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THE ECOSYSTEM OF RUSSIAN TECHNOPARKS: THE ISSUES OF CREATION AND DEVELOPMENT

E. V. Pavel (a)*, N. A. Polyakov (b), T. V. Kudryashova (c)
*Corresponding author

(a) Petersburg State University, Universitetskaya nab.,7/9, St. Petersburg, Russia, e.pavel@spbu.ru,
(b) Petersburg State University, Universitetskaya nab.,7/9, St. Petersburg, Russia, n.polyakov@spbu.ru,
(c) Yaroslav-the-Wise Novgorod State University, ul. B. St. Peterburgskaya, 41, Veliky Novgorod, Russia, Tatyana.Kudryashova@novsu.ru, tel. +7-921-697-77-59,

Abstract

The article is dedicated to the analysis of the process of technology parks development in Russia. The object of research is the Russian technology parks as an element of the innovation infrastructure; the subject of research is the ecosystem of Russian technology parks. For the purposes of the study, the concept of "technology park structure" was introduced, which links together varieties of technology parks (or "technoparks"), and by which the authors mean a real or virtual form of business organization specializing in the provision of a package of services to innovation-oriented companies. In parallel with development of technology parks, the article traces formation of technopark ecosystem, which is interpreted by the authors as the unity of hard and soft elements of influence. The key stages of development of technopark structures in Russia are distinguished. The stages differ in their goals, objectives, content of the development process and in the types of technoparks that developed during certain periods. For each stage, the hard and the soft elements of technology park ecosystem are identified, and general conclusions containing the most important characteristics of each stage are drawn. Characteristics of the main institutional forms of technology parks, such as technoparks, innovation centers, business incubators, etc., are given. The dynamics of creation of technology parks in Russia for the period from 1990 to 2017 are analyzed. The main results of the activity of Russian technology parks residents for 2016 such as total revenues, total output of import-substituting products, etc. are presented.

Keywords: Business incubator, ecosystem, innovation, technology park, technology park structure, technopark.

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1. Introduction

Technopark construction has been exercised in Russia for more than a dozen years, so a rather large amount of information has been accumulated. On the basis of this information one can conclude that technopark structures have experienced several different periods, during which the understanding of the goals and objectives of technology parks in Russia, the understanding of what structural elements a technopark can consist of, etc. were corrected. The study of the development of such structures abroad (Al-Mubaraki & Busler, 2017) and of the role of innovative entrepreneurship in the development of regions (Nikolaidis, Fouskas, & Carayannis, 2013) contributed to this as well.

Nowadays, researchers come to understand that the technopark structure itself will not fundamentally change the innovation climate in the region. Practice confirms that technoparks formally exist in many regions of Russia, but that they do not significantly affect the scale of the innovation activity that is actually carried out in them.

Thus, it becomes obvious that the fact of having a technopark as an institutional structure is a necessary condition, but it is far from sufficient for innovative activity in the region to revive and reach a higher level. It is necessary to more consciously use additional factors that can ensure the activation of innovational activity of technoparks and increase its efficiency.

2. Problem Statement

The authors of the article put forward a hypothesis: to activate innovation in the region, along with creating innovation infrastructure facilities, it is necessary to provide the innovation process with “soft factors”, which are legislative initiatives at the level of the subjects of the Russian Federation, significant events in the field of innovation, scientific and practical conferences on innovation, publication of scientific and popular works, etc., which link together the individual institutional and physical factors of innovational activity. Due to supplementing the existing infrastructure of innovation with these soft factors, the region will eventually develop a viable and effective innovation ecosystem.

3. Research Questions

In order to understand the evolutionary processes in the development of technopark structures and to identify the factors that determine formation of the technopark ecosystem, the following questions need to be addressed in this study:

- identifying the stages of technopark development in Russia;
- characterizing the hard and the soft elements of the ecosystem in relation to each stage in terms of their impact on the formation of technopark structures;
- giving a generalized description of each of the stages.

4. Purpose of the Study

The purpose of the study is to show the history of the technopark structures development and the parallel formation of their ecosystem in Russia. The objectives of the study are to carry out the

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periodization of the technology parks formation and to identify the elements of the ecosystem that were formed at each stage of the development of technology park structures.

