

Analysis of Investment Activity in the Russian Intellectual Property Market

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Abstract. The article analyses the current investment problems in the intellectual property market in Russia. Global experience of investing in an intellectual product is reviewed. The statistics of investment activity in the market of intellectual property of Russia is observed, the correlation analysis of investment policy influence on patent activity is done.

1. Introduction

The strategy of long-term development of the Russian Federation is based on the innovative growth of the economy and IP market development. In modern conditions of Russia's development, the economic growth and its qualitative changes are possible, first of all, through the introduction of an innovative intellectual product. According to most modern researchers, it is the national innovation system, viewed as a set of scientific and technological achievements and institutional policies, that will be a key factor in the growth of economies in the near future [1-7].

Russia still faces the urgent problem of searching and attracting of large-scale domestic and foreign investments in knowledge-based industries, as well as the formation of a clear mechanism for improving competitiveness, protection, and, as a consequence, the investment attractiveness of Russian intellectual property in the world market.

Unfortunately, today Russia is playing catch-up in the IP world market, that is why it's of utmost importance to choose the most optimal S&T development strategies together with the production of new knowledge.

2. Methodology

The scientific works of Russian and foreign researchers studying the problems of investment activity in the field of intellectual property, intangible assets of enterprises and knowledge economy provided basis for this research. The author uses methods of statistical, system, retrospective, comparative, correlation and logical analysis. The official data of the Federal State Statistics Service of the Russian Federation, reports of the Center for Strategic Research, statistics of the World Bank and the IMF served as the statistical base of the study.

3. Institutional features

The process of the intellectual property market formation in Russia faces significant hurdles, while Western countries have a long-standing experience of patenting any product of intellectual labor, for which the owner receives a decent remuneration. Moreover, the state guarantees the legal protection of

the inventor and ensures strict compliance with the terms and procedures of purchase and use of the patent by interested natural and legal persons. As of today, in Russia these mechanisms are not fully developed, which does not contribute to the private investment flows necessary to address the research activities, nor does it encourage the rapid growth of patent activity.

Analysis of the world practice, reflecting the dynamics of patent applications over the past 30 years, gives grounds to conclude that Russia is lagging behind the leading countries [8]. Since the early 2000s, China and the Republic of Korea have demonstrated a strong growth in patent activity, the United States of America has continued to move forward, the European Union has shown steady growth. Against the background of the top five leaders, the indicators of the Russian Federation are a failure. In 2018 the applicants in Russia filed IP patent applications 27.3 times less than those in China, 15 times less than those in the USA, 8.2 times than those in Japan, 5 times less if compare with patent applications situation in the Republic of Korea, and 3.9 times less to compare it with the EU countries!

It should be noted that the small number of filed patents does not indicate a low level of effectiveness of Russian science. The country has not yet developed a modern intellectual property market. Scientific institutions, being the property of the state, legally reserve the right of ownership to scientific breakthroughs and inventions made by their scientific staff. That's mainly the reason why the innovators feel indifferent to reserve IP rights in the form of a patent, as it does not bring significant economic benefits to Russian scientists. Table 1 shows poor activity of scientists in intellectual property patenting process.

Table 1. Patent activity of specific categories of economic entities in 2018 [9].

Economic entity	Number of submitted patent applications, pcs	Percent-age of total number, %	Number of obtained patents, pcs	Percent-age of total number, %
Universities	6199	23,2	3 292	15,7
Research Institutions	2 634	9,9	2 028	9,7
Entrepreneurs (individual entrepreneurs (IE) are not included)	6 111	22,9	6 504	30,9
IE and natural persons	11 570	43,4	9 050	43,0
Other categories	157	0,6	138	0,7
In total	26 671	100	21 012	100

