Science parks and the regional socio-economic conditions for their development in Russia

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Abstract

Objectives *of the research are science parks and regional circumstances of their development in Russia. Science parks is the driver of an economic growth of the territory and the country since 1960th (Silicon Valley in the USA). There was a fast growth of the amount of science parks in Russia starting from the first park in Tomsk to 179 organizations which have attributes of techno parks in 2015. Nevertheless, the general estimation shows, that the majority of them operates or functions inefficiently and share same issues. . I considered 71 organizations in 30 regions of the Russian Federation, which were identified as technological parks by the Association of cluster and technological parks.* ***Prior work:*** *I used surveys and the methodology of regions grouping, which is used by the Analytical Center for the Government of the Russian Federation. I observed results of a competition between science parks in terms of real effect of their activities. I considered the common issues of science parks in Russia basing on the research of Russian scientists and venture organizations.* ***Approach:*** *The research started from data retrieving of socio-economic indicators with further processing. I observed general problems and compared the conditions and the results of science parks activities.* ***Results:*** *The difference found of the science parks efficiency between the groups of the regions. Approach provided for group mate science parks developing based on the catch-up development principle, with taking into account the general troubles.* ***Implications:*** *The results of the study can be useful for researches and practitioners, working on science parks (technological parks) development topic.* ***Value:*** *The original approach of this research lets consider the development of science parks of the Russian Federation in light of socioeconomic conditions of the regional groups*

Keywords: Innovations, regional groups, technological parks.

1. Introduction

The technological parks history in Russia begins from 1990th, when the Tomsk Technological Park was founded. The State was the exceptional owner of the institution. But, five years later it was reorganized in the open join-stock company "Tomsk International business center - Technopark". Thus, it was first Russian experience in state and private technoparks developing. Furthermore, first of these parks were not successful because of undeveloped policies on the state level by that time. There were no special conditions for the technoparks activities such as: crediting policies, floor space policies, subsidies etc. Moreover there were no defined aims of residents' supporting forms in the earliest technological parks such as: marketing, accounting, advertisement, communications providing, education and other kinds of thechnoparks' directions of activities.

From 1993 to 2000 around 50 technological parks were created in Russia; but, from 2000 to 2006 the amount of them have been decreasing to zero because of undeveloped institutions and a gap of state support forms of regulation.

Probably the new age of technological parks in Russia started in 2004, when the President of the Russian federation Vladimir Putin and the minister of Communication Leonid Reiman visited Bangalor, India. As a result of this visit the Pime Miniter of Russia Mikhail Fradkov has signed the order about foundation of technological parks in Russia in the period from 2006 to 2010. The construction of state supported technological park in Saint-Petersburg began in 2006.

From 2014 the Ministry of Telecom and Mass Communications of the Russian Federation and the Ministry of Industry and Trade of the Russian Federation support science parks in form of subsidies for reimbursement of expenses on creation of infrastructure of industrial parks and technology parks in the framework of the Resolution of the Government of the Russian Federation dated 30 October 2014 No. 1119 "About selecting Federal subjects eligible to receive subsidies for foundation of industrial and scientific parks" . Thus, from 2006 to 2015 the amount of technological parks in Russia grew up to 179 parks. Nowadays, according to the Geographic Information System of the Industrial Parks (GISIP.ru, 2016), there are 115 operating technological parks, 74 are being designed and 34 are indented to be created.

According to the Association of Clusters and Technological Parks (ACTP, 2016, p.6), there are 179 organizations in Russia which have attributes of technological parks. But, it was allocated 71 of them, which are most corresponding to the existing requirements and recommendations. The ACTP approach is taken as a base for this paper, because Association provides the most data about the parks activity for the observing year of 2015. Moreover, there are some uncertainty about technological park attribute, and some of organizations were not defined by the Association because of they didnot match..

Twelve of 71 industrial parks were developed with the support of the Ministry of Telecom and Mass Communications of the Russian Federation in the framework of the complex program "Creation in Russian Federation of Technological Parks in Sphere of High Technologies". Two technological parks were created and two are being created with the support of the Ministry of Economic Development of the Russian Federation in the framework of the subprogram "Development of Small and Medium Entrepreneurship" of the state program of the Russian Federation "Economic Development and Innovative Economy". One technological park is developing under the Federal law "About the innovative centre "SKOLKOVO". Six technological parks are being developed through open contests of "ROSNANO" for the selection of projects of nanotechnology centers in the regions of Russia. Three parks are developed at universities with the support of the Ministry of Education and Science of the Russian Federation. Twenty of the parks are developed under regional programs. Five scientific parks are developed under the public-private partnership, 20 technology parks are developed by private owners.

These 71 technological parks are situated in 30 regions of Russia. The regions are included in regional groups with common characteristics to discover common patterns of a relation between technological parks and regional socio-economic conditions.

There are several methodologies for determining the classes of the region for the purpose of Government management. The synthetic classification of the regions provided by L.Grigoriev, U. Urojaeva and D. Ivanov (Grigoriev, Urojaeva and Ivanov, 2011, p. 34-58) identifies four groups which are included nine types of the regions. This classification is based on regional diversity explained by socio-economic development, the industrial specialization. Four regional classification consists of four groups (Appendix A). Highly Developed group includes Financial Economic Centers (capitals) and Commodity Export-Oriented types of regions. Developed group includes three types such as: With Diversified Economy, Based on Manufacturing Industry, Relying on the Mining Industry. Moderately Developed group includes Industrial and Agricultural and Agricultural and Inustrial types. And, the Less Developed Regions group includes Commodity and Agricultural types of the regions. According to Grigoriev, Urojaeva and Ivanov the every group includes similar level and type of development, characteristics and difficulties regions.

Based on the regional grouping methodology, common characteristics and differences of science parks can be observed in the same group, indicating the level of dependence of the technological parks development of the regional characteristics.