5. Research Methods

The article uses general logical and historical research methods: analysis and synthesis, analogy, generalization, structural-logical and comparative methods. The content analysis of literary sources as well as the regulatory framework relating to the research problems are also used, their assessment and interpretation is carried out.

6. Findings

Until 2015, there was no clear definition of a technology park or a technopark structure in the legislation of the Russian Federation. However, in 2006, the concept of Technopark in the sphere of high technologies" was introduced. This concept was understood as a structure representing a form of territorial integration of commercial and non-profit organizations of science and education, financial institutions, enterprises and entrepreneurs interacting with each other, with government bodies, with local governments that create the modern technological and organizational environment for the purpose of innovative entrepreneurship and the implementation of venture projects (Complex program, 2006). In 2015, the "Technopark" national standard was adopted. The term "Technopark" is disclosed as "a complex of public, transport and technological infrastructure facilities managed by a management company, providing a full range of services for placement and development of technology parks residents" (Technoparks. National standart of the Russian Federation, 2015). Recently, the President of the Russian Federation made amendments to the Federal Law "On Industrial Policy in the Russian Federation" (Federal Law N160-FL, 2018), which introduces the concept: "Industrial Technopark – industrial infrastructure and technological infrastructure objects intended for subjects of activity in the field of industrial production to perform scientific and technical activity, and (or) innovation activities in order to master the production of industrial products and the commercialization of the scientific and technical results obtained and managed by a management company – a commercial or non-profit organization established in accordance with the legislation of the Russian Federation" (Federal Law N160-FL, 2018).

Taking into account the fact that Russian practice is very heterogeneous and has generated a large number of institutional forms which are similar in content of their activity, but differ by the names, for further consideration of the issue it is necessary to introduce the concept of "technopark structure" – a real or virtual form of business organization that specializes in providing a service package to innovation-oriented companies, including small companies and start-up projects, provides them with office space and/or production areas, provides services of innovative projects assistance carried out by them in order to commercialize the results of intellectual activity. Technopark structures, in our opinion, may include business incubators (business accelerators), various types of technology parks, innovation and technology centers, science cities, special economic zones (SEZ) of technology-innovative type,

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technopolises/innovation cities. This study does not consider the last three types of technopark structures due to the fact that there will be a separate publication devoted to them.

In modern scientific literature economists are actively using the concept of "ecosystem of innovation". The technopark ecosystem of innovation is a combination of hard and soft elements, and the hard elements include the objects of the innovation infrastructure. Application of this concept gives a researcher the following possibilities:

1) to abandon the hierarchical structure with its characteristic rigidity and inflexibility and go over to the network structures;

2) to expand the understanding of key factors of active innovation activity due to the fact that more attention is paid to the soft factors – innovation policy, innovation culture, acceleration programs for the development of innovative entrepreneurship, innovation events, national peculiarities of doing business, etc;

3) to form clearer ideas about real drivers of innovation activity and soft tools and control mechanisms.

Conditionally, the modern history of the development of technopark structures in Russia consists of four key stages.

The first stage (1990 – 1995): Copying the US Experience

Some researchers consider the opening of the Akademgorodok (academic town, campus) in the city of Novosibirsk in the 1950s of the last century the beginning of the Russian technopark movement history (Kostyunina & Baronov, 2012). In our opinion, this approach is erroneous, since even in the presence of similar parameters – a high concentration of scientists living and working in the territory of the town, an administratively limited territory, a large number of well-equipped laboratories and pilot productions, – Akademgorodok of that period still cannot be attributed to the technopark structures. The reason for this is that Akademgorodok solved rather narrow scientific tasks for the defense complex of the USSR and did not solve the problems typical for market economy: the tasks of developing small and medium-sized innovative businesses in the region, the tasks of commercializing new technologies and producing new innovative products. The commonality between an academic town and a technopark is that they are a territorial form of scientific (academic town)/innovation (technopark) activities. That is why a technopark in the modern sense of this term was created in the Novosibirsk Akademgorodok only in 2006 (Academpark, 2018).

Initially, the idea of creating technology parks appeared at the final stages of the Soviet Union existence in the depths of the State Committee on Public Education in 1990. The five-year state program "Technoparks of Russia" was approved. The main purpose of the program was to increase the recoil of scientific research and developments, made during the Soviet period, on the basis of targeted funding. In mid-1990, the first in Russia international seminar on technology parks was held in Tomsk (an international seminar is an example of a soft element of innovation ecosystem). Russian and foreign experts presented at it. The first technopark was the Tomsk science and technology Park. The idea of its creation originated in 1989, officially it was established in 1990 (Syryamkin, 2011). The same year, the

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"Association of scientific and technological parks of higher school" appeared – 1990 (Shukshunov, 2005) (hereinafter – the "Technopark" Association).

