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International Experience of Techno-parks in the Russian Context

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Abstract:

The relevance of this study is determined by the problem of a technological gap between the Russian Federation and developed and rapidly developing countries, as well by insufficient effectiveness of the activities of technology parks in modern Russian science-based economy. Even though many techno-parks are functioning in the Russian Federation today, their performance indicators are not always satisfactory, which reduces the pace of innovative development of the state.

Therefore, the work of modern Russian technology parks needs to be optimized, especially from the viewpoint of stimulating the development of science-intensive technologies. The purpose of this study is to identify the ways to improve the performance of the modern Russian techno-parks in creating and developing knowledge-intensive and innovative technologies. International experience in this field has been studied to achieve the objective of the study. Next, the authors conducted a comparative analysis (quantitative and qualitative) of documents (open sources, reporting and analytical documents, etc.), describing the experience of 12 overseas technology parks, showing strong economic performance.

Additionally, an in-depth analysis was performed regarding four techno-parks, which have significant indicators of scientific and innovative activity, and leitmotif non-formalized expert interviews were held with employees of the Tomsk techno-park (a special economic zone, Tomsk, West Siberia) in July 2017. Based on the analysis recommendations were made for improving the Russian techno-parks management system that enhance the effectiveness of research and innovation activities, as well as the commercialization of the obtained results, which is highly significant for the development of Russia's science-based economy.

Keywords: *techno-parks, high technology, commercialization of innovation, business incubators, national innovation strategy.*

JEL Classification: *A13, A14, O31, O32, 033*

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1. Introduction

Creation and development of new technologies is a complex and non-linear process that implies consideration of quantitative and qualitative characteristics of innovations (Vasiljeva, 2013). In consumer technologies, the latter are determined by the ability of the consumer's technical solution to interact with other machines or devices of the social environment that belong to him; simplicity of work; degree of protection, etc. In fundamental developments, it is more difficult to identify the qualitative characteristics of innovations; however, it is precisely this sphere which actualizes the need for integrating the capabilities and resources of various scientific fields and for implementing more effective interaction with public and economic systems affecting technological development. Having in mind that consumer and fundamental innovations are linked, considering the impact of socio-cultural and economic factors on innovations (otherwise – *the diffusion of innovations),* it is possible to speak of the necessity to analyze the innovation processes in the focus of institutional interaction.

2. Research Background

One of the leading roles in the system of creation and development of new technologies is played by the organizations, developing and commercializing innovations. Growth in the number and performance improvement of the latter is an essential element of the modern state and social management (Muslimova, 2013). At the same time the tendencies of modern innovation (both fundamental and consumer) are closely related to NBIC-convergence, i.e. the process of merger and rapprochement of nano (N)-, bio (B)-, info (I), cogno (C)-technologies (Roco and Bainbridge, 2003). Any complex technology requires interaction with many others, which implies a high level of cooperation and trust between the developers, investors, controlling bodies, markets, consumers and society. The relationships between business and innovation are of interest, since many private companies have achieved high performance through the creation of new products and services, but despite this the path of innovative development is still a complex strategy for the competitive business.

This property can be explained by the fact that the creation and implementation of new technologies is a multifactor process with a relatively low chance to return the investment and make a profit. Considering that it is not always profitable and safe for entrepreneurs to create new technologies, it should be noted that many successful innovative companies (based on the support of the state and a favorable socio-economic environment) are completely private and have successful performance indicators.

A financial aspect is an important but not the only factor in the development of innovations among a number of others. It becomes extremely complicated to create new technologies without the presence of high-level professionals, well-established

relationships with stakeholders, and interaction with science and education, the effective culture of labor and production, a special legal status, etc. By focusing only on financial instruments, it is difficult to develop advanced technological systems, therefore, in the process of creating and developing innovations, considerable attention should be paid to the following factors: infrastructure features, communication between the stakeholders, social and cultural aspects of interaction and production activities. The activity of innovative companies assumes the existence of special social, economic and cultural conditions. The world experience shows that their creation and functioning in the specialized territories can largely meet this need.

