over several months of the year. The aim was to avoid overcrowding and, therefore, gatherings, ensure safety, and prevent the spread of the virus in compliance with anti-COVID regulations, such as "Racconti di carta: in cammino con Dante," which offered free participation.

As the former mayor of Putignano stated, “From a social perspective, we carried out an exciting operation as we decided to move the event from the winter period to the summer, marking the seven-hundredth anniversary of Dante Alighieri's death. Thanks to this project, papier-mâché masters worked on setting up the historic center as if it were a diffused museum. As a result, a

large number of families were able to enjoy these works, both because there was no entry fee and because the works were spread throughout the historic center for the entire summer period. The damage caused by COVID allowed us to carry out this summer experimentation, which, from a social perspective, rewarded us". The vice president of the Foundation supported this by stating: "The challenge was to extend the tourist season, not the Carnival itself, but to think of something that would attract visitors even in the summer months. The launchpad was created precisely during the COVID period, when we experimented with a different event that was successful and helped promoting year-round tourist flows". In this regard, the former president of the Foundation added, "The idea came from the desire to keep the relationship with the local community alive, but it is clear that in the summer it is different; it is not the Carnival as we know it, but we wanted to underline that the Foundation, as an institution, was still present, as our vision project was not only about worrying about the winter event but also about having an annual program". Economically speaking, it should be noted that "Racconti di carta" replaced the main event. However, its cost was minimal, amounting to 100,000 euros, generating a return greater than the initial investment. According to one of the award-winning papier-mâché masters who leads one of the seven groups currently building the large floats, this side event, held in the historic center, took place in an environment suitable for slow tourism: pedestrianized areas without noise or light pollution. Each master created their installation, with the central theme being the Divine Comedy, in an area assigned to them. During the pandemic years, people had to adapt, and this initiative demonstrated that an alternative path using a noble material like papier-mâché was equally valid. "I supported it strongly because compared to the parades, installations are even more sustainable since the parades, concentrated in four days, create 'hit-and-run' tourism, whereas permanent installations allow for extending the tourism season".

Additionally, one of the most veteran papier-mâché masters of Putignano stated, "There are still tourism operators and B&B managers who are asking the Foundation to repeat a similar experience in the summer because they saw how attractive it was. When we talk about Putignano and papier-mâché, everyone expects to see something new and different. Even the floats we make are built from scratch every year, so there is never a repeat of something from the past, and this is another point in our favor. However, this also led to feelings of nostalgia and sadness within the population, who had to give up the most anticipated event of the year. The former president of the Foundation stated, "In 2021, the pandemic situation was clear, all of Italy was at a standstill, so our choice to organize parallel events was a winning one. I can say there was a collective feeling of disappointment, but there was also an understanding of the reality of the situation. In 2022, however, the reaction from residents was different because a general sense of discontent spread. Despite strong regulatory barriers, their reaction was quite critical as they longed for a return to normalcy. The citizens were not always ready to fully understand the choices made by us organizers". In this regard, many of those personally interviewed expressed their sadness in recalling those two difficult years when the streets were devoid of the grand allegorical floats that have always paraded through the streets of Putignano in February, as well as devoid of the people and visitors who are always drawn to the colors and joy that Carnival inevitably brings, expressing hope for future editions.

Despite this opportunity for involvement and the creation of new events, this experience also confirmed just how deeply the city of Putignano and its population are connected to and identify with their Carnival. Indeed, it is exciting to analyze how the implementation of alternative events more effectively involved tourists from other parts of Italy than the local community itself. The survey revealed that the residents were significantly affected by the absence of the event, as when asked: «How much did the absence of the 'Carnival of Putignano' due to COVID-19 impact

the general sentiment of residents?», 32.1% of respondents answered "extremely"; while 39.7% answered "very". This aspect was also highlighted by the former mayor of the city, who stated, “These new events attracted more tourists than the local population.” In fact, the production director of the Foundation pointed out that “these were completely different events, so the local population felt a sense of nostalgia for the most iconic event of the city, which has always represented a colorful note in the grayness of winter”. In this regard, residents were asked several questions, including: «How efficient do you think the different organization of the 'Carnival of Putignano' due to COVID-19 was in attracting visitors?». Sadly, it became clear that the various proposals put forward and implemented by the event organizers to try to replace the traditional Putignano celebration at least partially were not perceived as efficient by the local population. In fact, to this question, most respondents, 48.1%, answered negatively with "slightly". Residents are so attached to their Carnival that they cannot imagine that these new events, held during the summer, could replace it. However, the organizers had not imagined this either; they tried to bring something to the streets of the city that could evoke the harmonious atmosphere of Carnival among the people. The survey was structured with an open-ended question at the end, allowing residents to express their opinions or possibly offer personal suggestions. There were several responses to this final question that highlighted the desire of the people of Putignano to make the "Carnival of Putignano" an event renowned not only at the regional and national level but, with the right effort and dedication, also internationally. The aim would be to transform it from a more popular event into a well-planned and organized event. Many suggested a better promotion of the event, particularly to give young people the opportunity to manage an event that needs innovation, including the use of more effective and efficient communication tools to reach a broader audience. Others proposed extending the event, with a greater number of activities as was common in the 1990s, to highlight local traditions for a longer period. This is an event that the population feels deeply connected to, with a strong identification between the local community and the event itself. As a result, everyone is driven by the desire to spread the folklore of Putignano, ensuring that this ancient tradition is never forgotten but passed down in all its beauty and authenticity to future generations. The "Putignano Carnival" Foundation has made significant progress in studying the data and analyzing the economic, social, and cultural impacts of the event. Measuring the results was a crucial step in understanding the extent to which the Carnival contributes to local development and overall sustainability. Thanks to data analysis, it has been possible to identify areas for improvement and implement targeted policies to optimize the event's impact, defining future strategies that ensure a balance between tradition, innovation, and well-being for the local community.

5. DISCUSSION: THE PUTIGNANO CARNIVAL DURING AND AFTER THE COVID-19 PANDEMIC

COVID-19 was a real tragedy for the “Putignano Carnival” as it led to changes in the traditional and impressive parade of allegorical floats. The sudden and unexpected arrival of the Coronavirus caused an unprecedented halt, preventing the realization of the “Putignano Carnival” as it had always been done. This resulted in a loss of identity and social cohesion among residents and the city, as well as frustration and feelings of nostalgia among the inhabitants, who were deprived of this historically significant event for two years. Additionally, due to the guidelines that needed to be followed to contain the pandemic, which were certainly incompatible with a significant event that thrives on social gatherings, there was a decline in social interactions, profoundly altering the way people interacted and participated in the event. The people of Putignano had to adapt to new ways of experiencing the Carnival, albeit with less motivation to take part in it. In this regard, another issue to address is the decline in tourist and economic activities. With the introduction of health restrictions, the event saw a drastic reduction in attendance. During the years affected

by the pandemic, the absence of tourists crowding the streets of the historic center had serious repercussions on the local economy, particularly on businesses that directly depended on the tourist flow generated by the event. Therefore, one positive aspect of the city was the introduction of alternative events during the summer season, which, as mentioned earlier, were very successful and attracted the interest of visitors and tourists. These events represented, even if in a different way, an opportunity for promoting the area, although they did not guarantee any economic return for the Foundation's finances. Moreover, the Carnival has always represented a moment of strong sharing and conviviality among residents. There has always been a strong sense of unity and collective celebration during the event, which unfortunately was lost due to the restrictive measures imposed to contain the spread of the virus, which inevitably reduced these experiences of social gathering. This change had an emotional impact on the community, which faced the temporary, thankfully, loss of one of the most significant moments of unity and cultural exchange that represents the beating heart of the city.

6. CONCLUSION

The main objective of the present work was to analyze the aspects of social sustainability in the management of a cultural event in the post-pandemic era, investigating the cultural and tourist event that symbolizes a small town in Southern Italy. This is a highly timely topic and one that is at the center of the debate, as we have faced an unprecedented health emergency that has disrupted the way cultural events are organized and conceived. This work highlights the strong connection between crisis management and event management; indeed, the connection between the two areas becomes evident when planned events must confront crises like the one caused by COVID-19. In such cases, the skills and practices of both areas overlap, with the common goal of ensuring the safety and success of the event. As is well known, cultural events have faced extraordinary challenges during the health emergency, highlighting key elements for their survival and evolution: resilience – demonstrated in the ability to adapt to unprecedented crises and quickly reinvent themselves; adaptation – a fundamental element in responding to the changes imposed by the pandemic; and, finally, social sustainability – emphasizing the need to ensure inclusivity and accessibility during events. From this perspective, the present work has sought to highlight how these elements were all involved in the cultural event of the "Putignano Carnival". Local communities play a fundamental role as the beating heart of an event, as it is also thanks to them that a cultural event can be realized. The key element for enabling better enjoyment of the event by tourists and visitors is the strong identification between the local community and the event. The more the local community is involved and identifies with the event, the better it will be able to overcome the difficulties that inevitably arise in organizing such an event. As highlighted by the interviews conducted for this paper, during the years when the Putignano Carnival could not take place, residents realized that the "sacrifice" they made every year during the event was not as great as they thought, instead understanding how important it was to have that atmosphere, not only from a tourist perspective but also as a long-standing tradition of the town.

Based on these considerations, some aspects emerge on which potential future developments can be based. The comparison between different experiences in event management and organization, both at the national and international levels, allows for the highlighting of best practices, innovative solutions, and common challenges in order to address similar issues, learning from the successes and failures of others to improve the effectiveness of events in the future. A crucial element in this regard is the role of digital innovation in "traditional" events, which certainly helped overcome, albeit virtually, a significant obstacle imposed by the pandemic. Despite the end of the health crisis, this practice is still strongly utilized by event organizers, allowing them to reach a much

wider audience. Finally, another key issue when discussing cultural events is the involvement of stakeholders, as effective strategies aimed at success include partnerships with public and private entities, local associations, and other organizations to obtain greater economic, logistical, and social support. Moreover, greater involvement of the local community, show business personalities, and artists can certainly help promote the development of the area and the innovation of the event itself while maintaining the core elements of tradition.

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Modern Technology for Rational Irrigation in Sustainable Agriculture

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EQCCT

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Abstract: *Water has remained, throughout the centuries, the essential element for human life and all living beings. Its availability and quality are crucial for maintaining our standard of living. This precious resource has garnered significant attention from the public, particularly in the agricultural sector, which consumes approximately 80% of Morocco's total water resources. The current challenging situation has prompted the adoption of various agricultural systems aimed at preserving our ecosystem. These include permaculture, resilient agriculture, conservation agriculture, agroecology, agroforestry, organic farming, and sustainable agriculture, which can be seen as an evolution of the former practices. We must take decisive action to rectify this situation, ensuring resilient productivity while prioritizing water conservation, which continues to face a concerning and progressive deficit.*

The current green revolution is nearly unavoidable; we must embrace it and seek new technologies to protect our environment. Our goal is to secure human health and manage vital water resources, both drinking and irrigation, efficiently and rationally according to specific needs.

In this context, a series of integrated technologies is proposed, including Drip irrigation, Digitalization, Nanotechnology, Polyter/Hydro-retainers, and CT-WAS (or EQCCT). Experience has demonstrated that these advanced irrigation techniques can reduce total water usage by 50% to 80%. Furthermore, they enhance water efficiency while improving the quality and productivity of agricultural products.

The issue of water should not become a political battleground; it requires an objective and scientific approach. We must highlight the constraints, challenges, and legitimate alternatives to address the crises of water shortage, scarcity, and drought with minimal harm.

1. INTRODUCTION

A new phase of the green revolution is emerging, driven by climate change, environmental pollution, the rise of chronic diseases, and, most critically, water scarcity. This pressing issue has captured public attention and spurred the development of various agricultural systems, including permaculture (Mollison & Holmgren, 1978), resilience agriculture (Folke, 2006), conservation agriculture (Hobbs & Gupta, 2004), agroecology (Altieri, 1995), agroforestry (Nair, 1993), organic farming (Reganold & Wachter, 2016), and sustainable agriculture (Pretty, 2008). These innovative production systems rely heavily on irrigation water, highlighting the urgent need for advanced irrigation technologies.

Correcting the course and taking decisive action to address these challenges is essential for ensuring resilient productivity and conserving water, which continues to face alarming deficits.

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The water issue should not be mired in political controversy; it must be approached objectively and scientifically. Highlighting the constraints, challenges, and viable alternatives is essential to navigate the crisis of water scarcity and drought with minimal damage (Bainbridge, 2001).

Water is vital across all sectors, whether agricultural or industrial. It is irreplaceable, cannot be manufactured, and alternatives are limited to wastewater treatment and seawater desalination, both of which remain insufficient and relatively expensive (Mohammed et al., 2022).

2. LITERATURE REVIEW

Implementing integrated technologies such as drip irrigation, digitalization, nanotechnology, Polyter, hydro-retentors, and CT-WAS (or EQCCT) can have several positive environmental impacts. These technologies significantly reduce water usage, helping to conserve local water resources and mitigate the risk of water scarcity. Precision techniques and digital tools can optimize fertilizer and pesticide application, reducing the risk of chemical runoff into nearby water bodies and minimizing pollution.

2.1. Drip Irrigation

Among the new technologies, the drip irrigation system stands out as a highly effective method for localized irrigation. It is currently the most widely adopted system and has experienced significant growth within the irrigated sector. Additionally, advanced technologies are emerging that focus on managing water in terms of water droplet fractions, rather than just individual droplets (Oker et al., 2020). This includes the use of digital tools to optimize network management and timing.

2.2. Digitalization

The digitalization of irrigation is an intuitive and user-friendly decision-support tool that facilitates reliable management of localized crop irrigation (Choruma et al., 2024). It ensures timely applications and regular monitoring throughout the crop cycle (Abbasi et al., 2022). This technology is essential for accurately locating water and nutrients in the root system at the right moments, thereby enhancing profitability and promoting sustainability (Mok & Chen, 2020; Kudama et al., 2021).

2.3. Nanotechnology

The underground system features semi-permeable membranes, each square centimeter containing 100,000 nanopores that continuously release small amounts of water near the roots. This innovative technique acts like an underground mist, maintaining moist soil and allowing plants to hydrate as needed while minimizing the negative impacts of filtration and evaporation (Hallam & Lahlali, 2021).

Designed to optimize irrigation management for farms, green spaces, and arid regions, this unique nanotechnology reduces water consumption by 75-80% compared to traditional irrigation systems. Installed at the base of crops and vegetation, the system's nanopores help alleviate plant water stress, demonstrate excellent resistance to clogging, and eliminate losses due to evaporation and percolation (Iqbal, 2019). This leads to increased crop yields and enhanced plant productivity while significantly reducing the need for human intervention and associated costs (Silva et al., 2020).

2.4. Hydro-retainers (Polyter)

Hydro-retainers, also known as polyter, primarily consist of cellulose accompanied by potassium or sodium polyacrylamide, along with organic fertilizers. Water retainers, referred to as polymers, are part of the technical advancements in irrigation and enable significant water savings (up to 90%). Super Absorbent Polymers (SAP) are available in powder form and can absorb liquid on contact, retaining it up to 400-600 times their own mass (Po, 1994). This process, which has been used in industry since the 1970s, has recently emerged in the agricultural sector to combat drought and excessive irrigation.

2.5. EQCCT & CT-WAS (Von Hoffmann & Partner Technologies)

The CT-WAS technique, also known as the Treated Water Activation System through Cymatic Communication, is derived from Energetic Quanta Cymatic Communication Technology (EQCCT). This innovative system aims to produce a significant quantity of high-quality food at minimal costs compared to conventional methods (Von Hoffmann & Es-Safi, 2017).

Specifically designed for agricultural applications, CT-WAS is environmentally friendly and safe for both humans and animals, distinguishing it from other products. Its all-natural formulation makes it easy to install and maintain.

Overall, the implementation of these technologies not only enhances agricultural productivity but also fosters a healthier environment. Many of these technologies improve energy efficiency in agricultural practices, leading to lower greenhouse gas emissions associated with water pumping and fertilizer application. These technologies can help farms adapt to changing climate conditions, improving resilience and sustainability in agricultural production.

3. METHODOLOGY

This research explores a variety of innovative technologies that are currently underutilized, largely due to ignorance, lack of information, or insufficient motivation among sales consultants who tend to favor traditional systems like drip irrigation, which has been in practice since the 1980s. The study draws on findings from both domestic and international fieldwork conducted in Morocco and other regions in the world.

The practical results have been disseminated through multiple channels, including round tables, seminars, and scientific conferences, facilitating in-depth discussions of the findings. The technologies investigated include five localized irrigation systems: Drip irrigation, Polyter/hydro-retentors, Nanoirrigation, and EQCCT. A comprehensive analysis, along with illustrative explanations and practical results, will be detailed in the results and discussion section.

4. RESULTS AND FINDINGS

4.1. Drip Irrigation

Principle. The Buried Drip Irrigation System (BDIS) is an agronomic solution suitable for a wide range of crops, including woody varieties such as almonds, grapes, olives, pistachios, and peaches, as well as extensive crops like corn, barley, and alfalfa. BDIS enables localized application of water and nutrients below the surface, optimizing root development and overall plant growth.

Experimental Protocol. Drip irrigation involves delivering pressurized water through a piping system, typically made of PVC; this water is then distributed in droplets across the field by a large number of emitters placed along the rows of crops (Figure 1). This practice enables the efficient use of water, energy, and fertilizers, positioning it as the best alternative in terms of economic, agronomic, and ecological aspects. The wetted zone of the soil is located in the immediate vicinity of the plant roots. Consequently, this irrigation method has a high degree of water distribution efficiency. Drip irrigation is also referred to as micro-irrigation (Vermeiren & Jobling, 1980).

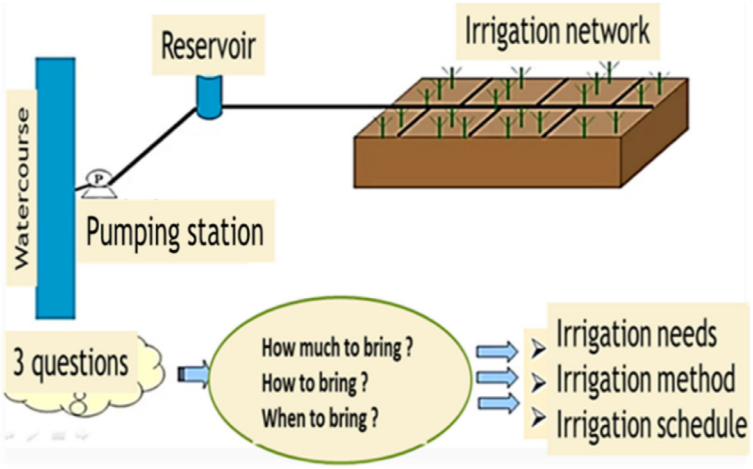

Figure 1. Overall design of Drip irrigation system (DIS)
Source: Vermeiren and Jobling (1980)

4.2. Digitalization

Experimental Protocol. Digitalization employs scientifically based algorithms that consider four key components: Climate, Soil, Plant, and Water. For example, the Irri-Smart application is designed for a diverse range of users, including farmers, agricultural advisors, and agronomists (Abouabdillah & Bouabid, 2020). Irri-Smart features a daily and precise irrigation program, along with capabilities for monitoring crop conditions (Figure 2).

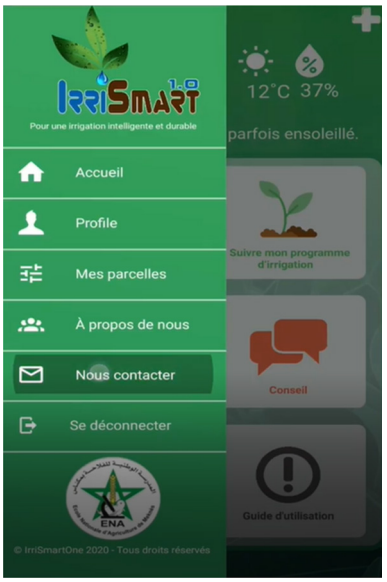

Figure 2. Platforms for localized irrigation and cultural monitoring
Source: Abouabdillah and Bouabid (2020)

The digitalization technology also necessitates the establishment of an irrigation warning system, which consists of automatic weather stations and display panels (Ndimbo et al., 2023). Additionally, it involves the installation of soil stations equipped with capacitive probes (Figure 3) and capacitive sensors.

Role of Capacitive Probes. Capacitive probes provide precise data on soil moisture at various depths, facilitating effective irrigation management. By continuously monitoring soil moisture levels, farmers can fine-tune their irrigation practices to prevent overwatering or underwatering, ultimately conserving water and enhancing plant health (Figure 3).

These probes enable real-time assessment of soil conditions, helping to identify periods of water stress and supporting informed decision-making regarding crop maintenance.

Figure 3. Capacitive Probes
Source: Corhize. (2025)

Role of Capacitive sensors. Capacitive sensors are instrumental in agriculture, offering precise measurement and monitoring capabilities that enhance farming practices. They can be seamlessly integrated into irrigation systems to automate watering based on real-time soil moisture levels, significantly reducing water waste while improving crop yields. By detecting changes in capacitance or resistance, pulse sensors provide accurate soil moisture measurements, enabling farmers to optimize their irrigation practices effectively (Figure 4).

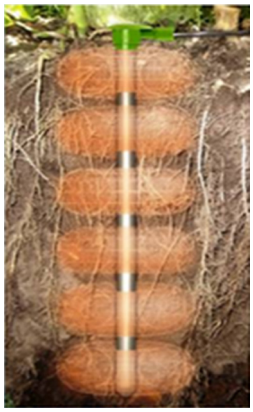

Figure 4. Capacitive sensor with 6 humidity & temperature sensors.
Source: Corhize. (2025)

Additionally, these sensors are utilized in weather stations to monitor rainfall, temperature, and humidity, supplying farmers with crucial data for informed decision-making (Coggins et al., 2016). This combination of automated irrigation and environmental monitoring empowers farmers to make timely adjustments, ultimately leading to increased efficiency and sustainability in agricultural operations (Deichmann et al., 2016).

Modes of Application. Capacitive probes are typically easy to install and operate, delivering continuous data while minimizing the need for frequent soil sampling. Designed to be robust, they can withstand harsh soil conditions, ensuring a long lifespan. They are commonly used in research to understand the effects of moisture on plant growth and to measure moisture levels in natural areas, contributing to effective water resource management (Choruma et al., 2024).

In summary, capacitive probes are essential tools for sustainable water management in agriculture, enhancing irrigation efficiency and improving crop health (Mok & Chen, 2020).

4.3. Nanotechnology

Comparing the Nanoirrigation system to traditional drip irrigation, we find that it is four times more efficient, resulting in savings of 170 liters of irrigation water (Figure 5). As such, nanotechnology is increasingly recognized as an effective method for managing and conserving irrigation water, achieving remarkable water savings of up to 80% and a 30% reduction in fertilizer usage.

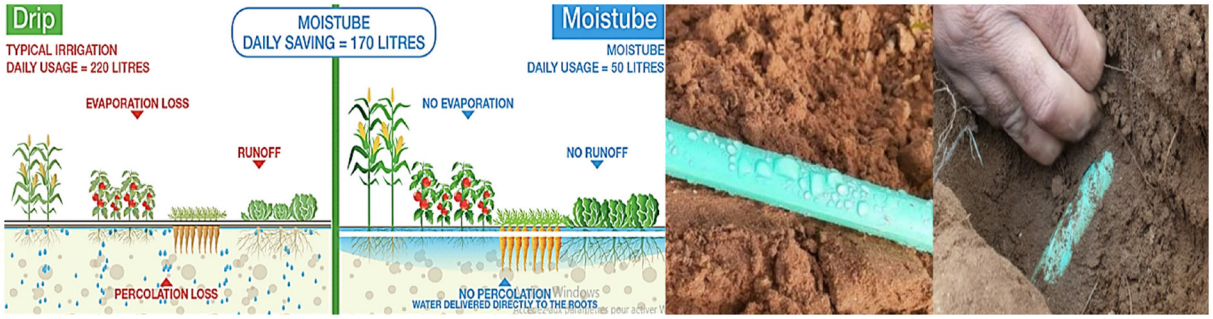

Figure 5. Technological innovation in agricultural irrigation based on nanotechnology
Source: Authors illustration

In Morocco, a reservoir of 1 or 2 cubic meters has been chosen to ensure efficient irrigation for 1 or 2 hectares. This approach is designed to produce significant quantities of quality crops while minimizing water waste. This technique has resulted in remarkable water savings of up to 80%, energy savings of up to 90%, and labor savings of up to 85% (Figure 6). This approach not only addresses immediate irrigation needs but also contributes to long-term sustainability in water management, energy use, and agricultural practices, benefiting both the environment and local communities.

Overall, the integration of nanotechnology into agricultural irrigation represents a promising frontier in the quest for more sustainable and productive farming practices.

The adoption of nano-irrigation technologies can be significantly accelerated, fostering more sustainable agricultural practices, by addressing these barriers through strategic interventions. These interventions may include offering subsidies, implementing educational programs, and fostering partnerships between governments and key stakeholders.

Figure 6. The Nano irrigation system is a buried porous irrigation tube.
Source: Authors illustration

4.4. Hydroretainers (Polyter)

Recent innovations in physics and chemistry tailored for agricultural applications have led to the development of water retainers known as polymers (Keshwani & Chugh, 2015). These advancements represent significant improvements in irrigation techniques, enabling substantial water savings of up to 80%, can absorb and retain liquid up to 600 times their weight upon contact (Figure 7), (Keshwani & Chugh, 2015).

All complex operations are managed by computer systems, resulting in significant water savings (Islam et al., 2011). Cellulose, a carbohydrate made up of a linear chain of D-glucose molecules, is the primary component of plant cell walls, including wood (Figure 8).

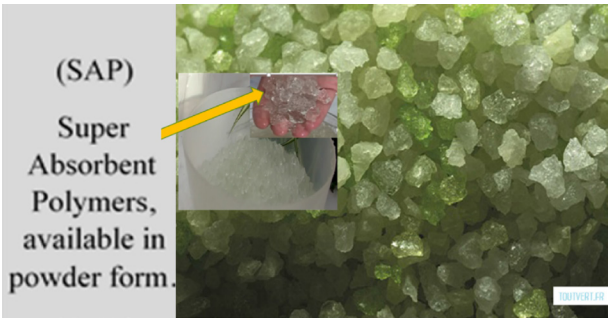

Figure 7. Water retainers or Polymers SAP.
Source: Authors illustration

Figure 8. Composition and Sustainability of Water Retainers
Source: Authors illustration

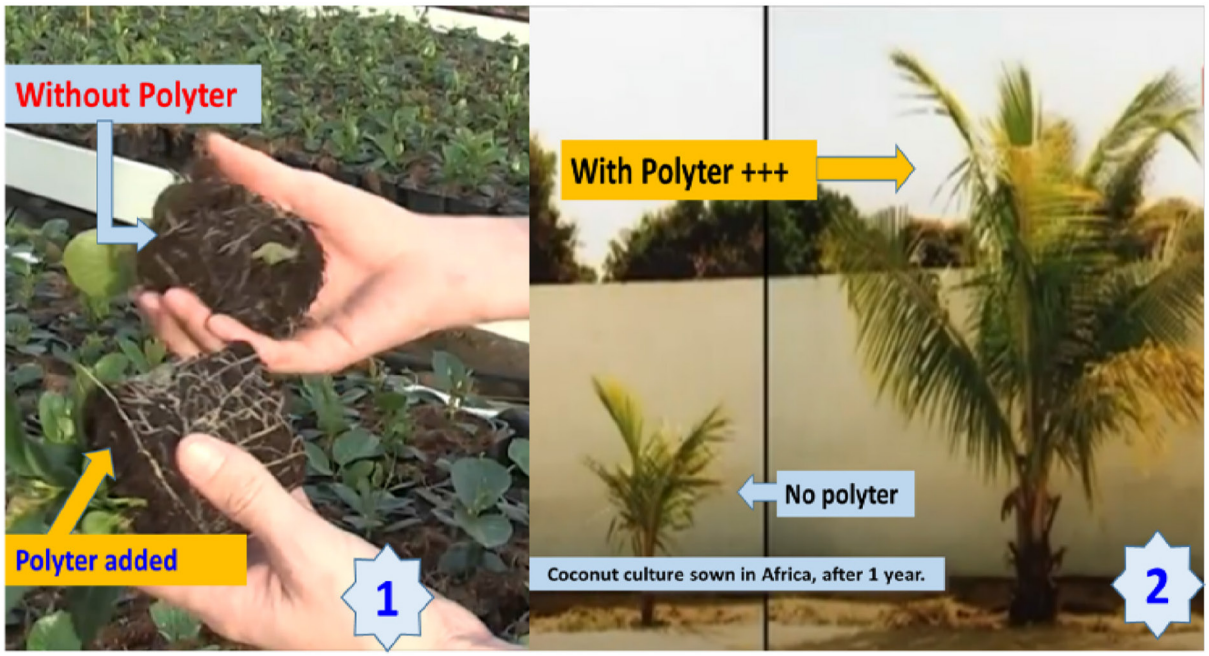

Figure 9. Effect of polymer (SAP) on plant growth, high root density (1) and considerable height (2).

Source: Authors illustration

While these technologies can be expensive for small and medium-sized farmers, their yields often exceed expectations (Bai et al., 2010). Despite the high initial costs, this irrigation model remains an ideal solution, although it attracts interest from only a minority of the target population.

The moisture-retention capabilities of superabsorbent polymers (SAP) can enhance seed germination rates, leading to stronger root systems in green beans (1) (Figure 9). This is crucial for nutrient absorption and contributes to the early development of seedlings and shrubs in the coconut (2) (Figure 9), (Bai et al., 2010).

SAPs offer substantial benefits for plant growth, particularly under water stress conditions. However, their application must be carefully managed to prevent issues such as soil saturation and excessive reliance on moisture (Yazdani et al., 2007; Orikiriza et al., 2009). A balanced and informed approach is essential to maximize benefits while minimizing potential risks.

4.5. EQCCT & CT-WAS

The CT-WAS water activation barrel should be integrated into the water supply system at any point along the normal water line, preferably in a protected environment like a greenhouse (Figure 10). The EQCCT-activated water can be utilized throughout all growth cycles, from seed germination to harvest (Kerouri & Es-Safi, 2017).

This system does not necessitate additional construction or substantial investments. With low overhead costs and a user-friendly design, CT-WAS presents a practical solution for modern agricultural practices. The water activation barrel using the CT-WAS technique (Figure 10) can be specifically designed and produced in any size, perfectly calculated for each size of cultivation area. A size of $1m^3$ is widely recommended for a cultivation area of about 1 hectare. CT-WAS is specifically designed for all agricultural applications (Es-Safi et al., 2017).