By the 2000s, according to some sources, the number of technoparks in Russia reached 80 units. They were created in universities or in close proximity to them. The main impact on the process was caused by the American technology parks, they were established at universities, and by the presence of the state program mentioned above, in which universities were allocated some funds for the creation of technology parks. The problem of this period was that many of the technology parks were created only in the form of constituent documents, there was no real work in them. In the universities and in the young entrepreneurial environment, which at that time only recently started emerging, there was no understanding of what these structures are, and what their functions are. The statistical bodies did not take them into account, therefore in the literature of that period there are significant discrepancies concerning the number of technology parks, from 40 to 80 units (Technopark of the Novosibirsk Academgorodok, 2007; Sirotkina, 2008; Kostyunina & Baronov, 2012). For this period it is characteristic that all intellectual industrial property belonged to the state, the overwhelming share of enterprises was also the property of the state, small enterprises, as a form of business, just started to appear, commercialization of industrial intellectual property (IP) at the domestic market was not carried out, as the results of research and development, as well as new technologies, were in the hands of the state, and the creation of new technologies was hindered or discontinued due to political and economic transformations taking place in the country and also due to the leakage of a large number of scientists, engineers, and high-class specialists abroad.

Serious explanatory work of "Association of scientific and technological parks of higher school", carried out during this period, led to the idea of technology parks becoming widespread; after that the formation of a Russian technology park model began gradually. Researchers note that in the mid-1990s, technoparks were created not only on the basis of universities, but also on the basis of state research centers (SRC) or academic science organizations. The stereotype of technopark only being binded to a university was overcome, they began to be created also in campuses and science cities. Later, regional technoparks began to appear, they set broader goals and objectives for themselves than university technoparks. Regional technoparks were created with support of local authorities to support the production of innovative and high-tech products by local enterprises (Technology park, 2006).

At this stage (Table 01), there is no fixed concept of a "technopark" in the regulatory legal acts, but the issue is being actively studied in the scientific literature.

Table 01. Hard and soft elements of the ecosystem formed at the first stage *

Hard elements of the ecosystem	Soft elements of the ecosystem
Higher educational institutions of the USSR	International scientific seminar (1990)
Scientific institutions of the USSR Academy of Sciences	Association of technoparks in higher school (1990)
The country's first science and technology park was established (in Tomsk)	Scientific conference on technoparks in Leningrad (1991)
Venture funds with foreign capital appeared (1991-1993)	The "Technopark" association attracted funds from the European Bank for reconstruction and development, the "Know How" Fund under the
State enterprises of the USSR	

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Scientific research cooperatives	Government of the United Kingdom, the TACIS and TACIS-BISTRO programs, the Eurasian Fund for carrying out international educational projects for training 8 teams of managers of Russian leading technology parks and young, starting technology parks

*Note: Compiled by the authors

Conclusion: at the first stage of development, the vast majority of university technoparks are not large-scale and effective. However, a number of technoparks during this time found their niches in the innovation complex of the country, formed an environment to support innovative entrepreneurship and ensure a good level of its functioning (Shukshunov, 2005). In addition to the small number of technoparks during this period, it can be noted that they did not have an adequate management, there was a very weak material and financial base, which did not allow them to ensure the realization of the possibilities incorporated in this form. Foreign experience proves that good development of technology parks requires state and local authorities paying serious attention to them, which was not the case in Russia at that time.

Formation of an ecosystem of technology parks was initiated; it was fragmented.

The second stage (1996 – 2005): the initiation of the market model of technopark in the Russian context – innovation and technology centers

The authors of the article consider 1996 the beginning of the second period of the technology park movement, because the first innovation and technology center (ITC) was created in 1996. Although the name "technopark" is not used for this structure, the authors believe that it fulfills the same functions as a technopark, therefore it can be considered in this study (Gribovsky, 2010). However, there is no unity on this issue, and some authors believe that this structure cannot be equated to a technopark (Klyopov, 2005). Surely, there are some differences between these forms (Table 02), but they relate to secondary factors, and according to the content of the activity, these structures can be considered related or even duplicative.