The described features and attributes of modern technological structure and socio-economic relations have identified the need to create and develop the territories where the infrastructure, communications, and peculiarities of cultural cooperation would be formed to ensure an effective process of creation and development of new forms of products, services and business (Kotelnikov and Nagaeva, 2014). This need has become decisive for the formation of territorial entities with the common name *the technopark,* which are also called sometimes the 'innovation house', 'technopole', 'technology park', 'technology area', 'technozone', 'research park', 'technopolis', 'science park', 'IT park', and so on.

Techno-parks have given impetus to the development of several new technologies, and by now they have existed in the Russian Federation for more than 25 years, excluding the experience of science towns, as with them the experience of developing similar territories exceeds 40 years in the domestic practice; however, not always their activities allow achieving the desired performance (Tyurina *et al.,* 2017). It should also be noted that the development intensity of new technologies is insufficient in modern Russia, as evidenced by the statistics on the registration of patents for new developments: less than half of applications for patents are Russian developments, of which more than two thirds are not regained financially (Tyurina *et al.,* 2016).

The above-mentioned trend of 'evolution' of Russian techno-parks into business centers challenges the very idea of the techno-park, since its use exclusively as a business support mechanism is a controversial measure, and may create problems in the innovative development of the state. The authors deem it possible to solve this problem not only through administrative, legislative and regulatory measures, but also through the modernization of technology parks management system, namely by optimizing their activities in the framework of research and development and subsequent commercialization.

In this regard, this study was aimed at identifying the ways to improve the performance of the modern Russian technology parks toward creation and development of science-intensive and innovative technologies. To achieve the goal, a number of tasks were solved, namely, the study of international experience in the

creation and development of techno-parks was conducted; the activities of 12 international technology parks were examined; a deep analysis of the activities of 4 techno-parks with high performance in science and innovation was realized; interviews with experts – employees of the Tomsk Techno-park – were held.

3. Literature Review

The content analysis showed that performance assessment of modern technology parks aimed at the implementation of the national innovation strategy is one of the most important issues of research practices studying their operation (Sakun, 2014). In addition to the now traditional description of the experience of the USA (Hyde, 2016), Europe (Varkhola and Dubovitska, 2014) and Japan (Hansruedi, 2015) it becomes significant to study features of technopark functioning in Asia: Turkey (Bilge and Tanyel, 2017; Masumova, 2012); China (Kaneva and Untura, 2014); South Korea (Park, 2016; Link and Yang, 2017), Indonesia (Asmara *et al.*, 2016) and in South America: Argentina (Castillo *et al.*, 2014), Chile (Rehman, 2017) and others.

Another relevant line of research practices is the development of issues focusing on the efficiency of interaction of stakeholders participating in the work of techno-parks (Estrella *et al.*, 2017). This refers to the three main stakeholders – government agencies, scientific organizations and business structures (Kang, 2014). In addition, it is possible to highlight research, exploring the possibilities of activities of hybrid innovative organizations with 'diffuse interface' (the so-called Triple Helix) which have the functions of educational, industrial and regulatory institutions. There are also developments describing the opportunities for universities in the formation of techno-park innovative environment (Narbut *et al.*, 2014) and the participation of public authorities in promoting the development of innovative development territories (Sharkov, 2017). Moreover, these issues are often studied in the context of the growth opportunities of economic performance of technology parks (Phan *et al.*, 2016), their role in the innovative economy of the state (Link and Yang, 2017), the industry-specific (Yim *et al.*, 2016), scientific (Yaniktepe *et al.*, 2016) and regional development (Olcay and Bulu, 2016).

