Science and Technology Parks and Their Role in the Economic Development of the Republic of Serbia

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Abstract: In a large number of countries, both developed and developing countries, science and technology parks are considered an important mechanism for improving and encouraging the development of industry, as well as the economy as a whole, because they encourage the development of SMEs, which use modern (high) technology, which at the same time affects accelerated economic development based on knowledge. The basic task of all forms of science and technology parks is the development and promotion of innovative activities, the appearance of as many innovations as possible on the market (domestic and international) and assistance in the commercialization of the results of scientific research. The goal of the work is to indicate that the construction and development of science and technology parks should enable the improvement of the competitiveness of the Republic of Serbia, more intensive economic and development as a whole, faster development of innovative SMEs and increased volume of foreign direct investments. Bearing in mind that there is an uneven distribution of science and technology parks and that in the development of science and technology parks, the Republic of Serbia lags behind the countries of the European Union, as well as some countries in the surrounding area, it is necessary for the coming period to equip them with all the necessary infrastructure, which will enable companies, scientists to engage in scientific research and project development, as well as to be connected with faculties, other innovative companies and local self-government units.

1. INTRODUCTION

The modern stage of economic development takes place in conditions characterized by increasingly fierce competition between companies on the market, intensive technological development, increasing customer demands regarding product quality, demands and pressures for the protection and preservation of the human environment, etc. Successful business and survival in such conditions impose the need for small and medium-sized enterprises, in a certain area, to connect through certain forms of business infrastructure, namely: industrial clusters, and business incubators, as well as by establishing industrial and free zones and science and technology parks, which become increasingly popular (Gligorijević, 2021). At the same time, the increasing connection of science and, above all, industry, as well as the increasingly rapid and intensive development of science, technique and technology, especially influenced the emergence and accelerated development of science and technology parks, which are of crucial importance for the economic development of a country because they encourage the development of innovative small and medium-sized enterprises that use modern techniques and technology and that, at the same time, influence faster economic development based on knowledge. In addition, with their help, investors can obtain the necessary permits for the construction of business premises in which they will carry out industrial production, as well as other numerous scientific research and innovation activities, much more easily.

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Science and technology parks are certainly one of the key elements of business infrastructure, considering that they represent a communally equipped space that provides the necessary infrastructure to companies dealing with advanced technologies, software design, electronics production, and the like (Mijačić, 2011, p. 35). The goal of science and technology parks is that, first of all, small and medium-sized enterprises, which are interested in this type of work, are under the same roof, are gathered in the same location and encourage each other in the process of cooperation, and therefore development technique, technology, innovation and entrepreneurship.

The representation of science and technology parks in the Republic of Serbia is gradually increasing, that is, it tends to further growth and development. The Law on Innovation Activities lists the services that science and technology parks can provide, which are increasing over time: use of business space for work and infrastructure support, use of common business premises, legal-administrative services, secretarial services, bookkeeping and accounting services, services marketing, promotion and sales, business and individual consulting services, telecommunications and information services, access to equipment for applied scientific and research work, providing support in prototyping, testing projects in a real environment, business planning services, financial consulting services, training and coaching services, financial services and technical and many other services (Official Gazette of RS, no. 110/2005, 18/2010 and 55/2013). It should be emphasized that for the development and improvement of science and technology parks, as well as free zones, the issue of optimizing their activities and actions at the regional and local level is particularly important (Pace, 2000, p. 1).

2. **SCIENCE AND TECHNOLOGY PARKS (STP) AS AN ELEMENT OF BUSINESS INFRASTRUCTURE – PHASES, OBJECTIVES AND ADVANTAGES OF ESTABLISHING A STP**

The development of science and technology parks began in the 50s of the 20th century, and they experienced their full expansion in the 70s and 80s of the 20th century. The first science and technology park (STP) was founded in the 1950s at Stanford University in the USA. In Europe, science parks appeared during the early 70s of the 20th century. The winners were Heriot-Watt University Research Park and Trinity College Cambridge, Science Park in Great Britain, Louvain-la-Neuve in Belgium and Sophia Antipolis and ZIRST Grenoble in France. They followed examples from the USA and based their activity mainly on renting land to one owner (Žuvela, 1993). Their emergence and rapid expansion were conditioned by the scientific and technological revolution and with it the need to connect science and industry. To date, several organizational forms of technology parks have been developed. The main task of all of them is to support innovative activities and commercialize the results of scientific research (Brunsko, 1995, p. 321).