2. The socio-economical conditions of technological parks developing.

Nowadays, there are the second wave of technological parks foundation in Russia. According to ACTP (ACTP, 2016, p.33-36), these 71 technological parks consist (Table 1) of 49 operating parks and 22 parks which are being designed. To observe the socio-economic conditions in which technological parks are developed we used data of the Russian Statistical Service (Rosstat, 2016). To avoid the dependence of lack of data and the number of technological parks, average values based on regional types grouping are used:

Table 1. The technological parks which are observing in prism of socio-economic conditions

The regional group	The regional type	The number of discounted technological parks
Highly Developed Regions	Financial economic centers	26
	Commodity Export-Oriented	6
Developed Regions	With Diversified Economy	18
	Based on Manufacturing Industry	3
	Relying on the Mining Industry	6
Moderately Developed Regions	Industrial and agricultural regions	2
	Agricultural and industrial regions	10
Less developed Regions	Commodity	0
	Agricultural	0

Source: The Association of Clusters and Technological Parks, author's calculations

The sustainable socio-economic development needs appropriate conditions including economical activity. The level of life, possibility of state subsidies and other forms of regional government support depends on the welfare level of the territory. The regional economic activity should be on the high level to provide development conditions . So, regional GDP per capita is taken on the floor as useable indicator for territory attractiveness and general conditions of technological parks activity comparative estimation. According to Rosstat data (Fig. 1. It has been taken 43.5 RUB for one US dollar currency rate as a middle for 2014 to currency conversion), there are quite high average GDP per capita for the Commodity Export-oriented regions from Highly developed group, due to oil and gas producing. That is why every region has a technological park despite of small population. The Financial centers in Highly developed regions group have traditionally high level of regional GDP because of centralized redistribution system existing in Russia, and economical activity catches up the oil and gas taxes flows here. The high value of regional GDP in Commodity Less developed regions to a greater extent due to the extraction of minerals in Chukotka AO, and in Magadan oblast. It means that at this territory is suitable for implementation of the model of technological parks development from Commodity export-oriented Highly developed regions; but, the issue of human capital should be solved here before.

The appropriate human capital at the territory is the other significant factor. The amount of actual human capital is based on working-age population of the region. Fig.2 shows the ratio of working age population to one technological park according to groups and types of regions. The amount of technological parks in Moscow allows to keep the ratio on the best level between all the regional groups – 570 thousand working age people per one technological park.

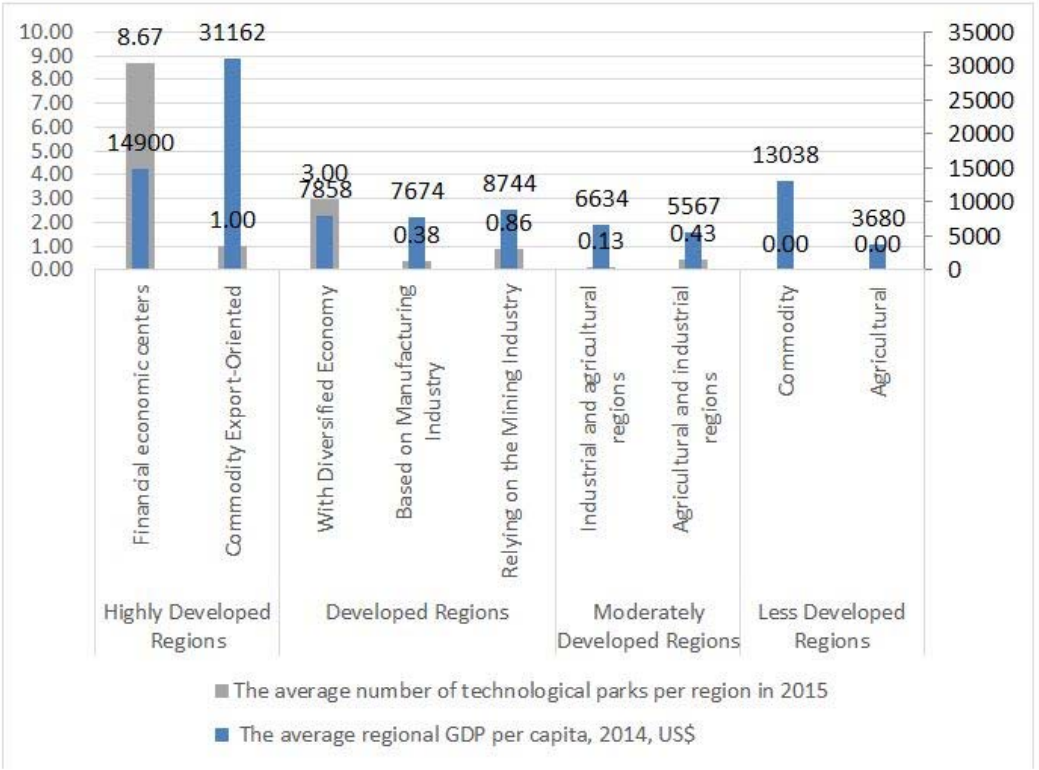

Fig. 1. The average number of technological parks per a region and regional GDP within the regional classification groups.
Source: Rosstat, The Association of Clusters and Technological Parks, author's calculations

The gap of technological parks opportunities in terms of ratio to economically active people is presented in the group of Moderately developed regions. Probably this could be the place for the third wave of the parks foundation in Russia.

The issue of human capital is close to the internal emigration topic. According to Fig.3 such successful region group as Highly developed Commodity export-oriented type is under the negative migration. The most impact on this trend is coming from Komi and Sakha (Yakutia). But, also KhMAO-Yugra and Yamalo-Nenetsk show the same dynamic in less scale. This are westward drift symptoms, which mean the tendency, that Russian population is migrating from Eastern regions (migration zones) to western ones. The donors for Moscow are mostly from European area of the country. For Saint Petersburg it is North-West regions and Eastern regions. The better economic and social conditions lead to increase of attractiveness of these two main cities. There are some other intermediate centers of internal immigration in Russia since 1990th such as: Krasnodarskiy kray, Tatarstan, Belgorodskaya oblast, Kaliningradskaya oblast, Nozhegorodskaya oblast.