Less attention is paid to the study of the features of management by the technology parks, and these studies are held in the development of specific issues of management, such as: creating a competence model for the employees of industrial parks (Smirnov *et al.*, 2016); generating information support system for the process of technopark management by digital technologies (Aliyev and Shahverdiyeva, 2017; Gordeev and Baraniuc, 2016); optimization of the technopark development strategy (Kulikova *et al.*, 2016). The issues of integrated assessment of techno-park management systems are raised in foreign scientific papers less common and mainly they investigate resident companies' management systems (Robert and Ananth, 2017). Russian studies exploring the ways to improve techno-park management

efficiency demonstrate a certain lack of integrated development aggregating management experience of international organizations.

4. Materials and Methods

The study is based on the deductive method which resulted in the decision to analyze the common properties that determine the performance of technology parks and to identify the ways and means promoting growth rates of modern Russian technology parks using the array of these data. At the beginning of the study, the history of the formation and development of technology parks was studied, both in the international and in Russian practice of innovative development. This revealed the 7 main stages in the development of technology parks that are characterized by specific requirements for technology park management system. Further the analysis of 12 international techno-parks was conducted which were selected about the high differentiation and included the techno-parks operating in different states, with different purposes for creation, development strategies, peculiarities of territories, management, residents' structure, admission rules and so on.

Four techno-parks were selected of these 12, having high performance in the direction of creating and developing science-intensive and innovative technologies. These technology parks have been more extensively studied to identify features that enable them to have higher achievement in science and innovation. Also 7 leitmotiv non-formalized expert interviews with the Tomsk Techno-park were held (special economic zone, Tomsk, West Siberia). These research practices have made it possible to determine the ways to increase the performance indicators of techno-parks toward creating and developing science-intensive and innovative developments.

5. Results

The model of a modern techno-park appeared about 60 years ago at Stanford University. Under the supervision of F. Terman part of the University area was put into long-term lease to the high-tech companies that had interest in the purchase and use of the intellectual developments of the University, as well as in the involvement of students and graduates to work. The main feature of this approach was the need for commercial profitability of these activities. This model gave rise to the creation and development of many high-tech companies, such as Hewlett-Packard, Electronic Arts, Sun Microsystems, Nvidia, Yahoo!, Cisco Systems, Silicon Graphics, Google, and became the basis of the technological center of the Silicon Valley.

Later, technology parks began to be created in Europe (France, Belgium, etc. in the 1970s), the North and South Americas, Asia, and Australia (Canada, Brazil, Singapore, Malaysia, India, Japan, etc. in the 1980-1990s), as well as in the countries of the former USSR (the Russian Federation, Belarus, Uzbekistan,

Ukraine, etc. in the 1990-2000s). Conditionally the history of the development of techno-parks can be divided into the following stages:

- realizing the need to create specialized territories (the 1920-1950s);
- forming the first technoparks in the USA (the 1950-1970s);
- getting successful operation experience of the first technoparks (the 1970-1980s);
- disseminating the practice of creating technoparks internationally (the 1980-1990s);
- increasing the number of types of technoparks and differentiating their activities (the 1990-2000-ies);
- expanding international cooperation and increasing the number of stakeholders (the 2000-2010s);
- developing digital communications and 'cloud services', for example, in combining computing power (currently).

International practice shows that the full-fledged launch of the technology park requires a minimum of 10 years, and its universal acceptance and the exit to the optimum economic mode takes from 20 to 40 years (Barinova, 2012). It should be noted that the growth rate of innovative initiatives is increasing and about 80% of projects were launched in the 2000s (Klyucharev, 2015), which enables to state the growing need for reducing the launch time of modern technology parks.

The man-made technology clusters – the Silicon Valleys in the United States and Israel; 'digital cities' Cleveland, Amsterdam, Seattle; the Medicon Valley in Denmark; the Belgian-Dutch Dommel Valley and several others – have gained the greatest popularity and effectiveness to date., There are now more than 130 science and technology parks in China, of which more than half are high-tech ones. More than 50% of them are non-governmental. The main lines of development and commercialization of innovations in the technology parks today are (in % of the total amount), energy and environment (21%), medicine and pharmacology (17%), information and communication and media technologies (14%), new materials and chemistry (11%), micro-, nano- and optical technologies (10%), biotechnologies (9%), aircraft and aerospace industries (5%), food products and cosmetics (4%), transport means (4%), other (5%) (IDB, 2017). To form a general idea of the activities of modern technology parks, 12 structures operating in different countries were analyzed (Table 1).

