

Technopark Based on Higher Educational Institutions of Russia: Problems and Solutions

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Abstract—The implementation of innovation policy is considered as one of the ways out of the crisis, an opportunity for accelerated economic growth. The most common objects of innovation infrastructure are technology parks (technoparks). They are also an effective tool to stimulate innovation activities of universities and have a significant impact on the regional socio-economic development. In this article the authors investigated the problems of creation of technoparks on the basis of higher educational institutions of Russia and made recommendations in this area.

Keywords—*technology park, innovation activities of universities, innovation infrastructure, innovation system*

I. INTRODUCTION

The problems of technoparks' creation have recently attracted increasing attention of scientists, research centers and government agencies of all levels. Various measures are being taken to replicate the successful international experience of well-known technology parks, usually established at large research centers and designed to stimulate the development of new companies involved in high-tech business. At the same time, at present, in particular in Russia, there is an urgent problem of the organization of effective technoparks due to differences and peculiarities: historical, regional, socio-economic, regulatory, financial and others. The results of our research have shown that the activities of technoparks in the Russian Federation are not highly efficient. They do not have a significant impact on the economic and innovative development of the country and individual regions. Overcoming the low efficiency of domestic technoparks will mean that the Russian economy will achieve global competitiveness [1]. At the same time, positive international experience of successfully operating technology parks on the basis of universities has been accumulated, which is

taken into account in the development of recommendations by the authors and can be used in regulatory and policy documents for the development of technology parks in various regions of Russia and foreign countries.

II. THE BASIC PART

Currently, such element of the structure of the national innovation system (NIS) as technopark is widespread in developed countries, and the level of innovation activity is determined by this element. Technopark structures are present in all countries with developed NIS. Examples of such countries are the USA, Great Britain, France, Germany, China, Japan, Canada, Australia, etc., where all elements of the national innovation system, all elements of the triple helix are concentrated.

The economically developed countries, having estimated advantages of innovative business and prospects for development of the economies, rebuild systems of its formation and development, investing considerable budgetary funds in innovative business. Innovative business is a way to achieve the priority of the country in certain areas of science, technology, technology and the economy, because its main task - not just profit, and profit from the introduction of new developments. Therefore, for many countries there is a clear need for the transition of national economic systems to an innovative way of development. And the state chooses an innovative way of development, can't do without the main conductors of new technologies and innovations, which are small innovative enterprises.

Especially important for innovative development are partnerships between the three leading institutional sectors-government, business and science/universities, called the triple helix Model (Triple Helix Model). This concept entered into

economic life in the mid-1990s and was designed to help developed countries to form the basis of innovation policy for their transition to the knowledge economy. Technoparks were an infrastructural element that contributed to this transition. And the most effective form of stimulating economic development, the integration of science and production in developed countries are technopark-type structures.

The first stage began in the late 1950s, when the first university technoparks were created in Stanford, Cambridge and other cities in the United States and Great Britain. The universities created platforms that attracted local researchers to solve practical problems. Many international high-tech companies have grown out of the walls of the first technoparks. At the same time, the concepts of creating science cities and technopolises were formed. First, it was due to the successful experience of creating agglomerations of innovative cities that were created around the first technology parks (for example, Silicon valley, which stretches from San Francisco to the South, covering cities such as San Jose, Santa Clara, Mountain View, Palo Alto and others). Secondly, it was connected with the success of science cities, the concept of which was promoted by the USSR. For example, in 1959 the Novosibirsk academic town was founded, which housed research and design institutes of various industry directions. The difference between Soviet research centers like "Akademgorodok" and Western technoparks was that they were focused mainly not on market demand, but on the solution of clearly defined sectoral tasks of the planned economy [1]. A product of the first industrial parks, which remain the dominant form of industrial parks, now is its innovative products. Such technology parks are focused on the process of implementation of scientific and technological developments by commercialization of accumulated scientific knowledge, which can be carried by universities, researchers or companies.