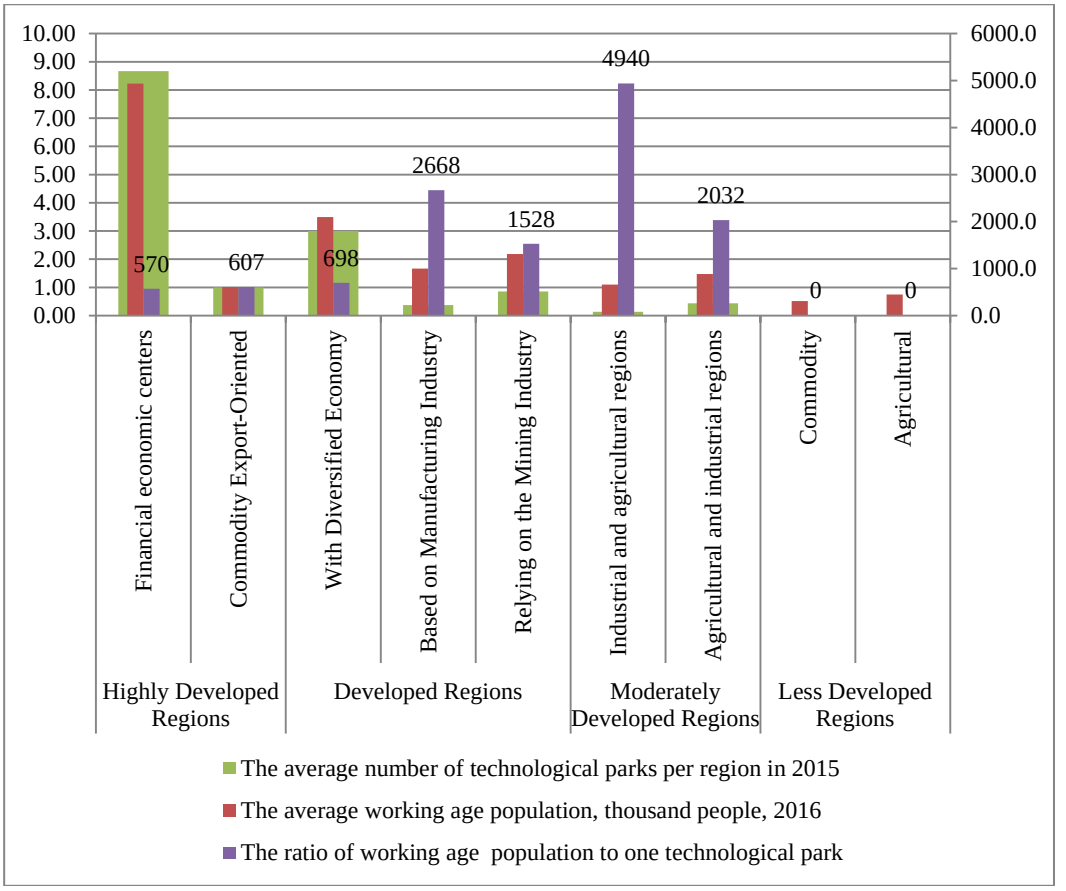

Fig. 2. Working age population and technological parks within the regional classification groups.
Source: Rosstat, the Association of Clusters and Technological Parks, author's calculations

The next factor of technological parks developments and their successful activity is the characteristic of employed in the economy by the level of education. The parks need as high level prepared specialists for R&D as secondary educated people for producing. According to Fig. 4, the Highly developed regions group has more opportunities for fundamental R&D with their attracted intelligent staff; and, the other groups of the regions have a higher predisposition for applied works in general.

The dynamics of the number of technological parks per region changing is almost identical to the dynamic of granted patents within the regional classification. The distribution of state and municipal institutions is also has similar shape. Thus, it can be supposed, that the spread of technological parks around the country is appropriating to educational and scientific possibilities of the regional groups (Fig.5).

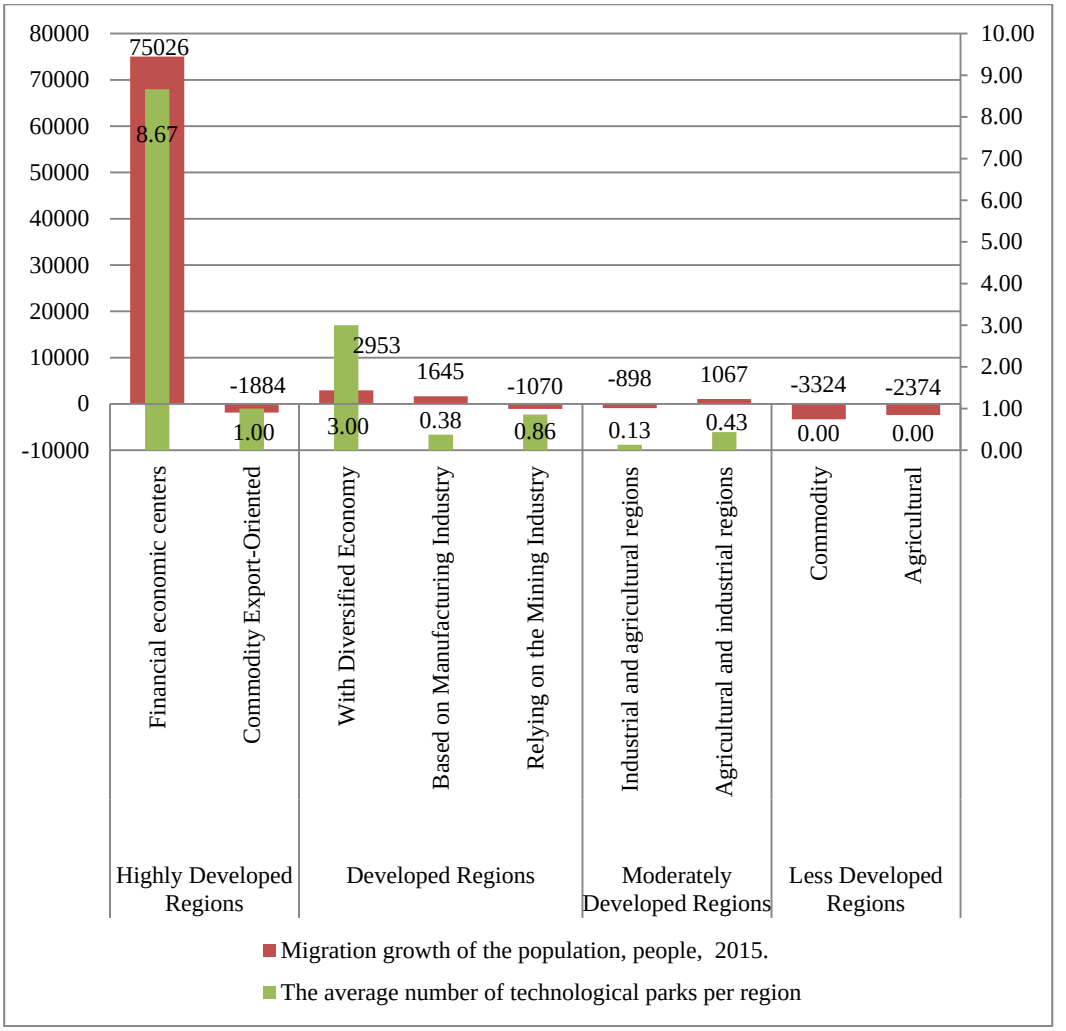

Fig. 3. The migration flow within the regional classification groups.
Source: Rosstat, the Association of Clusters and Technological Parks, author's calculations

To realize innovation activities in the region it is necessary to use results of scientific researches. To attract intelligent staff to the territory there should be attractive salary. Fig. 6 shows the level of financial attractiveness of the regional group in terms of scientists' wages. It has been taken 64 RUB for one US dollar currency rate as a middle for 2015. The picture shows that most attractive conditions in terms of Salary is in the regions - Financial Economic Centers. The dynamics of technological parks per region and salary differs because of other factors, such as: population, infrastructure, level of life, climate etc. For example, Commodity export-oriented regions have small population and comparatively weak infrastructure with transportation issues and discomfort cold climate. So, they have less general attractiveness for the scientists in compare with Moscow or Tatarstan – the regions of two other types around of the classification.