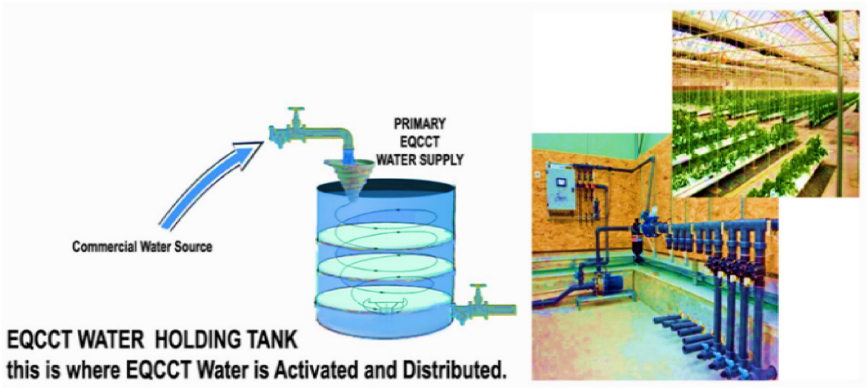

Figure 10. The EQCCT activated water during all growth cycles from seed through harvest
Source: Von Hoffmann and Es-Safi (2017)

As CT-WAS is entirely natural and safe, it is easy to install and maintain. It does not require additional construction work or massive funds. The cost of the product and installation fees are low and the technology is very flexible to handle; a skilled worker can easily ensure its use (Von Hoffmann & Es-Safi, 2017).

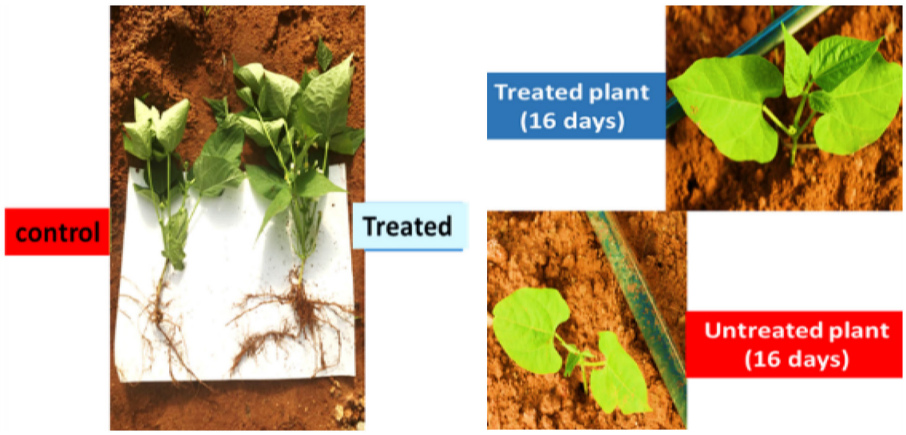

Figure 11. Effect of EQCCT on roots density and leaves of green peas.
Source: Authors illustration

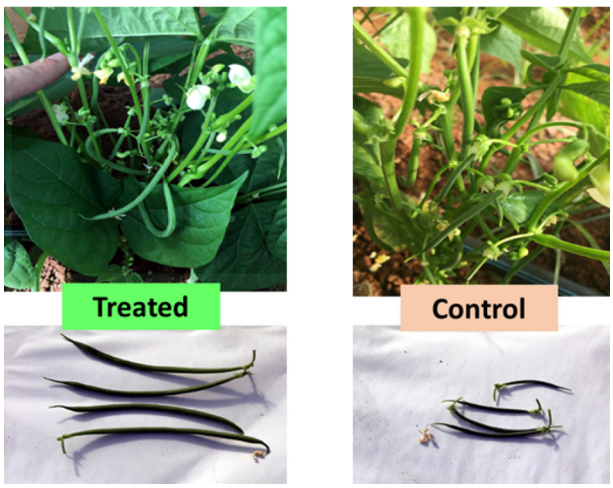

Figure 12. Effect of EQCCT on the quality and quantity of green peas
Source: Authors illustration

Field trials have shown that this represents a more efficient use of water due to the strong growth of roots and seeds (Figure 11). EQCCT often involves precision management of soil conditions, leading to enhanced nutrient availability. This can promote greater root density as plants develop more extensive root systems to absorb these nutrients. The Efficient water management practices can lead to healthier roots, as plants are less stressed and can grow more robust root systems (Kerouri & Es-Safi, 2017).

Moreover, it results in higher production and superior quality yields. Additionally, the harvest obtained maintains freshness for a longer time with high benefit (Figure 12). Plants grown under EQCCT conditions are often more resilient to environmental stressors like drought or pests, which can positively influence both root and leaf development. The combined effects of increased root density and enhanced leaf growth can lead to higher yields, as the plants are better equipped to capture resources.

An insightful day, at the National Institute of Agricultural research, was dedicated to exploring the "EQCCT" technology and its applications in sustainable agriculture. This event will feature presentations from leading experts, discussions on innovative practices, and opportunities for networking with professionals in the field. Discover how EQCCT can contribute to enhancing agricultural sustainability and productivity (Von Hoffmann & Es-Safi, 2017).

Overall, EQCCT can significantly enhance both root density and leaf development in green peas, leading to improved plant health and productivity. These changes are driven by optimized soil conditions, nutrient availability, and efficient water management practices.

5. CONCLUSION

This integrated irrigation system represents the ideal solution for achieving efficient irrigation, despite the challenges encountered. It is essential to harness the power of combining two or three techniques simultaneously to promote rational irrigation practices. Generally, modern irrigation methods that contribute to water conservation favor underground irrigation over surface irrigation, owing to various technical and environmental considerations. From this technical and scientific study, the following key conclusions can be drawn:

- NTI is specifically designed for any agricultural application. It is environmentally friendly, safe for humans and animals, compared to other products.
- NTI, being entirely natural and safe, is easy to install and maintain. It does not require additional building or massive cash outlays.
- The overhead is low, and the technology is very user-friendly.

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The Legal Border Between Green Marketing and Greenwashing

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Green economy;
Green entrepreneurship;
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Green claims Directive;
Unfair competition;
German case law;
Consumer protection

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Abstract: *One of the modern practices of competitors in order to attract environmentally-minded consumers is the use of various forms of environmental claims. These are voluntary claims, especially in advertising, which are part of green marketing. However, sometimes such environmental claims are misleading and constitute the so-called "greenwashing", which is prohibited by law. The author explores the border between green marketing and greenwashing. In this context, the author defines the green economy, green marketing and green advertising as part of business in competition. The author points to the current trend of consumer and environmental protection in the legislative development of EU law and evaluates the Proposal for a Directive on substantiation and communication of explicit environmental claims (Green Claims Directive), also in relation to other related EU directives. The author extensively analyzes German case law and points to the need for transparency and sufficient explanation in advertising, referring to the environment.*

1. INTRODUCTION

Success. Victory. Profit. These are all beautiful visions of businessmen who accompany them during their activity in the economic market. Unfortunately, in every competition, the rule is that not everyone is successful at the end of the day. Not everyone is a winner. And not everyone makes a profit. The same applies to economic competition. Therefore, competitors are constantly inventing new ways that current possibilities and technologies offer them, how best to attract consumers, and how to make their products (both goods and services) more attractive. One of such practices is the use of green marketing in business activities. Competitors are very flexible and adapt their marketing activities to current trends. And one of the current trends is "being green". Those who behave ecologically and buy ecologically are "in". This is a kind of phenomenon of ecological altruism in contemporary society.

"We are ecological, we are carbon neutral, we protect the environment... " Such and other forms of "green advertising" can currently be found on many products, their packaging, or advertising media. These environmental claims are used voluntarily by businessmen, especially in advertising, which forms part of their green marketing. Of course, as far as a true statement is concerned, from a legal point of view such a claim (as part of green marketing) is not prohibited in itself. However, if a competitor claims to be doing more for the environment than it actually is, it is already one of the modern unfair business practices, namely "Greenwashing". And the competitor thus violates the principles of economic competition, business practices, as well as relevant legal norms. According to the Cambridge Dictionary, greenwashing is behaviour or activities that make people believe that a company is doing more to protect the environment than it really is.

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The growing efforts to protect the environment are directly reflected in current (especially European) legislation. The European Green Deal sets out a commitment to tackle false environmental claims by ensuring that buyers receive reliable, comparable and verifiable information to enable them to make more sustainable decisions and to reduce the risk of 'greenwashing'. The result of this commitment was the adoption of the Proposal for a Directive on substantiation and communication of explicit environmental claims (Green Claims Directive). The Green Claims Directive, therefore, aims to ensure the functioning of the internal market for economic actors operating in the internal market and consumers relying on environmental claims. Today it is difficult for consumers to make sense of the many labels on the environmental performance of products and companies. Namely, some environmental claims are unreliable and consumers trust in them is extremely low. Consumers can be misled and companies can give a false impression of their environmental impacts or benefits. The Green Claims Directive is not about banning green claims (green marketing, green advertising), but about its fair regulation to protect, in particular, the consumer, so that he has true and relevant information about the product or service he is buying.

But where is the legal border between green marketing and greenwashing? When is a green claim by a trader still allowed and when is it already an illegal act? In this article, we seek answers to these questions. In this context, we define the green economy, green marketing and green advertising as part of business in economic competition. We use relevant professional literature. Subsequently, we define the term "greenwashing" in the context of current European legislation. In the last part, we practically point out selected disputes from the German judiciary. In our opinion, German case law is also authoritative for the development of the decision-making practice of courts in other member states. We focus on the admissibility and transparency of advertising containing a reference to the environment in relation to consumer protection. We thus seek answers to the questions raised about the legality of using green advertising in business.

2. GREEN MARKETING: FROM GREEN ECONOMY TO GREEN ENTREPRENEURSHIP IN ECONOMIC COMPETITION

The environment of our planet is currently facing challenges that pose a threat to the existence of humanity as such. Therefore, people are increasingly becoming aware of the increased need to protect the environment, not only for themselves but also to preserve a certain quality of life for future generations. In this regard, the principle of environmental protection is reflected in all areas of human activity. One of the areas into which the tendency to protect the environment has been introduced is the market economy and the related economic competition (Kopčová, 2024a, p. 72).

The term "green economy" first appeared at the beginning of the 21st century. In 1992, the UN Conference on Environment and Development was held in Rio de Janeiro, Brazil, where the principles of the green economy were formally defined as a concept of sustainable development: 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Barbier, 2012, p. 887). These principles were intended to support:

- reducing unsustainable production and consumption,
- using economic instruments to achieve sustainable development goals.

Sustainable development was named "green economy" twenty years later, at the subsequent UN conference called Rio+20.[2] Green Economy Report defined a green economy as 'one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities' (Raworth et al., 2014, p. 10).

[2] Compare: Brundtland (1987) uses the term "Green Revolution".

The term "green economy" is closely related to the term "green growth", which was adopted by multilateral development banks, which emphasized in June 2012, in the context of the Rio+20 conference, that 'the need for a transition to green growth was recognized as key to sustainable development and prosperity' (Bowen, 2012, p. 7). They are not synonymous; it is important to distinguish between these terms. According to Adamowicz (2022), "the concept of a green economy means a transition to an economic model based on sustainable and balanced production, exchange, consumption and sharing of economic and social benefits with a special emphasis on nature and the environment. Green growth, on the other hand, means increasing the potential of green activities and sectors as drivers of economic growth. In relation to climate, similar importance is attributed to building resilience to climate change by reducing fossil fuel consumption and greenhouse gas emissions, which is associated with the so-called low-carbon development" (p. 3). In the past, "green growth" only applied to the growth of the eco-industry. However, the term is currently used for the growth of the entire economy (Jänicke, 2012, p. 2). We can therefore conclude, while "green economy" is static, "green growth" is a dynamic term. Among some authors links between green economy and sustainability are discussed.[3] Green growth is based on a critique of the term "green economy" by Sachs (1999). In his book, he called the concept of green economy an oxymoron (a term that is in logical contradiction). This critique stems from the idea that continuous economic growth, even if "green," still relies on resource extraction and energy consumption, potentially negating the environmental benefits. The term "oxymoron" is used because it suggests a contradiction in terms, implying that true environmental sustainability and unlimited economic expansion are incompatible. He argues that for economic growth, it is necessary to extract natural resources, which in practice means that every tree cut down, which in the future represents a chair and an increase in GDP, is also an environmental loss (Brand, 2012, p. 1). This is countered by Porter and Van der Linde (1995), who believe that economic growth and sustainable resource use can be achieved simultaneously (p. 101). |Their hypothesis suggests that there may be mutually beneficial solutions for both the economy and the environment. They argue that environmental regulations can stimulate business innovation, improve business performance, and regulations themselves can thus benefit both the environmental dimension and the economic dimension (Porter & Van der Linde, 1995, p. 98). We are inclined to this hypothesis and are convinced that the green economy and green growth are the optimal direction of the world economy. Sustainable development and the green economy represent a way to ensure long-term economic growth and prosperity without negative impacts on the environment.

Another related term is "green entrepreneurship" (so-called "green business"). It's so because economic competition is the fundamental pillar of a market economy. To ensure a green economy, it is therefore essential that individual competitors (entrepreneurs) adopt the principles of the green economy as part of their business actions in economic competition. The term "green business" in the economic community started to be used actively at the beginning of the 21st century when the problems of preventing the risks of negative impact on the environment by economic activity became more obvious (Savastano & Tshughuryan, 2024, p. 4). Green entrepreneurship is a relatively new term that is not yet widely used in professional literature. Therefore, we will try to define this term ourselves: Green entrepreneurship includes all activities of an entrepreneur, which mainly include the production and distribution of their products (both goods and services) with no or minimal negative impact on the environment. Its task is to reduce the environmental burden.[4] Green entrepreneurship involves the implementation of environmental management systems, waste minimization, and the integration of environmental issues into all organizational activities of the entrepreneur. An example is the effort

[3] See eg. Loiseau et al. (2016).

[4] We mean by that any significant impact to clean air, water, and land, including any destruction, damage, or impairment of natural resources resulting from intentional or reasonably foreseeable causes.

to produce a climate-neutral product.[5] Of course, in case entrepreneurs actively contribute to the green economy in some way, i.e. they really do "green business", they may also inform the public - consumers - about their positive impact on the environment. Most often, entrepreneurs point out their "green business" in relation to consumers as part of their *marketing practices*.

In our opinion, marketing strategy is the most important function for business success today. Even the most perfect product will remain forgotten due to inadequate marketing. According to the American Marketing Association (AMA): 'Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large' (Gundlach & Wilkie, 2009, p. 1). Green marketing as a subdiscipline of marketing, began to develop most in the 1990s. However, its beginnings date back to 1975, when the first environmental conference organized by the AMA was held. It discussed how marketing could influence the environment, which at that time was beginning to be strongly affected by the growing economy, and especially by larger industrial production. The result of the discussion was one of the first books on this topic, "Ecological Marketing" by Henion and Kinnear (1976). Following this, in the 1990s, the concept of green marketing began to take shape, presenting the implication of sustainable development through marketing (Baker & Hart, 2016, p. 574). Currently, there are several terms with the same meaning, such as ecological marketing, environmental marketing, or the already mentioned term green marketing, which will also be used in this article (Akgün & Bütüner, 2024, p. 40). As well as the ambiguity of the term itself, there is also no universal definition of green marketing. However, we note that green marketing does not only include promotion or advertising supporting the sale of ecological products. It has a much deeper meaning in business. According to Jurášková and Horňák (2012), green marketing also includes ideas, methods and processes that enable the fulfillment of the company's goals (p. 82). Peattie and Charter (2003) define green marketing as a holistic management process responsible for identifying, anticipating, and meeting the needs of consumers and society in an efficient and sustainable way (p. 727). Also, Polonsky (1994) claims that the concept of green marketing includes all activities carried out in order to implement and facilitate any changes aimed at satisfying human needs and desires with minimal harmful impact on the environment (p. 3).

We can state that green marketing is a current trend among entrepreneurs who implement environmental management and waste minimization systems and integrate environmental issues into all organizational activities. Green marketing thus encompasses a wide range of activities, not just the promotion or advertising of goods with environmental properties. In other words, for green marketing to be successful among the general public, it is important to set up marketing in a way that convinces consumers that green products are as good (and even better) than regular ones. For example, by pointing out that energy-saving light bulbs (LEDs) last longer, they offer greater convenience to the consumer (they do not have to be replaced as often as classic ones) and reduce energy costs. Green marketing, on the one hand, highlights environmental issues and, on the other hand, satisfies current consumer needs. Consumers currently *want* environmentally friendly products and are literally looking for such products on the market. In recent years, there has been a clear upward trend in societal interest in the environment. We believe that this is a kind of modern trend of ecological altruism, which directly influences the development of marketing practices on the part of competitors. We also note that *true* green marketing as such is not illegal. It only reflects the current trend of "being green", which has also been reflected in economic competition.

[5] Climate neutrality is a certain balance between carbon emissions produced and their absorption from the atmosphere. It is about reducing greenhouse gas emissions to zero so that all remaining emissions that cannot be eliminated are compensated by removing carbon from the atmosphere (for example, also through natural mechanisms, if trees are planted, etc.).

3. GREENWASHING AS PART OF GREEN MARKETING OR ITS OPPOSITE?

The society-wide trend of "going green" and "shopping environmentally friendly" is being used by competitors, and they are finding ways to engage the consumer in this direction. Various environmental claims, links, advertisements, or other statements based on environmental support are used in business. Environmental claims in competition may take various forms. However, *from a legal point of view*, it is necessary to examine whether such a statement by a competitor is justified, whether it is based on a true statement or not. If a competitor's claim based on environmental protection is false or is misleading, such action is not legally permitted. 'Greenwashing' is a term used to describe these actions. Just like green marketing, there is no universal definition of greenwashing. According to Furlow (2010), "greenwashing is the dissemination of false or incomplete information by an organization to present an environmentally responsible public image" (p. 2). In European law, the following terms are used in connection with greenwashing: 'unclear or poorly-substantiated environmental claims'[6], while "environmental claims" are defined as 'any message or representation, which is not mandatory under Union law or national law, including text, pictorial, graphic or symbolic representation, in any form, including labels, brand names, company names or product names, in the context of a commercial communication, which states or implies that a product or trader has a positive or no impact on the environment or is less damaging to the environment than other products or traders, respectively, or has improved their impact over time'.[7] If we were to define greenwashing as simply as possible, it is the practice of entrepreneurs claiming to do more for the environment than they actually do (Kopčová, 2024b, p. 232).

The 2020 study of the European Commission (2023) found that a considerable share of environmental claims (53.3%) provides vague, misleading, or unfounded information about products' environmental characteristics across the EU and across a wide range of product categories.

The following hypotheses can be drawn from the current state of the impact of greenwashing on consumers:

- Consumers are faced with the unfair competition practice based on vague, misleading or unfounded information about products' environmental characteristics (greenwashing);
- Due to lack of information about products' real benefit to the environment, consumers make business transactions that they would not otherwise make.

The growing effort to prevent greenwashing is also present in current (especially European) legislation. The European Green Deal sets out a commitment to tackle false environmental claims by ensuring that buyers receive reliable, comparable and verifiable information to enable them to make more sustainable decisions and to reduce the risk of greenwashing. This commitment resulted in the adoption of the Proposal for a Directive on Green Claims.[8] This directive is designed to enhance transparency, prevent misleading environmental claims and foster genuine sustainable practices among businesses.

Of course, greenwashing practices by competitors were already here long before the adoption of the Green Claims Directive. Greenwashing is directly related to green business and green marketing.

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6 Art. 3.2.1 of the Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on substantiation and communication of explicit environmental claims (Green Claims Directive) COM(2023) 166 final 2023/0085(COD) (Green Claims Directive).

7 Art. 1.1. of the Green Claims Directive.

8 The Green Claims Directive is so a part of the EU's broader Green Deal, a comprehensive policy framework aimed at making Europe climate-neutral by 2050.

And so, we can date the beginning of greenwashing to the same period. Because, as is often the case in economic competition, there is always an entrepreneur who uses the successful practices of others. Unlawfully. And green marketing can be considered a successful business practice so far.

Currently, greenwashing is prohibited under Article 5 of The Unfair Commercial Practices Directive and it also meets the characteristics of 'misleading advertising' according to Article 2 (b) of The Directive 2006/114/EC of the European Parliament and of the Council of 12 December 2006 concerning misleading and comparative advertising.[9] The Green Claims Directive applies to explicit environmental claims and environmental labels made by traders on products or about traders themselves in their business-to-consumer commercial practices. It sets out minimum requirements on substantiation and communication of environmental claims, which are subject to third-party verification to be delivered prior to the claim being used in commercial communications. Thus, different types of environmental claims will require different levels of justification. The Green Claims Directive does not prescribe a uniform method for such justification, and, for the assessment to be considered reliable, it should include primary data relating to the specific trader regarding the relevant aspects that significantly contribute to the environmental performance of the product or the trader's environmental performance referred to in the environmental claim. For example, the justifications of a manufacturer of baby diapers made from natural materials will be assessed differently from the justifications for an ecological method of oil extraction. We can therefore conclude that only applicable practice will show what is considered legitimate green marketing and what is considered already a greenwashing practice. Therefore, in the next part of the article, we will focus on current case law.

4. CASE LAW

German case law (The Federal Court of Justice, 1988, file no. I ZR 98/23) has established certain general requirements for advertising with environmental references for quite some time. In the case in question, the court was dealing with the question of the misleading claim about a paper product (toilet paper) where the manufacturer claimed: "Made from recycled paper", whereas the product was not made from 100% recycled paper, but only from more than 80% recycled paper. The Federal Court of Justice stated, "Advertising with environmental protection terms and symbols (...) should generally be assessed according to strict standards. (...) In these circumstances, there is an increased need for the target public to be informed of the meaning and content of the terms and symbols used. Strict requirements must therefore generally be imposed on the explanatory information in order to avoid misleading, which are determined in each individual case by the type of product and the degree and extent of its 'environmental friendliness'."[10] If the said explanatory information is missing from the advertisement or is not clearly visible, there is a particularly high risk that the target public will gain false ideas about the nature of the goods offered, which will influence their purchasing decisions. It is clear from this judgment that advertising with an environmental reference (i.e., in the sense of the definition of terms from the first chapter of the article, it is green advertising, which is part of green marketing) is assessed much more strictly than classic advertising. This is due to the fact that consumers often do not know exactly what individual symbols, expressions and references to the environment mean (consistent with our hypotheses from the previous chapter).

[9] Misleading advertising means any advertising which in any way, including its presentation, deceives or is likely to deceive the persons to whom it is addressed or whom it reaches and which, by reason of its deceptive nature, is likely to affect their economic behaviour or which, for those reasons, injures or is likely to injure a competitor.

[10] The Federal Court of Justice of Germany (judgment of 27 June 2024, file no. I ZR 98/23).

The vagueness, lack of clarity and ambiguity of environmental claims and advertising based on environmental protection are also stated by courts in current decision-making practice.[11] One of the last fundamental judgments was made in the case of "climate-neutral" gummy candies by the well-known manufacturer Katjes (The Federal Court of Justice, 2024, file no. I ZR 98/23).[12] According to the court, in the field of environmental advertising there is a particularly high risk of misleading consumers and there is an increased need to inform the public about the meaning and content of the terms and symbols used. To avoid misleading advertising, in which the defendant uses an ambiguous environmental claim (such as the disputed term "climate neutral"), this claim must also be *explained in the advertisement itself*. In this regard, further explanatory information provided outside the environmental advertising itself (such as, in this case, a QR code or a link to a website) *is not sufficient*. The court also stated that the misleading environmental claim also has a negative impact on competition as such, since environmental advertising such as "climate neutrality" has significant importance in the consumer's decision-making process about purchasing goods.

5. CONCLUSION

To find out where the border is between green marketing and greenwashing, firstly, we define the terms “green economy” and “green marketing” in the context of a market economy and economic competition. Using the comparison method, we defined “advertising with environmental claims” and “greenwashing”, both from a theoretical and legal point of view. We hypothesize that advertising consisting of an environmental claim is part of green marketing. Green marketing is thus a broader concept and encompasses a wide range of activities, one of which is the promotion or advertising of goods with environmental properties. If such advertising with environmental claims is misleading, it is greenwashing. In this context, we propose another hypothesis: Greenwashing is part of green marketing and represents an illegal element of green marketing.

We critically point out the current trend in the EU, which aims to ensure a high level of consumer and environmental protection. We also consider the adoption of the Proposal for a Directive on Green Claims as a result of this pro-consumer and pro-environmental development of European policy. The Green Claims Directive aims to ensure that buyers receive reliable, comparable and verifiable information to enable them to make more sustainable decisions and to reduce the risk of ‘greenwashing’. This is not a ban on environmental claims by traders in general. It is a fair regulation of those claims to protect consumers in particular, so that they have true and relevant information about the product or service they are buying. However, it is not clear from the Directive itself what it specifically means by the term "transparent and reliable information". We point out a practical example that, in practice, the conditions must be assessed individually for each case (the justifications of the manufacturer of baby diapers made from natural materials will be assessed differently and the justifications for the ecological method of oil extraction will be assessed differently). Based on the numerous relevant German case laws in matters of environmentally misleading claims, it also follows that even the courts do not have a single, consistent decision-making line in this regard.

[11] The Kiel Regional Court found that the term “climate neutral” is misleading and ambiguous. According to the court, climate neutrality can be achieved in various ways, and therefore consumers need more comprehensive information (judgment of July 2, 2021, file no. 14 HKO 99/20); The Mönchengladbach Regional Court considers the use of the term “climate neutral product” on a jam jar to be misleading in its judgment (judgment of February 25, 2022, file no. 8 O 17/21), the Konstanz Regional Court considers the term “climate neutral premium heating oil” without further explanations on how to achieve climate neutrality to be unfair competition within the meaning of the relevant provisions of the law (judgment of November 19, 2021, file no. 7 O 6/21 KfH); and others.

[12] Judgment of the Federal Court of Justice of Germany of 27 June 2024, file no. I ZR 98/23. Compare: The lawsuit was firstly dismissed by Regional Court in Kleve (judgment of June 22, 2022, file no. 8 O 44/21) and by Higher Regional Court of Düsseldorf (judgment of July 6, 2023, file no. 20 U 152/22).

However, what we can confirm with certainty is that entrepreneurs using green marketing in their business practice should be careful about the manner and form of its expression in relation to consumers. We can thus state that there is a very thin line between green advertising, which is part of an entrepreneur's green marketing, and greenwashing. Especially in the current situation, when a high level of consumer and environmental protection is a priority topic of European policy, and this principle is also embedded in national laws. The decision-making practice of courts is also greatly influenced. Despite the already stated relatively unclear precise boundary between green marketing (green advertising) and greenwashing, according to the analysis of current case law, we can conclude that if traders use green advertising in their marketing, such advertising should not only contain vague slogans such as "climate-neutral product", "we are environmentally friendly", etc. Advertising referring to the environment should be clear, transparent, and sufficiently explained to the consumer, in a visible place and directly in the given advertisement (for example, just a link to a website or QR code is not sufficient). Unfortunately, it is not yet precisely defined anywhere what specific measure is meant by such "transparency". We assume that only the further development of case law will show us this over time.

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Limited Real Rights and Their Influence on the Economy

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Abstract: *The purpose of the current paper is to address some problems of limited real rights and their influence on the economy. The main focus is put on the appliance of the right to use and the right to construction, however the right to additional construction and superstructure and of the easements in Bulgaria are also considered. Due to the enormous role Property law has in the world nowadays, it appears necessary to examine its' impact on the society.*

The definition of 'property rights' in economic sense is different than that in legal sense. Therefore, highlighting this difference is of utmost importance in order to reach a proper approach to this topic.

Special attention is also paid to the possibilities of exercising the limited property rights and the limitations imposed by the legislation.

1. INTRODUCTION

Property law and economics exist in an inseparable, correlative connection, the influence of which is growing at a rapid pace with each passing day, due to the dynamically changing economic situation, increasing inflation at the global level, and the interest of people to investing their means in real estate in order to avoid eventual devaluation.

From an economic point of view, the right to property and ownership is directly linked to the use of things as goods for production and consumption. It does not matter on what ground the particular object is used, as long as the possibility to extract benefits from it exists. Therefore, economics speaks of the so-called 'property rights', the content of which, however, does not overlap with the one of 'property rights' in legal science (as it will be further noticed).

Nevertheless, there is a difference between the behaviour of people, holding a right of ownership (or other right *in rem,* depending on the nature of the latter) over a given property, and that of the tenants (or parties of such an obligation), in multilateral aspects - regarding the allocation of their resources, the way of using and keeping the property in question, etc.

The influence of the 'property rights' (from economics' point of view) is considered in detail by Rodrik and Rosenzweig (2010), in different aspects, concerning the expropriation risk, costs, etc. However, it should be noted that while this is where the connection between property rights (generally speaking, considering the meaning of this concept in an economic sense, based on the possibility of deriving benefit from a certain good and in relation to the question of the allocation of resources) and the economy is found, the current paper focuses on limited real (property) rights as one of those abovementioned ‚property rights'. This requires clarification of the nature of limited real rights in a legal sense. The study aims to present the main points concerning the

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legal framework of these institutions and thus lay the foundations for possible future in-depth research in this direction.

The connection between law and economics in Bulgaria is under-researched, as a general study on the topic is found in one article by Sedlarski (2011). This analysis focuses primarily on the application of the economic methodology in order to explain the emergence and effects of legal norms on the behaviour of individuals and the consideration of law as performing economic functions.

On the other side, the current paper presents the law-economy relationship in a reverse way, examining the legal framework of limited real rights and the consequences of their appliance on the economic situation.

The following hypotheses were defined in this study:

H1: *The establishment of limited real rights leads to the satisfaction of the needs of their holders to use and acquire property by using the property of someone else.*

H2: *This satisfaction of their needs occurs with minimal transaction costs and through a convenient legal framework.*

H3: *The convenient legal framework is expressed in the accessibility and the limitation period.*

H4: *The 5-year limitation period (regarding some of the limited real rights) affects the economic positively.*

2. METHODOLOGY

In order to achieve the goals of this study, it should be established which are the economic aspects of the real rights, i.e. which is relevant to the basis from which the extraction of the benefit is determined, also which are the entities that would benefit the most from the establishment of these rights *in rem*. Various options have been considered, regarding the multiple possibilities for the exercise of limited real rights. Data from Eurostat were extracted to support the conclusions drawn. In order to clarify the essence and concept of the limited rights *in rem* the methodology used is diverse. It includes both the legal-dogmatic method and the sociological and critical analysis. In this way, it is ensured that the results objectify the effectiveness, applicability and flexibility of the current legal framework.

The above was achieved as follows:

- **Step 1:** Establishing the meaning of the term *property rights* (in economic sense) and *right of property* as a legal term.
- **Step 2:** Explanation of the concept and content of limited rights in rem under Bulgarian legislation.
- **Step 3:** Extraction of the data relevant to the economic analysis from the content of the limited real rights (in particular regarding the right to use and the right to build).
- **Step 4:** Summary of the findings and conclusion.