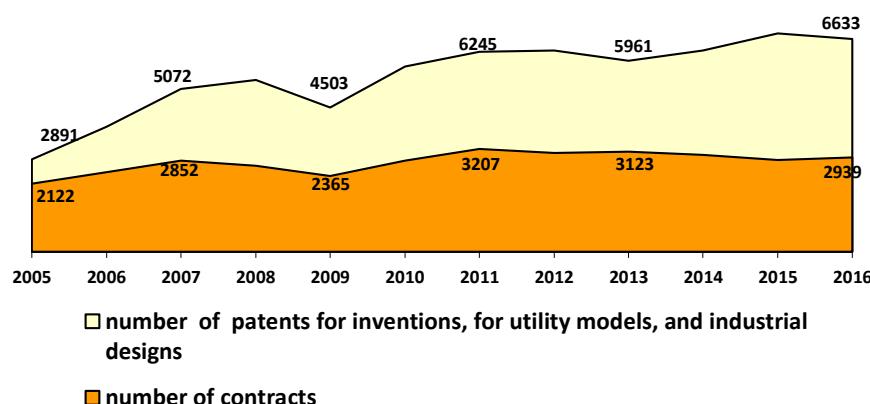
Based on the data in the table 1, we can argue that entrepreneurs and other natural persons, who account for more than 70% of all applications, are the most active in patents registration. They are interested in obtaining the economic effect from the introduction of scientific discoveries into the process of production and the conversion of a scientific product into an object of market relations. The share of universities and research institutes accounts for slightly more than 25% of all patent activity in Russia, which is certainly an insignificant share. Another important fact should be particularly underlined: less than 22% of innovations tend to be brought up to the condition of the utility model and the industrial design, which demonstrates a low degree of their introduction.

Patent activity of research and educational institutions of Russia is even less optimistic (table 2).

In addition to quantitative indicators of registration of rights to the results of intellectual activity (RIA), an important parameter is their quality, expressed in their commercialization. In particular, the dynamics of transactions with RIA objects over the past 10 years shows that their commercial attractiveness in the domestic market is going down, or they are used solely in the interests of the author of RIA (Fig. 1).

Table 2. Patent activity of Russian enterprises abroad for 2018 [9].

Economic entity	Number of patients	% percentage of total number of patents
Universities	16	1,5
Research institutions	24	2,3
Entrepreneurs (without IP)	481	45,4
IP and natural individuals	539	50,8
In total	1060	100

**Figure 1.** RIA as the results of transactions in the domestic market. [10].

When we speak about Russian scientists' opportunities to create and increase RIA, it is important to point out the factors that directly affect the effectiveness of scientific and educational institutions in the intellectual property market; these include: the amount of funding, highly qualified scientific personnel, modern infrastructure, resources and facilities.

Today we can point out as the current trend of redistribution of innovation infrastructure between research institutions and universities a pronounced shift towards an increasing activity of universities. The Decree of the President of the Russian Federation № 1448 dated 07 October 2008 on establishing of such type of institutions of higher education as the National Research University speaks in favor of this tendency [11]. The pilot program for the establishment of National Research Universities is targeting to set up the scientific and educational infrastructure which allows to integrate the process of scientific research directly into the educational process in order to involve academic students in scientific activities during their university studies. As at 2018, a total of 29 National Research Universities are functioning in Russia.

The initiative to establish National Research Universities is largely congruent with the global trend of moving the basic scientific infrastructure to universities. The next logical step in the creation of innovative infrastructure of universities is the formation of so-called business parks (technoparks) on the basis of universities, that help to attract investment from private business in the research activities of educational institutions. Although today there are more than 115 technoparks in Russia, this does not allow to fully solve such a problem as the lack of real long-term practice of commercialization of intellectual property. This shows the low efficiency of technoparks in Russia, if compared with business parks in Europe and the United States.

Thus, in the United States the first Technopark appeared at Stanford University in 1951, the main goal of its creation was to attract companies conducting a large-scale research policy in the field of high technologies. Today there are more than 150 companies in the Park, which provide more than 23,000 jobs. The fundamental difference of technoparks in economically developed countries is a deep

integration of research institutions in the business processes of resident companies. Technoparks not only provide the infrastructure and institutional environment for the formation of intellectual property in their territory, but also participate financially in the creation of innovative enterprises. Thus, with the participation of the Massachusetts Institute of Technology, more than 150 companies are created annually, among them are such today's market leaders as Hewlett-Packard, Digital Equipment Corp., Rockwell International, Texas Instruments Inc., Intel Corp., National Semiconductor and others.