The second stage can be designated within the boundaries of 70-80-ies. Technoparks in this period began to be more and more like a real estate business. They began to focus on commercializing the results of research and development, but only by selling rental space and providing complex support services to growing innovative businesses. At the second stage, technological incubators of business became widespread. In addition, there are many highly specialized technology parks focused on servicing individual sectors. In many countries, especially in the growing economies of Asia, the concept of creating large megatechnoparks, characterized by a large-scale construction, has been developed. The product of the most innovative companies in these years is technology. The 70-80-ies are the heyday of business incubators. At this stage, the number of technology parks with a narrow industry specialization is growing, which is dictated by the conditions of increasing competition in the markets of innovative products.

The third stage began in the 90-ies. Industrial parks are gradually transformed from real estate into spaces for communication. This function was inherent in technoparks

before, but now, due to the development of information services, the emphasis has shifted towards the sale of communication or services for researchers' access to the global market by exploring various professional communities (venture financiers, researchers, industry experts). Technoparks are increasingly becoming organizational structures and expanding virtual opportunities for their work. The frequency of activities carried out on the basis of the Technopark (or with its participation) becomes a determining indicator of the effectiveness of its activities.

In Russia, the formation of technoparks began in the early 1990s, mainly in higher education. The very first was Tomsk scientific and technological park, which was opened on the basis of Tomsk State University of control systems and radioelectronics. Since then, the number of technoparks has gradually increased, and by 1992 there were 24 in Russia. Later, technoparks began to appear on the basis of state scientific centers, in academic towns, science cities and by 2000 there were already 54 [2, 3].

They, for the most part, were created as structural units of universities, whose teams understood the need to develop cooperation between science and industry. Not supported by financial security, which the university has no right to carry out commercial organizations, they, however, became the first experience of commercialization of scientific developments, which universities are so rich in.

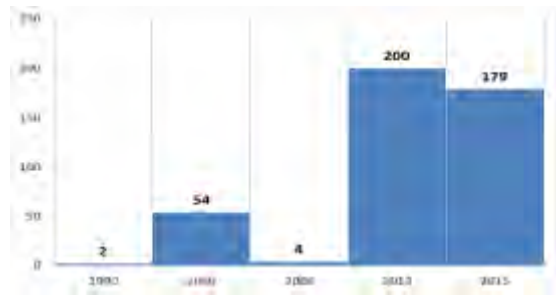


Fig. 1. The evolution of industrial parks in Russia from 1990 to 2015

Since 2006, Russia has begun to develop federal profile programs and to allocate funds for the development and establishment of industrial parks. One of these programs was a comprehensive program coordinated by the Ministry of communications and mass media of the Russian Federation "Creation of technoparks in the field of high technologies in the Russian Federation", which was completed in 2014. For its implementation for eight years, 13.4 billion rubles were allocated from the federal budget. According to another program, coordinated by the Ministry of education and science of Russia, since 2009 about 9 billion rubles have been allocated to the creation of three dozen technoparks. Four more technoparks have appeared since 2010 with the help of the Ministry of economic development of the Russian Federation. Given there is this trend, many regions of the Russian Federation also considered it necessary to start such technopark sites on an initiative basis.

Thus, by 2013, more than 200 technoparks had been formed in the country (Figure 1) [4].

But despite the active dynamics in the organization of technoparks, we should note, in our opinion, the following significant problems in this area:

1. Lack of a clear definition of what should be considered a technology park and what goals it should pursue.
2. The absence of a legislative framework that would define the goals, objectives, evaluation criteria, principles of operation and the role of technoparks in the national innovation system.
3. Absence of clear requirements to the infrastructure and technical equipment of technoparks in the programs.
4. Large interdepartmental dissociation in the sphere of creation of the Russian innovation infrastructure.
5. The lack of financial leverage and sources of formation and development of small innovative enterprises in universities, often without other means for the implementation of innovative projects, except for personal investments of individuals - the organizers and founders of small innovative enterprises.
6. The lack of interest of the business sector in the financing of innovative projects, the inability to implement these projects with small grants of funds and government agencies put the created small innovative enterprises often on the brink of survival.

In today's economy, we can distinguish the following types of technology parks: university's technology parks, regional industrial parks, industrial type, technology parks, technoparks on the basis of the science cities.

As a result of the analysis of economic literature [5, 6, 7, 8], it is established that at present only 2% of technoparks, which are more than ten years old, operate effectively in Russia. The remaining 98% are actually at the stage of creation or development. At the same time, only a few of the currently functioning infrastructures have the necessary services, and hardly 10% of the currently functioning ones declare the provision of services necessary for resident companies.