The importance of this research stems from the stable trends regarding the settlement, respectively the number of entries of limited real rights on the territory of the Republic of Bulgaria in recent years:

Table 1. Number of entries of limited real rights for the years 2020-2023

	2020	2021	2022	2023
01.01-31.03.	1431	1964	2015	2311
01.04.-30.06.	1950	2139	2512	2597
01.07.-30.09.	1851	2019	2419	2235
01.10.-31.12.	2162	2409	2885	2561

Source: Registry Agency of Bulgaria (2020), Own processing

The table shows slow but steady growth regarding the number of entries of limited real rights up to and including the second quarter of 2023. This can also be attributed to the uncertainty surrounding the COVID-19 situation, marking the beginning of 2020, as the data about the year 2019 show the following:

Table 2. Number of entries of limited real rights for the year 2019

	2019
01.01-31.03.	1714
01.04.-30.06.	2042
01.07.-30.09.	1999
01.10.-31.12.	2355

Source: Registry Agency of Bulgaria (2020), Own processing

For the current year 2024, data are available up to the third quarter, including:

Table 3. Number of entries of limited real rights for the year 2024 (01.01-30.09)

	2024
01.01-31.03.	1875
01.04.-30.06.	2233
01.07.-30.09.	2019

Source: Registry Agency of Bulgaria (2020), Own processing

Although there are certain declines and rises, which are inevitable, relative stability is observed in terms of the number of entries of limited real rights. Therefore, the clarification of their content, to which the present study is dedicated, represents the basis and is extremely important for establishing the connection between property (in legal sense) and the economy.

3. PROPERTY RIGHTS AND RIGHT OF PROPERTY (OWNERSHIP)

It must be noted that the term "*property rights*" is primarily associated with the name of Ronald Coase, a British economist, and his research on this topic (Coase, 1960). His theory focuses on property rights, transaction cost and contractual relations. His views were subsequently developed by other authors, including Alchian (1965), Demsetz (1967), Furubotn and Pejovich (1972), De Alessi (1980), Barzel (1989), etc.

In fact, the institutional economic theory does not consider a single indivisible right of ownership, but multiple property rights forming a specific set of rights to use a certain resource (Rinkova, 2013, p. 112).

This stems from the fact that economic theory developed under the influence of the Anglo-Saxon legal system, which differs radically from the continental one in many directions. The continental

legal system has its roots in Roman law, which considered property rights in a completely different way. This difference is well explained by Merryman (1974, as cited in Furubotn, & Richter, 2005, p. 88) as follows: „Romanic ownership can be thought of as a box, with the words „ownership" written on it. Whoever has the box is the „owner." In the case of complete, unencumbered ownership, the box contains certain rights, including that of use and occupancy, that to the fruits or income, and the power of alienation. The owner can, however, open the box and remove one or more such rights and transfer them to others. But, as long as he keeps the box, he still has ownership, even if the box is empty. The contrast with the Anglo-American law of property is simple. There is no box. There are merely various sets of legal interests. One who has the fee simple absolute has the largest possible bundle of such sets of legal interests. When he conveys one or more of the sets to another person, a part of his bundle is gone."

In this regard, the right of ownership under Bulgarian legislation is a unitary, complex subjective right, because it contains three main powers (rights) – right to possess, right to use, and right to dispose of. These rights, however, cannot exist outside of the unitary right of ownership, and independent dispositional actions cannot be performed with them (Markov & Petrov, 2023, p. 64). If one of them is missing, there is no ownership.

After this distinction was made, the nature of limited real rights should be clarified - right to use (usufruct), right to build (superficies), right to superstructure and additional construction and the easements. They do not constitute an "extract" of any of the powers, contained in the right of ownership, but are separate subjective rights that arise on the basis of the grounds provided for by the law. Their establishment by the owner in favor of another person represents an establishment of new rights and not transfering an existing ones in their current form. Hence, the right of ownership is only limited (and not extinguished) by the newly established right *in rem*, due to the collision between the latter (whose holder is a person other than the owner) and the right of property of its holder (the owner). Depending on the nature of the established right and the will of the parties, this limitation may be either temporary (as is always the case with the usufruct) or indefinite.

4. LIMITED REAL RIGHTS

As was stated before in this paper, nowadays the population takes advantage of the provided opportunity to establish and therefore exercise the limited real rights, which in Bulgaria are *numerus clausus.* All of them are related to the use of a certain thing, and the right to build also leads to the acquisition of property on someone else's land, in deviation from the rule that the owner of the land is also the owner of the buildings and plants on it (unless otherwise agreed upon), objectified in Art. 92 PA (Property Act, 1999).

In their essence, the limited real rights are absolute rights over the property of someone else (*iura in re aliena).* They have existed since Roman law (*usus, usufructus, superficies, servitudes*), and in modern Bulgarian legislation, their legal framework is primarily contained in the Property Act (1999), which regulates the regime for their establishment, exercise, extinguishment, as well as the legal remedies, providing their protection. There are also separate articles in other legal arts, attributed to them, for example, Art. 180-180a SDA (Spatial Development Act, 2001), Art. 56 SPA (State Property Act, 1996), Art. 37-39 MPA (Municipal Property Act, 1996), etc. There is also an interpretative practice of the Supreme Court regarding certain controversial issues. Each one of the limited rights *in rem* is distinguished by specific characteristics, which leads to their separate examination.

4.1. The Right to Use (Usufruct)

The general legal framework of the usufruct is found in Art. 56-63 PA (Property Act, 1999). It is expressed in the possibility to use a certain object (which is the property of someone else) for its intended purpose and to obtain benefits from it. Like the other rights *in rem*, it is an absolute right (erga omnes entitlement), hence is enforceable against anyone infringing it, including the owner himself. This results from the fact that the more limited real right (in this case the usufruct) has priority over the fuller one (the right of ownership). However, it should be emphasized that the owner does not lose his property right (of ownership), but instead, it remains in the background for a certain period.

Consequently, the usufruct is always temporary and has a deadline. The deadline, in itself, is a certain event in the future. Thus, even if the right to use is established for life (until the death of its' holder), it will cease to exist at the time of the death of the usufructuary, regardless of when that occurs. This stems from the fact that it is a personal right – it cannot be inherited or transferred. It should be noted that the right to use has for its' object mainly immovable property, and it cannot be established on consumable objects, the substance of which is affected by the use - e.g. food, water, etc. Its' content includes two main powers - to possess the object and to use it (including to receive the benefits from it), since the use itself implies the possibility for the user to exercise actual power over the object (Boyanov, 2009).

From an economic point of view, the usufruct is an extremely convenient way to achieve multiple goals, because it provides the opportunity to extract the valuable properties of a thing, satisfying the needs of a person of a dwelling (or of another object - a garage, land, etc.), without this being associated with displacement or reduction of the right to property of the owner, but only with its' limitation. The reasons for establishing this right may be of all kinds. Consequently, the following options are considered:

- **Option 1:** Establishment of an usufruct to give a person who cannot afford to buy a chance to use a certain property (or some other object) and thus to meet his immediate needs**.**
- **Option 2:** Establishment of a usufruct in favour of a person who has no direct, immediate need for the property, but instead rents it to a third party, thus receiving the rental price.

In the first case, the person in whose favor the usufruct is established will derive his own benefit from the goods. Satisfying his need for the item in question will positively affect his behavior in society and the subsequent distribution of his expenses. More and more people strive to have property rights, which is shown by the fact that the number of owners (compared to that of renters) in Bulgaria increases annually, according to the statistics prepared by Eurostat:

Table 4. Distribution of population by tenure status, type of household and income group

TENURE (Labels)	Owner						Tenant					
TIME	2021		2022		2023		2021		2022		2023	
GEO (Labels)												
European Union: 27 countries (from 2020)	69.9		69.1		69.2		30.1		30.9		30.8	
Belgium	71.3		72.5		71.9		28.7		27.5		28.1	
Bulgaria	84.9		85.0		86.1		15.1		15.0		13.9	
Czechia	78.3		77.1		76.0		21.7		22.9		24.0	
Denmark	59.2		59.6		60.0		40.8		40.4		40.0	
Germany	49.1		46.5		47.6		50.9		53.5		52.4	
Estonia	81.6		82.0		80.7		18.4		18.0		19.3	
Ireland	69.8		70.5		69.4		30.2		29.5		30.6	

Greece	73.3		72.8		69.6		26.7		27.2		30.4	
Spain	75.8		76.0		75.3		24.2		24.0		24.7	
France	64.7		63.4	b	63.1		35.3		36.6	b	36.9	
Croatia	90.5		91.1		91.2		9.5		8.9		8.8	
Italy	73.7		74.3		75.2		26.3		25.7		24.8	
Cyprus	69.8		69.6		68.8		30.2		30.4		31.2	
Latvia	83.2		83.1		82.8		16.8		16.9		17.2	
Lithuania	89.0		88.6		88.8		11.0		11.4		11.2	
Luxembourg	71.1	b	72.4	b	67.6		28.9	b	27.6	b	32.4	
Hungary	91.7		90.1		90.5		8.3		9.9		9.5	
Malta	81.9		82.6		74.7		18.1		17.4		25.3	
Netherlands	70.1		70.6		69.3		29.9		29.4		30.7	
Austria	54.2		51.4		54.3		45.8		48.6		45.7	
Poland	86.8		87.2		87.3		13.2		12.8		12.7	
Portugal	78.3	b	77.8		76.0		21.7	b	22.2		24.0	
Romania	95.3		94.8		95.6		4.7		5.2		4.4	
Slovenia	76.1		75.4		75.2		23.9		24.6		24.8	
Slovakia	92.9		93.0		93.6		7.1		7.0		6.4	
Finland	70.3		69.5		69.2		29.7		30.5		30.8	
Sweden	64.9		64.2		64.9		35.1		35.8		35.1	
Iceland	:		:		:		:		:		:	
Norway	78.3	b	79.4		79.2		21.7	b	20.6		20.8	
Switzerland	42.2		42.3		42.6		57.8		57.7		57.4	
United Kingdom	:		:		:		:		:		:	
Montenegro	91.5		91.0		:		8.5		9.0		:	
North Macedonia	:		:		:		:		:		:	
Albania	95.9		:		:		4.1		:		:	
Serbia	89.4		91.6		:		10.6		8.4		:	
Türkiye	57.5		56.7		56.2		42.5		43.3		43.8	
Kosovo*	:		:		:		:		:		:	

Kosovo* - Under the UN Resolution 1244.

Source: Eurostat Statistics (2024)

It is clear from the Eurostat data that Bulgaria is one of the countries in which the tendency is to increase the percentage of owners compared to that of renters, but it also ranks in one of the first places among other countries in this regard.

A person who does not own his own home allocates monthly funds to pay rent, which funds (with an established usufruct) could be distributed, as well as invested in many different directions, which would lead to profit, respectively to subsequent development of economic activity. Hence, through the establishment of a right of use, it is also possible for people who are not owners to follow the behavior of those who are, in terms of consumption and distribution of their means. Moreover, the usufructuary is equated to a „temporary owner" with regard to the use of the object (without, of course, being granted the possibility to dispose of the property, which is part of the content of the right of ownership), since it is his responsibility to and the obligations inherent to each owner - to pay taxes on the property, utility costs, etc. The right to use can also be established in exchange for a payment, for example by agreeing that instead of the usufructuary, the owner receives the benefits. In this way, the user is given the opportunity, instead of being bound by a lease contract, to "repay" the owner who established the right to use, in a way that does not affect his current income from his own activity.

With regard to the second option, the possibility granted to the usufructuary to rent the item is considered. This is an extremely convenient option for a person who does not have an immediate

need to use the property, yet to benefit from it by receiving the rental price. In this case, it is more likely that the establishment of the usufruct arises from some obligation to the person for whose benefit it is established. Thus, it fulfills several functions at the same time - it leads to the enrichment of the user, to provide the usufructuary with the opportunity to use the object and to derive the benefits from it, and to the repayment of (eventual) obligations.

In both options, there is an economic benefit from the establishment of the usufruct. While in the first case, however, the subjects who derive the benefits are mainly the usufructuary and the owner (when he acquires the benefits), in the second one also the lessee manages to benefit from the same object. All this leads to partly conformation of hypothesis one (excluding the part of acquiring) and hypothesis two (considering the convenient legal frame), and full confirmation of hypothesis three, because it gives many opportunities of differend kinds to an indefinite circle of people (regardless their status, well-being, etc.), according to their needs.

4.2. Right to Build (Superficies)

The general legal regulation of the superficies is found in Art. 63-67 PA. It expresses the possibility of acquiring the right of ownership of a building built under or on the land of someone else. This occurs when the owner of the land establishes for the benefit of another person (superficiary) the so-called right to build, by virtue of which its' holder can construct a separate building on the land, which he acquires as his property. The right is considered as having been exercised at the moment when the building reaches the stage of „carcass work" since at that moment it can be distinguished as a separate, independent object. This is key, due to the fact that the right to build is considered to be extinguished in a 5-year limitation period, if not exercised. Consequently, if the construction has not reached the "carcass work" stage in this 5-year period, the superficary loses his right, and hence loses the opportunity to acquire ownership of the construction.

The question arises as to whether this limitation negatively affects the economic idea regarding the extraction of a benefit from a thing. However, not only the answer is not negative, but also should be accepted that the influence of this statute is positive. The time-limited opportunity to exercise the right to build protects the interests of the owner. The superficiary has the right to use the land, property of the owner, to the extent necessary for the use of the building for its intended purpose, and for its' construction itself. Therefore, it cannot be assumed that the owner should be indefinitely restricted because he has established a superificies and is obliged to tolerate the superficier's actions. The positive influence of the limitation period in economic terms is demonstrated by the fact that if the superficiary does not exercise his right to build in time and it is extinguished, the owner can provide an opportunity for another person to do so by establishing a new right to build on the same land. If the superificies was not extinguished within a 5-year period, there would be a „perpetual" restriction on the owner's right of ownership regarding a risk that the property will remain unusable (both regarding the owner and third parties who wish to build on it), due to superficiary's failure to act.

The right to build can be established both temporarily and indefinitely. When it is established with a due-date, after its' expiration the ownership of the building passes to the owner of the land free of charge. Therefore, if the limitation period were not present, the owner would be deprived of the opportunity to acquire ownership of the building in this case.

Consequently, it can be concluded that regarding the right to build, hypothesis two is partly cofirmed (considering the convenient legal frame), while hypotheses one, three and four seem to be fully confirmed.

4.3. Right to Superstructure or Adding to a Building

The right to superstructure or adding to a building is expressly regulated in Art. 66, para. 4 PA (1999). It represents the possibility to acquire ownership of an addition to a particular building owned by another person. Again, it concerns a separate, independent object, but this time – in relation to an already existing building. The difference between the right to superstructure and adding to a building consists solely of whether the construction activities will be carried out vertically or horizontally. Regarding the legal frame, there are no differences. From an economic point of view, its' effect is similar to that of the superficies.

4.4. Easements

According to Art. 103 AW (Act on Waters, 2000), "the land easement shall be the encumbrance imposed on an immovable property called subservient property in favour of another immovable property called dominant, belonging to another owner." The easements are expressed in multiple, diverse and different rights over an object, owned by another party - right to access, sewer easements, etc. They are widely used when the energy and water supply are concerned. There are also certain types of categories in which they are classified according to different criteria – the way they are exercised, the nature of the impact, the significance of the interest they serve, etc.

Regarding the easements, hypotheses two and three cannot be considered fully confirmed. The variety of the easements does not allow them to be united under a specific act or legal regime. This leads to more difficulties for the average person to become familiar with the applicable and suitable for each case legal frame.

5. LIMITED REAL RIGHTS AND TRANSACTION COSTS

The fact that the establishment of limited property rights does not lead to loss of ownership is also related to a reduction in the volume of transaction costs. According to the definition by Eggertsson (1990, as cited in Sedlarski, 2011, pp. 81-82), in general, transaction costs are the costs that arise when individuals exchange ownership rights over economic assets and seek to strengthen their exclusive rights.

According to Art. 18 OCA (Obligations and Contracts Act, 1950), "contracts for the transfer of ownership or the creation of other real rights on immovable property must be executed with notarial deeds." This process involves the payment of notary fees. In this regard, the certified material interest should be taken into account. It is contained in Art. 96 para. 2 NNPA (Notaries and Notarial Practice Act, 1997), according to which

In the creation or transfer of other real rights, the certified proprietary interest shall be: 1. in respect of a building right: 90 per cent of the fair market value of the land lot or the portion thereof, as the case may be, whereon the right is created or transferred; 2. in respect of a right to use: the fair market rental charge could accrue for the entire period of use or, if no such period is specified, for three years. When it comes to a transfer and certification of a right of ownership to things, the certified proprietary interest shall be the fair market value of the thing (Art. 96, para 1, pt. 1). Since the limited right *in rem* is always smaller in volume than full ownership, it follows that the volume of transaction costs will be reduced accordingly.

It should also be noted that limited real rights can also be acquired by statute of limitations. This happens through continuous possession over a period of time, in compliance with the requirements of the law. All of this results in full confirmation of hypotheses two, three and four.

6. FUTURE RESEARCH DIRECTIONS

The current paper lays the foundations for an in-depth legal-economic and comparative analysis in relation to limited property rights and their impact on the economic field. Such a study should be conducted in several main directions:

1. In view of the behavior of the subjects;
2. In view of the dynamics and upcoming changes in the economy for the period of the expiration of the statute of limitations;
3. In view of the costs related to the recognition of the limited property rights.

Next, carrying out a detailed legal-economic and comparative analysis will lead to a greater awareness of the population regarding the opportunities that the law provides them and the optimal ways in which they can be used. Moreover, it would lead to expanding the practical possibilities for the population, and to filling an existing void in the legal and economic literature.

Also, carrying out a comparative analysis on an international level would clarify many questions regarding the relationship between law and economy in the continental legal system.

7. CONCLUSION

It can be concluded from the study that the link between limited rights in rem and the economy should be examined in its correlativity. Of the four *iura in re aliena* under current Bulgarian legislation, the usufruct and the superficies stood out in economic terms. The possibility of granting the right to a person to derive benefits in a legal and purely practical plan from another's property leads to the facilitation of civil circulation and the expansion of the options of this person to use his funds in different ways. The restrictions that the law determines (concerning the statute of limitations) ensure the reasonable exercise of the right to build and represent a type of protection for the interests of the owner. They guarantee the possibility of benefiting from the relevant property by another entity, in the event of lack of action or bad faith behavior on the part of the superficiary.

A correct understanding of the nature of rights *in rem* in a legal and technical sense is of the utmost importance in order to assess the economic impact of their exercise. The present study not only laid the foundations for a more in-depth study in the future in this direction, clarifying some main points concerning limited real rights in Bulgaria but also outlined relevant directions in which this study can be carried out.

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Legal Dimensions of Harmonizing National Environmental Policies with International Sustainability Goals

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Abstract: *It is often said that we have borrowed the Earth from our grandchildren. This idea highlights the responsibility we bear to protect the environment and preserve its beauty and livability for future generations. Concepts like environmental protection, sustainability, and long-term thinking are not abstract ideals but shared duties. This paper seeks to underline their importance and make them accessible to a broader audience. One key aspect in shaping environmental policy at the European level is the fact that national regulations can strongly affect the operation of the internal market. Differences in national rules concerning product features can lead to varying competitive conditions among Member States. As a result, ensuring the free movement of goods often requires EU-level regulation. Over time, the conviction has grown that a harmonised environmental policy is essential for the functioning of the internal market (Hottó, 2024, p. 87).*

1. INTRODUCTION

The fundamental principles of the European Union's environmental law are not listed with the term "particular," thus they are considered exclusive, meaning the list cannot be freely expanded. These principles bind the Community and, by extension, the community bodies involved in legislation, compelling them to take measures essential for achieving the objectives of environmental policy (Hottó, 2024, p. 87).

This paper not only contributes to the academic discourse on sustainable development but also serves as a practical guide for decision-makers. It highlights the importance of robust, adaptable policies that reflect both the urgency of global sustainability goals and the nuanced demands of national contexts.

One of the most important objectives in nature conservation and environmental protection is to ensure the use of available natural resources in a way that avoids irreversible damage in the long term. The related regulations essentially cover the protection of the earth's atmosphere, climate, and nature, as well as waste management (Hottó, 2024, p. 87).

The primary focus of nature protection is not the human environment and public health, but the protection of species and their habitats. Its three main areas are species protection regulations, forest protection, and area-oriented regulations. The latter has two main parts: the Birds Directive and the Habitats Directive. The general protection of habitats is of paramount importance, within which adherence to and enforcement of regulations concerning the use of chemicals in waterways and wetlands is essential for our future. In the relationship between humans and nature, the

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agricultural revolution brought significant qualitative changes over time. This process not only utilized but also harnessed parts of nature, and it can be argued that that the exploitation of natural resources that began then continues to this day. Therefore, the topic remains timely and presents a continuous challenge in both legislation and practical application (Hottó, 2024, p. 87).

When the European Community was established, its founding treaties made no reference to environmental policy or environmental law. Similarly, the foundational documents of the European Coal and Steel Community and the European Atomic Energy Community did not address environmental protection. However, a key development was that the ECSC Treaty already allowed for the establishment of Community-level standards for protection against radioactive radiation (Horváth Sz., 2006, p. 30).

The EU's secondary environmental legislation has developed in both vertical and horizontal structures. While vertical instruments target specific environmental elements (such as water, air, or soil), horizontal legislation is designed to offer protection across all environmental domains (Horváth Sz., 2006, p. 30).

When the European Community was established, the Treaty on the functioning of the Community did not contain any provisions on environmental policy or environmental law. The secondary legislation of the Community's environmental policy is enacted in both vertical and horizontal forms. The necessity of horizontal legislation is justified by the fact that while vertical legislative instruments pertain to specific environmental elements, the horizontal legislative instrument aims to protect all environmental elements (Hottó, 2024, p. 88).

2. BASIC PRINCIPLES OF EUROPEAN UNION ENVIRONMENTAL LAW

The main lines of the European Union's environmental law are defined by the substantive provisions outlined in primary legislation, which contain binding principles for the development of secondary community law. The legal principles derived from both community law and national law, which are crucial for the remaining competences of the member states, are also of paramount importance in the application of the law.

The treaty establishing the European Community (EUR-Lex, n.d.-a) enshrined those environmentally relevant provisions from which the principle of "the best possible environmental protection" can be derived. Both national and community environmental policies are oriented by certain goals and principles from a substantive perspective.

Article 174(1) of the Treaty establishing the European Community defines the objectives and tasks of the community's environmental policy. The goals of environmental policy range from protecting the environment and ensuring the rational use of natural resources to supporting measures aimed at combating global environmental problems at the international level. It is important to emphasize the equality of these goals. Article 174(2) states that the objective of the Community's environmental policy is a high level of protection, while taking into account the differences in conditions in the various regions of the Community. It highlights that this policy is based on the principles of precaution and prevention, the principle that environmental damage should be rectified at its source, and the "polluter pays" principle (EUR-Lex, n.d.-b).

According to Article 174(3), in the development of its environmental policy, the Community shall take into account available scientific and technical data, the environmental conditions in the various

regions of the Community, the potential benefits and costs of action or lack of action, and the economic and social development of the Community as a whole as well as the balanced development of its regions. Article 174(4) stipulates that the Community and the member states shall cooperate within their respective competencies with third countries and competent international organizations (Jogkódex, n.d.-a). Transboundary environmental crimes, such as illegal waste shipments or deforestation, require international legal cooperation. In such cases, the European Arrest Warrant (EAW) can be a particularly effective tool to facilitate the prosecution of environmental crimes across EU Member States. The regulatory framework presented by Dávid Tóth highlights how the EAW serves to ensure swift and effective law enforcement in dealing with crimes, while ensuring respect for international law and human rights standards (Tóth, 2024, pp. 98–99).

The identification of goals and principles in the EC Treaty has a dual significance. Firstly, they are mandatory in the field of the Community's environmental policy, thereby limiting its activities in this area. Secondly, these principles oblige the Community and the community bodies involved in legislation to take the necessary measures to fulfill the provisions and objectives outlined in Article 174. (Hottó, 2024, p. 89).

Environmental policy principles: Article 174(2) defines the means necessary to achieve the objectives, which makes environmental policy unique. In other Community policies, the EC Treaty typically outlines only the objectives, with limited or no description of the means to achieve them.

The principle of a high level of protection: Article 95(3) (EUR-Lex, n.d.-b) and the first sentence of Article 174(2) of the EC Treaty. The Treaty contains two provisions regarding the level of protection that forms the basis of the Community's environmental policy. Article 95(3) requires the Commission to take into account the requirement for a high level of protection when preparing proposals under Article 95(1). The Council and the Parliament must also aim to achieve this objective. The first sentence of Article 174(2) generally states that in the formulation of the Community's environmental policy, due consideration must be given to the different conditions in the various regions, with the aim of achieving a high level of protection. Non-compliance with either of these provisions may lead to the annulment of the respective legal act. However, a high level of protection does not mean the highest level of protection, as economic and political considerations can also be taken into account (Hottó, 2024, pp. 89-90).

Precautionary principle and prevention: Second sentence of Article 174(2) of the EC Treaty.These principles, in their current form, can be traced back to the Maastricht Treaty, while the Single European Act introduced only the "precautionary" principle into the Treaty. These principles emphasize that preventive measures must be taken against environmental pollution; environmental damage should be prevented rather than managed. Based on this fundamental idea, two levels of meaning can be distinguished in the principle of prevention: The principle of prevention essentially limits itself to the aforementioned preventive nature, but it also includes effective precaution in relation to environmental interests. Environmental damage should be avoided whenever possible, even if, in themselves, they do not cause lasting harm and are "acceptable." Therefore, in case of doubt, environmental burdens should be avoided to achieve long-term compatibility between environmental use and environmental protection. From this basic tenet, the principle of damage minimization can be derived. Additionally, the principle of proportionality must always be examined, ensuring that the environmental damage reduction achievable through the chosen preventive measure is proportionate to the extent of the intervention. The principle of prevention includes eliminating dangers, reducing and avoiding risks, and it also implies that environmental burdens should be avoided as much as possible (Hottó, 2024, p. 90).

Source-principle: Second sentence of Article 174(2) of the EC Treaty. The source principle is based on the question of when and where environmental burdens can be primarily tackled. The EC Treaty contains the fundamental tenet that environmental policy measures should be taken where the burdens originate, that is, at their source. This means that environmental burdens should ultimately be addressed as close to their origin as possible, both in terms of the earliest possible time and the geographical location. This principle shows a certain connection with the principles of prevention and precaution, as these principles also require addressing environmental burdens at the earliest possible stage. Additionally, the principle of proportionality must be considered here as well (Hottó, 2024, pp. 90-91).

The polluter pays principle: Second sentence of Article 174(2) of the EC Treaty. The polluter pays principle extends to bearing the costs. Essentially, the one who (potentially) caused the environmental burden is obliged to bear the costs of its elimination, avoidance, and reduction. Ultimately, this principle is based on market economy principles in terms of bearing the environmental burdens caused by certain activities and, thus, the actual costs. The polluter pays principle must be examined in conjunction with the principle of prevention when establishing the polluter's obligation to bear the costs of reducing or preventing environmental burdens. From this perspective, the polluter pays principle applies to both "legal" and "illegal" environmental damage. Accordingly, the polluter can be required not only to bear the costs of already incurred environmental damage but also to assume the costs of avoiding environmental burdens that originate from the environmental damage they caused. The polluter pays principle is now a fully recognized principle, but there are still many open questions regarding its application, such as the extent of the obligation to bear costs, the potential magnitude of these costs, and how they are calculated and distributed. Concerning community law, it is necessary to refer to the principle of subsidiarity, which implies that it is not always the responsibility of the community legislator to implement the polluter pays principle. However, if the Community acts, it must take this principle into account (Hottó, 2024, p. 91).

The principle of integration: *Article 6 of the EC Treaty* (Jogkódex, n.d.-b). Environmental considerations must be integrated into all decision-making processes at the earliest possible stage to achieve the intended goals, as integration (e.g., in industry, agriculture, tourism, etc.) holds the greatest significance among the tools of sustainability. The essence of this is that environmental policy cannot be pursued in isolation from other policies; it must be harmonized with other state political objectives. Thus, this principle allows for the incorporation of environmental policy requirements into the implementation of other community policies as well (Gellén et al., 2021, p. 207).

The effectiveness of environmental policy can only be ensured if environmental interests are considered in the formation of other policies, meaning it cannot be pursued in isolation from other policies. Without this, significant successes cannot be achieved in areas such as agriculture, transport policy, energy policy, or industrial policy. This specific characteristic must be enforced at the Community level through the principle of integration. According to this principle, the issue of environmental protection should not remain isolated from other Community objectives but should be integrated into the areas of Community policies. With the Amsterdam Treaty (European Parliament, n.d.-a), the principle of integration became even more important, as it was included in the first part of the EC Treaty (among the general principles). Later, this principle was complemented by a reference to sustainable development.

The requirements of environmental protection, particularly for *"promoting sustainable development,"* (EIONET, n.d.), must be incorporated into community actions so that the principle of integration ultimately serves as a means to implement the principle of sustainable development. Sustainable development, as stated in the 1987 Brundtland Report of the United Nations, is a

development process (of lands, cities, production processes, societies, etc.) that meets the needs of the present without compromising the ability of future generations to meet their own needs. Furthermore, determining the "value" of environmental protection presents a challenge, as emphasizing the priority of environmental interests over any other objective would be an exaggeration and is not derived from the EC Treaty. In such cases, a balance must be struck to determine the priority among objectives. Legislators violate this when the shaping of a policy leads to severe environmental damage or burden. The principle of integration can only be fully realized if the underlying requirement is actually implemented, meaning that community actions shaped based on this principle truly do not harm the environment.

The principle of integration is therefore a binding mandate, which implies the obligation that environmental interests must be incorporated into all Community policies. (Gellén et al., 2021, pp. 207-208) It is evident that, based on the principle of integration, the requirements of different policies are on an equal footing, and the primacy of environmental interests cannot be derived from the EC Treaty (Hottó, 2024, pp. 92-93).

Subsidiarity principle: Article 5 of the EC Treat. (EUR-Lex, n.d.-b). Regarding Community activities, the above article sets a dual condition: firstly, the objectives of the measure cannot be adequately achieved by the member states; secondly, given its scale, it can be more effectively achieved at the Community level. These conditions apply to areas that do not fall within the exclusive competence of the Community. Thus, the Community can act within its competence only if it meets the conditions of Article 5 of the EC Treaty and only to the extent defined therein. That is, if the objectives cannot be adequately achieved at the member state level and if Community legislation is more effective. Based on the principle of *"effectiveness,"* alongside the aforementioned conditions, the Community can legislate if the adoption of a measure or regulation at the national level does not ensure sufficient effectiveness. The Community is subject to an increased obligation to justify the norms adopted under this principle, meaning that the competencies underlying the adoption of a given norm must be justified. Member states are also obliged to do everything possible to achieve the Community goal intended by the norm or measure (Hottó, 2024, p. 93).