Science and technology parks occupy a part of the country that is configured to promote the economic activities of integrated firms, infrastructure and amenities that support technology-intensive production and commercialization in innovative enterprises, start-ups, research institutes and universities (Bellavista & Sanz, 2009).

Science and technology parks are extremely popular today, and this stems from the fact that their establishment provides various benefits for both the local self-government and the entire region. They contribute to industrial and economic development and are very important, both for highly developed countries and for developing countries, such as the Republic of Serbia. However, one must take into account the fact that the science and technology park is significant, but not
sufficient, as the only instrument for attracting foreign investors and new interested companies. On the contrary, without a legal framework that ensures a favorable business climate and without an appropriate and high-quality workforce, as well as infrastructure, investing in a science and technology park is considered futile and without the benefit (Kostadinović, 2016, p. 138).

In the process of establishing science and technology parks, there are several important stages, namely:

- **The first phase** includes making a decision – namely the decision of the local self-government to invest in the construction of a new science and technology park. It must be based on previous research on the need to establish a science and technology park. The business environment, as well as the physical environment, is examined and researched, and the demographic and economic structure is analyzed. If, after adequate research, it is established that there is a need and that such a decision will lead to concrete results, the construction of the park is approached and it is decided which type of science and technology park will be dominant.

- **Phase two** includes the formation of a working group for the establishment of a science and technology park – the president of the municipality appoints a team of experts from various fields, and the team must also have all the necessary skills and knowledge to be able to participate in the establishment of the park.

- **Phase three** includes a feasibility study (market and financial analysis). It is necessary to examine in detail the location where the construction of the science and technology park is planned. In the same way, an analysis of the environment is necessary, as well as an analysis of the market, which will show us what the infrastructure of society is like, the supply of labor, the demand for industrial facilities, etc. In addition to the aforementioned analyses, the financial analysis is no less important, which certainly shows us how profitable the construction of the park is.

- **Stage four** – location assessment – in most cases, the success of a science and technology park depends on a properly chosen location. The choice of location is largely influenced by factors such as the possibility of a good, reliable and adequate supply of electricity, gas and heating, water; proximity and accessibility to airports, railways and main roads; the possibility of processing wastewater, etc. Environmental factors are also very important, which actually means that the goal is to choose a location that will reduce the harmful impact on the environment.

- **Phase five** is related to the management of the science and technology park. Namely, the park can be managed in two ways: management through a domestic company or a foreign company, which is the owner or lessee of the land, and the park can be managed by the head of KLER (Office for Local Economic Development) with the help of the Directorate for Construction and Public utility companies (JKP), the Department for Property and Legal Affairs and the Department for Urban Planning.

- **Phase six** – securing the land and/or pre-contracting with private owners and/or contracting with private investors – the land intended for the science and technology park can be owned by the local self-government or private owners.

- **Phase seven** – preparation of the project for infrastructural equipment of the science and technology park – after providing an adequate location, it is necessary to carry out the infrastructural equipment of the park itself.

- **Phase eight** – construction of infrastructure in the science and technology park – this phase is perhaps one of the most important in the process of establishing a science and technology park. Phase nine refers to the marketing and promotion of the science and technology park, which are of great importance in the process of attracting direct foreign investment.
Science and technology parks are drivers of technological changes that encourage new investments and provide support to newly established small and medium-sized enterprises, reducing unemployment and increasing the standard of living, thus influencing the development of the region in which they are established. Therefore, the construction of such parks is of strategic importance for the development of the country, both economically and overall.

The key to the success of science and technology parks is the provision of non-monetary values related to research and development (proximity to a university or a large research laboratory, the presence of large organizations or the concentration of other local activities related to research and development) and the availability of business services that promote the development of companies in the role of the client of the science and technology park (European Commission, 2013, p. 41).

The positive results of science and technology parks are reflected in the successful attraction of foreign direct investments and investments in production capacities, especially in developing countries. Speed and success in the development of parks can significantly increase the probability of attracting foreign direct investments to the Republic of Serbia.