Table 1. *Features of modern technology parks*

Techno-parks	Techno-park features
1. Research Triangle *(USA)*	**Year of foundation:** 1959
	Floor space: 2,800 hectares (premises take 6,700,000 m^2)
	Number of employees: more than 52,000
	Number of organizations: more than 170

	Cooperation with universities: actively cooperates with universities
	Eligibility criteria: organizations involved in R&D and pilot production are allowed to work in the technopark. Priority is placed on environmentally friendly production facilities.
	Services: The complex offers a range of outsourcing services and incentive rent rates.
	Business profile: the basic importance of research in the fields of biological, medical and pharmaceutical technology
	Participation of the state: activities are supported
2. Silicon Valley *(USA)*	**Year of foundation:** it began its work as a spontaneous zone in the 1950-1960s.
	Floor space: "spontaneous zone"
	Number of employees: "spontaneous zone"
	Number of organizations: more than 100
	Cooperation with universities: actively cooperates with universities
	Services: residents have the opportunity of using the simplified taxation and benefits for entrepreneurs
	Business profile: the research in the fields of manufacturing and IT –technologies is of basic importance
	Participation of the state: the state does not participate in the techno-park management, but is a customer of the resident companies
3. Lahti Science and Business Park (*Finland*)	**Year of foundation:** 2008
	Floor space: 70 hectares (premises take 13,000 m^2)
	Number of organizations: more than 50
	Cooperation with universities: universities participate in research and commercialization of technologies
	Eligibility criteria: priority is given to the companies operating in the field of forestry, whose activities are aimed at socio-economic development of the region
	Services: The complex has a business incubator available and offers incentive rent rates and a flexible system of lease payments.
	Business profile: information and communication technologies, biological, pharmaceutical and medical developments, as well as search for alternative energy sources. It was established to develop the region, but turned into the scientific center.
	Participation of the state: managing companies are limited liability companies with dominating participatory interest of urban municipalities in management
4. Lakeside Science and Technology Park (*Austria*)	**Year of foundation:** 2002
	Floor space: 22 hectares (premises take 28,000 m^2)
	Number of employees: more than 400

	Number of organizations: 53 (including 20 start-ups)
	Cooperation with universities: higher educational establishments have a complementary role in the activities of the techno-park and act as partners
	Eligibility criteria: IT-companies are permitted to work in the complex
	Services: has business incubators available, but does not provide broad outsourcing services, offers incentives for start-ups
	Business profile: IT
	Participation of the state: the complex is partially owned by the state and private organizations
5. Otaniemi (*Finland*)	**Year of foundation:** 1949
	Floor space: 200 hectares (premises take 40,000 m^2)
	Number of organizations: more than 800
	Cooperation with universities: universities are involved in the implementation of research procedures
	Eligibility criteria: priority is given to companies operating in the field of forestry
	Services: the complex has a business incubator available and offers incentive rent rates and a flexible system of lease payments.
	Business profile: electronics, alternative energy generation, environmental protection, forestry
	Participation of the state: the techno-park is managed both by government agencies and private organizations
6. Hagenberg Softwarepark (*Austria*)	**Year of foundation:** 1990
	Floor space: 200,000 m^2 (premises take 15,200 m^2)
	Number of employees: more than 250
	Number of organizations: more than 50
	Cooperation with universities: universities provide specialists and conduct joint research
	Eligibility criteria: companies that specialize in the field of information technologies are allowed to the techno-park
	Services: the complex has two business incubators and provides a number of services (outsourcing); flexible lease payment is offered
	Business profile: software and IT development
	Participation of the state: the techno-park is owned by a private developer company in which the government has a stake
7. Sophia-Antipolis Park *(France)*	**Year of foundation:** 1969
	Floor space: 2,400 hectares (premises take 1,100,000 m^2)
	Number of employees: more than 40,000
	Number of organizations: more than 250
	Cooperation with universities: first the territory had no university, but today it is actively cooperating with the University of Nice