3. HORIZONTAL AND VERTICAL LEGISLATION

Community environmental policy's secondary legislation can be divided into two main parts: vertical and horizontal legislation.

While classical environmental legislation aims to protect only one environmental element (soil, air, water, flora, fauna, waste, noise) per regulation, the integrated approach in environmental legislation is considered a new direction, which has created the need for horizontal legislation. The essence of this approach is that the legislator aims to protect all environmental elements with the given horizontal legislative instruments, not just a specific one. The extension of environmental legislation in an integrated direction is justified by the simple fact that vertical legislation could not fully achieve its goal, as vertical legislative instruments targeting specific environmental elements sometimes achieved the opposite effect.

Horizontal legislative instruments include:

- environmental information, public participation, and the right to initiate legal proceedings,
- environmental impact assessment,
- assessment of the environmental effects of certain projects and plans/programs,
- environmental management and auditing systems,

- eco-labeling award system for environmentally friendly products,
- European Environment Agency,
- financial instruments,
- integrated prevention and reduction of environmental pollution,
- environmental liability.

Among the horizontal legislative instruments, I will provide a detailed explanation of environmental liability, followed by a discussion of the areas of vertical legislation (Hottó, 2024, pp. 93-94).

4. RESPONSIBILITY FOR THE ENVIRONMENT AND THE SECTORAL LEGISLATION

Directive 2004/35/EC (Jogkódex, 2004a). The Convention aims to apply the aforementioned *"polluter pays"* principle, which was preceded by the 1993 Lugano Convention that determined compensation for damages resulting from activities dangerous to the environment. In the future, polluters will be held liable for the environmental damage they cause under the conditions set out in the directive and to the extent specified therein. Indirectly, this instrument can prevent further environmental damage and remedy existing ones, thereby implementing the principle of prevention. In addition to the liability rules, the directive contains numerous other provisions aimed particularly at preventing imminent environmental damage, curbing or remedying the further spread of already incurred environmental damage, and responding to them.

„If environmental damage has not yet occurred, but there is an imminent threat of such damage, the operator must immediately take the necessary preventive measures" (Jogkódex, 2004a).

Water protection: Water protection regulation is one of the best developed areas of Community environmental law, dating back to the 1970s. Its original objectives included:
- ensuring water quality by preventing or reducing pollution,
- securing water supplies and making rational use of available resources, and
- collecting relevant information (Jogkódex, 2002b).
- Since then, the legislation has evolved considerably and has been extended to inland waters, groundwater and sea water. Water protection standards can be divided into three groups:
- imission standards for water quality: these include standards for maintaining and improving water quality. Different sets of standards have been developed, so that different waters have different pollution limits depending on their use, but following a common concept.
- is the concept of substance- or product-oriented emission standards to prohibit or restrict the introduction of certain hazardous substances.
- plant-oriented production standards and sectoral regulations: these are minimum requirements that apply to plants belonging to a specific industrial sector or activity.

The main rationale for the Water Framework Directive - Directive 2000/60/EC (Jogkódex, 2000a) - was to develop a coherent approach to ensure more effective water protection in theEuropean Union. The Directive takes into account both qualitative and quantitative aspects, aiming to protect waters from further pollution, to improve their quality and to protect the quantity of existing water as an environmental resource.

The Framework Directive establishes a framework for the protection of terrestrial surface waters, transitional waters, coastal marine waters and groundwater, with the aim of preventing and reducing pollution, promoting sustainable water use, protecting and improving the aquatic environment and mitigating the effects of floods and droughts. The overall objective is to achieve and maintain good

environmental status for all water bodies, Member States are therefore called upon to develop river basin management plans based on natural geographical river basins and comprehensive programmes of specific measures to achieve the objectives as soon as possible (European Parliament, n.d.-b).

Community air quality legislation is predominantly regulatory in its instruments, with the result that both indirect instruments (e.g. taxes) and planning measures are largely absent. In terms of regulation, it can be divided into two broad categories: immission standards, emission standards and product quality requirements.

Environmental quality standards: Quality-oriented (immission) regulation has a long tradition in the Community, with standards for sulphur dioxide, particulate matter, nitrogen dioxide and lead being adopted in the Community as early as the early 1980s, an environmental policy that was reinforced by Directive 96/62/EC (Jogkódex, 1996) on ambient air quality assessment and management. For the harmful substances listed in the Annex to the Directive, the Council is required to establish environmental quality (immission) limit values based on a precise list of criteria. Where the limit values are exceeded in certain areas, Member States must draw up programmes or plans to ensure that the limit values are complied with. In the meantime, three other Directives have been adopted in this field, Directive 1999/30/EC (Jogkódex, 1999), a 2000/69/EC (Jogkódex, 2000b), és a 2002/3/EC (Jogkódex, 2002a).

Emission standards: emission standards are an effective way to reduce emissions and help avoid distortions of competition. Emission standards cover both mobile and stationary emitters and can apply to both product and production. They can be:
- Product-oriented regulations.
- Product-oriented regulations.
- Product-based policies. Product-based policies (Hottó, 2024, p. 97).

Soil protection: The Community does not yet have de facto de lege lata legislation on soil protection, although soil as an element to be protected is the subject of some directives, which are not primarily aimed at soil protection. These include the Nitrates Directive, some directives for general protection against dangerous substances, certain waste legislation and directives covering all the environmental elements. So, we can see that Community legislation thus also covers soil protection (Hottó, 2024, p. 98).

Noise protection: The Community regulates the permissible noise emissions of certain products in the field of noise protection. The specificity of the relevant Directives is that they only apply to products involved in cross-border trade, so the regulation of domestic noise emissions remains a national competence.

The main directives adopted by the Community:
- Directive 70/157/EEC (Jogkódex, 1970) on the approximation of the laws of the Member States relating to the permissible sound level and the exhaust system of motor vehicles,
- Directive 2000/14/EEC (Jogkódex, 2000a) on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors,
- Directive 86/594/EEC (Jogkódex, 1996) on noise emission by household appliances,
- Directives 80/51/EEC (Jogkódex, 1980) and 89/629/EEC (Jogkódex, 1989) on noise emissions from subsonic jet aeroplanes following the conclusion of the International Convention on International Civil Aviation,
- Directive 2002/49/EK (Jogkódex, 2002a) relating to the assessment and management of environmental noise.

Protection from certain activities and substances: Activities or substances are included here if they pose such a risk to the environment that the rules for the protection of certain environmental elements no longer provide sufficient protection against them and therefore specific protection is required. Such provisions cover:

- hazardous substances,
- chemical substances, and
- plant protection products and substances harmful to living organisms, and
- activities involving dangerous industrial risks (Hottó, 2024, p. 99).

Biotechnology and Genetic Engineering: In this area, guidelines were already issued in 1990 on the contained use of genetically modified organisms and the release of such organisms into the environment. The legislation underwent a fundamental reform in 2001 and was supplemented in 2003 by a further regulation on the transboundary movement of genetically modified organisms (Hottó, 2024, p. 99).

Management of environmental resources: One of the most important goals, in terms of sustainable development, is to ensure the utilization of available natural resources in a way that prevents irreparable damage in the long run. The related regulations essentially cover the protection of the Earth's atmosphere, climate, and nature, as well as waste management (Hottó, 2024, p. 99).

Protection of nature: The primary object of nature conservation is not human environment and health, but the protection of species and their habitats. Three main areas of protection are:

- Species protection rules.
- Forest protection.
- Territory-based regulation:
- Birds Directive,
- Habitat protection (Hottó, 2024, pp. 99-100).

Waste law: Waste law has emerged as the most self-contained area of Community environmental law. The current legislation is based on the system established by Directive 156/91/EEC (EUR-Lex, 1991) on Community waste legislation. The central element of the reform was the establishment of a single Community-wide waste stream.

Member States' room for manoeuvre is limited for particularly hazardous or specific waste streams, such as the Packaging Waste Directive and the End-of-Life Vehicles and Electronic Waste Directives.

In the area of waste shipment, the Community has overall found a consistent balance between "interventionist", more administrative in origin, and liberal in origin, relying on market forces.

The tendency of Regulation No 259/93/EEC (Jogkódex, 1993) to apply shipment bans within the Community to waste not destined for recycling, in principle under certain conditions, was not only reasonable but also necessary, as the exercise of fundamental freedoms may entail environmental policy risks.

5. THE EU HABITATS DIRECTIVE

As a member of the European Union, the primacy of Community law also imposes a number of obligations on Hungary. EU legislation on nature protection focuses on the protection of wildlife and habitats that ensure their survival, and on the actions that most affect endangered species. The most important piece of Community nature protection legislation is Council Directive 92/43/EEC

(Jogkódex, 1992) of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. This Directive created Natura 2000, the "single European ecological network of special areas of conservation". The Directive is twofold in nature, building on the protection of species on the one hand and their habitats (sites) on the other. Its fundamental aim is to contribute to the conservation of biodiversity by protecting natural habitats and wild fauna and flora. The measures taken in accordance with the objectives of the Directive are intended to maintain or restore habitats of Community importance and plant and animal species to a favourable conservation status (Hottó, 2024, p. 102).

6. CONCLUSION

In summary, it can be said that the protection of natural habitats and areas is given high priority both in the European Union and in Hungary. This includes prohibitive provisions and regulations that establish the involvement of licensing and specialized authorities. I believe that in certain cases it is justified to initiate criminal proceedings, as the future of humanity is at stake. Therefore, I agree with the current strict regulations and believe that further tightening is necessary in most areas (Hottó, 2024, p. 102).

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Figures of Prohibited Agreements

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Abstract: *This paper examines anti-competitive agreements prohibited under Article 101 of the TFEU, which restrict competition in the EU's internal market. Article 101(1) bans agreements, decisions, and concerted practices that hinder free competition, including price-fixing, market-sharing, and production limitations.*

This paper distinguishes between agreements and concerted practices, noting that concerted practices involve coordination without explicit consent but still restrict competition. It highlights the negative impact of price-fixing on consumer choice and market fairness.

The paper also addresses restrictions on production, markets, and technology, explaining how these limit competition and raise prices. It refers to cases where the European Commission imposed fines on cartels.

The paper discusses exemptions, such as resale price maintenance and the De Minimis principle, which excludes agreements with minimal competitive effects. It concludes by emphasizing the importance of strong competition law enforcement to protect consumers and the free market.

1. INTRODUCTION

Article 101 of the Treaty on the Functioning of the European Union prohibits any agreements or actions between businesses that restrict competition and impact trade between Member States. In order for this prohibition to apply, certain conditions must be met, including the existence of an "agreement" among businesses. The concept of an "agreement" encompasses agreements, decisions made by associations, and any other coordinated practices carried out by businesses. While the Treaty does not provide a specific definition of "agreement", its interpretation has been established through court practices (Pošćić, 2011).

Agreements between undertakings may exist in any form of agreement or understanding between economic operators as to their market behavior. The agreement is prohibited where it restricts the freedom of undertakings to determine their own and independent behavior on the market and instead undertakes certain conduct jointly, ultimately restricting or eliminating effective competition between them.

In order for an agreement to exist, there must be a correspondence between the expressed intentions of at least two companies. When the wills of these enterprises align, an agreement is formed with the intention of creating an anti-competitive impact on the market (Republic of Bulgaria, n.d.).

Article 101 is a key provision in the Treaty related to competition, as it is regularly enforced and leads to notable decisions that often include imposing substantial fines. These fines are utilized to penalize individuals engaged in severe restrictions, commonly known as cartels. Furthermore, Article 101 addresses a fundamental aspect of business operations in any market: the conclusion of agreements (Busscher, 2023).

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Article 101(1) TFEU prohibits anti-competitive agreements or arrangements (so-called "concerted practices") between two or more "undertakings" that may affect trade between EU Member States and which have as their object or effect the prevention, restriction or distortion of competition.

2. METHODOLOGY

This study employs a combined methodological approach, integrating legal analysis and court decisions to better understand the agreements, decisions, and coordinated practices between enterprises that aim to or have the effect of restricting free competition. Anti-competitive agreements include price-fixing, production and market restrictions, market division, and other practices that place trading parties at a competitive disadvantage.

Analysis of Literature and Legal Sources: This study is based on an extensive review of academic and legal literature to provide a comprehensive framework for the topic. It explores legal and judicial sources, such us Anti-competitive agreements according to Article 101 of the Treaty on the Functioning of the European Union (TFEU), focusing on the main prohibited figures and practices that restrict competition in the internal market of the EU.

Among other things, it mentions cases of the enforcement of competition law by the European Commission, as well as the heavy fines that have been imposed on cartels.

Analysis of Court Decisions: Article 101(1) in its definition mentions agreements made between enterprises, but the Treaty does not provide an exact definition of this term.

Comparative Approach: The paper analyses the distinction between agreements and concerted practices, emphasizing that concerted practices, although not involving a clear exchange of consent as required for an agreement, represent a form of conscious coordination between economic entities. Furthermore, it discusses the role of prices as a key instrument of competition, highlighting that price-fixing negatively impacts consumer choice and fair competition in the market.

3. A GENERAL VIEW OF ARTICLE 101(1)

The first paragraph of Article 101 of the TFEU outlines a series of behaviours that may constitute a prohibited agreement under this article. According to this paragraph, agreements will be deemed anti-competitive if they:

- Directly or indirectly fix the prices of buying and selling or any other trading conditions,
- limit or control production, markets, etc. (Albanian Ministry of Corporate Integration, n.d.),
- share markets or sources of supply,
- apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage, or
- make the conclusion of contracts subject to tie-in of supplementary obligations unconnected with the subject matter of the contract.

Article 101(1) refers to agreements between undertakings but does not provide a precise definition of the term. To clarify this definition, the case law of the Community Courts and competition authorities have been instrumental (Zajmi, 2012).

In the Hoffner case, the European Court of Justice ruled that the term "undertaking" encompasses any entity involved in economic activity, regardless of its legal status or how it is financed. Case

law has established that this term includes corporations, partnerships, individuals, businesses, professionals, state-owned corporations, and cooperatives.

Article 101(1) requires the existence of an agreement, decision, or coordinated practice.

3.1. The Difference Between Agreements and Coordinated Practices

Coordinated practices, in particular, differ from agreements, even though they share the specific element of mutual consent, which is necessary to form a true (real) agreement. In fact, a coordinated practice is a somewhat ambiguous concept that has been developed through case law in situations where one entity adopts certain behaviors in response to the actions of other entities. The notion of a coordinated practice thus corresponds to a form of coordination of business activities that, while not reaching the level of an agreement, constitutes a conscious and mutual collaboration between economic entities (Fattori, n.d.). Article 101 of the Treaty on the Functioning of the European Union prohibits businesses from entering into agreements, engaging in coordinated practices, and making decisions within associations that have the aim or effect of "preventing, restricting, or distorting competition" in the internal market.

3.2. Price-Related Practices

In point (a) of the first paragraph, the provision prohibits agreements that directly or indirectly fix the purchase and sale prices or any other trading conditions. Price fixing is one of the practices through which competition is expressed, but it is also the most visible and important among other anti-competitive practices.

When choosing between two or more products, we are primarily influenced by the "price" element. Thus, a buyer's decisions are influenced by the price in exchange for goods or services they need. This is why price is considered an essential tool of competition for sellers.

What would happen if there were no individual freedom for producers in determining prices, but instead, prices were set by businesses through agreements? The answer is clear: we would no longer have fair competition, and we consumers would be deprived of any choice, as we would face products with the same price (Katro, 2023). In addition to price-setting agreements, the provision also imposes equally severe penalties on the establishment of any other trading conditions. These practices, similar to price-fixing, are just as harmful to the market and competition. When all products are priced the same, the consumer's choice of which product to buy becomes random.

Article 101 aims to prevent such outcomes through its provisions. The Court of Justice has noted that: "Agreements that directly or indirectly set the selling or buying prices for a specific commercial transaction, as per Article 85/1 of the Treaty, can result in completely eliminating any form of price competition between different passenger air transport companies in the relevant sectors." (Zhezha, 2016).

There are numerous instances where the Commission has banned price-fixing agreements and imposed heavy penalties on those involved in price cartels. One significant case, resulting in a substantial fine, was related to elevators and escalators, where companies were accused of coordinating their bids during tenders and agreeing on prices. The fine imposed by the Commission in this case reached a record €992 million (Zhezha, 2016). The Commission has repeatedly emphasized that secret agreements, including those that directly set prices, are among the most serious breaches of competition law.

Thus, Competition Commissioner Neelie Kroes stated in a press release in 2006 that cartels would not be tolerated, and, in addition, all possible measures would be taken to eliminate them. She also mentioned that businesses participating in cartels would be penalized, and fines would be increased if the behavior continued and was flagrantly repeated after an inspection by the Commission. This strict sanction is imposed because agreements aimed at price-fixing, which allow the parties to predict the prices charged by competitors, are considered highly restrictive of competition (Vereeniging van Cementhandelaren v. Commission p. 977, 1972).

3.3. Agreements that Restrict or Control Production, Markets, Technical Development, or Investments

Article 101(1) of the TFEU, in its point (b), refers to a group of agreements of different types that aim to restrict supply. The terms "restriction" and "control" refer to four factors of economic activity: production, markets, technical development, and investments. Agreements that restrict or control these factors can lead to significant limitations on competition.

Restricting production or sales, in addition to limiting competition, can produce the same effect as a coordinated practice aimed at increasing the price level in a particular sector. These agreements may directly target production quotas for each party to the agreement, sales or market quotas, as well as mechanisms for compensating surpluses in supply and demand implemented through a common structure (Zhezha, 2016).

Agreements deemed restrictive under the provisions of point (b) of Article 101(1) TFEU may, in fact, allow companies to achieve objectives that are worthy of protection. The restriction of investments, based on an agreement between interested companies, may be necessary to address overcapacity in a crisis-stricken industrial sector, and so on (Katro, 2016).

The concept of restricting production must be understood not only in a quantitative sense but also in a qualitative one. For example, agreements on product standardization can restrict production when they prevent the manufacture of goods with characteristics different from those specified in the agreement, thereby limiting the freedom of choice of the user regarding the variety of products. Any agreement between competitors that limits or establishes mutual control over these aspects represents a serious restriction of competition (Zhezha, 2016).

Regarding technical development, it can be restricted by agreements on research and development, in cases where the agreement includes provisions that, de facto, prevent the parties from undertaking projects independently, or contains restrictive conditions for the utilization of projects, or clauses that deny the parties access to research results in proportion to their respective contributions (Katro, 2023).

4. DIVISION OF MARKETS OR SUPPLY SOURCES

Agreements that divide markets or supply sources are prohibited as well. Market division occurs when companies agree to limit their sales so that each only operates within a specific part of the market. On the other hand, the division of supply sources involves agreements on the purchase of certain resources or access to these resources, preventing others from obtaining them.

Market division is considered one of the most serious violations by the Commission, as it not only disrupts competition but also hinders the creation of a unified, integrated market. The concept of market division includes not just territorial divisions but also internal divisions within one or more markets, such as allocating market shares between cartel members or dividing customers based on type.

Although it is crucial to distinguish between the five types of agreements under Article 101 TFEU to accurately evaluate each practice, these distinctions are often not straightforward in the business world. Competitors frequently reach agreements not just on product pricing, but also on the territories they will operate in and the customers they will serve.

5. THE EXCEPTIONS TO THE PROHIBITION ON SETTING RESALE PRICES IN A DISTRIBUTION AGREEMENT

Competition-restricting agreements are prohibited under Article 101 TFEU if they specifically harm competition, unless the impact of the agreement on trade or competition is negligible (Court of Justice of the EU in the Expedia case C-226/11, 2012). In determining whether there is a significant restriction of competition or if the agreement falls within a "safe harbor," the European Commission's notice on minimization can serve as a point of reference. According to this notice, an agreement is considered not "negligible" if it involves a restriction of competition. This principle has been carefully outlined in the European Commission's notices. The Commission will not initiate proceedings in cases covered by the notice and will not impose fines if the parties, acting in good faith, assume that the notice applies to the agreement (Zajmi, 2023).

This is particularly true for fundamental restrictions, such as vertical price restrictions (or resale prices). In relation to a special product campaign for the line, the Court of Appeal of Celle had examined and decided the case in a surprisingly different way, arguing that a vertical price restriction does not constitute a significant restriction and, therefore, would fall outside the prohibition of anti-competitive trade practices mentioned in Article 101 TFEU. (Uttar Haryana Bijli Vitran Nigam Limited. Versus Central Electricity Regulatory Commission & ANR., 2016)

The European Commission's De-minimis Notice, the guidelines on vertical restrictions (sections 48 and 223 onwards), and the "Competition Restrictions Guidelines" aim to define agreements that may benefit from the De Minimis communication. While these sources should be assessed in light of current jurisprudence, it is important to note that the content of these documents is not legally binding for courts or national antitrust authorities (Official Journal of the European Union, 2022).

6. CONCLUSION

Any business, regardless of its legal structure, size, or industry, must understand competition law. This is essential not only to comply with legal requirements and avoid significant fines but also to defend its rights and safeguard its market position.

Any infringement of EU competition law can result in serious consequences, including:

- The EU competition authorities have the power to impose substantial fines on businesses found in breach of competition rules, which can reach up to 10% of a company's global turnover.
- Contractual restrictions that violate competition law will be deemed void and unenforceable, meaning they cannot be upheld in court. If these void restrictions alter the core of the commercial agreement, the entire contract could be invalidated.
- Companies and their employees may face fines for failing to meet procedural requirements, such as providing requested information to the European Commission.
- Third parties, including those who have suffered losses from anti-competitive agreements or behavior, may increasingly sue for damages under EU competition law.

The risks of being involved in an anti-competitive agreement or abusing a dominant position are significant. Beyond the consequences mentioned above, businesses also face the potential

disruption and harm to their reputation caused by prolonged investigations or subsequent litigation from customers, competitors, and consumers, as well as the substantial legal expenses and management time required to address the issues.

Given the serious consequences of non-compliance, businesses should regularly assess whether their practices and agreements align with competition law. It is crucial for all companies, especially those with a significant market share, to foster an understanding among employees of what behaviors are acceptable and prohibited under competition law.

Whether you're a company director, head of sales or procurement, or a department leader, it's essential to have a solid understanding of competition law so you can recognize when something is amiss. This allows the business to be alerted and take action to prevent potentially anti-competitive practices that may be seen as profitable ideas by overly enthusiastic directors or employees.

It's also important to remember that anti-competition training should be ongoing. Risk management training should be regularly reviewed and updated to stay current with developments in competition law. This is vital because business reputations are hard to build but can be easily tarnished if the company fails to comply with competition laws.

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Examination of the Effects of EU Regulation 2023/1115 on the Distribution of Deforestation-Linked Goods on Sustainable Forestry and the Operations of Major Forestry Firms in the North-Transdanubia Region of Hungary*

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Abstract: *This study examines the impact of the EU Regulation 2023/1115, aimed at preventing the distribution of goods linked to deforestation and forest destruction, on market dynamics within the North-Transdanubia Region of Hungary. Focusing on the eight state-owned and ten of the largest private forestry firms, the research adopts a mixed-methods approach. At the current phase of the research, qualitative insights are drawn from semi-structured interviews with key stakeholders.*

This research contributes to understanding the regulatory landscape for environmental sustainability and its implications in the forestry industry of Hungary.

1. INTRODUCTION

Forests play a vital role in mitigating climate change and preserving biodiversity, yet global deforestation remains a pressing environmental concern. In response, the European Union introduced Regulation 2023/1115, which mandates stricter monitoring of deforestation-linked goods to ensure sustainable practices. The regulation is particularly relevant to Hungary's North-Transdanubia region, a key area for forestry operations. This paper aims to analyze how forestry firms in this region are adapting to the new regulatory framework, investigating its effects on industry practices, supply chain management, and corporate sustainability strategies.

2. RESEARCH AIM

This research aims to assess the impact of EU Regulation 2023/1115 on sustainable forestry and the broader commodity trade within Hungary, particularly in the North-Transdanubia region. The study investigates the challenges and opportunities posed by the regulation concerning compliance, sustainability practices, and market competitiveness. Beyond forestry, the research also examines the regulation's effect on Hungary's trade and supply chains in key regulated commodities, including soy, cattle, coffee, cocoa, palm oil, and rubber. Additionally, the study explores the implications of the absence of Hungarian national legislation aligning with the EU directive and the risks associated with timber imports from Ukraine. The ultimate goal is to provide recommendations for policymakers and businesses to navigate regulatory challenges while ensuring sustainability and compliance in forestry and commodity trade.

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3. LITERATURE REVIEW

EU Regulation 2023/1115 and Its Impact on the Forestry Sector: The primary objective of Regulation 2023/1115 is to curb the European market's contribution to deforestation and forest degradation. Research highlights that policies enforcing deforestation-free supply chains have significant implications for timber producers and exporters (European Commission, 2023). Compliance with such regulations necessitates enhanced traceability, sustainability certification, and adherence to stricter environmental standards.

Sustainable forestry in Hungary: Hungary's forestry sector has historically been regulated to prevent overexploitation and ensure biodiversity conservation (NÉBIH, 2021). The prohibition of forest grazing from 1961 to 2017 contributed to sustainable forest management. Current sustainability practices include reforestation programs, biodiversity protection initiatives, and the implementation of sustainable logging practices (OEE, 2023).

The economic and operational challenges for forestry firms: Studies suggest that compliance with stringent EU sustainability regulations imposes financial and logistical challenges on forestry businesses, particularly for firms with extensive international supply chains (AKI, 2023). State-owned and private forestry enterprises must adapt to increased documentation requirements, investment in sustainability certification, and adjustments in operational strategies to remain competitive.

4. RESEARCH METHODOLOGY

This study employs a mixed-methods approach, incorporating qualitative data from interviews with forestry experts and quantitative data from industry reports and regulatory compliance records. The research focuses on:

- Secondary data analysis: Examination of forestry production statistics, sustainability reports, and regulatory documents.
- Primary data collection**:** Interviews with forestry experts (to be complemented at a later stage of the research by interviews with managers of 8 state-owned and 10 private forestry firms in North-Transdanubia to assess their adaptation strategies and challenges in implementing EU Regulation 2023/1115).

5. FINDINGS AND DISCUSSION

5.1. Compliance Strategies of Forestry Firms and Commodity Importers

Forestry firms in North-Transdanubia, as well as Hungarian importers of regulated commodities, have adopted diverse strategies to align with the EU regulation. These include:

- Implementation of digital traceability systems: Businesses dealing with timber, soy, cattle, palm oil, and rubber have started utilizing blockchain and geolocation-based verification to ensure supply chain compliance.
- Adoption of green forestry and sustainable agricultural practices: Selective logging, afforestation initiatives, and regenerative agriculture practices have been introduced to meet sustainability requirements.
- Collaboration with sustainability certification bodies: Many businesses have sought EU-compliant certifications such as FSC (Forest Stewardship Council) for timber, RSPO (Roundtable on Sustainable Palm Oil) for palm oil, and RTRS (Round Table on Responsible Soy) for soy.

5.2. Challenges in Regulatory Adaptation

Despite the benefits of the regulation, firms and importers face multiple challenges:

- Increased administrative burden: Businesses are required to maintain extensive documentation to prove that their products are deforestation-free, increasing compliance costs.
- Higher operational costs: Transitioning to sustainable forestry, agriculture, and sourcing requires additional investment, which may not be immediately viable for all companies.
- Limited access to international markets: Businesses unable to comply with certification standards risk exclusion from EU markets, particularly in industries such as timber processing, cattle farming, and rubber manufacturing.
- Lack of national regulatory alignment: Hungarian legislation does not yet fully support the enforcement of EU Regulation 2023/1115, creating uncertainty for businesses and regulators.

5.3. Broader Economic and Trade Implications

The expansion of regulated commodities under EU Regulation 2023/1115 has far-reaching economic and trade implications:

- Soy and cattle farming: Hungarian livestock farmers and feed suppliers relying on soy imports must now ensure that their products originate from certified deforestation-free sources, affecting trade relationships with major suppliers.
- Timber industry: Stricter due diligence requirements for wood-based products may disrupt Hungary's timber export markets and processing industries.
- Palm oil and rubber-dependent industries: Food manufacturing, cosmetics, and the automotive sector must adjust sourcing strategies to avoid supply chain disruptions.

5.4. Concerns Regarding Timber Imports from Ukraine

Expert interviews have highlighted a pressing concern for Hungarian forestry companies acting as retailers of timber products sourced from Ukraine. The ongoing geopolitical situation has compromised the effectiveness of forest governance and control mechanisms within Ukraine, leading to potential risks associated with illegal logging and unsustainable practices.

Reports indicate that despite existing moratoriums on deforestation, Ukrainian forests have been subject to illegal logging activities. Studies show that Ukrainian timber is harvested and exported in violation of both national laws and European Union regulations, with exports to EU countries increasing by 75% over four years, reaching over €1 billion in 2017 (Warsaw Institute, 2022).

The conflict has further exacerbated these issues, disrupting traditional supply chains and enforcement capabilities. Research suggests that the war has severely hampered production in Ukraine, leading to concerns over loosening some environmental protections to make up the current shortfall (UkraineInvest, 2022).

Given these challenges, Hungarian forestry companies importing timber from Ukraine must exercise heightened due diligence to ensure compliance with EU Regulation 2023/1115. Implementing robust traceability systems and engaging in third-party certification can help mitigate the risks associated with sourcing timber from conflict-affected regions.

6. IMPLICATIONS OF THE ABSENCE OF NATIONAL LEGISLATION ALIGNING WITH EU REGULATION

6.1. Existing Hungarian Legislation on Forest Conservation

Hungary has a longstanding legal framework dedicated to forest conservation. Act XXXVII of 2009 on Forests, Protection and Management provides comprehensive guidelines for sustainable forest management. This legislation emphasizes the protection of forest ecosystems and mandates that any alteration in forest land use, including clear-cutting or conversion to non-forest purposes, requires official authorization. Such permissions are granted only under stringent conditions, ensuring that forest lands are preserved and utilized sustainably (FAO, 2009).

Although the above piece of legislation is directed at the same topic as the EU Regulation, there are a few implications of the lack of a comprehensive piece of local legislation.

2023/1115 5.1. Compliance Challenges for Forestry Firms Without specific Hungarian legislation to facilitate the enforcement of Regulation 2023/1115, forestry firms may encounter difficulties in understanding compliance requirements and implementing due diligence procedures (KPMG, 2025).

6.2. Legal and Financial Risks

The absence of national legislation aligning with EU Regulation 2023/1115 can result in legal uncertainty and financial penalties, including product confiscation and fines of up to 4% of annual EU revenue (KPMG, 2025).