The policy of technoparks, created on the basis of the leading universities of the USA and Europe, is aimed at increasing the intellectual potential of society and is determined by the following priorities:

- targeted patent policy: the results of intellectual activity patenting is churned out, its full legal and commercial support is provided, as well as the protection of the patent holder interests in terms of RIA protection (by the way, it should be said that in Russia in addition to significant legal and procedural gaps in protection of RIA, there are no regulations and traditions in the sphere of patenting in general, and legal protection of uniqueness of the patent is almost completely transferred to the patent holder);

- careful and attentive patent selection: each new development is subject to transparent and clear expert selection procedure, companies must constantly confirm the accreditation of the resident, conducting large-scale scientific activities;

- careful monitoring and assistance in the implementation of RIA created by staff members and students of universities: all developments made through the activities carried out by universities are recognized as their property, and a separate license is issued for their commercial implementation;

- startup financing: the principle of startups co-financing allows to implement most of the RIA in the form of a finished market product, and the size of investments rarely exceeds 12-15% of the startup capital of the company.

This allows not only to provide financial assistance to promising projects, but also to ensure the administrative and economic activities of technoparks through dividends received from profitable startups.

The implementation of such measures in Russian universities, if to take into account the current level of administrative and economic activity of scientific and educational institutions, undoubtedly requires significant initial investments from the state budget.

The human factor is fundamental for the creation of RIA and the formation of a competitive scientific and educational enterprise. However, today employee problem is one of the most challenging issues for scientific and educational institutions of Russia. In particular, the proportion of the population engaged in scientific activities has been steadily declining over the past 15 years (Fig. 2).

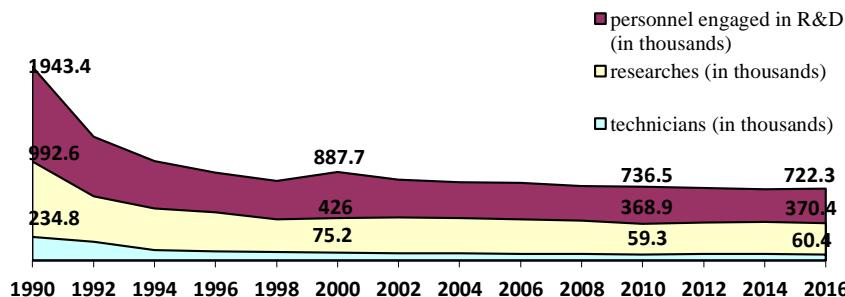


Figure 2. The proportion of the population engaged in research and development (R&D), thousand people. [10].

Although over the past 6 years the rate of staff turnover in science-intensive industries and universities has been reduced, it is still difficult to get young professionals involved in academic research. The decline in the prestige of the academic and teaching profession in the 1990s and 2000s played a major role in this process. At present, increased interest the academic profession has received is a slight but positive tendency. Thus, according to the monitoring of innovative behavior of the population for the period 2003-2017, conducted by the National Research University Higher School of Eco-

nomics (NRU HSE), in Russia a career in science is the choice of about 30% of the respondents, while in the USA and Israel interest in scientific activity demonstrate about 80% of the interviewees.

The data of the Federal State Statistics Service of the Russian Federation reveal the ageing of scientific and teaching personnel: the median age of the Candidate of Sciences is 51 years, and the Doctor of Sciences is 63 years. There has been a steady decrease in the number of staff with candidate and doctoral degrees (table 3); for the period from 1990 to 2017, the number of personnel with candidate and doctoral degrees decreased by 1.3 times, which account today for about 30% of the total number of research staff.