	Eligibility criteria: companies whose operation is useful for the region and having environmentally friendly production are permitted to work in the complex.
	Services: the techno-park has a business incubator and offers a wide range of outsourcing services
	Business profile: the activity of the complex is aimed at socio-economic development and diversification of the region's activities in biological, pharmaceutical and medical projects, as well as communication technologies and chemical research
	Participation of the state: part of the complex is privately owned (it was created by a private individual, but later received the active support of the state) and was aimed at developing property cluster. It is managed by a specially created state company, and the individual organizations are involved in the development and commercialization of the techno-park
8. Technologiepark Heidelberg GmbH (*Germany*)	**Year of foundation:** 1984
	Floor space: 5 hectares (premises take 50,000 m^2)
	Number of employees: more than 1,400
	Number of organizations: 86
	Cooperation with universities: higher educational institutions form the foundation of the scientific base of the techno-park
	Eligibility criteria: companies engaged in biological research and environmental protection are allowed to the techno-park
	Services: the complex has a business incubator and provides a range of outsourcing services. There are incentives for start-ups
	Business profile: science development of in the field of biology, pharmacy and medicine
	Participation of the state: it has an active financial support from the state
9. Turku Science Park (*Finland*)	**Year of foundation:** 1988
	Floor space: 500 hectares (premises take 250,000 m^2)
	Number of organizations: 160
	Cooperation with universities: higher education institutions participate in the techno-park operation implementing research and technology commercialization
	Eligibility criteria: priority is given to the companies working in the field of forestry
	Services: the complex has a business incubator available and incentive rent rates and a flexible system of lease payments
	Business profile: socio-economic development of the region and the commercialization of projects in the field of electronics, search for alternative energy sources,

	biological and pharmaceutical research
	Participation of the state: the complex is jointly owned by the state and private organizations
10. Kechnec (*Slovakia*)	**Year of foundation:** 2000
	Floor space: 80 hectares
	Number of employees: more than 1,000 (taking into account the residents' activities more than 3,000 jobs have been created)
	Number of organizations: 19
	Cooperation with universities: the techno-park interacts with the Pavol Jozef Šafárik Technical University and the University of Veterinary Medicine
	Eligibility criteria: pharmaceutical, industrial organizations
	Services: logistics center, consulting services
11. Kulim Hi-Tech Park (*Malaysia*)	**Year of foundation:** 1996
	Floor space: 1,700 hectares (premises take 133,000 m^2)
	Number of employees: more than 18,500
	Number of organizations: 59 companies, including 22 manufacturing 37 servicing companies
	Cooperation with universities: interaction within the development of innovations
	Eligibility criteria: companies engaged in R&D, developing innovative technologies and production are permitted to work in the techno-park
	Services: the techno-park has a business incubator and offers outsourcing services; the companies are also offered simplified taxation procedures and tax incentives
	Business profile: the complex specializes in the creation of electronics, the development of biology, pharmacy, medicine, and also carries out research in the field of physics and optics
	Participation of the state: the techno-park was created to develop innovations, the decisive role in the management belong to the state. A significant part of the techno-park is owned by the management company
12. One-North (*Singapore*)	**Year of foundation:** 2001
	Floor space: 200 hectares (premises take 340,000 m^2)
	Number of employees: more than 3,200
	Cooperation with universities: higher education institutions are of auxiliary importance for the complex
	Eligibility criteria: organization involved in research within physics, biotechnology, R&D are allowed to the complex
	Services: more than 60% of the techno-park facilities are used as laboratories; a number of outsourcing services are provided; it is possible to use the

	simplified tax procedures
	Business profile: the activity of the complex is aimed at the development of science and innovative development of the state in the field of information and communication technologies, medicine and physics
	Participation of the state: the techno-park is state-owned

The analysis of the activity of techno-parks above allowed us to determine that to provide for effective commercialization and large-scale attraction of investors the technology park location should meet the following requirements:

- ✓ the availability of skilled manpower;
- ✓ the presence in universities and other educational and research institutions in the territory;
- ✓ the presence of an international airport and access to rail or water logistics (availability of the transport hub).