Table 02. Comparison of technology parks and innovation and technology centers *

	Technology park	**Innovation and technology center**
Differences	Subsidized	Independent self-sustained
	Includes the stage of small companies incubation	Does not deal with the incubation stage
	Young companies	Developed companies
Similarities	Provide the same services	
	Are a part of infrastructure of innovation activity support	
	Work with small and medium-sized companies	

*Note: Compiled by the authors

In accordance with the Regulation of the Federal State Statistics Service of 2007 (Resolution of the Federal State Statistics Service N104, 2007). The innovation and technology center "is an organization created on the basis of a scientific organization or its pilot plant, it possesses a property complex in the

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form of office, industrial premises and relevant equipment, it leases it to small enterprises on the basis of contracts or to carry out its own innovative activities...” The first ITC was established on the basis of the OJSC “Svetlana” in St. Petersburg (one of the leading enterprises of electronic instrument engineering in the former USSR). The developers of the innovation and technology center concept employed the idea of using the production sites of non-performing enterprises to accommodate a significant number of young companies. The territorial proximity arising from this approach should have generated more intensive contacts between small and large enterprises; it became possible to assist them in doing the office work, accounting, taxation, marketing and other issues in which young companies did not have a significant experience. The project of this ITC was supposed to be replicated if good results were achieved.

Indeed, two dozen other similar centers were organized throughout the country and in 2000 they created the “Union of ITC of Russia”. ITC are positioned as “basic infrastructure elements based on organizations leading large-scale innovation activities in the high-tech industry in the regions of Russia”. Thus, unlike the first technology parks, ITC are focused on supporting innovation activity in the sphere of high technology in the regions.

In the same 1996, the first business incubators were been created in Russia. It is also expedient to attribute this form to technopark structures, but it should be noted that a business incubator has a number of differences from a technopark (Table 03). More precisely, the first business incubators, created at the expenses of the United States Agency for International Development (USAID), appeared in Russia in 1990 (Makhlyde, Bibik, & Yakubovich, 2013).

Table 03. Comparison of technology parks and business incubators

Technology park	**Business incubator**
Young companies	Start-ups
Duration of stay is long or unlimited	Duration of stay is limited (up to 3 years)
Function on a commercial and non-commercial basis	Mainly non-profit organizations

*Note: – Compiled by the authors

However, in the opinion of the authors of this study, they did not have any significant impact on Russian economy, since they did not become the basis for the further development of incubators and the dissemination of experience (Sedakov, 2014). Full development of Russian business incubators based on Russian financing began in 1995 in Zelenograd, when it was decided to create a community of business incubators of the country – the National Commonwealth of Business Incubators. In the same town, one of the first business incubators in Russia was created in 1996. The network of regional and municipal business incubators was established on the basis of the “Federal program of financial support for small and medium-sized businesses” since 2005 with the support of the Ministry of Economic Development of Russia (Federal Support Program, 2005). Three widely used business incubator models were distributed:

- multipurpose business incubator (mixed);
- a business incubator at the university;
- technological business incubator (Sedakov, 2014).

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In 2010, the Ministry of Economic Development presented the requirements for the premises of a business incubator created at the expense of the budget of a subject of the Russian Federation (Order of the Ministry N59, 2010). The use of the premises: industrial, office, innovation, agro-industrial and mixed.

Another important step at this stage was the conduct of state-public accreditation (Regulation of Ministry, 1999)[1] of university technoparks. The need for it was due to the fact that there were many different organizations that called themselves technoparks, in order to receive state development grants, but not all of them were actually engaged in supporting innovative activity. Accreditation during this period took place on a voluntary basis, it was carried out in order to streamline the activities of university technoparks, to ensure the development of these technoparks as mechanisms for developing and commercializing a high-tech product of higher school, to support small innovative entrepreneurship and rational use of budget funds (Regulation of Ministry, 1999). Accreditation showed that some of the technoparks are developing intensively, but the bulk does not show high rates of development and does not have a significant impact on the innovative activity of the university. In total 21 university technoparks were accredited in these years (1999-2000).

According to the data of the Ministry of Education and Science of Russia at the beginning of 2005 the organizational infrastructure in the sphere of innovative activity already included 76 university technoparks (Technology park, 2006).