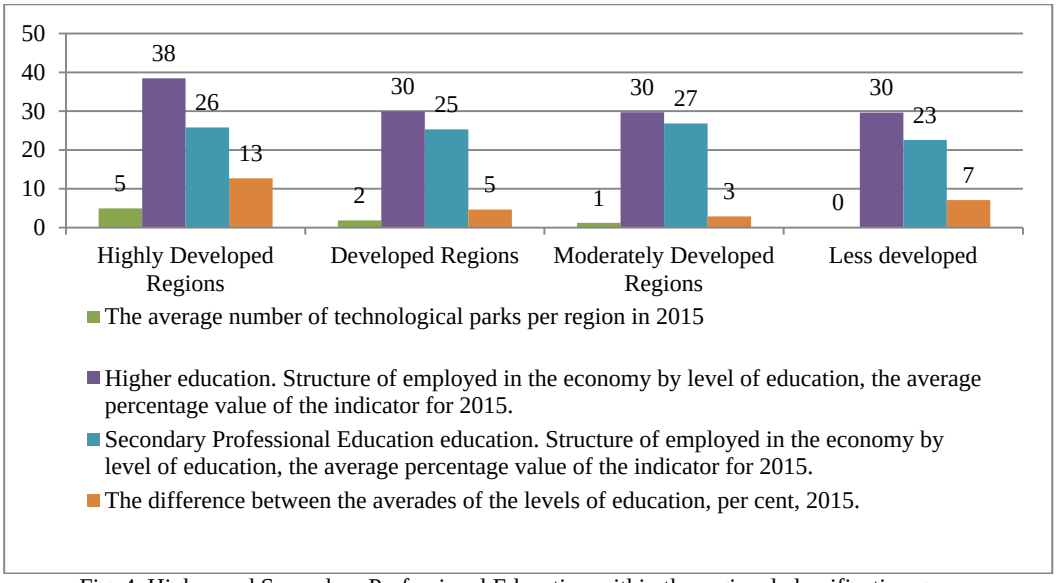

Fig. 4. Higher and Secondary Professional Education within the regional classification groups.
Source: Rosstat, the Association of Clusters and Technological Parks, author's calculations

To account for such factors as health and longevity together with educational level we use human development index for the regions group of the Russian Federation provided by the Analytical center for the Government of the Russian Federation (ACGRF, 2015, p.259). The average Index for all the regions inside the grouping is being used, not only the regions where technological parks are situated (Fig. 7). So, the dynamic of changing amount of technological parks between the groups is appreciated to the dynamic of changing Human development index. Exception is the Commodity export-oriented regions the specifics of which were discussed earlier. Thus, it can be the attribute of harmonious technological parks developing.

Having observer Fig.8 and Fig. 9 it could be concluded that the regional GDP changing between the groups of regions significantly exceeds the changing of monthly wages. The low changes of salary despite the worse economical situation could be explained by the policy of balancing the budget (centralized redistribution policy) providing by Russian Government. This approach lets high skilled labor remain in the regions and also reduces the negative internal migration flows to the center. This approach makes possible to keep a highly skilled workforce in the regions.

It can be concluded, that the development of technology parks is carried out systematically, and relatively balanced. However, there are such negative factors as regional disparities, negative internal migration, factors uncomfortable areas, etc. At the same time, Russian regions have the potential for the development of technoparks taking into account the relevant socio-economic conditions.

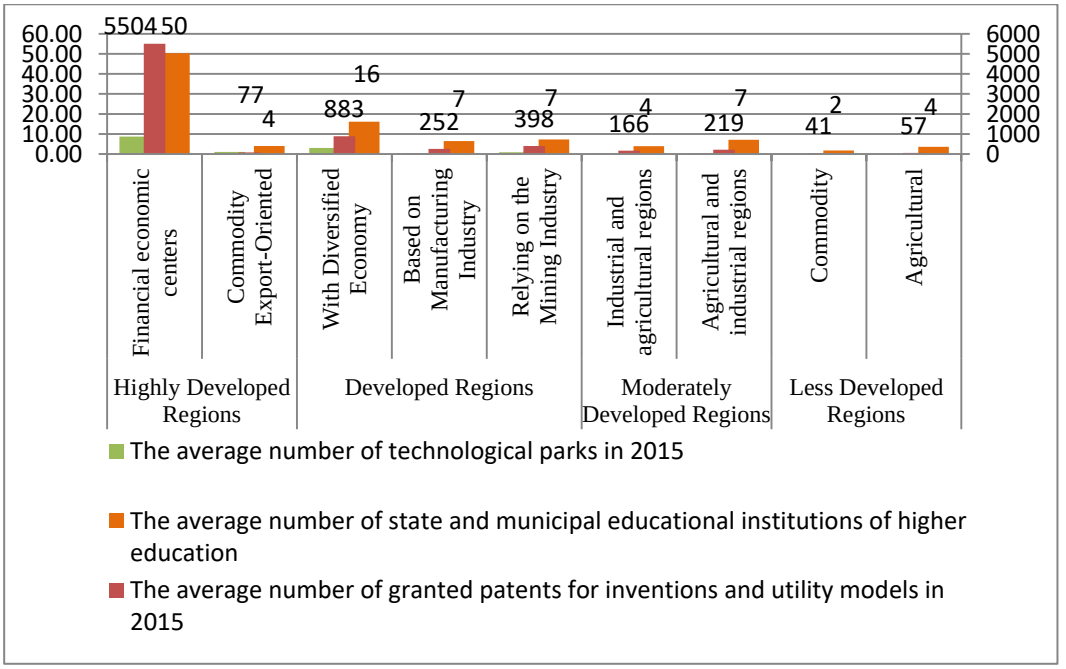

Fig. 5. The educational institutions and granted patents distribution.
Source: Rosstat, the Association of Clusters and Technological Parks, author's calculations