We found no direct correlation between the size of the technology park and the success of its activities; however, it is clear that today medium and small industrial parks prevail, and this is primarily connected with the high cost of maintaining a large territory and the infrastructure complexity. Majority of the discussed technological parks are supported by the state. The architectural features of the considered techno-parks can be divided into two types: a structured territory with clear and understandable boundaries, providing a consistent style or, a chaotic type, within which there is no clear zonal division and requirements to the appearance and layout of the buildings. Industrial parks, located on the structured territory, are characterized by a wide range of services of various kinds and more stringent criteria for the admission of organizations as part of the residency.

Nearly every techno-park is a unique system and the peculiarities of their activities should be analyzed in accordance with their mission and key establishment objectives, as well as environmental conditions. Since the main driver of innovation is the development of science-intensive and converging technologies, it is offered to explore the features of techno-park activities in more detail, making emphasis on the lines of research. To this end the features were distinguished that enable the discussed above techno-parks – Lahti Science and Business Park, Lakeside Science and Technology Park, Kulim Hi-Tech Park and One-North – to have high indicators of research and innovation activities (Table 2).

Table 2. *Peculiarities of Techno-park activities influencing the increase in efficiency of high-tech developments*

Techno-park	Techno-park features affecting the research and innovation performance
Lahti Science and Business Park (*Finland*)	1. Admission of companies that have focused their activities on the areas of relevance to the technology park (ecology). 2. Efficient industry-based communication lines – a number of organizations involved in environmental activities are operating in

	the region. 3. The presence of several universities, research centers and libraries in the techno-park. 4. Low cost of renting premises for small innovative enterprises (as compared to the market one). 5. Active cooperation with other technology parks (including foreign ones). 6. Provision of consulting services to the resident companies. 7. Assistance in the search for sources of funding (including the foreign one). 8. Availability of a business incubator and broad ties with the business community.
Kulim Hi-Tech Park (*Malaysia*)	1. The expenses of resident companies on R&D should be not less than 1% of annual sales. 2. Not less than 7% of the resident companies' employees must be scholars or specialists with higher technical education. 3. The products and services of the resident companies must be high-tech. 4. The resident companies should actively cooperate with universities and research organizations. 5. In case of further use of in-house research in the resident company's activities, it should be granted the tax benefit (50%) for capital expenditure for a period of 10 years. 6. In case a resident company creates a completely new development, it is assigned the status of a pioneer and provided tax relief for capital expenditure in the amount of 100% for 10 years. 7. The techno-park is actively supported by grants, resident companies owned by citizens (the Malays), or employing more than 50% of the Malayan citizens. At the same time, according to the laws of Malaysia, every company must employ at least 30% of the Malayan citizens. 8. In the state of Kedah (where the techno-park is located) the rental cost is reduced for the land used for the high-tech production facilities. 9. The available business incubator is a separate structure, the techno-park just rents out the land to it. 10. There is active international cooperation.
Lakeside Science and Technology Park (*Austria*)	1. Admission companies that have focused their activities on the lines of research required for the technology park (in this case, these are information technologies), priority is given to the leading and developed companies. 2. The resident companies are offered a rental discount, as well as venture capital financing opportunities. 3. The techno-park provides resident companies with PR-services (including internet marketing, banner advertising, media relations, etc.), helps in attracting foreign investors, arranges presentations and meetings, provides language support in the framework of international projects (with a discount for the resident companies).