It is worth noting that the initiative to create technology parks on the basis of universities did not receive proper attention from the state during this period due to the fact that the country was undergoing rapid socio-economic changes. University technoparks of that period were often subdivisions of universities, which limited their sphere of influence, as they had to operate within the framework of the university's regulations, to work only with small companies created by teachers or students, to use only the intellectual property created at the university. As a result, many university technoparks were not performing well enough. Experts of a rating agency note that when creating technology parks, market approaches were not used. Most of them were organized for the sole purpose of obtaining additional budget funds for the new structure. At the same time, the state did not carry out any initial selective policy on the basis of specified criteria: in particular, an approximate calculation of the payback of projects was not done (Expert RA Rating agency, 2000).

The elements of the ecosystem of the second stage are given in Table 04.

Table 04. Hard and soft elements of the ecosystem formed at the second stage*

Hard elements of the ecosystem	Soft elements of the ecosystem
FL of 07.04.1999 №70-FL "On the status of a science city of the Russian Federation"	1995. National commonwealth of business incubators
2000. Venture innovation fund with Russian venture capital	Federal program of state support for small business in the Russian Federation for 1998-1999
Conducting state-public accreditation of	The interdepartmental program of activating

[1] State and public accreditation (onwards – accrediation) is a recognition of the level of activity of a university technology park that meets the criteria and requirements of the Ministry of Education of the Russian Federation and of the Technopark Association, as formulated in the Regulation on university technology parks and the present Regulation.

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technoparks 1999-2000	innovative activity in the scientific and technical sphere of Russia for 1998–2000
The Ministry of Science and Technology initiated the creation of centers for the promotion (transfer) of technologies in 2003	2000 Creation of a non-profit organization "Union of innovation and technology centers of Russia" – "Union of ITC of Russia"
2005 Federal Law "On special economic zones in the Russian Federation"	Since 2005, the State Financial Program for the support of small and medium enterprises

*Note: Compiled by the authors

Conclusion: the second stage of the Russian technopark structures development can be described as stratification into several types, search for new forms, adaptation to Russian conditions, creation of basic infrastructure. Key elements of infrastructure appear in the ecosystem: venture funds (Dikul, 2017), science cities and special economic zones.

The third stage (2006 – 2014): the use of tools of public-private partnership in creation of technology park structures

The third period began with the emergence of the technopark movement at the state level, when in 2006 the implementation of the targeted comprehensive state program "Creation of high-tech technology parks in the Russian Federation" No. 328 began. The emergence of this program indicates that there has been a change in the state's attitude towards technology parks, an attempt has been made to apply new economic tools to support technology parks: the mechanism of public-private partnership, the creation of a sectoral investment fund (Investment projects of the regions of Russia, 2007). The state program set the level of a technopark that meets the interests of the state and which it would like to support – a technopark that raises high-tech companies. Seven regions were selected in which the construction of new technology parks began. Over the past years, the program implementation coordinator has been replaced: since 2007, this function has been performed by the Federal Agency for Information Technologies, and in 2009-2011 the functions of the program coordinator were transferred to the Ministry of Communications and Mass Media of Russia. Also, the Republic of Mordovia, Penza and Samara regions were added to Kaluga, Moscow, Nizhny Novgorod, Novosibirsk, Tyumen, Kemerovo regions, the Republic of Tatarstan and the city of St. Petersburg, which were originally included in the complex program. In 2013 the program underwent some other changes, Sverdlovsk region and the city of Moscow were also included in it. program was completed in 2014 and its result was the creation of 12 technology parks (Ministry of Telecom and mass communications of the Russian Federation, 2015), formed with the support of the federal budget in various regions of Russia.

It should be noted that the effectiveness of this program is not very high (D-russia.ru, 2015)[2], since it was originally planned to create 16 technology parks.

In 2011, the Ministry of Connections and Mass Communications of the Russian Federation took the initiative to create a non-commercial partnership "Association of technoparks in the field of high technologies". The objectives of the Association were:

1) coordination of the technology parks work;

[2] During the 8 years of program realization 30 billion rubles was invested, 13 billion rubles of federal money and 17 billion rubles – regional; in 2015 out of 12 technoparks, building of 2 was completed, but not put into operation, and the rest are still yet to be completed or brought to design capacity.

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2) interaction with Skolkovo innovation center.