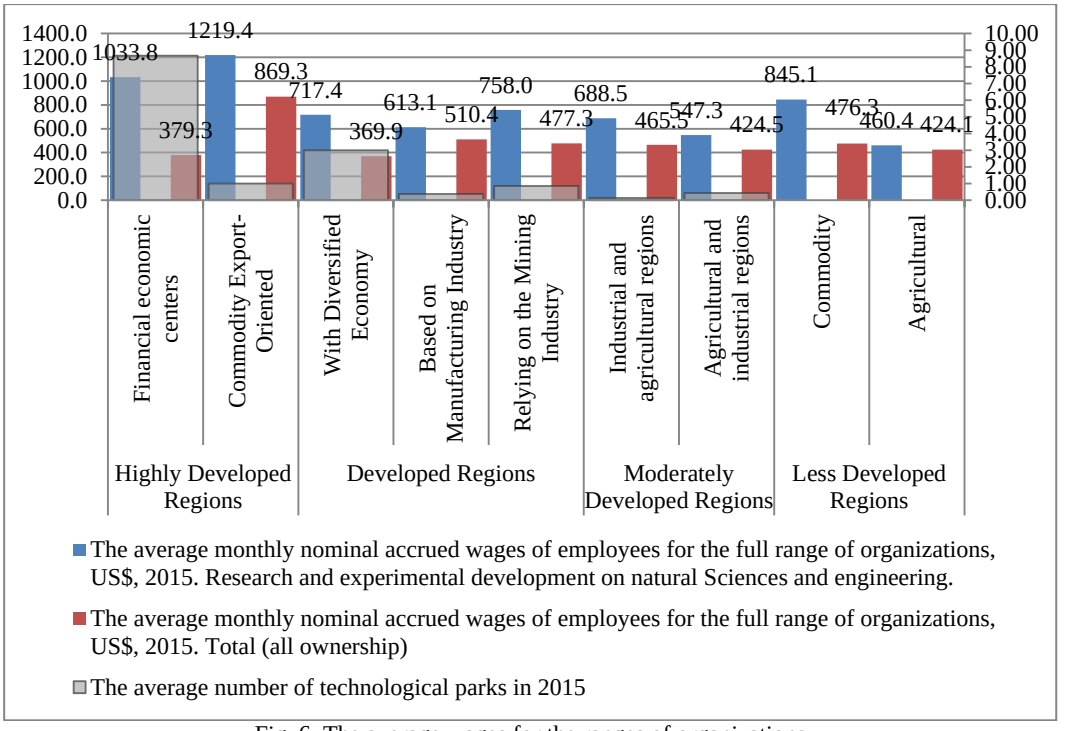

Fig. 6. The average wages for the ranges of organizations.
Source: Rosstat, the Association of Clusters and Technological Parks, author's calculations

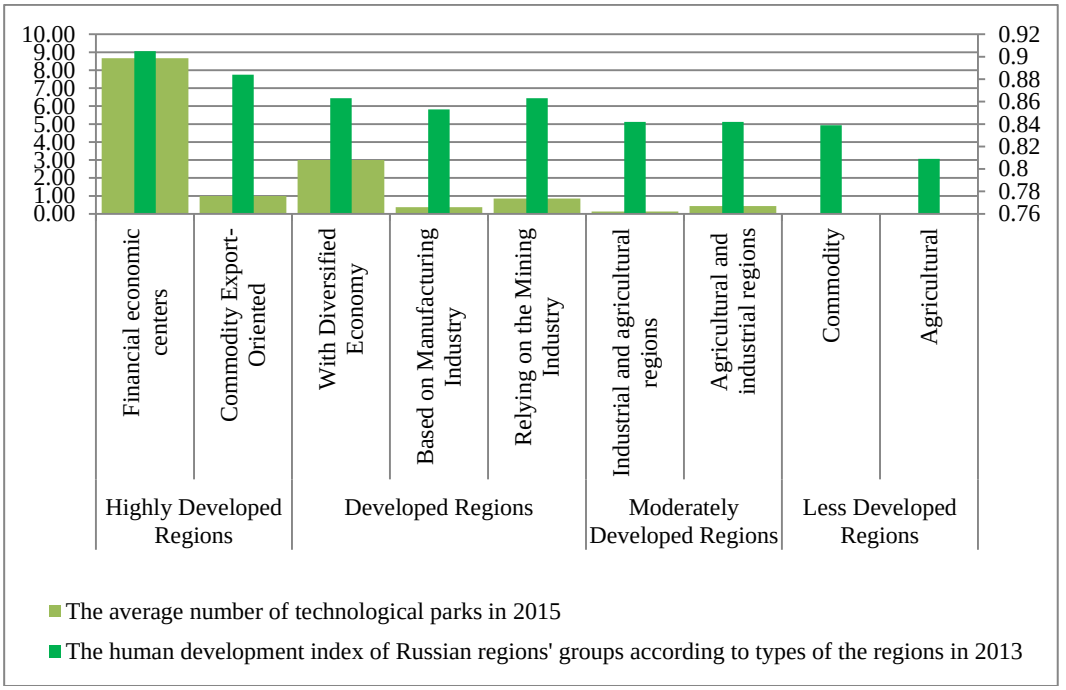

Fig. 7. The average wages for the ranges of organizations.
Source: The Analytical center for the Government of the Russian Federation, the Association of Clusters and Technological Parks, author's calculations

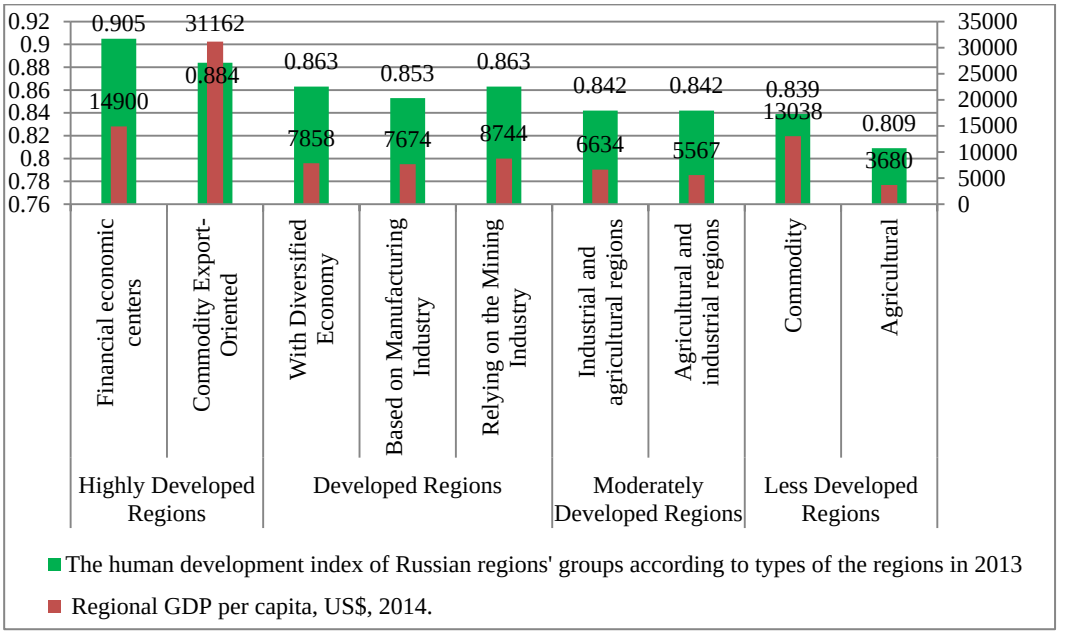

Fig. 8. Regional GDP changing between the groups of the regions.
Source: Rosstat, author's calculations