Russia is one of the world leaders in the quality of labor resources: even taking into account the numerous problems of the domestic education system, the Russians remain one of the most educated nations. In addition, our country ranks 8th in the world in terms of funding for science. But, unfortunately, a good educational base and strong science do not give us "practical results", which is a structural problem of the development of the national innovation sector of the economy. The scientific community and business do not have a close relationship. In turn, businessmen are not prone to risk, do not rush to invest in high-tech projects and prefer ready-made technological solutions of foreign origin. If we compare Russia and America, the US share in the world accounts for 21% of the innovation market, and the share of Russian producers — only 1%.

In the modern conditions, long-term projects in Russia scare away entrepreneurs, despite the fact that in the future they can get a significant return. However, most businesses prefer to make a small but stable profit in the short term. This tactic in the country leads to a technological lag, and as a result — to a decrease in competitiveness. The structure of Russian technoparks in the sphere of their specialization is dominated by diversified technoparks (31%) and the sphere of information technologies (29%). The minimum activity of technoparks in Russia falls to the sphere of agriculture. The whole structure of technoparks is shown in Figure 2.

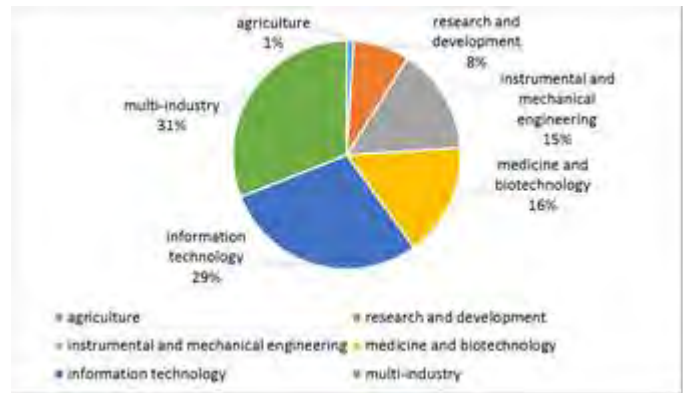


Fig. 2. Specialization of Russian technoparks

Ownership of Russian technoparks determines the level of financing provided by them, and, consequently, the potential opportunities in the implementation of projects. In the ownership, the structure of technoparks, shown in Figure 3, is dominated by regional administrations, which account for 39% of the gross volume of creation and support of technoparks. In the second place there is the administration of universities, which formed and supported 26 % of Russian technoparks. The minimum number of them falls to municipal administrations (13% of technoparks).

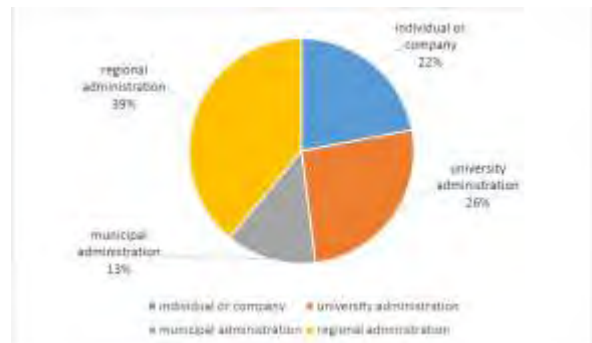


Fig. 3. The owners of Russian technoparks

The problem is the low activity and efficiency of formation of material infrastructure of technoparks and especially from the innovative (service) infrastructure that is observed not only by

"public men". The fact that these areas are not linked to a coherent and harmonious system, and auditors of the accounts chamber of the Russian Federation revealed violations in the creation of technoparks in the framework of a comprehensive program of the Ministry of communications and mass communications of Russia. It turned out that 12 technoparks participating in the program are located in 11 regions of the Russian Federation; only five were fully built in three regions (three in Tatarstan, one in Kemerovo and Tyumen regions). Three more technoparks were in Moscow, Sverdlovsk and Kaluga regions. At the time of the inspection, no resident companies were located at all. And where they were, there were no significant results on such indicators as the number of completed experimental design and research works, the number of patents for inventions [6].