In 2013, the Association, along with technology parks, also began to work in organizing clusters in the industry.

A very important step was taken in the direction of expanding the powers of universities in terms of their business activities in 2009, when Federal law № 217 was adopted. According to this law universities received the right to create small innovative companies (Federal Law N217-FL, 2009).

The elements of the ecosystem of the third stage are presented in Table 05.

Table 05. Hard and soft elements of the ecosystem formed at the third stage*

Hard elements of the ecosystem	**Soft elements of the ecosystem**
2006 State program "Creation of technology parks in the field of high technologies in the Russian Federation" № 328-p	2011 Establishment of the "Association of technoparks in the field of high technologies"
2007 Creation of the sectoral Russian investment fund of information and communication technologies	2011 Creation of a rating of innovative activity of regions of the Russian Federation
2007 Beginning of construction of 16 high-tech technoparks in 13 regions of the country	2013 The work of the Interdepartmental Commission for coordination of activities for creation, operation and development of technology parks in the field of high technologies
Federal Law of July 24, 2007 № 209-FL "On Development of small and medium-sized businesses in the Russian Federation"	2013 Summit of Russian Technoparks "Technopark 2.0: Sustainable Development Model Improving the efficiency of current activity", organized by the HSE and NP "Association of technoparks in the field of high technologies"
Federal Law of the Russian Federation of August 2, 2009 № 217-FL on small innovative enterprises at universities	
Federal Law "On the Innovation center "Skolkovo" September 28, 2010	
Creating a special economic zone (SEZ) "Innopolis" in accordance with the Regulation of the Government of the Russian Federation № 1131 of November 1, 2012 "On the establishment in the territories of Verkhneuslonsky and Laishevsky municipal districts of the Republic of Tatarstan of a special economic zone of technology-innovative type"	

*Note: Compiled by the authors

Conclusion: at the third stage, a lot of work was done on the construction of technoparks in the field of high technologies with serious state support in the form of a comprehensive state program. The official Russian model of technopark construction has been developed. However, with all the advantages of this program, it was limited to one industry. The vast majority of industries remained beyond the scope, although they all needed innovative development. During this period, quite significant investments were made that did not give the expected effect in the form of new jobs, young innovative companies and innovative products at the domestic and foreign markets. A positive, though not indisputable step was taken towards the development of university technoparks in terms of providing them with the opportunity to commercialize their intellectual property by creating small investment enterprises (SIEs) at the university (Polyakov & Yanykina, 2013).

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Fourth stage (2015 – present): technoparks as a recognized form of business. Integration

By 2015, a large array of information about Russian technology parks was formed. After its processing a new important document was born – the state national standard of the Russian Federation (Technoparks. National standart of the Russian Federation, 2015), where key points concerning creation and functioning of Russian technology parks were systematized and formalized. In 2015, the "Association of technoparks in the field of high technologies" was transformed into a non-profit organization "Association of organizations promoting development of clusters and technoparks" (Association of clusters and technoparks, 2018). The renaming reflected the expansion of the scope of the association and the development of a new direction in the innovation policy pursued by the state – the development of clusters.

State support of creation of technoparks in the field of high technologies in this period continued in the form of subsidies to the budgets of subjects of the Russian Federation for reimbursement of the costs of creating the infrastructure of technoparks in the sphere of high technologies. The state started practicing this form of support in 2015. These subsidies are formed at the expense of federal taxes and customs duties paid by the residents of technoparks. The emphasis is shifted towards stimulating the development of existing structures in the subjects of the Russian Federation and the creation of new ones (Maslennikov, 2017). Great attention is paid to innovative entrepreneurship (Andreeva, Simon, Karkh, & Glukhikh, 2016). In 2016, for reimbursement of the subjects of the Russian Federation the RF government proposed a mechanism for subsidizing the infrastructure of industrial parks or technoparks from the federal budget, with the exception of technoparks in the field of high technologies. Another step was the publication of the Federal Law of 27.06.2018 N160-FL "On the Amendments to the Federal Law "On Industrial Policy in the Russian Federation". This law provides definitions of several types of technology parks and the legal framework for operation of industrial technology parks (Federal Law N160-FL, 2018). The elements of the ecosystem of the fourth stage are presented in Table 06.