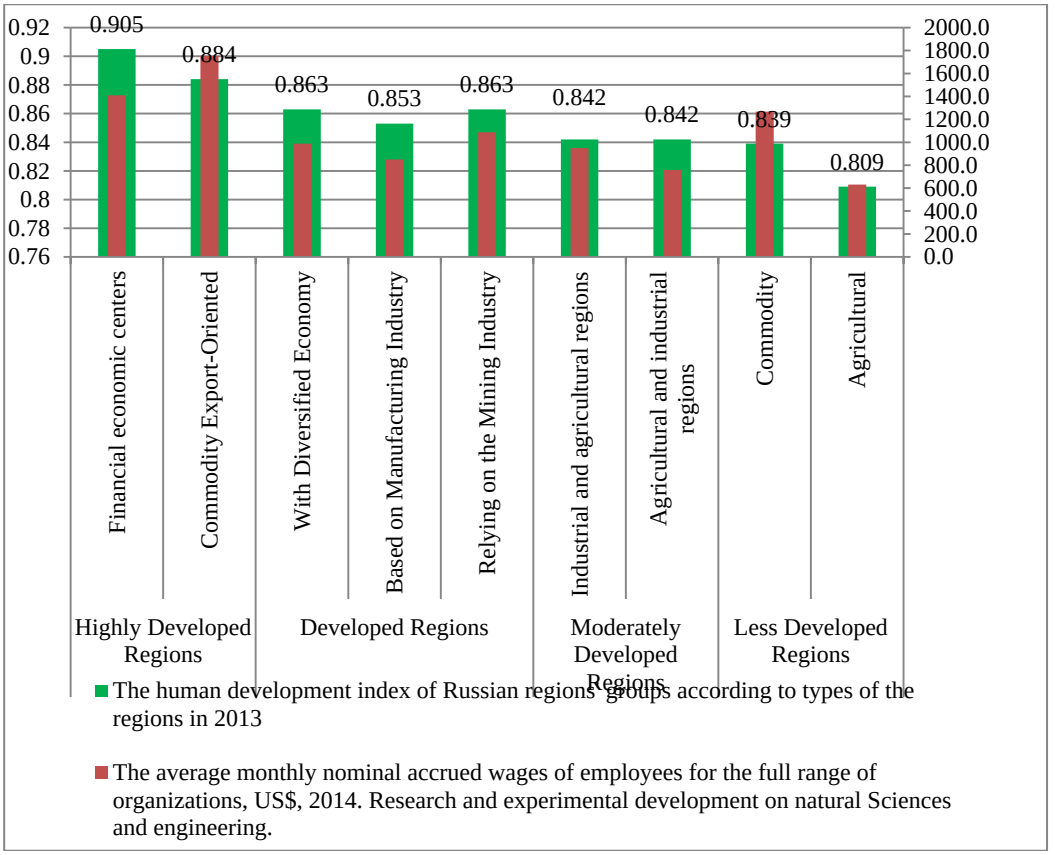

Fig. 9. The average monthly nominal accrued wages changing between the groups of the regions.
Source: Rosstat, author's calculations

3. The results of the technological parks activities.

There are many criteria of technological parks estimation could be observed potentially. The most important of them is job places providing and creation, tax generation, total revenue generation. Based on the existent data this section is concentrated on total revenue, job place providing and financial output per employee. To observe these criteria we used the characteristics of 39 income generation technological parks within the groups as it showed in Table 2. To avoid the dependence of lack of data and the number of objects average values based on regional types grouping were used.

Table 2. Observing income generation technological parks

The regional group	The regional type	The number of discounted technological parks
Highly Developed Regions	Financial economic centers	13
	Commodity Export-Oriented	4
Developed Regions	With Diversified Economy	9
	Based on Manufacturing Industry	1
	Relying on the Mining Industry	4
Moderately Developed Regions	Industrial and agricultural regions	1
	Agricultural and industrial regions	7

Less developed Regions	Commodity	0
	Agricultural	0

Source: The Association of Clusters and Technological Parks, author's calculations

The total income and the labor efficiency is highest in the developed group of regions with diversified economy. One employee can generate in average sixty thousand dollars income in prices of 2014 (Fig. 10). It has been taken 43.5 RUB for one US dollar currency rate as a middle for 2014. The first place in terms of total revenue can be explained by the strongest industrial regions in this group. Thus, Sverdlovsk oblast is the biggest manufacture region, Novosibirsk is the science center of Siberia and Tatarstan is one of the most developed regions where it is possible to extract oil and grow talents in ITC. Also there are some old Technological parks such as: Innovation-technological center "KNIAT" (since 1997) in Tatarstan and Innovation-technological center "Academical" (since 1998) in Sverdlovsk oblast. But, the main part of revenue came from Academpark the Technopark of Novosibirsk Akademgorodok (since 2007) and Tatarstan's Technopolis "Khimgrad" (since 2007). The third and the second places of total revenue are occupied by the technological parks from the region of Commodity export-oriented type Highly developed group. It could be explained by developed and commodity oriented residents; thus, one of the residents of High Technology Park of KhMAO-Ugra is Schlumberger (High technology park, 2016).

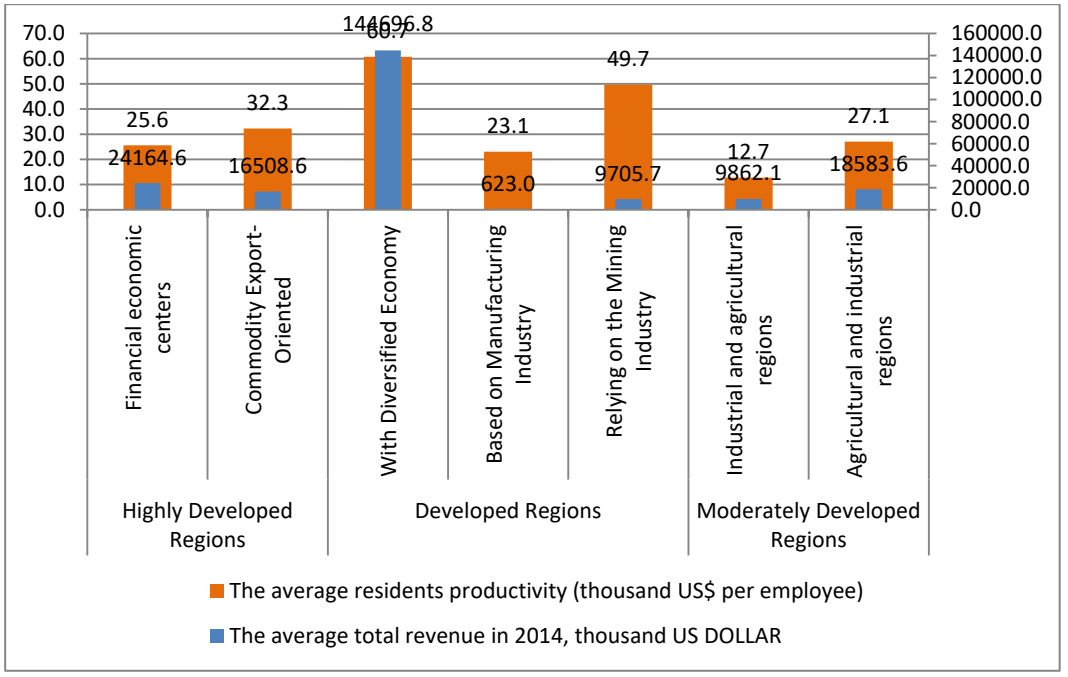

Fig. 10. Comparison of the average residents' productivity and the total revenue of the technological parks within the classification groups.
Source: The Association of Clusters and Technological Parks, author's calculations