As for the goals, the most important goals of the establishment of science and technology parks are: a) creation of favorable conditions for the acceleration of science and technology development in the most developed and advanced scientific research branches of production with the help of the most successful commercialization of scientific research, based on mutual connections between science and industry; b) Acceleration of the process of restructuring the industry and the entire economy, which is achieved by the modernization of traditional industrial branches, the constant introduction of innovations, the spread of high technologies and the creation of new industrial branches; c) acceleration of economic and social development of the region, activation and better use of local natural, intellectual and financial resources, creation of regional, scientific, transport and communication infrastructure and inclusion of the region in the national economy, world market and international scientific, technological and business standards; d) activation of entrepreneurial spirit and initiative, greater openness of business relations of companies with their domestic and foreign partners, as well as with scientific and educational institutions, and raising business culture and ethics to a higher level. In addition to the stated goals, the main goals of establishing science and technology parks are also highlighted: a) introduction of new production activities; b) the construction of business-residential infrastructure is an extremely important goal in the process of formation, but also the further development of science and technology parks; c) building the infrastructure of modern companies and their entry into the science and technology park; d) creating a favorable business environment with better communication between institutions of higher education (Žuvela, 1993, p. 107).

3. SCIENCE AND TECHNOLOGY PARKS IN THE FUNCTION OF ECONOMIC DEVELOPMENT OF THE REPUBLIC OF SERBIA

In modern conditions of development, science and technology parks are increasingly popular in the countries of Southeast Europe and developing countries. In the Republic of Serbia, this instrument of business infrastructure is increasingly represented and has a tendency for further growth and development. Although there is no explicit legal framework that defines business infrastructure, certain elements of business infrastructure are regulated at the level of the Law. Thus, the Law on Innovation Activity is related to science and technology parks. This Law
foresees the following services that can be provided by business and technology incubators and science and technology parks: use of business space for work, which can be equipped with furniture, equipment and installations; use of common business premises used for business meetings and other purposes; secretarial services; administrative services; bookkeeping and accounting services; advertising and sales services; business consulting services; telecommunication and information services; business planning services; financial advisory services; training and training services; financial services and technical and other services (Official Gazette of RS No. 110/2005, 18/2010).

The cities of Belgrade, Niš, Novi Sad, and Kragujevac have the greatest opportunities for the development of science and technology parks, bearing in mind that they represent the largest industrial and university centers, with the largest number of inhabitants and the largest number of educated personnel in the Republic of Serbia. The scientific institutes "Mihajlo Pupin" and "Vinča" also have great opportunities for the development of science and technology parks. In addition, in the area of the metal processing industry, the greatest opportunities for the development of science and technology parks are in Čačak, Kraljevo and Kruševac; Pirot and Leskovac in the area of the textile industry, and Vranje in the area of the wood industry and furniture production. Currently, the following science and technology parks exist in the Republic of Serbia: NTP Belgrade, NTP Čačak, NTP Niš, NTP Zvездара, NTP University of Novi Sad, Technology Park Kragujevac (under construction), NTP Zemun.

Table 1. Science and technology parks in the Republic of Serbia

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<th>Science and technology parks</th>
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<td>1.</td>
<td>Belgrade Science and Technology Park</td>
<td>- founded in 2015 (from 2015 to the end of 2022, it supported the accelerated development of more than 150 companies)&lt;br&gt;- founded in partnership with the Government of the Republic of Serbia, the City of Belgrade and the University of Belgrade, with the support of the Government of Switzerland,&lt;br&gt;- provides support to start-ups and growing companies in the development and commercialization of innovative products and services,&lt;br&gt;- companies that are members of NTP Belgrade develop over 130 innovative products and services, export to over 50 countries around the world and employ over 1500 employees,&lt;br&gt;- member companies have a visionary view of their environment, create a new economic climate, and generate a young qualified, creative workforce&lt;br&gt;- 25 new start-up companies in 2022&lt;br&gt;- great success during 2022 – transition to a market strategy, entering the global market and access to VC funds.</td>
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<td>2.</td>
<td>Science and Technology Park Čačak</td>
<td>- founded in 2011; in 2019 the NTP Start-up Center was equipped, in 2020 – opening of new production and office spaces,&lt;br&gt;- enables the cooperation of the economy, science and research, the development of new ideas and the application of innovative solutions, create conditions for the development of entrepreneurship,&lt;br&gt;- provides: education for the needs of innovative entrepreneurship, support for innovation and the establishment of innovative companies, start-up center services, logistical and technical support,&lt;br&gt;- enables cooperation between science and business in the area of Western Serbia,&lt;br&gt;- In 2022, a Demo Day was organized on the occasion of the implementation of professional workshops &quot;Application of robotics in the improvement of production processes and products&quot; for small and medium-sized enterprises from the area of Central and Western Serbia.</td>
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In addition to science and technology parks in Belgrade, Niš, Novi Sad and Čačak, the plan is to build a science and technology park in Kragujevac. The construction of this park is planned in Sobovica, and the Government of the Republic of Serbia allocated 12 million euros for its construction. The goal of building this science and technology park is to connect the University of Kragujevac with the economy. There is an idea to unite science and economy in one place through NTP. The construction of this park will certainly affect the development of scientific and research work in the field of natural sciences, electrical engineering, mechanical engineering, chemical analysis and other fields related to natural and technical-technological sciences.