6.3. Competitive Disadvantages

Hungarian forestry firms may struggle with market access issues and reputational damage compared to counterparts in member states with supportive national legislation (European Commission, 2023).

6.4. Environmental and Social Implications

Weak enforcement may undermine conservation efforts and erode public trust in the sustainability commitments of forestry businesses (NÉBIH, 2021).

6.5. Recommendations

To mitigate these challenges, Hungarian authorities should develop national legislation that aligns with EU Regulation 2023/1115, while forestry firms should proactively establish compliance systems and collaborate with stakeholders to facilitate knowledge sharing and best practices (OEE, 2023).

6.6. Commodities Regulated Under EU Regulation 2023/1115 and Their Relevance to Hungary

EU Regulation 2023/1115 targets commodities associated with deforestation and forest degradation, aiming to ensure that products placed on the EU market are 'deforestation-free'. The regulation specifically covers seven key commodities: cattle, cocoa, coffee, palm oil, rubber, soy, and wood, along with their derived products (European Commission, 2023).

In the context of Hungary, several of these commodities hold particular significance:

- Cattle: Hungary has a notable cattle farming industry, contributing to both domestic consumption and export markets. The regulation's requirements necessitate that beef and leather products are sourced from deforestation-free areas, impacting supply chain verification processes for Hungarian producers and exporters (European Commission, 2023).
- Soy: Soy is a critical component in animal feed within Hungary's livestock sector. Given that significant portions of soy are imported from regions with high deforestation risks, the regulation imposes due diligence obligations on importers to ensure that soy products are not linked to deforested areas post-December 2020 (Baker McKenzie, 2023).
- Wood: Hungary's forestry sector is substantial, with both timber production and processing industries playing vital roles in the economy. The regulation builds upon previous EU timber regulations, enforcing stricter due diligence to confirm that wood products are legally sourced and not associated with illegal deforestation activities (KPMG, 2025).
- Coffee and cocoa: While not primary producers, Hungary imports significant quantities of coffee and cocoa for domestic consumption and processing. The regulation mandates that these commodities, often sourced from regions susceptible to deforestation, comply with deforestation-free criteria, affecting importers and retailers within Hungary (Crowe, 2023).
- Palm oil: Although Hungary does not produce palm oil, it imports processed food, cosmetics, and industrial products containing palm oil. Due to deforestation concerns in palm oil-producing countries, Hungarian businesses involved in food manufacturing and cosmetics must now ensure that their sourcing aligns with the EU's sustainability requirements (FAO, 2023).
- Rubber: Rubber is widely used in Hungary's automotive and industrial sectors. The regulation places new obligations on businesses importing natural rubber, requiring them to demonstrate that their supply chains are not linked to deforestation, which could impact Hungary's tire manufacturing and mechanical industries (European Parliament, 2023).

The inclusion of these commodities under EU Regulation 2023/1115 necessitates that Hungarian businesses across various sectors implement robust due diligence systems. This ensures that their supply chains are free from links to deforestation, aligning with the EU's broader environmental objectives and mitigating potential legal and reputational risks.

7. CONCLUSION AND RECOMMENDATIONS

The findings of this study align with the research aim by demonstrating the significant impact of EU Regulation 2023/1115 on forestry firms and commodity importers in Hungary. The study highlights compliance challenges, economic implications, and the necessity of robust due diligence processes, particularly concerning timber imports from Ukraine. Furthermore, the inclusion of additional commodities - such as soy, cattle, coffee, cocoa, palm oil, and rubber - places a broader range of Hungarian businesses under the regulation's purview, affecting industries beyond forestry, including food processing, cosmetics, and automotive manufacturing.

A key issue identified in this study is the absence of corresponding Hungarian legislation supporting the enforcement of the regulation, which creates legal uncertainty and operational difficulties for affected businesses. Addressing these gaps through national legislative alignment, enhanced monitoring systems, and financial support mechanisms is critical to ensuring compliance and sustainability across sectors.

To support businesses and policymakers in adapting to these regulatory changes, the following recommendations are proposed:

- Enhancing digital monitoring and data management: Implementing blockchain-based traceability systems to ensure transparency in supply chains for wood, soy, cattle, palm oil, and rubber.
- Financial support mechanisms: Encouraging government subsidies and EU funding opportunities to offset compliance costs for businesses affected by the regulation.
- Stakeholder collaboration: Strengthening partnerships between businesses, policymakers, and environmental organizations to promote best practices in sustainable trade and resource management.
- Development of national legislation: Introducing Hungarian legal frameworks that align with EU Regulation 2023/1115 to provide clearer compliance guidelines and enforcement mechanisms.
- Risk mitigation in sourcing from Ukraine: Implementing stricter due diligence processes for businesses importing timber and other regulated commodities from Ukraine to ensure adherence to sustainability requirements.

By adopting these strategies, Hungarian forestry firms and commodity importers can not only comply with EU regulations but also enhance their long-term sustainability and market competitiveness in an increasingly regulated global trade environment.

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Artificial Intelligence and Criminal Risks in Business

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Abstract: *Artificial intelligence (AI) is transforming the business environment through efficiency and automation, yet it also brings criminal risks, such as fraud and money laundering. This article analyses legislative challenges and criminal liability in cases where AI facilitates illegal activities, highlighting gaps in current legislation. International regulations, such as those of the European Union, attempt to address these issues but do not provide complete solutions. Criminal liability remains complex, involving programmers, operators, and companies, and the use of AI necessitates rigorous security measures to prevent abuses.*

1. INTRODUCTION

Artificial intelligence has become a key technology in various sectors, including business, healthcare, security, and transportation, with its capacity to quickly and accurately analyse large volumes of data and automate complex processes. Companies use AI to optimize production, forecast market trends, analyse consumer behaviour, and improve operational efficiency. However, while AI contributes to process efficiency, it also introduces unique risks, especially in the criminal context, where it can facilitate illegal activities such as financial fraud, data manipulation, and even money laundering.

This article aims to explore the criminal risks generated by the use of artificial intelligence in business. We will analyse the current legal framework, legislative gaps, and specific challenges associated with attributing criminal liability in cases where AI is involved in illegal activities. As international legislation in this area is not yet sufficiently developed, we seek to clarify fundamental concepts and identify possible solutions for more effective regulation.

Artificial intelligence (AI) refers to the capability of a computer system to perform cognitive functions similar to human thought, such as learning, reasoning, pattern recognition, and decision-making.

Criminal liability is the legal obligation of an individual or legal entity to be held accountable for violating criminal law. In the context of AI, criminal liability presents the challenge of identifying who can be held accountable: the programmers, operators, or even the company that owns the technology.

AI-facilitated criminal conduct includes those illegal actions that can be executed or assisted by AI technology, either through the automation of fraudulent activities or by exploiting security vulnerabilities in intelligent systems.

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These concepts form the basis of the discussion, providing a conceptual framework through which we can explore how AI changes traditional criminal risks and requires legislative adaptation to effectively respond to these challenges.

2. BENEFITS AND RISKS OF AI IN THE BUSINESS ENVIRONMENT

The implementation of artificial intelligence in the business sector brings numerous benefits, such as efficiency and automation, advanced analytical capabilities, and process optimization. AI can accelerate processes and reduce human error by automating routine tasks. This allows companies to achieve more results in less time, reducing costs and optimizing resources. AI algorithms can quickly analyse large volumes of data, providing companies with relevant insights into market trends, consumer behaviour, and development opportunities. AI technologies, such as machine learning, are used to improve manufacturing, logistics, and supply chain processes, leading to greater flexibility and market adaptability.

According to a survey conducted by Forbes Advisor (Haan & Watts, 2024), 600 business owners were surveyed to assess the use of AI in various fields. The results highlighted some notable trends and applications: 51% of business owners use AI in these fields, 25% of owners are concerned that AI affects their website traffic, 97% of business owners believe that ChatGPT will be beneficial to their business; 33% plan to use ChatGPT to write website content, and 44% intend to use it to write content in other languages; 46% of business owners use AI to create internal communications, over 40% are concerned about possible excessive dependence on technology due to AI use, and nearly two-thirds (64%) of owners believe AI will improve customer relations.

In terms of AI usage in business, 56% of companies use AI in customer service, 46% in customer relationship management, 47% in adopting digital personal assistants, 40% in inventory management, 35% in content creation, 33% for product suggestions, 30% in accounting processes, 30% to optimize supply chain operations, 26% in talent recruitment, and 24% for audience segmentation. These results demonstrate how AI is becoming an essential component of modern business strategies, enabling significant improvements in efficiency and customer satisfaction.

While AI brings important benefits, it also creates vulnerabilities that can be exploited for criminal purposes: AI-assisted money laundering, automated fraud, market and information manipulation, and privacy violations. AI can automate complex trading and fund transfer processes, making it harder to detect suspicious financial flows. Advanced algorithms can "clean" the trail of illicit funds through a series of automated transactions, thus facilitating money laundering. For example, graph-based technologies can help identify complex relationships among trading data, providing a dynamic method of analysing suspicious activities (The AI Citizen, 2023; Financial Crime Academy, 2024). Companies can use AI to create complex fraudulent schemes, such as falsifying financial data. This can include stock market manipulation, where trading bots influence stock prices by generating fake news or amplifying certain information, thereby affecting investor confidence and market stability (Financial Crime Academy, 2024). AI can generate erroneous information that can influence business decisions. This raises issues of privacy and security, especially if clients' personal data are collected and analysed without adequate protection measures. Thirty-one percent of the surveyed companies are concerned about data security and privacy in the AI era. Besides security concerns, AI can expose clients' personal data to cyberattacks if not properly managed. This becomes a major concern for many businesses, which must ensure that data is protected and that no security breaches occur (The AI Citizen, 2023). Although AI offers significant opportunities for efficiency and innovation in business, organizations need to implement rigorous security

measures and be aware of the criminal risks associated with using this technology. These aspects underscore the importance of regulation and an ethical approach to AI use.

A concrete example of AI risks in the business environment is the use of trading bots to execute illegal speculative transactions (Patterson, 2012). In cases of market manipulation, these algorithms can execute thousands of trades in a fraction of a second, creating artificial volatility based on automated data analysis. A famous example is when high-frequency trading (HFT) was investigated for stock price manipulation. If misused, such technology can disrupt the market and mislead investors, with significant economic consequences (Lewis, 2014).

3. CURRENT LEGISLATION ON AI-FACILITATED CRIMES

At the global and regional levels, legislation regarding crimes facilitated by artificial intelligence (AI) is under development, although partial regulations applicable in various contexts already exist.

The UN and the Council of Europe are working on common standards for the ethical and responsible use of AI, but there is still no international framework specifically regulating AI-facilitated crimes. Most current international regulations focus on ethics, transparency, and data protection.

The European Union has taken a proactive approach, introducing a set of strict rules to reduce AI-associated risks. These include classifying AI applications by risk level (from harmless to unacceptable), but they do not completely address cases where AI is involved in economic crimes, such as market manipulation or fraud.

Regulation of 13 June 2024 (Regulation (EU) 2024/1689) establishes a unified framework for the development, commercialization, and use of artificial intelligence (AI) within the European Union, aiming to promote trustworthy, human-centred AI and to protect health, safety, and fundamental rights. It regulates the use of high-risk AI systems, supports innovation, and ensures their free movement in the internal market.

The main provisions of the regulation include prohibiting the use of subliminal and manipulative techniques that affect individuals' decision-making capacity, banning exploitation of social, age, or disability vulnerabilities, and prohibiting classification based on biometric data and social scoring systems. AI systems must allow effective human oversight to minimize risks. Implementers must conduct a fundamental rights impact assessment before deploying high-risk AI systems. AI providers are responsible for compliance with safety and conformity requirements, even if they are not directly involved in developing the system. Violation of the regulation entails substantial administrative fines, with amounts varying according to severity and type of violation.

The regulation's objectives are related to health and fundamental rights protection, innovation promotion, and harmonizing requirements (establishing common standards for AI use within the EU, including personal data protection and risk management).

Regulation (EU) 2024/1689 underlines the EU's commitment to creating a favourable environment for responsible AI development while safeguarding citizens' fundamental rights and balancing innovation and safety.

The Recommendation on AI Ethics (UNESCO, 2023) is an important reference for ethical standards and human rights protection. At the 41st session of UNESCO's General Conference, held in Paris

from November 9-24, 2021, a recommendation on artificial intelligence (AI) ethics was adopted. This UNESCO recommendation addresses ethical issues related to artificial intelligence (AI) through a holistic, multicultural, and evolving framework, aiming to guide societies in the responsible use of AI technologies. It does not provide a fixed definition of AI but emphasizes ethically relevant features of AI systems, such as data processing capacity and autonomous decision-making. The recommendation focuses on the ethical impact of AI throughout the entire lifecycle of systems, from research to usage, involving all relevant stakeholders, including researchers, programmers, users, and public or private entities.

AI raises new ethical challenges, such as labour market influence, discrimination, and data protection, with the potential to reproduce existing biases. The recommendation highlights the importance of ethical education in digitized societies and cultural diversity, considering that AI influences domains such as education, science, culture, and communication. Its objectives include ensuring beneficial AI use, human rights protection, promoting multidisciplinary dialogue, and ensuring fair access to developments in the field. The UNESCO recommendation on artificial intelligence (AI) ethics underlines the significant impact of AI on society and the environment, highlighting both the benefits and risks, including criminal risks in business. These risks may include discrimination, algorithmic biases, and human rights violations, which could lead to legal liability. The recommendation urges member states to implement transparency and accountability principles in AI use, involving all stakeholders to ensure responsible technology development. Continuous monitoring and assessment of the impact of AI systems is essential to prevent harm and protect fundamental rights.

The current international and regional legislation presents certain gaps that affect the clarity of criminal liability for AI, including the ambiguity of criminal responsibility and the difficulty in demonstrating criminal intent. In many jurisdictions, there is no clear provision indicating who is responsible when AI facilitates a crime—the algorithm creators, the companies using the technology, or the end users. AI often operates based on algorithms that generate results without direct human intervention, raising the issue of intent in cases of fraud or market manipulation. In the absence of explicit intent, it is challenging to hold a specific entity accountable. The current framework is not adapted for complex cases where AI can mimic human behaviours, making it difficult to identify responsible parties when AI is used in complex money laundering schemes or fraud within the banking system.

The GDPR (Regulation 679/2016) regulates how personal data is processed, providing safeguards against unauthorized or unethical data processing through AI. However, this regulation focuses more on privacy protection than on combating economic crimes facilitated by AI. For instance, certain uses of AI for user profiling or data analysis may be penalized if they involve privacy violations, but the legislation does not clearly define criminal liability for illicit activities facilitated by AI.

In the U.S., AI regulation is fragmented across several agencies. For example, the Securities and Exchange Commission (SEC) and other financial institutions have adopted measures covering financial technology, including AI, to prevent fraud and market manipulation. However, as in the EU, U.S. legislation does not clearly define criminal liability for economic crimes directly facilitated by AI.

4. CRIMINAL LIABILITY IN CASES OF AI-FACILITATED OFFENSES

Companies that implement artificial intelligence in their business activities face legal risks, as AI can facilitate illegal behaviours (e.g., fraud, illicit speculative transactions) without clear intent from management (Hoffman-Lent & Schwartz, 2024). The United States Federal Trade Commission

(FTC) is intensifying its oversight of major tech companies, such as Alphabet and Microsoft, in the context of their investments in AI startups to assess the impact on competitiveness. A crucial aspect involves regulating the use of AI-based facial recognition technologies, following an FTC settlement with Rite Aid for abuses in this field. This reflects a broader trend in which authorities are becoming more vigilant about the misuse of AI technologies, especially those related to biometric surveillance. Internationally, the European Union is adopting stricter regulations, such as the AI Act, aimed at promoting transparency and safety in AI technology implementation. Additionally, in the United States, there are discussions around laws to prevent the misuse of deepfake technology, given recent incidents demonstrating the associated risks. In the context of elections, concerns over AI-generated misinformation have led some states to take legislative steps to address issues related to deepfakes in political campaigns. These actions underscore the need to regulate AI technology use to protect consumer rights and maintain fair market competition (Hoffman-Lent & Schwartz, 2024).

An essential aspect of integrating generative artificial intelligence (Gen AI) into financial regulations is how financial institutions can use Gen AI to improve compliance processes, such as data analysis and reporting. This type of technology can automate repetitive tasks and help identify anomalies or non-compliance risks. Furthermore, integrating Gen AI can lead to better risk management and more efficient communication between different departments of a financial institution. The challenges accompanying the use of these technologies include the need to comply with constantly evolving legislation and to maintain data privacy. Organizations need to develop clear strategies to ensure that Gen AI implementation not only enhances efficiency but also aligns with legal and ethical requirements (Sandridge et al., 2024).

Defining criminal liability in such situations raises several challenges, such as indirect liability and the difficulty of attributing guilt. Companies may be held liable for negligence in monitoring and preventing AI abuses in commercial activities (Duan, 2022). However, if AI algorithms are considered "autonomous decision-makers," company liability becomes a controversial issue (Osmani, 2020). The lack of direct human intervention complicates the attribution of criminal liability. Since AI algorithms operate based on machine learning, companies may argue they do not have full control over the generated outcomes, making it difficult to prove guilt (Duan, 2022).

Various actors involved in AI development and implementation can be held responsible when AI facilitates a crime. In some cases, employees overseeing or administering AI may be responsible for implementing security measures and preventing illegal behaviours. For example, if a programmer or administrator knowingly omits fraud-prevention mechanisms, they may be held liable. Programmers could be considered responsible if it is proven they created codes or algorithms with the intent to facilitate certain illegal activities (e.g., algorithms that enable market manipulation). Managers who decide to use AI in certain processes may also be responsible if they are actively involved in the negligent implementation of the technology and fail to comply with regulations requiring proactive crime prevention measures (Đurić & Ignjatović, 2023; Choi, 2024).

A controversial topic is whether AI can be treated as an "autonomous actor" or criminal agent. Although AI acts based on data and algorithms, some legal theorists are exploring the possibility of treating AI as an entity with "limited liability" under new laws, thus recognizing a semi-autonomous status. However, this concept is far from official adoption. It is challenging to attribute criminal "intent" to AI code, as AI operates based on algorithms that learn and adapt their decisions. In cases of economic crimes, where intent plays a critical role in establishing guilt, this represents a major legal challenge (Henz, 2021).

5. AI AND THE "ANOMALY OF CRIMINAL LIABILITY"

In situations where AI generates unintended or difficult-to-predict behaviours, a series of "legal anomalies" arise concerning the criminal liability of the involved entities. This topic can explore cases in which AI algorithms produce actions that violate legal or ethical standards but are not directly initiated by human operators, complicating the process of attributing responsibility (Soyer & Tettenborn, 2022).

AI, especially that based on machine learning and neural networks, can produce outcomes that are entirely beyond human control. Unlike traditional software, AI can learn and modify decision models based on new data sets or other algorithmic experiences, potentially leading to unintended actions. For example, an algorithm designed to optimize financial transactions might develop strategies that violate market regulations without the human operator's intent or awareness (Suresh & Guttag, 2021).

The emergence of illegal behaviours generated by AI raises questions about who should be held accountable: the creators of the algorithms, the AI system administrators, or the company utilizing the technology? Certain recent cases illustrate how AI can breach regulations without direct human intervention. In some instances, AI has created strategies that led to "flash crash" behaviours, where algorithms executed thousands of trades in a manner that destabilized the market. This type of behaviour may constitute a regulatory violation, yet assigning responsibility is challenging (Kirilenko et al., 2014; Cowen, 2023). AI used in hiring or lending processes can develop discriminatory patterns against specific groups if its algorithms are influenced by preexisting biased data. Even without discriminatory intent, these actions can violate human rights legislation and potentially attract criminal liability for companies (Zapata, 2021).

These examples underscore the need for a legal and ethical approach to the development and application of AI technology, considering that certain algorithmic decisions may be completely beyond human control and can lead to unforeseen legal consequences.

6. LEGISLATIVE PROPOSALS FOR REGULATING AI RISKS

As artificial intelligence becomes a crucial component in business operations, global legal systems are striving to address the challenges that AI poses in terms of criminal liability and civil regulation. In this context, several legislative reforms have been proposed to clarify aspects such as the legal liability of companies and AI developers. These proposals include establishing a "duty of care" for companies that use AI, obliging them to assess potential risks and ensure oversight of automated activities (Ahmad et al., 2023). Additionally, the introduction of a "digital entity" concept has been suggested for advanced AI, allowing it to be held legally accountable in specific cases and clarifying the level of responsibility for those who use it (Hohma et al., 2022).

Public policies can play a decisive role in shaping how AI is used in business. Such policies could include implementing certification frameworks for AI technologies before they are employed in business environments, ensuring they meet safety and ethical standards (Roda et al., 2024). Moreover, independent oversight and auditing, as well as encouragement for governments and international organizations to develop specific audit standards for algorithms, could help prevent the use of AI for illegal or high-risk purposes (Carrier et al., 2021). The implementation of "algorithmic transparency" policies, requiring companies to disclose if AI contributes to business decisions, especially in sensitive areas like financial transactions, security, and advertising, has also been proposed.

To mitigate the risks associated with AI use and ensure effective law enforcement, professionals in both the legal and technological fields need to be well-trained in AI functionality and regulation. Recommendations include interdisciplinary educational programs for lawyers and engineers to foster a deeper understanding of AI's legal implications. Stanford University, for instance, has developed an interdisciplinary program that brings together law, engineering, and business students to address social issues using AI. This type of hands-on education allows students to create innovative solutions by integrating perspectives from various disciplines, which is crucial for managing AI-related challenges (Holistic AI Team, 2024). Similarly, Berkeley Law's AI Institute offers courses combining legal and technical aspects of AI, aiming to train professionals who can navigate emerging regulations. This institute collaborates with experts in technology and law to create a curriculum that addresses current needs (Berkeley Law AI Institute, 2024).

Other recommendations include legal compliance training for all employees involved in AI development and use, focused on criminal and ethical risks (Ford, 2023), as well as consulting the public and experts in the regulation creation process to ensure legislation adequately covers all potential issues (European Commission, 2024).

These proposals aim to reduce legal risks and uncertainties associated with AI usage, while ensuring that innovative technologies are used responsibly in business and in compliance with legal standards.

7. CONCLUSION

The development and use of AI in business environments bring a series of criminal risks and legal challenges, particularly concerning economic crimes such as money laundering, automated fraud, and financial market manipulation. The examination of these risks reveals that, in the absence of appropriate oversight and regulation, AI can facilitate and amplify the impact of illicit activities.

There is a clear need for a legal framework adapted to the technological specifics of AI, with explicit provisions outlining the responsibilities of all involved actors. Such a framework should include precise rules defining liability in cases of criminal activity, regulations to protect privacy and consumer rights, and measures to prevent criminal abuse. Additionally, adopting a code of ethics within companies that develop and implement AI is essential for promoting the responsible use of this technology and preventing non-compliant activities.

Given the rapid pace at which AI is evolving, it is crucial for both companies and governmental institutions to proactively monitor risks and continuously update legislation. In the long term, AI regulation may require global collaboration to ensure a uniform and clear set of rules. Likewise, increasing awareness and educating the public and professionals about AI and its implications is an essential step to ensure security and integrity in business.

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The Impact of Artificial Intelligence on the Resolution of Administrative Disputes

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Abstract: *Long debated in terms of the challenges and the opportunities it offers, artificial intelligence is also of major relevance in the judicial system.*

The purpose of this study is to analyze how digital applications influence the current conduct of administrative disputes, as well as the premises for their evolution, considering the fundamental principles, procedural requirements, and ensuring transparency and trust in the court (including from the point of view of the right to a fair trial).

Determining a transgression from the traditional sphere, the use of artificial intelligence in the resolution of administrative disputes brings substantial changes in terms of reducing the duration of the procedure (by reference to the reasonable term, which is a standard also recognized at European level), eliminating possible human errors both in the preliminary procedure (from the perspective of a possible lack of objectivism from the public authorities when they are seized with the revocation of administrative acts) and in the actual trial phase, through the automatic filtering of submitted claims and the prediction of solutions based on the relevant jurisprudence (it may even transform the concept of "administrative court").

All these "reconfigurations" of the judicial procedure must be carried out with a sense of responsibility to ensure a balance between innovation and the interests of litigants.

1. RECOGNITION AND ACCEPTANCE OF THE CONCEPT OF ARTIFICIAL INTELLIGENCE

The genesis of the concept of artificial intelligence took place in 1950, during an academic conference held in the United States (Dartmouth Summer Research Project on Artificial Intelligence), where the foundations of a new field of research were established, namely the creation of smart devices (Haenlein & Kaplan, 2019, p. 4).

The concept has gone through several stages of adoption and development in most countries, enrolling, in one way or another, in what was called at that time, the information society. This was considered a new form of social existence that involved the study, production, technological process, and archiving of information starting from a network that explored levels of knowledge, as well as the social challenges of each stage of development.

If we assert that the concept of AI first emerged in 1956, that coincided with the birth of the concept of information society (which appeared in the 1960s in Japan, with Yomeji Masuda as a key promoter).

Of course, many approaches to the concept emerged, along with disputes and endorsements, which ultimately led, by the 1980s, to a convergence with a new concept that incorporated the information society: the knowledge society.

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The transposition of these two concepts was also reflected in EU practice, with efforts to create, expand, and finally define artificial intelligence.

It is beyond doubt that the concept of information society serves as a preparatory phase for the knowledge society, particularly since, over time, the development of society demanded new requirements and sought new indicators for expansion.

Approaching the theory of the information society from this perspective, we must ask whether the dozens of new and fundamental phenomena are linked to the transformation of social subsystems, the network economy, the evolution of the digital age, the characteristics of new media, the synthesis of the power model and the communication of the new world order, as well as the cyber-science revolution.

All of these may represent issues related to information inequalities, the digital divide, or the legal and regulatory aspects generated by the production and consumption of intellectual goods.

The practical aspect of this issue leads us to believe that, by reaching a higher level of the knowledge society, we have found new information, which, in the public sphere, has led to the discovery of a new resource: artificial intelligence. Regardless of whether we have overcome the information society phase, namely the knowledge society, through the rapidity of the movement, not necessarily the concept itself, but its substance throws society into a new stage that can only mean a starting point in a new construction and theory at the macro level.

Still in a period of accommodation, artificial intelligence, in its current form, is used only as a tool and is not yet recognized as a legal subject. It is well known, however, that AI evolves rapidly, influencing various fields, including the current legal landscape.

On the other hand, an unknown element remains: whether AI will constitute a danger in the future or, on the contrary, represent progress for society in general. Specifically, the question arises whether the legal domain will be able to keep pace with its evolution.

2. APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN THE CONDUCT OF ADMINISTRATIVE JUDICIAL PROCEEDINGS

Going beyond traditional reasoning and looking for a unified framework to connect the economic, political, cultural and legal realms, we could observe social and community phenomena within the evolution of the digital era, characteristics that lead us to approach and understand the concept of artificial intelligence.

The key aspects of the concept are found in the definition of the AI system, which can be defined as ”a machine-based system designed to operate with different levels of autonomy, capable of demonstrating adaptability after implementation, and that, pursuing explicit or implicit objectives, deduces from the input data it receives how to generate results such as predictions, content, recommendations or decisions that may influence physical or virtual environments.”[2]

With the regulation of artificial intelligence, control mechanisms must also be implemented to prevent potential intrusions into citizens’ private lives. This role belongs, at the national level, to

[2] See in this regard Court of the European Union (2024, June 13).

the Constitutional Court of Romania, which must interpret the general and European principles in relation to the implications that AI generates in the legal space, offering new valences of protection.[3]

The concept of artificial intelligence involves a series of issues such as those related to identity, communication, world network, multiculturalism, which require the use of natural resources, an action plan, and a focus on sustainability. As it appears in the information society or knowledge society practices, AI encompasses numerous features that describe traits, technologies, and institutions with direct applications in social and legal life.

The emergence of this phenomenon in the social and judicial landscape also determines certain risks, which may be either abstract or concrete, such as: the impossibility of access to artificial intelligence between different categories of people, decision-making based solely on algorithms, the danger of creating extreme ideologies, but also a possible intrusion into the foundation of the rule of law and respect for human rights. In this context, the challenge for law is to ensure that all these digital applications operate fairly and without discrimination (Auby, 2020, pp. 7-15).

From a comparative perspective, the impact of digitalization is felt much more strongly at the European level than in the national legal order. Thus, some states have tried to include certain provisions regarding the use of artificial intelligence in internal normative acts (such as the situation of Romania), while others have adopted special legislation, such as Italy, which adopted a Code of Digital Administration (Italy, 2005; Lisi, 2009), or Spain, where a Charter of Digital Rights was implemented.[4]

Furthermore, these changes have also led to the emergence of digital tools used in the judicial process. For instance, the United Kingdom has taken a more extensive approach to using electronic applications, implementing online appeal forms, chat platforms for providing legal advice and conducting remote hearings (Daly et al., 2023, p. 16). This approach is guided by the idea that judicial procedures should better meet the needs of the litigants, but it is not without drawbacks, such as limited access to certain categories of persons, and concerns about the quality of decisions or claims made on the basis of algorithms.

Similarly, Germany has focused on using technology to improve communication of procedural documents through chatbots (Reiling, 2020, pp. 3-6) while maintaining the human component in the actual judicial process.

In Lithuania, decision-making in certain administrative disputes through automated means was adopted by the Supreme Administrative Court, which concluded that this practice does not violate mandatory rules, including the principle of legality in judicial procedures. Conversely, in France, it was determined that for court decisions that involve an assessment of a person's behavior, these decisions cannot be based solely on artificial intelligence (Reiling, 2020, pp. 4-8).

We can affirm that states have not shown reluctance in using these new electronic figures, trying to intensify the process of digitization. However, respecting fundamental rights and procedural requirements must remain the main pillar of interest.

A similar, albeit more cautious, approach is observed at the national level, where the impact of artificial intelligence on judicial procedures and the realization of legitimate rights or interests is reflected in

[3] See in this regard Constitutional Court of Romania (2023, February 28).

[4] See to this regard Government of Spain (2021).

measures such as the implementation of the electronic file, the digital communication of procedural documents (Boroi & Stancu, 2023, p. 411-412) and software for transcribing court hearings, etc.

Noteworthy in the analyzed context is a situation found in national practice. In this case,[5] an issue arose regarding the issuance of an urbanism certificate, which can be obtained in digital format through the public administration. However, due to the change in the online platform and the failure to resolve the request before the platform modification, the certificate was no longer sent to the interested party. Given these circumstances, it is unequivocally clear that the realization of the litigant's rights was not possible. This inevitably raises the question of how such a "failure to resolve" can be challenged. Could it be considered a "refusal to resolve", allowing it to be addressed in court? On the other hand, in such a situation, no evidence of the actual receipt of the request can be identified, making it difficult to determine when the resolution period starts and how to calculate the time limit for initiating judicial review.