In contrast to our practice, where technoparks are, in fact, another faculty of the university or the laboratory of the plant, designed only to promote the implementation of the development of their specialists. In the West, they have considerable freedom from the founders, not imposing specific customers on technoparks, but even areas of work [9]. European and American technology parks, as any independent commercial firm, are guided by the same principles of economic efficiency [10].

In Finland, for example, 7 technoparks are slightly different from each other, but similar in the main - they are independent in their work. The largest technology Park is in Tampere. It is comparable to ours, but the power and prospects are far superior to the latter. Even in the context of the economic crisis, which is now taking place in Finland, it can be attributed to the small number of quite prosperous, if not prosperous, enterprises. The technopark in Tampere was established by the university. It received from them the territory and took advantage of all the benefits provided by the state for universities. The technopark in Tampere is completely independent [12].

It should be noted that at the present time there is another breakdown of trends in the development of technopark movement. The main trends that influenced the development of technoparks include:

- increase in the cost of the physical infrastructure;
- the spread of personal computers and the development of information barriers that have eliminated barriers to the exchange of information between remote entities;
- reduction of financial capacity of innovative companies due to the compression of demand and reduction of the cost of innovative products.

It is safe to say that in the future, success and competitiveness of technoparks will determine their ability to form effective professional communities, their position in the markets of new technologies (focus on the development of new markets: ecology, energy conservation, biotechnology, etc.), the density of links between technoparks and global research communities.

The problem of Russian technoparks is that they try to reproduce the experience of traditional technoparks created in the past under different economic conditions and market opportunities. Changed conditions of movement of goods in the markets have led to the fact that innovation has become a freely distributable product. The carriers of technological solutions are now not universities and research institutes, but individual researchers and developers.

The initiators of innovative business on the basis of universities are increasingly beginning to understand that a positive result can be achieved only by interacting with each other, which leads them to the idea of the organization of technoparks at universities, as one of the most effective mechanisms for infrastructure support of small business [13].

In addition, the experience of the autonomous existence of small innovative enterprises on the basis of the author's research teams shows that the most effective form of organization of small innovative enterprises can be their creation on the basis of existing small businesses. In this case, start-up capital, accumulated experience of financial management may appear [14, 15, 16].

Thus, the association of participants from the sphere of science and small business into small innovative enterprises is the most real way of normal functioning and development of these enterprises, and with financial support from the state at the stage of formation it will help to ensure their effective innovative development. The fusion of intellectual, financial and technological resources of small innovative enterprises, combining them into a single operating enterprise - technology park, according to the authors, are essential for normal development of innovative business in universities. University technology, science and research parks are designed to stimulate the creation of start-up companies engaged in the development of research and technology on the basis of universities, as well as the process of commercialization of intellectual property.

III. SUMMARY

1. The results of the analysis showed that the development of technoparks in Russia is an important element in the formation of stability of the economic system of the Russian Federation.

2. Attempts are being made to support science and education. However, a systemically developed integrated state scientific and technical policy covering science, technology, education, implementation and scientific and technological modernization of production has not yet been fully formed on the Russian scale.

3. The system of state scientific and technical policy should cover support and stimulation of science, domestic high and high technologies, transfer technologies, expansion of scientific and technical personnel potential, development of scientific elites, support of the status of science and scientists, the concept of science budget, various forms of financing, etc.

4. An important strategic goal of Russia is to transfer the economy to an innovative type of development. One of the forms of activation of innovative activity and state support of entrepreneurship is the effective functioning of technoparks. So the primary task of the legislator is the need to adopt the Federal law "Technoparks in the Russian Federation". It should include the concept of technopark, the purpose of its creation, effective measures of state support for technoparks. This will contribute to the development of science-intensive technologies and high-tech firms, successful commercialization of innovative developments of domestic universities and the development of competitive entrepreneurship.

5. The problem of Russian technoparks is that they are trying to reproduce the experience of traditional technoparks created in the past with other market opportunities and economic conditions. The value of a new generation of technoparks directly depends on the diversity of research potential. Technopark becomes a place for free communication and communication of the "creative class" of developers and consumers of technologies working in the markets of free exchange of technologies.

Thus, the process of development of a new generation of technoparks is very important for Russia in the global economic crisis. One way out of the current crisis is to rely on domestic science and high-tech production. In this regard, technoparks of the new generation on the basis of universities can play one of the most important roles in this process.

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