Table 06. Hard and soft elements of the ecosystem formed at the fourth stage*

Hard elements of the ecosystem	Soft elements of the ecosystem
2016. Regulation of the Russian Federation from 20.01.2016. "On approval of the Rules for granting subsidies from the federal budget to the budgets of the subjects of the Russian Federation for reimbursement of expenses for the creation of the infrastructure of industrial parks or technology parks, with the exception of technology parks in the field of high technologies"	2015. The "Association of technoparks in the field of high technologies" was transformed into a non-profit organization "Association of organizations promoting development of clusters and technoparks"
2018. Federal Law of 27.06.2018 № 160-FL "On the Amendments to the Federal Law "On Industrial Policy in the Russian Federation". This law provides definitions of several types of technology parks and the legal framework for operation of industrial technology parks	Preparation and publication of annual industry reviews on technology parks for 2015, 2016, 2017 (Association of clusters and technoparks, 2018).

*Note: Compiled by the authors

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Conclusion: the fourth stage is characterized by a cluster approach in the state-led innovation policy, as well as further diversification of state support for the creation of technology parks, including support in the form of subsides.

7. Conclusion

The first technoparks in Russia forestalled the development of Russian economy, it was not ready for them to appear. Over the past years, more favorable conditions have been formed for development of technoparks, for example, forms of support for innovative activities, which affected their number (Figure 01). As a result of the research, it was established that, as of 2017, in Russia, there are 192 organizations that have certain signs of technology parks. 125 technoparks that best meet current requirements and recommendations were selected for further study (Third annual review, 2017).

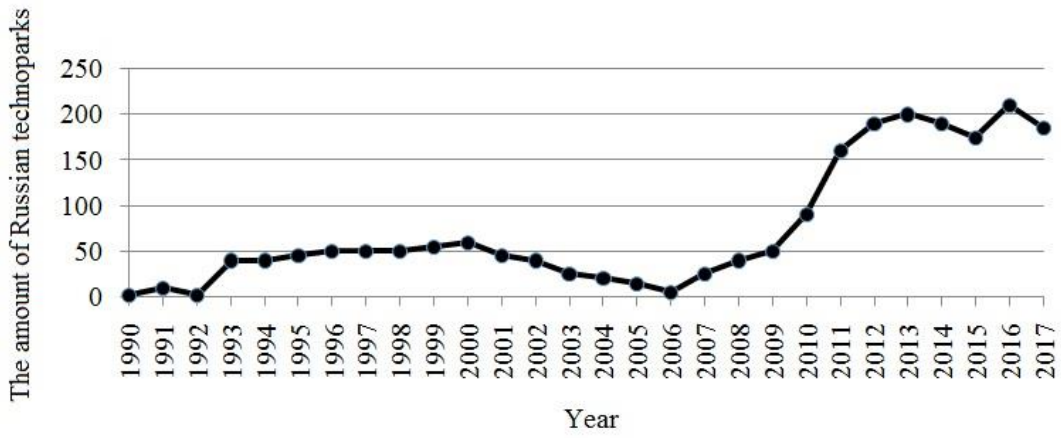

Figure 01. Dynamics of creation of Russian technology parks

Technoparks are an important tool in solving the problem of achieving the global technological leadership by Russia. They create transparent, comfortable and sustainable environment for the development of high-tech business (Third annual review, 2017). This is reflected in the performance indicators of technology parks residents (Table 07).

Table 07. Main indicators of Russian technology parks residents activity*

Name of the indicator	Unit of measure	Value of the indicator
Total revenue of technopark residents in 2016	Billion rubles	203.5
The total volume of release of import-substituting products in 2016	Billion rubles	27
Number of patents obtained by residents of technoparks in 2016	Units	900
The average expenses of one resident on R&D in 2016	Million rubles	2.2
The amount of expenses of one resident on R&D per 1 employee in 2016	Thousand rubles	147.1

* Note: Calculated by the authors based on data from 33 technoparks of Russia

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Summing up the evolutionary processes in the development of the technopark structure in Russia, it is necessary to admit that Russian technoparks have not yet received a full-fledged development and in their performance are still lagging behind the technoparks of the developed countries of the world. The ecosystem of technoparks is characterized by uneven development in different regions of Russia and is still in the process of becoming. However, such processes are peculiar not only to Russia, but to all countries that are on the path to become an innovative structure of economic development. The Russian model of innovation development does not only have its own characteristic features, which have a number of indisputable advantages, but also has a powerful potential.

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