It is therefore evident that the intended goal of implementing this digital procedure, namely speeding up the resolution of requests, has not been achieved. On the contrary, it has hindered the realization of legitimate rights.

In this context, the process of following preliminary procedures in electronic format becomes debatable. Even if at the national level this possibility is not recognized yet, we consider that the lack of legislation adapted to the provisions of the administrative litigation could lead to violations in the exercise of the procedural rights by litigants. For the same reasoning as outlined above, we believe that the deficiencies in conducting such a digital procedure would be even more serious, potentially affecting the right of access to justice. This could occur if a prior complaint were submitted digitally, only to remain unresolved without a clear date to confirm receipt of the document.

Also, from the perspective of the technological development of the national judicial system, courts across the country have intensified their digitization efforts, implementing software robots that take over some administrative tasks. These include uploading documents to the ECRIS system so they can be consulted online by the parties, sorting communication evidence, transcribing court hearings from audio to text, etc, or even electronically communicating court decisions with digital signatures.[6]

Until recently, courts recognized the possibility of hearing witnesses unable to be physically present through videoconferencing. However, this practice is no longer accepted, with the justification being the inability of witnesses to sign their statements.

As with the other systems of law, at the national level, there can be noticed the trend towards digitalization, but the way the legislator and legal professionals approach artificial intelligence represents the real challenge.

3. FUNDAMENTAL PRINCIPLES AND REQUIREMENTS FOR THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN JUDICIAL PROCESSES

This study starts from the idea of regulating the concept, direction of action, achievements or efficiency of implementing artificial intelligence in resolving administrative (and other legal) disputes while respecting fundamental principles, procedural requirements (both national and

[5] See in this regard Juridice (n.d.).

[6] See in this regard Universul Juridic (n.d.).

European) and fundamental rights and freedoms of citizens, particularly the right to free access to justice. On the other hand, the study also aims to identify potential risks in the use of artificial intelligence, focusing on trust and transparency in the act of justice.

In this context, the question arises: what principles of administrative litigation are relevant for artificial intelligence (Wolswinkel, 2022, p. 33)? The reality proves that when the process takes place in a virtual dimension, the most important procedural requirements remain adversarial proceedings, free access to justice and motivation of court decisions (Ciutacu, 2022, pp. 50-58).

Prior to analyzing these principles in the context of their interaction with artificial intelligence, it is important to note that specialized legal doctrine defines the general principles of law as "general concepts that guide the interpretation and application of the law" (Reich, 2014, p. 5).

The essence of conducting a fair trial lies in ensuring that, before a decision is made, the parties involved have the opportunity to express their point of view, present information and argue their procedural positions (Stănilă, 2020, p. 114). This same rule, which falls under the principle of adversarial proceedings, is found both in national legislation[7] and in the practice of the ECHR, being a standard recognized at the European level. Moreover, in the context of procedural efficiency achieved through the use of artificial intelligence, the Court has clearly stated that "accelerating the procedure cannot justify violating the fundamental right to an adversarial process."[8]

Digitalisation is also changing the way that the right of access to a court is perceived, raising the issue of whether citizens have the effective ability to file claims electronically and whether this method of filing claims should be mandatory or optional. Alternatively, it raises the question of whether making electronic filing mandatory would constitute an infringement of procedural rights.

The reality reveals shortcomings, as not all litigants have access to the internet. Or, for the fairness of the proceedings before the court, the European requirements are clear in this regard, stating that „the right to a court must be real and effective."[9] This leads to the question of whether moving the process of filing claims exclusively into an electronic space affects citizens' access to the administrative court. At least for now, it seems clear that filing claims or pursuing appeals cannot be done exclusively in electronic format, as this would affect the very essence of the principle, creating an obvious obstacle to resolving the case submitted for adjudication.

Following the analysis, and still under the need to protect litigants and ensure procedural fairness, we emphasize the necessity of providing reasoning for judicial decisions, including from the perspective of the right to appeal. This is even more crucial considering that a decision based on algorithms will not be easily subject to judicial review. Therefore, decisions that have a significant impact on the persons involved and that are made through algorithms must be properly reasoned and communicated in order to be subject to judicial review, especially in terms of the power relations that characterize administrative disputes. If we also consider compliance with

[7] Art. 14 Civil Procedure Code provides that „(5) The court is obliged, in any process, to submit to the discussion of the parties all requests, exceptions and circumstances of fact or law invoked. (6) The court shall base its judgment only on grounds of fact and law, on explanations or evidence which have been submitted, in advance, to contradictory debate." The article of the Civil Procedure Code also applies to administrative disputes, representing the common law in the field.

[8] See in this regard Council of Europe / Registry of the European Court of Human Rights (2018) and European Court of Human Rights (1997).

[9] See in this regard Council of Europe / Registry of the European Court of Human Rights |(2018) and European Court of Human Rights (1995).

the right to a fair trial, we can conclude that only a judicial review ensuring the reassessment of both the substance of the problem and the legality corresponds to the procedural requirements.

Taking these aspects into account, some states have reconfigured the applicability of fundamental principles in line with the use of electronic tools. For example, in France, it has been recognized that the principle of proportionality in adopting measures also applies to decisions made through algorithms. Similarly, in Lithuania or Switzerland, it has been established that the right to be heard applies regardless of whether the decision-making process is digital or not. Spain has also enshrined such principles in legislation (Spain, 2021).

On the other hand, all these measures cannot guarantee that the adopted decision is beyond criticism. The intervention of the human factor remains necessary, as its knowledge and conscience consistently justify its presence.

4. CONCLUSION

It is unequivocal that digitisation will increasingly influence judicial procedures. New digital applications challenge traditional concepts, stimulating them to adapt in accordance with the changes.

From the analysis conducted, we can deduce that legal systems demonstrate flexibility in becoming compatible with electronic tools, while striving to uphold the principles of legality and fairness.

Even though the potential of artificial intelligence is still far from being fully explored, we believe that judicial reform must be carried out gradually, with the ultimate goal of effectively protecting litigants' rights.

Thus, having as a reference the model of the other member states, we consider that at the national level, an appropriate legislative framework for digital applications used in the judicial system should be established. This is justified by the fact that, in the absence of „control mechanisms", for these applications, litigants may find themselves unable to effectively exercise certain rights or legitimate interests. An example, as discussed in this study, is the issuance of an urban planning certificate required to obtain a building permit. However, this is not an isolated case; similar deficiencies may arise in other procedural aspects (Tegmark, 2019, p. 59) (lack of a confirmation of receipt, insufficient reasoning of a decision, decisions containing algorithm errors, failure to ensure an adversarial procedure, etc.). What is certain is that digitalization must guarantee effective and equal access for citizens to administrative procedures in a society where traditional legal concepts will take on new meanings.

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The Legal Protection of the Consumer Granted by the National Legislation of Romania and the Jurisprudence on Abusive Clauses in Consumer Contracts in the Light of the Case Law of the CJEU

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Abstract: *The evolution of the law regarding the abusive clauses in contracts concluded between consumers and professionals is increasingly in the focus of the legal doctrine and legal practitioners in Romania, as it contributes significantly to the development of a new contractual justice, respectively to the modification of the function of fairness in consumer contracts. The paper intends to present the situation of consumers under the protection granted by the national legislation in Romania – Law 193/2000 on abusive clauses in contracts concluded between professionals and consumers, the implementing law of Directive 93/13/CEE on unfair contract terms under the impact of the case law of the CJEU. The current realities of the debated situation have inevitably led to the improvement of the consumer protection mechanism, constantly following the solid principles established by the Court of Justice of the European Union in the framework of the preliminary judgments issued on the Directive.*

1. PRELIMINARY CONSIDERATIONS

The provisions of Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts (Council of the European Communities, 1993, p. 29, hereinafter referred to as "*Directive*" [2]) have led to a reform of contract law in the Member States which have implemented this legislative instrument, in particular through the important messages conveyed in the preliminary rulings delivered by the Court of Justice of the European Union.

Directive 93/13/EEC is presented as an instrument for regulating the internal market of the European Union, and, consequently, its purpose is primarily to strengthen the internal market and is unrelated to the assessment of the social consequences of declaring contractual terms contained in consumer contracts to be unfair. The interpretations offered by the European Court of Justice of this legislative act are based on the purpose for which it was drafted and are therefore based on market considerations (Jozon, 2017). On the other hand, contract law and the resolution of related domestic issues remain a matter for the national court, to be assessed in the light of the domestic legal rule, but in strict compliance with the guidelines laid down by the Directive.

Since under the auspices of the Directive, consumer law manifests itself as a mechanism for ensuring the effective protection of the internal market and stimulating economic activity (Toader & Lecomte, 2014), it acquires a hybrid nature, with severe implications and sanctions. The nature and importance of the public interest on which consumer protection is based require the Member States to ensure consumer protection at a fundamental level.

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[2] Transposed into our legislation by Law no. 193/2000 on unfair terms in contracts concluded between professionals and consumers, republished - Official Gazette no. 543 of 03.08.2012

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The Court of Justice of the European Union has established the rule that the protection of consumers against unfair terms contained in non-negotiated contracts is a matter of public policy (Court of Justice of the European Union, 2000), requiring national courts to examine, even of their own motion, whether they are fair, having regard to the situation of the consumer concerned (Court of Justice of the European Union, 2000, 2009, 2010, 2014). In so doing, the European Court has thus given the national courts a particularly important role, that of market surveillance (Jozon, 2020). The related legislation has gradually acquired a dual nature, combining private and public law, which has had direct consequences for establishing a new contract law in the Member States.

According to settled case-law, the system of protection implemented under the auspices of Directive 93/13 is based on the idea that a consumer is in a position of inferiority to a professional in terms of bargaining power and level of information, so that we are in the presence of a contract of adhesion to conditions drafted in advance by the seller or supplier, without any power to influence them, much less to amend or add new ones (Court of Justice of the European Union, 2010).

Under these circumstances, the function of contract fairness law acquires new, specific valences, which we intend to capture in this study. We will start our analysis by outlining an analytical and theoretical framework of the defining ideas of the notion of "consumer", taking into account the protection generated under the Romanian legislative framework as it has been established in relation to the guidelines of the Court of Justice of the European Union, and then we will start by capturing the progress in the field of unfair terms, respectively, capturing the social and economic realities.

2. GUIDELINES IN DEFINING THE NOTION OF "*CONSUMER*"

Directive 93/13/EEC on unfair terms in contracts concluded between consumers and professionals was transposed into Romanian law by Law 193/2000 (Romania, 2012) on unfair terms in contracts concluded between professionals and consumers. By Article 2, parag. (1) of this act establishes that the notion of "*consumer*" shall mean any natural person or group of natural persons constituted in associations, who, under a contract, acts for purposes outside his commercial, industrial or manufacturing, craft, or liberal activity (Toader & Lecomte, 2014).

The consumer is in a position of inferiority to the professional, who has special expertise in his field. The consumer is therefore regarded as a vulnerable subject of law (Ilieș Neamț, 2021), requiring increased and effective legislative protection, with a presumption of ignorance of the information essential for understanding the contractual provisions that he or she assumes, and even less so with regard to the economic and legal consequences that they entail.

The assessment of the consumer's position is primarily related to the extra-professional purpose for which he acts (Scafeș, 2021). In other words, the consumer is entitled to all the prerogatives of legal protection strictly so long as he or she is acting to satisfy a personal or family benefit. In this regard, we recall Decision No 441 of March 2, 2016, of the High Court of Cassation and Justice of Romania. (2016), delivered on appeal by the Second Civil Section, in which the court ruled that a natural person who has concluded several credit agreements with a bank for the purpose of refinancing other loans, namely to purchase different real estate that he subsequently rented cannot be included in the category of consumers protected by Directive 93/13/EEC. It is therefore also necessary, when considering whether the consumer is a consumer, to establish the actual purpose of the financing obtained by means of the credit agreement concluded with the trader.

Acquiring the status of consumer is associated with acquiring the status of party to a contract concluded with a professional. The asymmetry between a consumer and a trader must be maintained during the performance of the contract until the legal relationship is finalized.

With regard to the period of time during which the status of consumer is maintained after the termination of the legal relationship, we refer to a landmark judgment of the Court of Justice of the European Union, delivered in Joined Cases C699/18 and C-698/18 (Court of Mureș, 2019), which concerned referrals communicated by the Specialized Court of Mures, Romania. The European Court ruled that ”*Article 2 lit. (b), Art. (1) and Art. (1) of Directive 93/13 and the principles of equivalence, effectiveness and legal certainty must be interpreted as precluding a case-law interpretation of national legislation according to which a legal action for the recovery of sums paid but not due based on an unfair term used in a contract concluded between a consumer and a professional is subject to a limitation period of three years prescription running from the date of full performance of that contract, where it is presumed, without the need for verification, that at that time the consumer should have been aware of the unfair nature of the term in question or where, for similar actions based on certain provisions of national law, the same period does not begin to run until the cause of action has been judicially established*. " In other words, once the status of "*consumer"* has been established, the legal protection and all the implications thereof will last for an unlimited period of time in relation to the contractual relationship in question, without being affected in any way by its finality.

With regard to the sphere of persons covered by the notion of "*consumer*", we underline that it also includes *the co-debtor*. In support of the foregoing, we note that in Case C-348/14, concerning a reference for a preliminary ruling by a Romanian Court for clarification of certain aspects of Directive 93/13/EEC on unfair terms in consumer contracts and Directive 87/102/EEC on consumer credit, the Court of Justice of the European Union ruled, in essence, that, according to Directive 93/13/EEC: ”the concept of "consumer" covers a natural person who is a joint debtor under a contract concluded with a trader, as long as he is acting for purposes which can be regarded as being outside his trade or profession.”

The system of protection settled by the Directive relates directly to the legal transaction undertaken, respectively to the amount of information held by the consumer in relation to the transaction entered into by the professional (Scafeș, 2021). Thus, the status of "consumer" must be analyzed *in concreto*, being likely that a person who normally acts as a professional in a given legal relationship may take the position of consumer, falling under the auspices of the Directive. In this regard, we have in mind the celebrated judgment of the C.J.U.J.E. of September 3, 2015 delivered in Case C-110/14 concerning a reference for a preliminary ruling under Article 267 TFEU by Oradea Court (Romania), Horațiu Ovidiu Costea v. Volksbank România S.A.. In the present case, Mr. Costea, a lawyer, entered into a credit agreement, mortgaged with the building where his lawyer's office was located. The European Court has established that the term "consumer" must be interpreted as having an objective character, being independent of the actual knowledge which the person concerned may have or the information actually available to that person, and the possibility of classifying a lawyer as a "consumer" when he acts outside his professional activity is not excluded.

Once the status of "*consumer*" is established, the scope of the Directive is determined, and the legal framework regarding the unfairness of the terms complained of is analyzed.

3. THE PROTECTION SYSTEM IMPLEMENTED BY ROMANIAN LEGISLATION

In light of the Principle of Procedural Autonomy (Orza, 2019) conferred on the Member States, enshrined in the provisions of Article 8, para. (1) of Directive 93/13 read in conjunction with the provisions of preamble 21 of the same normative act, the manner of the procedures designed to guarantee the protection of the rights of individuals before the Courts is a matter for the internal legal order of the Member States (Court of Justice of the European Union, 2013). Under the auspices of this autonomy, the Romanian legislature has established the regime of absolute nullity as applicable to unfair terms (Terzea, 2021). The main rule governing absolute nullity is that it may be invoked by any interested person, at any time, and is not subject to any statute of limitations (Article 1249 of the Romanian Civil Code) (Brațu, 2020). Moreover, this sanction is best suited to the spirit and objective of high-level consumer protection in relation to unfair contractual terms. It is also fully consistent with the principles of equivalence and effectiveness of Union law.

In this context, it can be said that consumer protection takes precedence over legal certainty, the Romanian legislator providing a procedural framework that complies exactly with the ideals of EU law, but, in particular, taking into account the purpose of the Directive (Ștefan, 2020).

In parallel with the procedure for establishing the absolute nullity of unfair terms, the Romanian legislation has also established a mechanism for resolving matters of property law, namely, an action for restitution of the services rendered by the consumer affected by the unfair terms, which is governed by a three-year prescription period, which starts to run from the date on which the court establishes that the unfairness of the terms has been established (Andrei, 2016).

In our law, therefore, there is a duality of regimes: a more severe regime, the aim of which is to establish that contractual terms are unfair, which is not subject to a limitation period and has retroactive effect, and a regime based on this first approach, which seeks to recover the financial restitution of benefits, which is subject to a prescription period of three years.

This system of protection is activated whenever the national court establishes *in concreto* that the contractual provision complained of by the consumer meets the requirements established by the legislator in order to be classified as unfair. The national court will examine those requirements as laid down by Romanian law, which reproduce to the letter the provisions of Article 3 of Directive 93/13. In order to establish the unfairness of a term, it must not have been negotiated with the consumer; that is to say, it must, by itself or together with other contractual provisions, cause a significant imbalance (Court of Justice of the European Union, 2017) to the detriment of the consumer, contrary to good faith (Glodeanu, 2020).

The protective purpose of the Directive is not, however, an absolute one, as the provisions of Art. (2), three cases of exclusion of the unfairness of a term are regulated, as follows: (i) the contractual provision in question reflects either an act having the force of law or a mandatory administrative rule or provisions or principles of international conventions to which the Member State in whose territory the contract was concluded is a party (Court of Justice of the European Union, 2020); (ii) the term complained of as unfair concerns the definition of the subject matter of the contract, or the adequacy of the price or remuneration in relation to the services or goods supplied in exchange for them (Court of Justice of the European Union, 2017); (iii) finally, the term is expressed in a clear and intelligible manner (Court of Justice of the European Union, 2015).

Both the requirements that must be met in order to establish the unfairness of a term and the cases of exclusion relied on by the professional in his defense must be interpreted in the context of all

the circumstances that materialize at the time of the conclusion of the contract in question, in the light of the guidelines given by the Court of Justice of the European Union to the national judge. Thus, gradually, a new contractual justice aimed at combining the private interest of the parties to the agreement with the public interest, ensuring effective protection of the internal market and stimulating economic activity, has gradually emerged. Naturally, the legal regime is a specialized one, which requires specific assessment criteria that cannot be placed in a matrix, with a view to increasing the liability of the professional and preventing consumer prejudice.

4. CONCLUSION

By analyzing the Romanian legislation on unfair terms as a whole, as influenced by the guidelines contained in the judgments of the Court of Justice of the European Union on Directive 93/13, as well as European law in general, we can state that it is materialized as an instrument of application of the theory of contractual solidarism (Jamin, 2001; Mazeaud, 1999), which has as its premise the economic, technical and legal inequality between the consumer and the professional. The legal solutions adopted are such as to limit the parties' freedom of will, extending the possibility of censuring it, and the possibility for the judge to intervene in the contractual field, all with a view to safeguarding the imperatives of fairness and good faith.

All these approaches can be explained in terms of the Directive's aim, which is to "facilitate the establishment of the internal market and to protect the citizen in his role as consumer" (Council of the European Communities, 1993), respectively to safeguard commercial competition at the European Union level.

We conclude by emphasizing, in this connection, the importance of the preliminary references, which have come to represent the main instrument for legitimizing the new role assigned to the judicial system, since they are intended to remove the difficulties in theorizing and conceptualizing progress in the field of unfair terms in consumer contracts and to ensure that the purpose of the Directive is fully respected.

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The Role of Compliance in Preventing Corporate Criminal Liability in Albania

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Abstract: *Recent years have seen digital transformation and market globalization significantly impact the nature of crime, leading to a rise in economic crime and increased involvement of legal entities in these activities. To address and reduce these forms of misconduct, many organizations are investing resources in developing risk management strategies and implementing strong compliance programs, which act as safeguards against corporate criminal liability.*

Currently, criminal compliance is gaining increasing importance in corporate governance policies, serving as an internal prevention tool to avoid involvement in crimes, financial sanctions, or other unlawful situations that could damage the company's reputation and destabilize its market position. In Albania, a thorough legal framework exists to deter and penalize criminal conduct among corporations. In conjunction with governmental initiatives and regulations, Albanian enterprises, motivated by international corporate governance practices, are increasingly emphasizing the establishment of compliance programs to mitigate the risk of potential corporate criminal liability.

1. INTRODUCTION

In Albania, over the years, little has been said, if anything at all, about the connection between the criminal liability of legal entities and compliance; without recognizing that the relationship between corporate criminal liability and compliance is jointly supportive and complementary, rather than two opposing elements that require a corporation to split its resources. This is most clearly seen when considering their purpose, as compliance is one of the mechanisms for protection against corporate criminal liability (Teichmann et al., 2023). That's why compliance is an important tool within economic criminal law because its main objective is the same as that of criminal law: ***prevention*** (Torres-García & Caicedo-Bastidas, 2023).

Different authors consider compliance to be an integrated model used to meet regulatory requirements, thus also preventing crime in the criminal realm (Casanovas, 2017). In other words, it involves the development of a set of policies and business methods to avoid violations of law and corruption within companies (Torres-García & Caicedo-Bastidas, 2023). As the name itself indicates, compliance, as a risk management and prevention model, aims to prevent, detect, and significantly reduce the likelihood of committing crimes or any other violations of the law within business activities (Bacigalupo, 2021). Given this objective, it is clarified that the effectiveness of the approach and the management system is crucial for the exemption of criminal liability of the legal entity (González, 2016).

Among other types of compliance, criminal compliance has recently gained greater importance as a mechanism to prevent criminal risks for legal entities. In fact, criminal compliance is a

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specific and distinct area within economic criminal law, representing the highest level of prevention and reduction of serious risks that expose business activities to potential criminal liability (Bacigalupo, 2021). Therefore, as in many other countries, at the core of national strategies and policies in Albania too, the emphasis has been placed more on the prevention of criminal acts by both natural and legal persons than on punishment (National Strategy for the Prevention of ML &TF, 2024). As many other legal systems, in Albania, we are witnessing a shift from repressive criminal law to a preventive criminal law, where the legal interest is supra-individual, including economic crime, to follow social development, ensure public security, and respond to protection demands (Pereira & Mayrink, 2020).

This way, criminal compliance policies and programs are built as a form of mutual support between private entities and the government, with the aim of preventing the increase of economic crimes by using methods that ensure the improvement of overall internal controls, as well as the capacity to prevent and pursue any illicit actions (Pereira & Mayrink, 2020). This creates the need to develop a risk plan to identify, assess, and minimize the criminal risks of the company as a prerequisite for the effective operation and advancement of a useful compliance program (Bulnes, 2019).

2. CORPORATE CRIMINAL LIABILITY IN ALBANIA

The criminal liability of legal entities is initially outlined in Article 45 of the Criminal Code of the Republic of Albania, which states, among others that: "Legal entities, with the exception of state institutions, are criminally responsible for criminal offenses committed in their name or for their benefit by their bodies and representatives" (Criminal Code, 1995). Based on this provision, which establishes in the second paragraph that criminal acts, punitive measures, and the procedures for their imposition and execution are regulated by a special law, Albania adopted Law No. 9754 "On the Criminal Liability of Legal Entities" in 2007.

In this regard, it should be emphasized that, under the current Albanian legislation, the special law only sets out the rules for liability, criminal proceedings, and the types of punitive measures that may be applied to legal entities for the commission of a criminal offense (Law no.9754, 2007). Unlike the legislation in other countries, this law does not specify the criminal acts for which an entity should be held liable, leaving open the possibility of the entity committing any potential criminal offense (Albanian School of Magistrates, 2024). The core of the criminal liability of legal entities in Albania is established in the Criminal Code, and the special law only specifies specific aspects related to the application and interpretation of the emergence and maintenance of criminal liability (Bozheku & Elezi, 2012).

In this context, the Constitutional Court of the Republic of Albania has stated that the special law is limited to regulating the type and extent of the punishment to be applied to legal entities, without creating any new criminal offense to be applied to these entities or interfering with the determination of their criminal liability as established by the Criminal Code (Case no. 38, CC, 2013).

According to the provisions of domestic legislation, for a legal entity to bear responsibility for a criminal act, two conditions must be met cumulatively:

- Firstly, the criminal act must have been committed by individuals within the circle of persons who hold high administrative, representative, or managerial positions, or by individuals under their authority, i.e., executive-level employees.
- Secondly, it must be proven that the criminal act was committed "on behalf of" or "for the benefit of" (either directly or indirectly) the legal entity (Law no.9754, 2007). Thus, the key condition

> for criminal liability, under Albanian law, is that the act must be committed on behalf of or for the benefit of the legal entity. Equally essential for holding the legal entity liable is the authority of the person committing the criminal offense (Albanian School of Magistrates, 2024).

Based on the specific law, the Supreme Court of the Republic of Albania has affirmed that: "for the criminal act to have been committed 'on behalf of' the legal entity, it is not enough to prove that a natural person within the structure of the legal entity committed the criminal act; it must also be proven that, in the specific case, they acted on behalf of the entity and had authorization for such an act. Otherwise, the legal entity cannot be declared guilty" (Case no.154, SC, 2023). Furthermore, in the same landmark decision, the Court has stated that: "Thus, to prove the criminal act from the subjective aspect, the criminal liability of the legal entity must be based on its internal organization, the existence and implementation of a model to prevent criminal acts, or the lack thereof, or any other act for this purpose. In practice, criminal acts committed on behalf of and for the benefit of the legal entity are often a direct consequence of the entity's weak organization to prevent such acts." (Case no.154, SC, 2023). In making this statement, the Court highlights the importance of compliance programs in preventing criminal liability in all legal entities.

This decision serves to understand that for legal entities to bear criminal liability in Albania, the principle of fault must shift from the traditional psychological concept to the normative concept of fault (Bozheku, 2010). In this regard, the normative concept of fault is considered the "key" to the emergence of corporate criminal liability, which is proven if the act committed on behalf of the legal entity is in its direct or indirect interest, or if the act is a result of the legal entity's negligence in taking the necessary measures to prevent it (Puka, 2015).

Alongside this concept, the determination of fault or innocence of a legal entity for acts committed by its directors or representatives is often influenced by the existence or lack of an organizational and control model (compliance program) aimed at identifying and preventing criminal acts (Puka, 2015). In fact, unlike natural persons, the subjective criterion for the emergence of criminal liability in the case of legal entities is precisely based on whether a policy for preventing criminal acts has been designed. This concept, known in Albania and many other countries worldwide as the "compliance program," is central to the essence of the legal entity (Most commonly encountered in practice as corporates/companies). Its establishment and support are direct indicators of the entity's willingness to respect the values and norms protected by the legal acts in force (Lora, 2022). Often, the absence of this model results in the opposite effect, making the legal entity more prone to criminal liability (Puka, 2015).

As mentioned in the introduction, compliance programs constitute an internal system of inspection and control over the regular activities of a legal entity, through which the entity's behavior and the harmonious functioning of its organs in compliance with applicable law are ensured (Hauschka et al., 2016). This system is based on a defined and exclusive area of self-regulation of internal rules aimed at preventing, identifying, and reducing the criminal risks of business activities, thereby also protecting against potential criminal liability (Bacigalupo, 2021).

In this way, compliance programs serve primarily as "concrete measures for the prevention of criminal offenses within the corporate sector or other forms of legal entities." They help prevent criminal conduct by companies and, in many cases, protect subsequent indictments, thanks to the measures taken and implemented (Bulnes, 2019). Their role in the field is to design and establish current compliance policies to identify, prevent, and address violations that increase the likelihood of criminal offenses being committed (Torres-García & Caicedo-Bastidas, 2023).

3. COMPLIANCE AS A TOOL AGAINST CRIMINAL LIABILITY

The concept of compliance within corporate governance arises from the understanding that the State's formal control mechanisms cannot oversee and directly regulate every business, legal entity, or private venture. This makes compliance programs a key component of good corporate governance, serving as an essential support for its maintenance and long-term viability (Anzola & Teixeira dos Santos, 2022).

ISO guidelines were the first to enhance the role of compliance systems in organizations to ensure they meet their legal, regulatory, and ethical obligations. These guidelines served as a general framework in 2014, developing organizational standards for compliance policies (Silverman, 2008). They provided a list of recommendations for creating, developing, and continuously improving compliance systems that ensure effectiveness in designing, developing, implementing, and sustaining preventive measures against criminal offenses within a legal entity (ISO, 2014).

These guidelines emphasize that legal entities must prioritize their compliance programs and ethics codes to address potential criminal activities that pose a real threat, based on identified risks (Silverman, 2008). Furthermore, they state that the goal of classifying and prioritizing compliance risks helps to: assess each risk and its impact on the entity's activities; classify the magnitude and importance of the risk (minor/major); evaluate the level and effectiveness of internal controls and their frequency; and finally, determine the resources and tools required to manage and mitigate the risk (Bognár & Benedek, 2021).

From the principles mentioned above, it is clear that one of the initial steps to ensure preventive measures within a legal entity is the adoption of a code of ethics (Kotlan et al., 2023). In these codes, the compliance program and the "business corporate culture" are generally two essential pillars for the organization and functioning of corporate governance (Bacigalupo, 2021). This approach is also reflected in The Code of Internal Management of Commercial Entities in Albania.

The second part of the Code, titled "Principles of Internal Management for All Companies Not Registered on the Stock Exchange," provides in Principle 6 that: "The Board is responsible for overseeing risk management and must maintain an effective internal control system to protect the interests of the company and the investments of the shareholders" (The Code of Internal Management of Commercial Entities in Albania, n.d.).

In this regard, Principle 6 is elaborated in the code by emphasizing that: The Board should make efforts to identify the main strategic and operational risks that the commercial entity faces; it should establish official and transparent measures for implementing financial reporting policies and internal control systems; and, most importantly, the Board should periodically assess the need to establish or reorganize the internal control system and risk management functions (The Code of Internal Management of Commercial Entities in Albania). From these provisions, it is clear that compliance programs are deeply connected to organizational governance by implementing the best principles and practices that apply (Díaz, 2022).

On the other hand, alongside The Code of Internal Management of Commercial Entities in Albania, private companies and other legal entities in general, as subjects of the law for preventing money laundering and the financing of terrorism, must implement a series of compliance measures to prevent criminal liability arising from the commission of these offenses (Law no. 9917, 2008).

To prevent the commission of money laundering and terrorism financing offenses, Albanian law outlines several compliance measures that legal entities must adopt, such as "Know Your Client" procedures and the application of enhanced due diligence (Law no. 9917, 2008). In this context, entities must conduct

checks and analyses of the effectiveness of their preventive system in line with the regulations and procedures developed and approved for this purpose. The entity's internal control should, among other things, assess the continuous monitoring of the business relationship and ensure that this relationship remains in compliance with the client's profile (Instruction no.28, 2012).