One-North (*Singapore*)	1. Large-scale support of the state bodies regulating scientific activity (Science and Engineering Research Council of the Singapore under the Agency for Science, Technology and Research). 2. Not less than 60% of the leased area should be allocated for research laboratories. 3. Priority for admission is given to the companies that have government support. 7. The resident companies (mostly) are focused on the research rather than on production. 8. There is territorial proximity with the National University of Singapore and active cooperation with universities (including with foreign ones). 9. Provision of incentives and financial support is approved by the Board of Economic Development. 10. There is a business incubator. 11. Laboratories and equipment are available for the resident companies. 12. There is developed infrastructure and availability of space for lectures, meetings, workshops and conferences. 13. There is a strategic focus on the unification of a number of research areas and active international cooperation.

6. Discussion

Based on the material studied it is possible to offer recommendations as part of management, organization of activities and formation of infrastructure of the territories enabling to improve the performance of modern Russian techno-parks aimed at creation and development of science-intensive and innovative technologies.

Firstly, from the viewpoint of *selecting the territory for the technology park* it is recommended: 1) to select the areas with well-developed logistic system and availability of an international airport; 2) to give priority to the areas provided with human resources having higher education and vocational secondary education degrees, who are ready for servicing activities; 3) the existence of developed business structures available for the techno-park would be an asset.

Special tax status of the territory (encouraging science and innovation) would also be an asset, but as practice shows, the availability of the above elements plays a more significant role than the reduction in tax rates.

Secondly, there are certain requirements for admission of the companies to work in the techno-park. These include: 1) matching the company's profile with the business profile of the techno-park; 2) rigid requirements for the ratio of resident companies engaged in developments and other entities (resident companies must make at least 50-70% of the total number of structures); 3) local and regional administrations should have relevant business units to ensure the activities of resident companies

(interaction with customs, territorial and tax issues, etc.) and to promote attraction of new residents to the techno-park; 4) foreign companies must employ Russian specialists.

Thirdly, mandatory institutional elements of industrial park include research and development centers; laboratories and resource centers with the appropriate software and hardware; Universities and structures of additional education and advanced training, including corporate universities or intermediary educational firms providing personnel training; and a business incubator. The practice of organizing a permanent exhibition – a salon or other site where all stakeholders can communicate – gave a good account of itself.

Next, the fourth recommendation is aimed at the technology park infrastructure. In addition to the production component, the social environment is of great importance, including the provision of employees with an affordable and comfortable living space, personal social services, centers for sports and leisure; shopping capacities.

It is also recommended to maintain a uniform architectural style, forming the characteristic appearance of the technology park and the corresponding social space. The Tomsk Technology Park (Tomsk, Western Siberia) can be mentioned as an instance, where the social space is determined by four large and efficient universities, dozens of thousands of research fellows, faculty members and students.

The measures that determine the efficiency of the technology park activities include: a system of key performance indicators encouraging the development of science-intensive projects of organizations, by reducing rental rates and providing additional services; the creation of a system of grants (in the Russian Federation Bortnik State Foundation and Russian Venture Company are engaged in these activities), introduction of a flexible system of lease payments; provision of discounts for techno-park services to the customers of resident companies. International collaboration and communication with other techno-parks and associations of techno-parks, cooperation with research centers and educational institutions, development of relationships with the international business structures are of importance.

7. Conclusion

Modern science-intensive technologies are developing in cycles, but unevenly, therefore, it is required to support flexible and responsive forms of organizational business establishment for the purposes of maintaining the rates of sustainable innovative growth. At the same time innovative entrepreneurship often bears significant risks and its existence requires institutional interaction mechanisms. One of the most effective tools for the development of innovative entrepreneurship is the creation of technology parks.

The analysis of the experience of some foreign institutions helped to formulate recommendations and propose solutions to improve the performance of modern Russian technology parks aimed at creation and development of science-intensive and innovative technologies. Many Russian techno-parks are far behind their international 'colleagues' in terms of in the organization and management, since they continue to exist in the context of the active and direct state protectionist policy. Increase in the share of private equity and venture capital investments, which is an essential prerequisite for the development of technology parks, is only forecasted for the next 5-10 years. Due to the possibility of optimizing and improving the effectiveness of techno-parks activities, the formation of effective management tools, based on international experience has a high potential.

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