High productivity of the developed regions which are relying on the mining industry could be explained by big human resources potential in the regions. For example, Krasnoyarsk region is big steel manufacturing center and Tomsk oblast which is historically the territory of universities.. Furthermore, the biggest influence on residents' productivity the "Kuzbass Technopark" introduced. Thus it includes 43 residents with 338 job places and has generated 1546 MLN RUB (around 23.8 MLN US$) revenue in 2014. There is no report on the organization's website since 2010, but the technological parks are concentrated in the innovation in the coal industry, that helps to achieve the results.

Nowadays strong technological parks just appeared in Russia, like the "Phystechpark" in Moscow, where high potential and strong links exist between Government, science and business. Thus, the income situation would be quite different next years.

In terms of job placing providing and creation the Fig. 11 shows the average number of residents and their employees of the technological parks generating outcome within the region's classification.

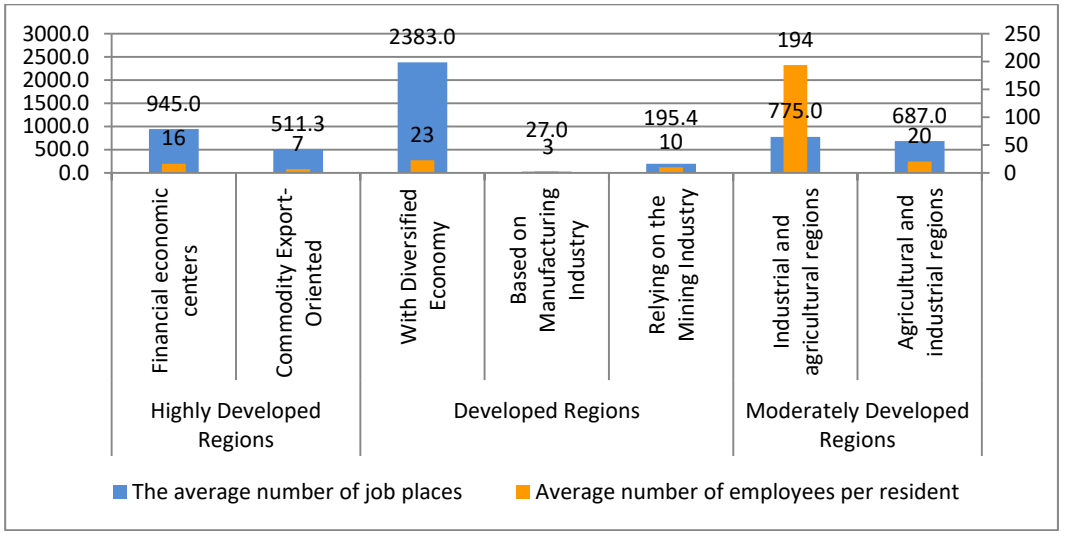

Fig. 11. Comparison of the average number of job places and the average number of employees per resident of the technological parks within the classification groups.
Source: The Association of Clusters and Technological Parks, author's calculations

We can see that the technological parks which belong to two types of regions within the Developed group are providing less than 500 job places and small residents are dominating there. The technological park from Industrial and agricultural region type hasthe biggest number of residents incountry in terms of job places. Thus, the technological park "Iksel" has four residents who are concentrated on climate control equipment and have 775 employees. The regions with diversified economy generate the

most amount of job places with 23 employee average number of staff; and, this regions generate the most total revenue.

Financial and economic centers types of regions, developed regions with diversified economy and have a trend to develop not big residents; and, this approach looks like more profitable and efficient nowadays.

4. Common issues of technological parks.

The issue of criteria determination is put on the floor. Many of criteria of technological parks activity don't show their aim and lead to perfunctory focus of their job and lack of result in some cases.

There are frequent indicators such as the number of residents in technological park. The desire to achieve criteria like this leads to competition decreasing between the potential residents.

No competition between the potential resident leads to decreasing of the quality of business, spreading of a park activity among inefficient efforts with weak teams and projects. A lot of technological parks are going to collect all of parks intending to become a resident.. But there is no straight dependence of income on the number of the residents (Fig. 12).

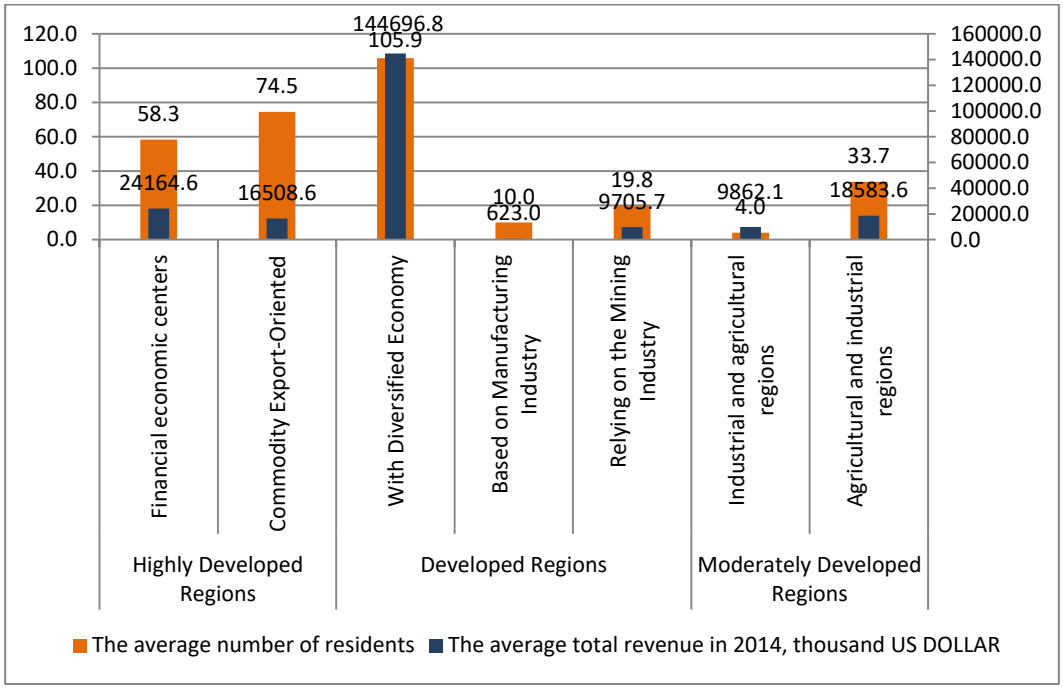

Fig. 12 Comparison of the average number of residents and average total revenue of technological parks.
Source: The Association of Clusters and Technological Parks, author's calculations