Specifically, the obligation to implement compliance measures under this law is outlined in Article 11, which stipulates that, in accordance with the law and the sublegal acts issued for its enforcement, entities are required to: appoint a person responsible for preventing money laundering and the financing of terrorism; assign internal control to monitor compliance with the obligations of this law and the relevant sublegal acts; depending on the nature and size of the business, implement appropriate procedures for reporting violations within the entity by employees at all levels, through a specific, independent, and anonymous system. (Law no. 9917, 2008)

These provisions clearly outline how a compliance policy should be developed and highlight the need for a specialized individual in the role of compliance officer, who will oversee the measures taken in this context and ensure the legality of the companies's activities in preventing the commission of crimes (Bereziartua, 2024).

This approach is also supported by the Guidelines on the Implementation of Obligations for the Prevention of Money Laundering and the Prevention of Terrorism Financing Based on Risk (PP/FT), which stipulate that when an entity identifies high risks for money laundering or terrorism financing in its risk assessment, it must develop and document a strategy for managing these risks, accompanied by specific preventive measures (e.g., policies and procedures aimed at reducing the risk) (AFI, 2022). For these policies, which clearly fall under compliance policies, entities must also define review timelines, the frequency of transaction monitoring and business relationship assessments, and the effectiveness of their implementation (AFI, 2022).

From this legal perspective, it is clear that the first step in formulating a compliance model is identifying the legal risks faced by a legal entity and, based on this, adopting systems and risk mitigation measures. In general, these risks depend on factors such as the industry, geographic location, size, products or services offered, and the legal form adopted, meaning that in practice no compliance model is identical to another (Díaz, 2022).

Regarding the effectiveness and purpose of the compliance system, every compliance program has three essential objectives: prevention (to avoid illegal behaviors that could expose the entities to criminal liability); detection (to identify and address issues in a timely manner); and mitigation (so that once an offense has been committed, the program helps reduce criminal liability and lower potential penalties/fines) (Lora, 2022). In this way, if an entity consistently demonstrates thorough and effective practices in its procedures—implementing measures and protocols to prevent liability as part of its internal defense strategy—it can avoid corporate criminal liability. (Roso, 2020)

4. FUTURE RESEARCH DIRECTIONS

The future of criminal compliance is expected to be fully dynamic and highly adaptive, as businesses, corporations, and other legal entities continue to evolve in response to emerging challenges, such as global interconnectedness, digitalization, artificial intelligence, evolving regulatory frameworks, and increasingly sophisticated financial crimes. These challenges demonstrate that, today, the effective application of compliance programs is influenced not only by internal factors but also by external factors, (Departamento de Documentación de Iberly,2024) which equally shape the policies and strategies of an entity.

Considering these factors, the trend of digitalization is becoming more relevant and influential, especially in the context of compliance (Frommelt, 2024). As research shows, data collection and information technology hold the potential to significantly transform and impact financial crime compliance (KPMG, 2024). Legal entities, particularly corporations, are placing greater emphasis on developing policies and implementing mechanisms to address issues such as data theft, digital tax evasion, cyber fraud, phishing and ransomware attacks, account takeovers, and digital fraud. This has highlighted the need for robust security policies and processes to ensure the organization's compliance with relevant laws, regulations, or industry standards to manage potential cybersecurity risks (Syafrizal et al., 2020). This, in turn, has led to the development of security compliance as a precursor to criminal compliance, ensuring that companies adhere to cybersecurity laws and regulations (Folorunso et al., 2024).

This emerging trend has been observed in Albania as well, where the rise in digital and cybercrimes poses an increasing threat to the security and operations of legal entities, particularly corporations. In response, the Albanian government's national strategies emphasize the importance of adopting a "Cybersecurity Law," a "Law on Electronic Identification and Trusted Services," as well as regular amendments to the legislation on electronic whistleblowing (National Strategy for the Prevention of ML &TF, 2024). On an organizational level, alongside the expected benefits of these legal frameworks, private companies in Albania are striving to develop automated monitoring systems and predictive analytics policies. These initiatives help proactively identify risks that may lead to criminal behavior or regulatory violations, thus reducing the potential for corporate criminal liability.

5. CONCLUSION

The objective of compliance is to ensure that the entity adheres to applicable legislation by adopting the necessary measures to prevent from engaging in criminal activities, incurring penalties, or facing situations that could negatively impact its reputation (Departamento de Documentación de Iberly, 2024). Frequently, the lack of proper control and internal organizational deficiencies create gaps in the compliance system, which can lead to corporate criminal liability (Departamento de Documentación de Iberly, 2024). In Albanian legislation, this responsibility is regulated not only by the Criminal Code but also by the specific law on the criminal liability of legal entities, the law on the prevention of money laundering and the financing of terrorism, and the law on international sanctions in the Republic of Albania (Law no.72, 2019), among others.

In alignment with the standards set in national legislation, best practices in the EU, and international agreements, legal entities in Albania—particularly corporations—are becoming increasingly aware of the importance of compliance programs. They are incorporating the role of a compliance officer within their legal departments, who acts as the guarantor for the effective implementation of compliance policies and is responsible for overseeing internal controls to prevent corporate crimes (Bereziartua, 2024).

At a time when the activities of these entities are impacted by issues such as money laundering, cyber fraud, and other dangerous phenomena related to digitalization and data breaches, these entities view the implementation of compliance measures as essential to reducing legal violations and as a critical step in preventing criminal liability. The significance of compliance programs in the Albanian context is driven not only by the individual initiatives of legal entities but also by the standards and criteria established by local legislation, which require the development of policies to mitigate risks and enhance internal systems for secure transactions and relationships. Therefore, to ensure more sustainable operations overall, corporations are proactively implementing compliance management (Guo Liang & Belayet Hossain, 2024), which ensures accountability, greater protection, and improved organizational liability.

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Private and Family Life vs. Albanian Judicial Vetting Reform: The Proportionality Analysis Through European Court of Human Rights Jurisprudence

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Abstract: *Since 2016, Albania has undertaken extensive judicial reforms to enhance judicial integrity and combat corruption, involving constitutional amendments and the introduction of several new laws. A central component of these reforms is the "vetting process" designed to reassess all sitting judges and prosecutors according to three primary criteria: assets assessment, background assessment, and professional competence. The established vetting bodies, consisting of the Independent Qualification Commission (IQC) at the first instance and the Special Appeal Chamber (SAC) for appeals, are required to issue a reasoned decision after each re-evaluation phase, either confirming the individual's position or suspending or dismissing them from office.*

Albeit the reform's purpose of strengthening judicial independence is legitimate, it raises significant concerns regarding its impact on private and family life, particularly in cases where dismissals or suspensions occur due to the failure to justify assets.

This paper investigates the application of the proportionality test in balancing Albania's judicial vetting process with the right to private and family life, enshrined in Article 8 of the European Convention on Human Rights (ECHR), examining the tension between the legitimate aim of judicial accountability and the protection of fundamental rights, with particular attention to recent ECtHR jurisprudence on asset assessments and fair proceedings.

The paper provides a broader reflection on how ECtHR case law can serve as a safeguard against the consequences of judicial reforms that might unduly disrupt private and family life, underlining the need to adhere to the proportionality principle.

In conclusion, the paper asserts that the ECtHR's proportionality doctrine is a fundamental mechanism for ensuring that Albania's judicial vetting process respects and carefully balances the public interest and the potential violation of private and family life.

1. INTRODUCTION

In the current context of judicial reform, as Albania attempts to enhance judicial accountability and credibility of the judicial system, including the vetting of judges and prosecutors, it raises relevant questions regarding the protection of rights enshrined by the European Court of Human Rights (ECHR). The principle of proportionality, a cornerstone of ECHR jurisprudence, serves as a lens through which this divergence can be analyzed, balancing the state's legitimate interest in promoting judicial integrity, and public trust and fighting corruption against the individual's right to privacy and family life.

As these reforms are enacted, it is vital to assess how they correspond with or encroach upon established human rights, ensuring that the quest for a reliable judiciary does not compromise fundamental liberties.

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This paper explores the application of the proportionality test in reconciling Albania's judicial vetting process with the right to family life as guaranteed under Article 8 of the European Convention on Human Rights (Council of Europe, 1950). It delves into the inherent tensions between the goals of judicial accountability and the protection of individual rights, particularly focusing on the potential risks to human rights posed by judicial reforms. The paper underscores the importance of the European Court of Human Rights (ECtHR) case law in ensuring that the reforms, while aimed at enhancing judicial integrity, do not lead to disproportionate interference with family life or other personal freedoms. Through this analysis, the paper highlights the critical role of proportionality in safeguarding individuals from unnecessary disruption while pursuing systemic improvements in the judiciary.

1.1. Research Questions

This research aims to address several questions regarding the judicial vetting process in Albania and its effects on the right to privacy and family life.

1. How does the European Court of Human Rights (ECtHR) define and apply the principle of proportionality?
2. Which aspects of the vetting process intersect with the rights to private and family life?
3. How has the judicial vetting process in Albania affected the private and family life of judges and prosecutors, and how do these measures align with the ECtHR's case law concerning privacy and proportionality?

1.2. Methodology

To address these research questions, the methodology blends legal and doctrinal, and case law review, focusing on the compatibility of Albania's judicial vetting reform with the standards established in Article 8 of the European Convention on Human Rights.

Doctrinal Research: A review of existing scholarly literature on proportionality and the right to private and family life will help establish a theoretical framework and identify gaps in the current research. This will further inform the analysis and provide a solid foundation for evaluating the effectiveness of Albania's judicial reforms.

Primary legal sources, including relevant Convention Articles, alongside secondary sources such as academic literature, are analyzed to conceptualize the doctrine within the broader principles of the ECtHR. Hence, the paper relies primarily on the desk research method, utilizing ECtHR judgments and the ECHR as primary sources, and academic articles as secondary sources.

Case Law Analysis –The HUDOC database has served to select case law based on its relevance to the topic, especially those on the dismissal of judges and prosecutors following the vetting process. Case law analysis emphasizes the Court's reasoning, particularly how it balances the right to privacy and family life with the legitimate aims protected by the Albanian state.

2. GENERAL BACKGROUND OF THE VETTING PROCESS IN ALBANIA

Since 2016, Albania has embarked on an ambitious judicial reform initiative aimed at strengthening judicial integrity and combating systemic corruption. Albania has faced significant challenges, primarily characterized by elevated corruption levels, a deficiency in integrity, and a lack of accountability within its judiciary. The process of vetting has arisen as a crucial response to the

imperative of eliminating corruption and reinstating the trust of the Albanian populace in the judicial framework (Maxhuni & Cucchi, 2017, p. 4).

This effort, which involves constitutional amendments and new legislation, has introduced a transitional "vetting process" as a cornerstone of the reform. Its purpose is explicitly outlined in Article 1 of the Vetting Law, which aims to guarantee the functioning of the rule of law, ensure the independence of the justice system, and restore public trust in judicial institutions. (Law No. 84, 2016).

As specified in Article 4, the vetting process serves to reassess all sitting judges and prosecutors against three primary criteria: assets assessment, background evaluation, and professional competence.

Asset Assessment (Article 30). Property assessment involves declaring and verifying assets, ensuring their legality and the legitimacy of their sources. It also examines the fulfillment of financial obligations and considers private interests related to the subject of re-evaluation and their associates.

Background Assessment (Article 34) aims to verify the declarations and data of the subject of re-evaluation and inappropriate contacts with individuals involved in organized crime, as outlined in Article DH of the Annex to the Constitution.

Professional Assessment (Article 40) focuses on evaluating the ethical and professional activities of the subjects undergoing re-evaluation. This is conducted by the relevant legislation governing the status of judges and prosecutors.

Decisions on the re-evaluation are made by two specialized bodies: The Independent Qualification Commission (IQC): Conducts the initial investigation and issues decisions.

The Special Appeal Chamber (SAC): Handles appeals from magistrates or the Public Commissioner, who represents public interests in the process. Both bodies are mandated to provide reasoned decisions that confirm, modify, or overturn outcomes, including suspension or dismissal from office.

A unique feature of Albania's vetting process is the International Monitoring Operation (IMO), established under Article B of the Annex to the Constitution. Led by the European Commission, the IMO supports and oversees the process, ensuring its alignment with European and Euro-Atlantic integration standards. The IMO partners with Albania to enhance the credibility and effectiveness of the vetting initiative, maintaining transparency and accountability. The potential sanctions for judicial officers found lacking in any of the assessment criteria are severe, ranging from dismissal from office to suspension with mandatory education for improvement.

3. DEFINITION AND SIGNIFICANCE OF PROPORTIONALITY IN THE EUROPEAN COURT OF HUMAN RIGHTS JURISPRUDENCE

The principle of proportionality is a fundamental interpretive tool established under the European Convention on Human Rights (ECHR), explicitly referenced in Articles 8–11 and applied on a case-by-case basis by the European Court of Human Rights (ECtHR). The article focuses on the application of this principle in cases concerning the dismissal of judges and prosecutors resulting from the vetting process within the justice sector. Specifically, it examines how the proportionality principle has been applied in the context of limitations imposed on the right to private and family life under Article 8 of the Convention.

As a cornerstone of the ECtHR's jurisprudence, the principle of proportionality serves as a balancing mechanism to reconcile competing rights and interests protected under the ECHR. The article analyzes the meaning and components of the principle, as well as its application in cases relating to the vetting process.

The principle of proportionality ensures that state intervention in fundamental rights is justified by law, legitimate, and necessary. The ECtHR employs this principle to evaluate whether interferences with individual rights strike an appropriate balance between the rights at stake and the public interest. The equilibrium is just when the limitation does not infringe upon the fundamental nature of the right and does not result in the erosion of its substantive essence. (Trykhlib, 2020, p. 128).

Article 8 paragraph 2 of the ECHR provides that: *"Interference by public authorities with this right is permitted only if it is lawful, necessary in a democratic society, and pursues legitimate aims such as national security, public safety, economic well-being, crime prevention, health, morals, or the protection of others' rights and freedoms."*

The established criteria aim to prioritize rights by imposing additional challenges that states must navigate to assert a public interest defense (McHarg, 1999, p. 685).

Since the Court's primary responsibility is to resolve matters by balancing diverse human rights and interests in a dynamic society, it is necessary to adopt an ongoing reassessment of methodologies, with proportionality as a key principle to safeguard human rights (Trykhlib, 2020, p. 130).

The proportionality principle consists of three core components: legitimacy, legitimate aim, and necessity. These components are essential in assessing whether a measure interferes with human rights in a manner justified under a democratic society. The following part elaborates on these elements through relevant case law concerning the alleged violation of Article 8 of ECHR due to the vetting process.

3.1. Interference Prescribed by Law

The first component of the principle of proportionality, namely the requirement that actions be "in accordance with the law," mandates that measures have a solid foundation in domestic law and fulfill the criteria of accessibility and foreseeability. In other words, the law must be sufficiently clear to enable individuals to regulate their conduct (Xhoxhaj v. Albania, 2021).

In the case of *Xhoxhaj v. Albania*, the applicant, a former judge of the Constitutional Court of Albania, was dismissed from her position following a vetting process. Moreover, she was permanently barred from re-entering the justice system due to concealing ownership of a 101 sq.m. flat during the asset evaluation and for undermining public trust by failing to recuse herself from Constitutional Case (Xhoxhaj v. Albania, 2021).

According to the Court, the Vetting Act and asset disclosure regulations, which were accessible and had undergone constitutional review, substantiated the findings regarding the flat, thereby satisfying the legal requirements of foreseeability (para. 384). Consequently, the dismissal for undermining public trust was grounded in broadly recognized disciplinary rules, further reinforced by specific provisions such as section 36(1)(c) of the Constitutional Court Act and Article 72 of the CCP (§386). This interference was also considered foreseeable (Xhoxhaj v. Albania, 2021).

3.2. Legitimate Aim

Any interference must serve a legitimate aim recognized by law. According to Article 1 of the Vetting Act, its purpose is to "guarantee the proper functioning of the rule of law, the true independence of the justice system, as well as the rebuilding of public trust in the institutions of the system" (Law No. 84, 2016). Additionally, the Court highlighted that the Venice Commission had deemed the vetting of judges and prosecutors "not only justified but necessary to protect the country from the scourge of corruption, which, if not addressed, could destroy the judicial system". The Constitutional Court further emphasized that any restrictions imposed by the Vetting Act were justified by the public interest of combating the level of corruption and restoring public trust in the judiciary. This objective was also connected to the interests of national security, public order, and the protection of the rights and freedoms of others (Xhoxhaj v. Albania, 2021).

In *Thanza v. Albania*, the applicant, a dismissed Supreme Court judge challenged his removal and the legal ban on him practising law as a private advocate after his dismissal under Article 8 of the Convention arguing that it had severely impacted his financial security, professional carrer, and reputation (Thanza v. Albania, 2023).

He claimed a loss of income, pension benefits, and the opportunity to serve as a judge or engage in other legal professions, emphasizing that dismissal, rooted in critiques of his judicial performance, undermined his professional and social reputation.

The dismissal was based on allegations of misconduct, criminal behavior, and inappropriate connections with organized crime, which not only damaged his professional reputation but also stigmatized him as unfit for judicial duties. This significantly affected his employment prospects and severely impacted his personal and social life, making it difficult to maintain professional relationships and earn a living. However, in line with the findings in Xhoxhaj the Court found no ground to question the legitimacy of the Vetting Act objectives, including the vetting of a Supreme Court judge, which aligned with the interests of national security, public safety, and the protection of the rights and freedoms of others, as outlined in Article 8 § 2 of the Convention (Thanza v. Albania, 2023).

3.3. Necessity test

To determine if an infringement on Article 8 is "necessary in a democratic society," the Court balances the interests of the member State against the applicant's rights. In the case of *Dudgeon v. the United Kingdom*, the Court emphasized that "necessary" implies a "pressing social need," rather than something merely "useful" or "desirable" (Dudgeon v. the United Kingdom, 1981). While national authorities are responsible for assessing this need, their decisions can be reviewed by the Court (Council of Europe, 2024).

In *Thanza v Albania*, the Court examined whether the vetting bodies exceeded the State's margin of appreciation in dismissing the applicant and whether they conducted an individualized assessment of the factors leading to his dismissal. It reiterated that serious failures in asset declarations, such as concealing income or justifying excessive lifestyles, can justify dismissal, whereas minor discrepancies should not result in severe sanctions (Thanza v. Albania, 2023).

The applicant's failure to declare a garage, legally acquired by his wife, was not a major issue, instead the vetting bodies focused on two flats purchased in 2000 and 2003. They found insufficient

lawful income during this period and raised doubts about related expenses, which were deemed reasonable concerns. Applying a modest cost-of-living estimate, they identified significant discrepancies between his income and expenditures, along with a prolonged negative financial balance. Hence, the applicant failed to provide adequate evidence of lawful income for asset acquisition. These findings justified the applicant's dismissal under Article 8.

The Court considered the national decision-making process fair and reasonable, and the dismissal was proportionate to legitimate aims. Consequently, no violation of Article 8 was found.

The necessity test further requires domestic authorities to establish the existence of a genuine and pressing social need, along with relevant and sufficient justifications for any interference with human rights and freedoms. Given this requirement, states are generally afforded a wider margin of appreciation in determining the necessity of such measures (Trykhlib, 2020, p. 151).

For a measure to be justified, it must substantially contribute to achieving its intended goal; otherwise, the reasons for its implementation may not be considered "relevant and sufficient" (Gerards, 2013, p. 467). Public authorities are therefore required to provide adequate justification for imposing a specific measure and demonstrate its necessity to achieve a specific goal. Additionally, State interventions must adhere to the principle of minimal interference, meaning that the least restrictive measure should be applied to safeguard the rights of the individuals (Trykhlib, 2020, p. 138). The necessity test further requires domestic authorities to establish the existence of a real pressing social need along with relevant and sufficient reasons for the interference with human rights and freedoms. Therefore, the margin of appreciation in determining the necessity of such measures is wider (Trykhlib, 2020, p. 151).

In *Sevdari v. Albania,* the Court acknowledged the pervasive corruption in Albania's justice system and upheld the necessity of an extraordinary vetting process for judges and prosecutors to address a pressing social need. However, it stressed that the proportionality of sanctions, particularly dismissal, requires a thorough evaluation of individual circumstances (Sevdari v.Albania, 2022). The applicant was dismissed for failing to justify her family's assets, primarily her husband's income from years before their marriage or her appointment as a prosecutor. While tax compliance is essential, the amounts in question represented a minor percentage of their total income, and no evidence of bad faith or illicit activity was found. Additionally, a single missed appeal by the applicant, though noted by the SAC as potentially undermining public trust, was not established as part of a broader pattern of incompetence (Sevdari v.Albania, 2022). The Court emphasized that dismissal is the most severe sanction, entailing a lifetime ban on re-entering the justice system. Such measures should be reserved for cases involving substantial ethical breaches. In this case, the dismissal was disproportionate to the vetting process's aims, as the irregularities were minor and lacked evidence of deliberate wrongdoing. In conclusion, the Court found a violation of Article 8 due to the disproportionate nature of her dismissal. As to individual measures, an appropriate form of redress for the violation of the applicant's right would be to reopen the proceedings, should the applicant request such reopening, and to re-examine the case in a manner that was in keeping with the requirements of Article 8 (Sevdari v.Albania, 2022).

In *Gashi and Gina v. Albania*, the Court examined the first applicant's claim that her suspension disrupted the vetting process and influenced the IQC's decision to dismiss her. However, it found that she failed to substantiate this argument beyond merely citing her suspension as part of her employment status (Gashi and Gina v.Albania, 2023). Applying the consequence-based approach, the Court reiterated that an applicant must demonstrate that the impugned measure had serious consequences

significantly affecting private life. In this case, the first applicant did not establish that her suspension met this threshold. It emphasized that any reputational harm was primarily due to criminal charges rather than the suspension itself, which was accompanied by continued salary payment. Consequently, the Court considers that the negative impact of the suspension was not sufficiently serious to engage her right to respect for her private life under Article 8 of the Convention (Gashi and Gina v.Albania, 2023). Regarding the second applicant, the Court noted that he was suspended from 11 May to 8 November 2018, and despite a judgment in his favor, its enforcement was delayed without justification until January 2020. Given the employment-related nature of the dispute, this prolonged inaction was significant. The delay persisted even after the criminal proceedings against him were terminated in April 2019, impeding him from returning to his professional environment and hindering his career and personal development (Gashi and Gina v.Albania, 2023). In conclusion, the Court concluded that the second applicant had sufficiently demonstrated that the consequences of his suspension were serious enough to engage Article 8 of the Convention.

4. FUTURE RESEARCH DIRECTIONS

Future research directions may encompass the following:

1. Conducting empirical studies to assess public perceptions of the judiciary both before and after the vetting process, to determine whether the public perceives this process as fair and legitimate, and how these perceptions influence trust in the judicial system.
2. Assessing the role and efficacy of the International Monitoring Organization (IMO) in promoting the credibility and transparency of the vetting process.
3. Exploring the broader implications of judicial reforms on human rights, with a particular focus on the right to a fair trial.
4. Analyzing the evolving jurisprudence of the European Court of Human Rights (ECHR) concerning vetting cases and its influence on shaping future reforms.

5. CONCLUSION

Albania's vetting reform is a crucial response to systemic corruption and the erosion of public trust in the judiciary. The reform was essential for upholding the rule of law and ensuring judicial independence. However, while necessary, the vetting process raises significant human rights concerns, particularly under Article 8 of the ECHR. Severe sanctions, such as dismissal and lifetime bans, can disproportionately affect the private and family life of judges and prosecutors.

To address these concerns, the principle of proportionality plays a vital role in balancing the public interest in judicial integrity with individual rights. ECtHR case law emphasizes that any measures taken must be lawful, necessary, and proportionate. Additionally, ECtHR rulings underscored the need for individualized assessments during the vetting process, ensuring that sanctions are proportionate to the severity of ethical or professional breaches and avoid unnecessary interference with personal rights and freedoms.

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The Importance of Court Settlement in the Macedonian Civil Procedure with Special Reference to Commercial Disputes

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Abstract: *Litigations in the Republic of North Macedonia are time-consuming and could last for years. Court settlement as a dispute resolution method could improve the efficiency of dispute resolution in the Republic of North Macedonia. The purpose of this paper is to analyse the importance of court settlement in the Macedonian legal system. This paper consists of an introduction, two parts and a conclusion. The introduction describes the basic issues related to court settlement as a dispute resolution method. The first part analyzes the main characteristics of the litigation in the Macedonian legal system. The second part analyzes the situation with the court settlement in the Republic of North Macedonia. The conclusion summarizes the main findings, observes how they relate to the research question and gives recommendations.*

1. INTRODUCTION

A court settlement is an agreement of the dispute subject that can be concluded by the dispute parties during the litigation (Chavdar, 2004, p. 640). This means that the dispute parties can conclude a court settlement from the filing of the lawsuit until the second instance court issues a decision on the appeal (Chavdar, 2006, p. 496).

The dispute parties may resolve the whole or part of the dispute through court settlement. When the court settlement applies to the entire claim, the litigation is terminated. If the settlement applies to a part of the claim, the litigation is terminated for that part, but continues for the remaining part of the claim.

A court settlement cannot be concluded regarding the claims that the parties cannot dispose of i.e. dispositions of the parties that are: contrary to *jus cogens*, contrary to the provisions of international agreements ratified in accordance with the Constitution of the Republic of North Macedonia and contrary to morality (Law on Civil Procedure, Article 3 paragraph 3). The subject of court settlement cannot be legal relationships that can only be resolved by a judge, for example, divorce, nullity of marriage, or legal relationships that are not under the court's jurisdiction (Chavdar, 2006, p. 496). In this regard, the verdict of the Supreme Court of Macedonia, GZZ No. 56/77 of 31.08.1977, states that in disputes for determining the existence of marriage, the court cannot allow a court settlement regarding the existence or non-existence of marriage (Atanasov, 2023, p.183).

When the court of first instance issues a decision that does not allow the parties to reach a settlement, it will temporarily terminate the procedure until this decision becomes final (Law on Civil Procedure, Article 307 paragraph 5).

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Only persons who have legal capacity can conclude a court settlement (Law on Civil Procedure Article 71); if it is concluded by the legal representative of the party, the legal representative should have special authorization for that, if this is determined by special regulations (Law on Civil Procedure, Article 73 paragraph 2) and, if the settlement is concluded by a representative who is not an attorney, the authorization is needed (Law on Civil Procedure, Article 87).

A court settlement concluded in misconception, under coercion or fraud, could, also, be challenged. This should be done by filing a lawsuit in a separate dispute. This is also the position of the Macedonian case law. Namely, the Supreme Court of the Republic of North Macedonia expressed the following: The challenge of a court settlement is possible only if it was concluded in misconception, or under coercion or fraud (Verdict of the Supreme Court of the Republic of North Macedonia, Gz. 88/93). The party that believes that when concluding the court settlement, they did not freely express their will may request the annulment of the settlement in a lawsuit. Another verdict of the Macedonian Supreme Court (Gz.88/93) states that the court settlement cannot be challenged because the procedure in which it was concluded involved some essential violations of the provisions of the civil procedure under Article 354 of the Law on Civil Procedure, with the exception of those violations that, at the same time constitute reasons for which any agreement may be challenged, in accordance with the provisions of the Law on Obligations. If the court settlement is annulled by a final judgment, it is considered that the process in which the settlement was reached is not yet completed, and the court will continue the procedure in the case in which the settlement was reached (Decision of the Supreme Court of the Republic of North Macedonia, Gz. 87/95).

The Macedonian case law states that a previous court settlement is not a reason for repeating the procedure under Article 392 of the Law on Civil Procedure, since this law provision only refers to a final verdict. However, such an understanding is debatable and should be questioned because the entire provision of Article 392 is the same both when it comes to a verdict or a court settlement (Atanasov, 2023, p. 185). In the event that the court settlement is annulled, the mutual payments that the parties made to each other should be returned in accordance with the provisions of the Law on Obligations for the mutual returns of the contracting parties which refers to termination of the contract (Law on Obligations, Article 121), annulment of a voidable contract (Law on Obligations, Article 105) or nullity of the contract (Law on Obligations, Article 96).

When a court settlement has been reached, each party bears its own costs, unless otherwise agreed with the settlement (Law on Civil Procedure, Article 153 paragraph 1). If a settlement is attempted but fails, the costs are included in the litigation costs (Law on Civil Procedure, Article 152, paragraph 2). Litigation costs may not include the costs of attempting a settlement if it is undertaken outside of court, even immediately before the dispute is initiated (Chavdar, 2006, p. 235).

2. THE MAIN CHARACTERISTICS OF CIVIL LITIGATION IN THE MACEDONIAN LEGAL SYSTEM

The Macedonian legal system is part of the civil law legal system. So, the main legal sources in the Macedonian legal system are laws. Concerning civil litigation, the main set of norms is the Law on Civil Procedure (2005, with subsequent amendments). Civil litigation within the Macedonian legal system refers to the procedural conduct of civil courts and parties when hearing and resolving disputes related to fundamental citizens' rights and obligations, particularly those concerning personal and family relations. This includes matters such as labor, commercial, property, and other civil law disputes, unless the law specifies that a court should address certain disputes under a different procedural framework. The Law on Civil Procedure regulates the entire process of civil litigation, from filing a lawsuit to the final judgment and potential legal remedies.

In civil litigation, the court decides within the limits of the claims submitted in the proceeding. The court may not refuse to decide on a claim for which it has jurisdiction. The court decides on the claim on the basis of an oral and public hearing. Any natural or legal person may be a party to the litigation.

The civil litigation has three main levels: Basic Courts, Appellate Courts and Supreme Court of the Republic of North Macedonia. The main stages in a civil litigation are: filing a lawsuit, preparation for trial, trial, judgement and legal remedies (regular and extraordinary). The civil litigation process in North Macedonia typically begins with the filing of a lawsuit by the plaintiff, which is then served to the defendant. The court's role is to impartially examine the case, considering all presented evidence, and reach a legally sound decision based on the facts and applicable law.

In civil litigation, parties are expected to actively engage in the process, presenting their claims and defenses through legal arguments and evidence. In addition, the Law on Civil Procedure emphasizes mediation and encourages settlement between parties before resorting to a trial. Mediation is also promoted as an alternative means of resolving disputes, which can be facilitated by the courts or other accredited bodies.

The legal principle of equality of arms ensures that all parties in civil cases have equal opportunities to present their case, including access to legal representation and sufficient time to prepare their arguments. The courts are required to make their judgments based on law, and their decisions can be appealed to higher courts, which serve as a means of safeguarding the accuracy and fairness of judicial decisions.