When it comes to the business of science and technology parks in the Republic of Serbia, it should be emphasized that large, developed companies and small start-up companies successfully cooperate within them and that this cooperation successfully contributes to common development. Science and technology parks in the Republic of Serbia help innovative start-up companies, while young entrepreneurs within the NTP Belgrade already create some innovations that are known all over the world (such as the Smart bench of the company Strawberry Energy, which provides energy for charging phones, tablets, etc. using only solar energy) (Kostadinovic, 2016, p. 281).

### 4. CONCLUSION

The development of science and technology parks is of crucial importance for the survival and development of modern industry and the economy as a whole. Namely, the incentives they give to the development of small and medium-sized enterprises, along with the use of modern technologies, simultaneously influence the development of the economy, which is additionally accelerated by basing progress on knowledge obtained from scientific research.
Science and technology parks should be seen as an organization for providing infrastructural support to innovation activity, which within the space entrusted to management provides infrastructural and professional services to companies, scientific research and innovation organizations in order to connect them and as quickly as possible apply new technologies, create and place on the market new products and services, with the aim of accelerated technological development of the country, based on examples of good international practice in this area.

Generally speaking, the main and basic task of all science and technology parks is to promote innovative activities, influence the appearance of as many innovations as possible on the market and help commercialize the results of scientific research (research work). Namely, parks, like incubators, are the most effective means of commercializing the aforementioned results, as well as the path to more efficient and faster restructuring of the industry, reduction of unemployment, more efficient use and further development of intellectual potential, as well as faster regional development.

Science and technology parks are also very important for the survival and development of modern industry. Their development is of essential importance for the entire economy, because they encourage the development of SMEs, which use modern (high) technology, which simultaneously affects the accelerated economic development based on knowledge.

Science and technology parks achieve impressive results, in addition to direct effects on the development of companies that cooperate within them, they also have direct effects on the entire social community, through the creation of new jobs, an increase in the population's income, an increase in tax income for local self-government, etc. They have been very relevant in the last few years, both in developed and less developed countries, and the purpose of their establishment is to connect science and the economy, all to increase regional competitiveness and create innovations. However, despite the excellent results, measures are needed to improve the development and operation of science and technology parks; namely, the legal framework is of essential importance, because without it, investment in a science and technology park is considered useless.

In the Republic of Serbia, there is an uneven distribution of business infrastructure elements. Namely, the business infrastructure is more significantly concentrated in five large cities of Serbia: Belgrade, Novi Sad, Niš, Subotica and Kragujevac. Among the many reasons for the concentration in these cities, we can mention the presence of donor programs and regional or SME development agencies that together contributed to the spread of awareness and ideas about the need for business infrastructure development. At the regional level, there is a significant difference in the concentration of business infrastructure, as well as the concentration of science and technology parks, between the region of Belgrade and the region of Vojvodina on the one hand, and the region of Šumadija and Western Serbia and the region of Southern and Eastern Serbia on the other.

Bearing in mind that in the field of development of science and technology parks, the Republic of Serbia lags significantly behind the EU countries and many countries in the surrounding area, it is recommended that in the coming period, the existing science and technology parks significantly improve their capacities for using science in order to technological, as well as regional and economic development.
References


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