The other issue of current technological park is difficulty to overcome early stages of the innovative business developing. One of the reason, for instance, is a low quality of a residents and it's project.. The other one is a lack of startups acceleration and primary support. The acceleration often can be substituted for training or business training. But, given the fact that a lot of technological parks have state ownership (at least, twenty the parks in current considering sample); and, the management is oriented on pro state aims and behavior, not on business approach. Furthermore, in any case, it is quite important to test the ideas, plans, usability etc of the residents' business by successful businessman, experienced mentors, professional ventures. By the way, residents become more ready for the market and business development through this hard training. There are several accelerators, ventures, co working, crowd funding platforms as domestic as foreign in the Russian Federation. For example, Numa, The Fund of Internet Initiatives developing, EVA Academy, Tech, Planeta.ru etc. This innovative business infrastructure should be used by technological parks to develop their residents. It can help residents with good (passed through mentors) projects to overcome the barrier on the pre seed and seed stages, because of majority of the projects stop on it forever. But, many of the existent parks don't use these opportunities. Those, who plan to use available support were just founded (for example, 'Phystech'). Other issues can include the creative atmosphere organization. Thus, the open communication space should be presented in technological park. This is the place where is formed the creative broth in which the molecules then are born of innovative ideas and projects. The closed office rooms without communications to limit the diffusion of knowledge and creativity.

According to Russian Venture Company and Ernst & Young research (RVC, EY, 2014), there were identified the following problems, which are still actual: technological parks' equipment downtime, lack of communication space, bad quality infrastructure in terms of PCs, shortage of industrial premises, lack of understanding of demand on innovative products, information asymmetry in niches topics and investors interests, lack of investors activity in the regions (concentration on Moscow), the lack of a unified and valid performance indicators and aims of technological parks activity, etc.

Thus, the problems of technological parks have as global as routine character; and, it is possible to solve them.

Conclusion

The development of technology parks is carried out systematically, and relatively balanced. However, there are such negative factors as regional disparities, negative internal migration, factors uncomfortable areas, etc.

The policy of balancing the budget (centralized redistribution policy) providing by Russian Government makes possible to keep a highly skilled workforce in the regions.

Financial and economic centers types of regions, developed regions with diversified economy have a trend to develop technological parks with not big residents; and, this approach looks like more profitable and efficient nowadays.

Despite the Highly developed region's leadership in terms of average socio-economic characteristics such as: GDP per capita, Monthly nominal accrued wages, Positive migration flow, Human development index etc., the Developed regions have the best average values of the results of activity such as: job places provided, total revenue, residents productivity. Thus, the common issues were solved there more efficiently and in greater volume. Furthermore, there are the potential for the development of technological parks with taking into account the relevant socio-economic conditions and approaches Russian regions.

The report is designed with a number of assumptions and it is not a source of accurate claims. However, here the proposed approach for the review of individual issues of activities of technological parks uniting socio-economic indicators, results, and routine, but important technological park's working aspects.

Acknowledgements

I want to express my gratitude to my colleague Maria Rezanova, the Head of PR division of Ugra Research Institute of Information Technologies for the supporting on this paper working; to Vasiliy Dudnichenko, the First deputy director of the Department of economical development of Khanty-Mansiysk autonomous okrug – Ugra for the wise advice; to Yuriy Reutov, the Director of the Technological park of Hi Technologies of Khanty-Mansiysk autonomous okrug – Ugra, to Ekaterina Eliseeva and Alexander Vehorev - the top managers of "Phystechpark" for the useful interview and feedback; and to Alexander Helvas from Moscow Physico-Technology Institute for the supporting in general; and, to Catalin Vrabie, a PhD of the National School of Political and Administrative Studies of Bukarest for the kindly assistance.

Appendix A. Classification of Regions in the Russian Federation

Group of Regions	Type of Regions	The Name of a Region
Highly Developed Regions	Financial economic centers	Moscow, St-Petersburg, Moscow oblast
	Commodity Export-Oriented	Komi republic, Sakha (Yakutia), Sakhalin oblast, Tumen oblast, Khanty-Mansiysk AO - Ugra, Yamal Nenetsk AO
Developed Regions	With Diversified Economy	Tatarstan republic, Nizhniy Novgorod oblast, Novosibirsk oblast, Rostov oblast, Samara oblast, Sverdlovsk oblast
	Based on Manufacturing Industry	Volgograd oblast, Irkutsk oblast, Leningrad oblast, Lipetsk oblast, Novgorod oblast, Omsk oblast, Chelyabinsk oblast, Yaroslavl oblast
	Relying on the Mining Industry	Bashkortostan republic, Belgorod oblast, Kemerovo oblast, Murmansk oblast, Tomsk oblast , Krasnoyarsk krai, Perm krai

Moderately Developed Regions	Industrial and agricultural regions	Karelia republic, Khakassia republic, Udmurtia republic, Primorsky krai, Khabarovsk krai, Arkhangelsk oblast, Vladimir oblast, Ivanovo oblast, Kaliningrad oblast, Kaluga oblast, Kostroma oblast, Ryazan oblast, Smolensk oblast, Tver oblast, Tula oblast
	Agricultural and industrial regions	Buryatia republic, Mari El republic, Mordovia republic, North Ossetia-Alania republic, Chuvashia republic, Altai krai, Kamchatka krai, Krasnodar krai, Stavropol krai, Astrakhan oblast, Bryansk oblast, Volgograd oblast, Voronezh oblast, Kirov oblast, Kurgan oblast, Kursk oblast, Orenburg oblast, Orel oblast, Penza oblast, Pskov oblast, Saratov oblast, Tambov oblast, Ulyanovsk oblast
Less Developed Regions	Commodity	Zabaikalsky krai, Amur oblast, Magadan oblast, Chukotka AO, Nentski AO
	Agricultural	Adigea republic, Altai republic, Dagestan republic, Ingushetia republic, Kabardino-Balkaria republic, Kalmikia republic, Karachaevo-Cherkessia republic, Tiva republic, Chechnya republic, Jewish AO

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