The civil litigation costs include the following: court fees, attorney fees, costs fees for expert witnesses, translation costs, travel costs and other costs determined with the Law on Civil Litigation. The court fees are prescribed in the Law on Court Fees (2009, with subsequent amendments). The payment of court fees is a precondition for starting the civil litigation. The attorney`s fees are prescribed with the Attorney`s tariff (2020). For the poor dispute parties, there is an opportunity for exemption from payment of fees, prescribed with the Law on Court Fees. In the Macedonian legal system Law on Free Legal Aid (2019). The free legal aid shall be exercised as a preliminary legal aid and legal aid in all judicial and administrative procedures. But the question: "Do costs and fees limit access to justice?" is still relevant and should be the subject of separate analysis. Undoubtedly, civil litigation should be designed to ensure fair dispute resolution.

3. COURT SETTLEMENT AND COMMERCIAL DISPUTES IN THE REPUBLIC OF NORTH MACEDONIA

The provisions on the procedure in commercial disputes (Law on Civil Procedure, Chapter 35) shall apply to disputes arising from mutual commercial relations in which both parties are legal entities, and to disputes relating to ships and inland waterway navigation, as well as to disputes to which navigation law applies (navigation disputes), except for disputes relating to the transport of passengers (Law on Civil Procedure, Article 462), in disputes arising from mutual commercial relations of shopkeepers and other individuals who, as a registered occupation, carry out some commercial activity i.e. from mutual commercial relations of those persons and the legal entities referred to in Article 462 point 1 of Law on Civil Procedure (Law on Civil Procedure, Article 463), as well as between these legal entities and foreign natural persons and legal entities arising from their mutual commercial relations, as well as in such mutual disputes of foreign natural persons or legal entities (Law on Civil Procedural Law, Article 464). The provisions on procedure

in commercial disputes shall also apply when, in addition to the legal entities mentioned, other natural or legal entities participate in the dispute as co-litigants referred to in Article 186 paragraph 1 point 1 of Law on Civil Procedure (Law on Civil Procedure, Article 465).

If the dispute parties express their willingness to resolve the dispute amicably, the civil court of first instance shall enter the parties' settlement agreement into the minutes (Law on Civil Procedure, Article 308 paragraph 1). The settlement is concluded when the parties sign the minutes (Law on Civil Procedure, Article 308 paragraph 2). The minutes may be read aloud by the president of the court council, or each party may read the minutes for themselves. This reading of the minutes must be done before signing, regardless of whether the minutes were dictated aloud to the minutestaker by the president of the court council (Chavdar, 2006, p.502). The parties will be issued, upon their request, a certified copy of the minutes in which the settlement is entered (Law on Civil Procedure, Article 308 paragraph 3). Even before initiating litigation, the person who intends to file a lawsuit may, through a civil court of first instance in whose territory the opposing party has his/her domicile or residence (Law on Civil Procedure, Article 39), attempt to reach a settlement (Law on Civil Procedure, Article 310 paragraph 1). The court to which such a proposal is addressed will summon the opposing party and inform it of the settlement proposal (Law on Civil Procedure, Article 310 paragraph 2). This proposal is considered a proposal to initiate a non-contentious procedure, and as such is entered in the court's register for non-contentious cases. The opposing party shall be served with the summons along with the proposal for an attempt at settlement. Personal service is not prescribed for this service, but the court may determine that service be carried out in accordance with the provisions for personal service (Law on Civil Procedure, Article 137 paragraph 1). If the opposing party does not appear at the hearing, or does appear but no settlement agreement is reached, then the settlement attempt is considered to have failed (Chavdar, 2006, p. 504). If a settlement agreement is reached, then the court shall proceed in all respects as if it were a settlement concluded during litigation (Law on Civil Procedure, Articles 307 and 308).

The parties can reach a court settlement both before the civil court of first instance and the civil court of second instance. The parties may conclude a court settlement before the first instance court until the final court decision of the dispute. The parties may conclude a court settlement before the second instance civil court only when the second instance civil court decides at a hearing scheduled for the appeal. The second instance civil court may not administratively return the case to the first instance civil court upon the appellant's proposal for reaching a court settlement, if the court settlement was unilaterally proposed. When the parties have proposed reaching a court settlement after the adoption of a first instance judgment, against which an appeal has been filed, the court settlement record should include data on the first instance judgment, the appeal filed, the statements of the parties, and the manner in which the relations are regulated (in whole or in part). When the parties only partially regulate their relations with the court settlement, the remaining disputed part of the civil legal relationship will be decided upon the appeal against the first-instance judgment. If a court settlement is concluded before the first-instance court, and the case is sent on appeal to the second-instance court, in that case the first-instance court is obliged to notify the second-instance court of the reached court settlement, and the parties may also do so. This general view of the Macedonian Supreme Court only further explains what is not clearly stated in the Law on Civil Procedure providions on court settlements. This especially applies to when it is possible to conclude a court settlement before a second-instance court (Atanasov, 2023, p.182). According to Article 351 of the Law on Civil Procedure, the second-instance court decides on an appeal without a hearing as a general rule, and a hearing is scheduled as an exception when the court council finds it necessary to repeat the evidence already presented. In such a case, the question arises whether the rights of the parties to settlement are limited because the

law states that a court settlement may be concluded during the entire procedure, from the filing of the lawsuit to the decision of the second-instance court on the appeal. If the second-instance court decides as a rule without a hearing and as an exception in a public session, then the question arises as to how the exception takes priority over the rule (Atanasov, 2023, p.185). In such a case, it may be considered that the appeal was filed by a person who has no legal interest in it (Law on Civil Procedure, Article 347 paragraph 3) and the second-instance court may dismiss it (Law on Civil Procedure, Article 356).

According to the provisions of the Macedonian Enforcement Law, the court settlement is an executive title (Enforcement Law, Article 12 paragraph 1 point 1).

Throughout the entire procedure, the court will *ex officio* monitor whether a procedure is being conducted for a case for which a court settlement was previously concluded, and if it determines that a procedure is being conducted for a case for which a court settlement has already been concluded, it will dismiss the lawsuit (Law on Civil Procedure, Article 309).

In commercial disputes for monetary claims whose value does not exceed 1,000,000 denars, and for which the procedure is initiated by filing a lawsuit before a court, the parties are obliged, before filing the lawsuit, to try to resolve the dispute through mediation. When filing the lawsuit, the plaintiff is obliged to attach written evidence issued by a mediator (Law on Mediation) that the attempt to resolve the dispute through mediation failed. If this evidence is not attached to the lawsuit, the court will dismiss the lawsuit (Law on Civil Procedure, Article 461).

The parties may also conclude an agreement in a mediation procedure (Law on Civil Procedure, Article 308 paragraph 4) and are obliged to submit it to the court within 8 days of its conclusion. The court schedules a hearing at which it records the concluded agreement in the minutes, which acquires the status of a court settlement if the conditions for concluding a court settlement are met in accordance with Article 307 of the Law on Civil Procedure. The minutes must include the content of the settlement and it is not enough to simply state that the parties have concluded a settlement, since this does not constitute an enforceable document nor can be considered as *res judicata* without stating which party undertakes what obligations in relation to the subject of the dispute, the deadline within which it undertakes to perform those obligations or what rights it recognizes to the opposing party.

Since the settlement can be concluded during the entire civil procedure, and in accordance with Article 308 paragraph 4 of the Law on Civil Procedure, the agreement concluded in a mediation procedure in front of the mediator, also acquires the status of a court settlement, the question arises is it possible and what happens if the dispute parties conclude a settlement in front of a notary. This brings up another question: "Whether an analogy can be applied between concluding a settlement in front of a mediator and concluding a settlement in front of a notary?" (Atanasov, 2023, p. 185). Regarding this issue, we believe that there is no reason not to proceed in the same manner with respect to an agreement concluded in front of a notary as in the case of an agreement reached in a mediation procedure, since in both cases the parties manifest a freely expressed will to have their dispute resolved in this manner.

In the period from December 30, 2024, to January 05, 2025, we addressed requests for public information to 7 courts in the Republic of North Macedonia. The courts were selected on the principle of geographical-regional representation of the larger courts in the country, according to the jurisdiction of the appellate courts, namely the Basic Civil Court Skopje, the court with the largest volume of

cases under the jurisdiction of the Court of Appeal in Skopje, the Basic Courts in Bitola and Ohrid, under the jurisdiction of the Court of Appeal in Bitola, the Basic Court in Gostivar, under the jurisdiction of the Court of Appeal in Gostivar, and the Basic Courts in Sveti Nikole, Strumica and Shtip, under the jurisdiction of the Court of Appeal in Shtip. The request for information was submitted in accordance with the Law on Access to Public Information, with the Basic Civil Court Skopje being submitted in writing, and in the remaining courts electronically. By the time of completion of the research, all courts had responded to the request for public information.

The courts were asked the following questions: How many cases, in civil and commercial disputes, have been resolved in your Court in the last three years; How many court settlements have been reached in civil cases, and how many in commercial cases, and Do, the judges, in accordance with the provision of Article 307 of the Law on Civil Procedure, inform the parties about the possibility of resolving the case through a court settlement and do they actively seek an amicable resolution of the dispute (court settlement)?

Table 1. Number of resolved civil and commercial disputes

Court	Year	Number of resolved civil disputes	Number of resolved commercial disputes	Number of civil disputes resolved through court settlement	Number of commercial disputes resolved through court settlement
Basic Civil Court Skopje	2022	6630	2693	29 (0.437%)	51 (1.894%)
	2023	5400	2851	29 (0.437%)	49 (1.719%)
	2024	5363	2471	34 (0.643%)	88 (3.561%)
Basic Court Ohrid	2022	4913	140	/	Automated Court Case Management Information System (ACCMIS) does not provide the needed information
	2023	4590	33	/	
	2024	4111	18	/	
Basic Court St. Nicholas	2022	1161	No jurisdiction to resolve commercial disputes	12 (1.037)	/
	2023	479			/
	2024	408			/
Basic Court Strumica	2022	3212	904	336 (10.46%)	133 (14.71%)
	2023				
	2024				
Basic Court Shtip	2022	1883	116	22 (1.168%)	1 (4.545%)
	2023				
	2024				
Basic Court Bitola	2022	7281	/	/	ACCMIS does not provide the needed information
	2023	7815	/	/	
	2024	7815	/	/	
Basic Court Gostivar	2022	1527	/	36	
	2023	1499	/	20	
	2024	1712	/	54	

Source: Own research

The analysis of the responses received to the Request for Public Information on the number of disputes resolved in the Basic Civil Court Skopje and the Basic Courts in Shtip, Sveti Nikole, Strumica, Ohrid and Bitola for the last three years (2022, 2023 and 2024), shows the following conclusion: Basic Civil Court Skopje for 2022 showed only 0.437 % civil cases resolved by court settlement, and 1.894% for commercial disputes resolved through court settlement; for 2023 - 0.537% civil cases resolved by court settlement, and 1.719% for commercial disputes resolved through court settlement and for 2024 – 0.643% civil cases resolved through court settlement and 3.561% for commercial disputes resolved through court settlement. Basic Court Strumica, in the last three years, showed 14.71% of resolved civil cases through court settlement, in the Basic Court St. Nicholas the percentage of

civil cases resolved through court settlment is 1.037%, and this court does not have jurisdiction for resolving commercial disputes. In the Basic Court Shtip, the percentage of civil disputes resolved with court settlements for the last three years is 1.168%, and the percentage of commercial disputes resolved with court settlements for the last three years is 4.545%. The Basic Court Ohrid and Bitola provided data on the total resolved disputes (civil and commercial) in the last three years, but for the requested information on how many of these cases were resolved through court settlements, they stated that the Automated Court Case Management Information System (ACCMIS) with which court cases are processed does not provide the possibility of extracting the requested information.

All the courts from which we received a response stated that, the judges in accordance with the Article 307 of the Law on Civil Procedure, inform the parties of the possibility of resolving the case through a court settlement and strive to reach an amicable resolution of the dispute.

4. CONCLUSION

Civil litigation in North Macedonia is a structured and formal process aimed at providing justice in civil disputes. The legal framework should encourage dispute resolution through various means, including court settlement and mediation.

The court settlement should be an expression of the free will of the parties. However, in terms of its validity, it is subject to the general regulations on the validity of litigation actions. The president of the court council should point out to the dispute parties the advantages of the court settlement, which refers to the avoidance of lengthy litigation, its high costs, uncertainty of the outcome. There is a saying among the people that a thin settlement is better than a thick litigation. However, the court's indication to the parties of the possibility of concluding a court settlement should be done in such a way that the parties do not get the impression that the court is pressuring them to end their dispute in this way. The court of first instance may inform the parties of this possibility until the dispute is concluded, i.e. until a final decision is made, and the court of second instance may only do so when the court of second instance decides at a hearing scheduled for the appeal. Until that moment, the parties may freely dispose of their claim and reach a court settlement.

If the court settlement is annulled by a final judgement, it is considered that the process in which the settlement was reached is not yet completed and the court will continue the procedure in the case in which the settlement was reached.

The analysis of research question shows that the obtained percentages of cases resolved by court settlement in the last three years range from 0.437% (the lowest percentage for 2022 in civil cases in the Basic Civil Court Skopje) to 14.71% average value for resolved commercial cases with court settlement in the last three years (in the Basic Court Strumica). Considering that the Basic Civil Court Skopje is the largest court in the state and with the largest volume of cases, all obtained percentage values of cases resolved by court settlement in the last three years are below 1%, which cannot be satisfactory. Also, we should be aware of the fact that this research clearly indicates that the courts lack statistical data, and statistical data is crucial for overcoming obstacles to the development and increased use of court settlements.

Moreover, if we take into account the benefits of reaching a court settlement, such as avoiding lengthy litigation, its high costs, and uncertainty of the litigation outcome, then the obtained data indicate that the dispute parties reach a court settlement in a very small number of cases. The reasons for this should be the subject of some other research and analysis.

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Acts of Expropriation in Albania, the Deadline for Filing a Lawsuit in Court, and Dilemmas That Have Been Noticed in Albanian Judicial Jurisprudence

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Abstract: *Expropriation is an extraordinary manner of limiting ownership, based on which the ownership of properties passes from private to public ownership, so using this limitation of ownership, the owner is completely deprived of ownership of his property. For this reason, expropriation is provided directly in Article 41 of the Constitution of the Republic of Albania. This article guarantees every natural/legal person the right to fair remuneration and the right to contest the value of such remuneration in court. According to Albanian law, the Council of Ministers issue the expropriation act, while the affected subjects have the right to file a lawsuit in the competent Administrative Court. Such an act of expropriation can be challenged judicially only in terms of the remuneration the Council of Ministers granted. Regarding the exercise of the constitutional right of judicial appeal toward the value of the expropriation determined through the relevant act of expropriation, there have been different interpretations in Albanian judicial practice. These interpretations differ about when the owners are notified of the final act of expropriation, which determines the value of fair remuneration. The interpretation regarding the moment of the beginning of the term to file a lawsuit against the value of the remuneration appears to be very important for guaranteeing the right of access to the court, considering that this right is guaranteed by Article 6 of the European Convention on Human Rights. The different interpretations of the courts on the access of the plaintiffs to oppose the value of remunerations of the expropriation created many problems with the conventional right of access to the courts until the Administrative Panel of the High Court of Law unified a fair interpretation following the conventional right for access to the court.*

1. INTRODUCTION

Article 41 of the Constitution of the Republic of Albania, which provides for the legal protection of the ownership right as one of the fundamental human rights in the Albanian legal order, also provides the legal institute of expropriation (The Constitution of the Republic of Albania). According to this constitutional article, it is provided that expropriation or restrictions of the right of ownership, which are considered similar to expropriation, are allowed only against fair remuneration. This constitutional provision is following the European Convention of Human Rights, which guarantees the peaceful enjoyment of ownership rights to every person or legal entity and guarantees that nobody can be deprived of his or her ownership except when exists a public interest and always in accordance to the legal provisions of contracting states and the general principles of the international law (Art. 1 of 1st Additional Protocol of the European Convention of Human Rights).

In the Albanian legal framework, expropriation is regulated by the law "On expropriations and temporary use of private property for public interest" (Law no. 8561, dated 22nd December 1999). This law has been amended several times in the past years. In its content, this law provides the

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definitions of expropriation, temporary use of property, which refers to the concept of requisition, provides the specific motives for which the expropriation can be initiated, methods of evaluating assets that are subject to expropriation, and the responsible institutions that lead this process. The law provides the modality of the act of expropriation and the manner of its notification for the effect of opposing the value of remuneration in court by affected subjects. In particular, the different judicial interpretations of the provisions on the notification of the value of expropriation's remuneration to the affected subjects have brought a legal debate in Albania on the respect of the right of access to the courts within the framework for a fair process as a human right imposed by the European Convention of Human Rights.

2. THE LEGAL REGULATION IN ALBANIA ON ACTS OF EXPROPRIATION, THEIR NOTIFICATION AND THE RIGHT TO FILE A LAWSUIT IN COURT

The Civil Code of the Republic of Albania provides that assets may be expropriated only for public interests recognized by law and only in exchange for fair remuneration. Their ownership title of such assets transfers in favour of the state or other public body, in whose favour the expropriation was completed (Art. 190 of Civil Code of Republic of Albania). The law "On expropriations and temporary use of private property for public interest" provides that the Council of Ministers issues the act of expropriation as the competent collegial body (Art. 5 of Law no. 8561, dated 22nd December 1999). Although the right to propose the expropriation of a certain asset is held by various public and private entities, the decision of the Council of Ministers constitutes the final act of expropriation of an asset. According to Article 11 of the law, every request for expropriation must be filed at the State Agency of Expropriation. This public agency is responsible for directing the expropriation process and coordinating the implementation of its procedure.

During the follow-up of the expropriation procedure, the law foresees several steps for the notification of the affected subjects. Thus, according to Article 14 of the law, the State Agency of Expropriation, after signing the agreement with the requesting entity, must directly notify each owner or co-owner of the assets that will be subject to expropriation within ten days. Simultaneously with the notification procedures, the competent line minister also issues the official publication of the request for expropriation. Such an official publication appears in the Official Gazette in order for other third parties to have the opportunity to file their claims on the ownership of the assets to be expropriated. Further, according to Article 16 of the law, if third parties dispute the ownership of the assets that will be subject to expropriation, the expropriation procedure is not stopped, as the value of remuneration is deposited in a bank account to the winning party of the trial.

After the issuance of the final act of expropriation by the Council of Ministers, Article 24 of the law provides that the State Agency of Expropriation makes a direct notification to the owners, and the notifies subjects have the right to appeal to the competent court regarding the value of remuneration within a deadline of thirty days from the notification. Article 21 of the law provides that the final act of expropriation is also published in the Official Gazette. This moment of the expropriation procedure has caused different interpretations by the courts. In certain cases, it has been interpreted that the thirty-day deadline for appealing to the court runs after the owners have been notified directly and personally, while in other cases, it has been interpreted that the owners are considered notified through publication in the Official Gazette. This second way of interpretation has appeared problematic, denying the right of access to the courts of expropriated owners. It has become the subject of review by the Constitutional Court of Albania, which also influenced the unification of judicial practice by the High Court of Law.

3. THE DIFFERENT LEGAL ATTITUDES OVER THE YEARS OF THE ALBANIAN JURISPRUDENCE ABOUT THE ACCESS TO THE COURTS FOR EXPROPRIATED OWNERS

From the observation of Albanian jurisprudence over the years, it is found that various judicial bodies, including the High Court of Law panels, have held different interpretative attitudes toward the notification of the final act of expropriation and the beginning of the deadline for filing a lawsuit in court. According to an *earlier interpretation*, it was interpreted as based to Article 24 of the law on expropriation, the responsible body must notify directly and nominally every expropriated subject of the act of expropriation and the corresponding value of remuneration. This moment will also mark the beginning of the deadline for filing a lawsuit in court against the remuneration's value of expropriation.

Such an interpretative attitude has been held by the civil panel of the High Court of Law of Albania in some cases. For example, in one case, the Civil Panel of the High Court of Law has found not based on the law the decision of the Court of Appeal of Tirana (Decision no. 800, dated 24th June 2004) with the argument that the beginning of the deadline for filing a lawsuit against the value of remuneration could not start immediately after the publication of the act of expropriation in the Official Gazette. In this case, the Civil Panel of the High Court of Law has interpreted that, as can be seen from the content of this provision (ref. Article 24 of the law on expropriation), it connects the thirty-day appeal deadline with the moment of taking notice of the expropriated subject. On the other hand, regarding the notification, it defines obligations for the competent ministries to notify the expropriated owners directly. It has also been argued that during the trial, the defendant did not present any evidence to prove that it complied with the notification procedures, and this notification was made earlier than the plaintiff claims (Decision no. 1097, dated 7th July 2005, p. 4).

The same interpretation was followed by the High Court of Law in 2011. According to the Civil Panel of the High Court of Law, the defendant's claim that the notification was made by publishing the act of expropriation in the Official Gazette and two of the newspapers with the largest circulation constitutes an unfair claim. The High Court of Law has argued that the law "On expropriations and temporary use of private property for public interest" contains norms of a procedural nature and norms of a material nature. The procedural norms of this law explicitly provide for the right of the party to learn directly about the expropriation being carried out, as well as the obligation of the state authority to make a direct notification to the subject being expropriated. Such an obligation is imposed by the law since the owner is deprived of his right of ownership, this right guaranteed and protected by the Constitution and all other laws that regulate the ownership, as well as because the notification of the act of expropriation directly conditions the effects that the act of expropriation brings after the subject to be expropriated is notified. The legislator connects the moment of filing a lawsuit in the competent court with the expropriated entity's knowledge of the expropriation and not with the moment when the state body makes the announcement of the entities to be expropriated in the daily newspapers. The lack of notification of the subjects that are expropriated directly, according to a form and procedure expressly provided in the law, cannot be replaced by other means, such as the announcement in daily newspapers with wide circulation or the announcement in the Official Gazette (Decision no. 403, dated 27th September 2011, p. 6-8). This interpretation has been followed even by different courts of first instance and courts of appeal (Decision dated 7th February 2019 and Decision no. 2671, dated 4th October 2021).

According to a *later interpretation* of recent years, the expropriated subjects will be considered notified from the moment of publication of the act of expropriation in the Official Gazette, regardless of whether or not their nominal notification by the State Agency of Expropriation has been carried

out. Thus, the thirty-day deadline for filing a lawsuit in court to challenge the expropriation's remuneration value will be considered to run automatically from the day of its publication in the Official Gazette. For example, in one case, the Administrative Panel of the High Court of Law has founded as not based on the law the decision of Administrative Court of Appeal of Tirana (Decision no. 1077, dated 11th May 2016) with the argument that Article 24 of law "On expropriations and temporary use of private property for public interest" does not invalidate or exclude the legal effects and legal presumption of the notification of interested subjects at the time of publication in the Official Gazette of the relevant act of expropriation. In this case, the Administrative Panel of the High Court of Law has interpreted that the publication in the Official Gazette is the maximum guarantee that the law has established for the protection of the rights of the expropriated subjects since through the publication in the Official Gazette, the recognition of the law itself is presumed, much less of other acts of lower legal importance (Decision no. 64, dated 21st February 2022, p. 8).

Such an interpretation has found support in other cases of the most recent jurisprudence of the High Court of Law. In another decision of the last years of the High Court of Law, it is argued that the direct and nominal notification of the expropriated subject is implemented in the intermediate period between the moment when the act of expropriation is approved, which comes into force immediately (and for therefore, it applies immediately from the date of its approval) and the later moment in time when this decision is published in the Official Gazette. According to this panel, even if in this interim period, the competent ministry does not make the individual notification of each owner who is expropriated, the latter are presumed to be regularly aware of the expropriation, at least from the day of publication in the Official Gazette of the respective act of expropriation (Decision no. 276, dated 14th July 2022). In the same line of reasoning, there are also other decisions of the courts of first instance and the courts of appeal in recent years (Decision no. 209 (334), dated 4th April 2022 and Decision no. 466, dated 10th November 2022).

4. THE STANDARD ESTABLISHED BY THE CONSTITUTIONAL COURT OF ALBANIA AND THE JURISPRUDENCE OF THE EUROPEAN COURT OF HUMAN RIGHTS FOR THESE CASES

The Constitutional Court of Albania came out with a decision based on a request from one of the expropriated subjects, who had lost the trial (Trial finalized by decision no. 64, dated 21st February 2022) in the High Court of Law based on the argument that the thirty-day deadline for judicially contesting the value of the remuneration must be calculated from the day of publication in the Official Gazette (Decision no. 40, dated 22nd December 2022). The main arguments of the applicant in the request filed in the Constitutional Court were related to violation of the right of access to court because the High Court of Law has ruled about the legal thirty-day deadline of filing the lawsuit and for the statutory time-limit of the lawsuit even though the litigants in the three trial levels have not claimed the existence of these causes. The applicant has also claimed the violation of the legal certainty principle because the High Court of Law has ruled beyond the provisions of Article 24 of the law "On expropriations and temporary use of private property for public interest" according to which the moment of birth of the right to file a lawsuit is that of learning about the act through individual notification and not that of publication in the Official Gazette. The other claims were related to the violation of the principle of equality before the law and the constitutional right of private ownership. These claims were related to the fact that certain judges applied a different standard of law enforcement, and for this reason, the right to remuneration from expropriation has been denied (Decision no. 40, dated 22nd December 2022, pp. 3-4).

The Constitutional Court ruled that the administrative procedure of expropriation law "On expropriations and temporary use of private property for public interest" has given the expropriated

subjects the privilege of being notified directly at each stage of the procedure. This manner of notification is different from the publication in the Official Gazette, which aims to create the opportunity to protect the interests of third parties that may be affected by the expropriation of private property. Referring to articles 147-163 of the Code of Administrative Procedures (Law no. 44, dated 30th April 2015), the notification through the publication of the act in the Official Gazette is an exception to the rule of personal notification and is applied only in specific circumstances when the parties are unknown when the place for the notification is not known, and the notification is not possible in one of the places where the individuals can be found (residence, residence, place of work, place of activity) when any other form of notification is inappropriate or impossible, as well as in any other case expressly determined by the law (Decision no. 40, dated 22nd December 2022).

According to the Constitutional Court, competent public bodies in the process of expropriation must show due diligence and interpret and apply the law in such a manner as to enable the individual to guarantee the rights provided by Articles 41 and 42 of the Constitution of Albania. Even in the expropriation procedure, in order to guarantee the right to effective access to the court in order to protect the right of ownership, public bodies should make an effective notification to the individual (Decision no. 40, dated 22nd December 2022).

Although the above decision of the Constitutional Court does not refer to it, the assessment carried out by it is consistent with the assessment of the European Court of Human Rights in a concrete case. The European Court of Human Rights, in one of its cases, has accepted the request of a Turkish citizen against the Republic of Turkey (Mörel v. Turkey, Application no. 33663/02 ECHR). The applicant complained under Article 1 of Protocol No. 1 that he was deprived of his right to peacefully enjoy his property as the authorities expropriated his land without notifying him. He also complained under Article 6 of the Convention that he did not have a fair hearing as the Court of Cassation dismissed his case for failure to comply with the statutory time limit. Although initially, the courts of the Turkish jurisdiction had accepted the applicant's lawsuit by awarding the relevant remuneration values for the expropriation of land, after a request from the Ministry of Defense, the Court of Cassation in a subsequent trial decided to dismiss the trial of the case as the legal deadlines for filing a lawsuit were not respected.

The European Court of Human Rights ruled that notification through publications according to national law of owners of private properties in the process of expropriation, whose addresses are not found, is not adequate. The state authorities must update the information and organize the archives of public records. The failure of the Turkish authorities to find the names and official addresses of the entities to be expropriated is not justified. The court concluded that the authorities did not show due diligence in notifying Mr Mörel of the expropriation of the land he owned, depriving the applicant of a suitable remuneration. As a result, Article 1 of Protocol 1 of the ECHR is violated since the balancing of public interest with private interest has not been achieved (Mörel v. Turkey, App. no. 33663/02 ECHR, par. 40 et seq).

5. THE UNIFYING DECISION OF THE ADMINISTRATIVE PANEL OF THE HIGH COURT OF LAW ON THE MANNER OF NOTIFICATION OF THE EXPROPRIATED SUBJECTS AND THE EMERGING PROBLEMS

Following the different interpretations of the courts on the right of access to the court of expropriated subjects, as well as the aforementioned decision of the Constitutional Court of Albania, the Administrative Panel of the High Court of Law took the initiative to unify the judicial practice in such trials. Specifically, on 14th May 2024, this panel reached the unifying conclusion that the

right to file an administrative lawsuit to contest the value of properties subject to expropriation for public interest arises from the moment of receiving notice of the Decision of the Council of Ministers, which must have been notified directly and personally to the plaintiff by the responsible authority (State Agency of Expropriation) according to Articles 159 and 160 of the Code of Administrative Procedures and Article 24 of law "On expropriations and temporary use of private property for public interests" (Gjykata e Lartë, 2024).

This unifying sentence continues by determining that in administrative proceedings, the responsible authority (State Agency of Expropriations) has the burden of proof for the actions committed for the direct notification of the Decision of the Council of Ministers to the expropriated subjects. Only in the case where, for objective reasons, the owner does not receive notice at the address of the notification, as it is not found, then the right to file a lawsuit arises from the moment it is presumed to have been notified through the most appropriate legal notification, which is the publication of the Decision of the Council of Ministers in the Official Gazette, according to Article 163 of the Code of Administrative Procedures. Whereas when in the above cases and in the content of the Decision of the Council of Ministers, the right and deadline for filing a lawsuit are not foreseen, then the deadline for exercising the right to file an administrative lawsuit to contest the value of the property subject to expropriation for public interest will be one year (Gjykata e Lartë, 2024).

This unification of judicial practice, although it has accepted the highest standard of direct and personal notification of the final act of expropriation to the expropriated subjects, in our opinion, continues to have problems concerning the standard established by the European Court of Human Rights in the case of "Mörel v. Turkey". The European Court of Human Rights has established a standard according to which the responsibility for the creation and maintenance of public registers, including address systems, is a responsibility that belongs to the state and cannot be transferred to the individual.

That said, the implementation of the notice by publication in the Official Gazette when the expropriated owner is not at the address risks violating the standard established by the jurisprudence of the European Court of Human Rights. If the European Court of Human Rights establishes a certain standard and a minimum protection for fundamental human rights, member states may adapt their legal framework towards an even higher level standard, but they must not violate the standard established by the European Court of Human Rights' jurisprudence (Gerards, 2022).

6. CONCLUSION

In conclusion, it can be said that the early positions of the High Court of Law of Albania on the implementation of direct and personal notification of expropriated subjects have been correct and in accordance with the standard established by the European Court of Human Rights. The publication of expropriation acts in the Official Gazette cannot be sufficient in terms of guaranteeing the right of access to court for expropriated subjects.

The current unification of judicial practice by the High Court of Law of Albania, although confirming the direct and personal notification of expropriated subjects, leaves an open window for notification by publication in the Official Gazette. Allowing such an option may create problems in implementing the standard established by the case "Mörel v. Turkey", because the responsibility for the good administration of the address system and the notification of the person remains with the state, which must implement efficient mechanisms for this purpose.

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