Table 3. Indicators of postgraduate and doctoral studies in 2012-2017, (pers.) [12]

Indicator	2012	2013	2014	2015	2016	2017
Enrolled in postgraduate course for candidate degree	45556	38971	32961	31647	26241	26081
Completed postgraduate course for candidate degree	35162	34733	28273	25826	25992	18069
incl. those who presented their theses	9195	8979	5189	4651	3730	2320
Enrolled in doctoral course	1632	1582	166	419	397	439
Completed doctoral course	1371	1356	1359	1386	1346	253
incl. those who presented their theses	394	323	231	181	151	65

As of today, net exports (the value of a country's total exports minus the value of its total imports) of intellectual property in Russia is a negative value of minus 1.22 billion US dollars. This negative indicator became equal to the indicator of intellectual property export by Russia, which in 2016, according to the Federal State Statistics Service of the Russian Federation, amounted to 1.27 billion US dollars. It only proves that there is a want of competitive developments made within the country.

The fundamental changes started in higher education and science in 2013, of course, give their positive results:

- the funding for researches has been increased,
- material and technical base of universities and research institutions is updated,
- new centers of collective use of scientific and industrial infrastructure are opened, currently there are more than 500 of them,
- unique facilities and technological stations are put into operation.

But, unfortunately, a number of very important problems remain unresolved, the issues which are no less, and perhaps even more important and painful for serious changes in the production of intellectual product. The main generator of RIA is scientific personnel, but at the moment the statistics paint a bleak picture of their activity. One can only hope that the tough personnel policy pursued today by the higher school and the Russian Academy of Sciences will raise the prestige of the scientist and teaching profession and will help the process of rejuvenation of scientific workers.

To break through to the level of world leaders, Russia must significantly increase public spending on training and retraining of scientific staff, to find funds for the development of scientific exchanges and business trips, for the acquisition of the up-to-date scientific literature, including the latest foreign literature, for the organization and holding of large-scale academic conferences and forums to facilitate the exchange of results and the establishment of scientific contacts.

It is necessary to use the experience of the leading countries in the integration of scientific and university creative teams to the real sector of the economy, to reduce to a minimum the time of exchang-

ing scientific discoveries between academia and industry, to use for these purposes the experience of technoparks.

It is important to solve the problem of registration of RIA. It is necessary for educational and research institutions to pursue a policy of encouraging and stimulating those researchers who work effectively on the registration of intellectual property, the policy of administrative measures for registration of intellectual properties, as well as their implementation and commercialization.

Russian science is on the verge of major changes that can significantly strengthen Russia's position in the international IP and innovation market. However, for Russia this is not an easy way to pass in hard economic times. The state should make such institutional changes that will help to transform the accumulated scientific potential of the country into the system for generating innovations and intellectual property, so that modern Russia is able to compete with the leaders of this industry on the world stage.

Undoubtedly, the commercial attractiveness of RIA, created by scientists of universities and research institutions both in the domestic market and abroad, remains important in this situation. In this light, the strengthening of cooperation between scientific institutions, universities and commercial structures in the development and promotion of innovations is particularly relevant.

4. Features of innovation activity

Analyzing the world statistics reflecting the structure of investments of developed countries [13-17], we can confidently say that the share of investments in intellectual property and intellectual property results (hereinafter – RIA) has been growing steadily over the past 20 years. In particular, the share of investments in RIA in the United States is approaching 30% of the total investing, while the share of investments in fixed assets has fallen from 75 to 62% over the past 20 years. A similar pattern is observed in European countries, where the share of investment in RIA constitutes 25% of the gross investment.

At the same time, Russian statistics indicate a fairly conservative investment situation: today in Russia the share of investment in fixed assets accounts for more than 97% of the gross investment, while investment in RIA is only about 2%. Although this indicator in the Russian Federation shows a positive momentum, it could be stated that the investment policy in knowledge-based economy lag far behind the global trends (table 1).

Table 4. Structure of investments in non-financial assets in Russia.

	Investment in fixed assets, billion RUB.	% of gross investment	Investment in intellectual properties, billion RUB.	% of gross investment	% of the investment, of which R&D investment, billion RUB.
2000	1165,2	98,4	17,76	1,5	3,6*
2005	3611,1	98,2	29,42	0,8	5,88*
2010	9152,1	98,7	37,09	0,4	7,418*
2013	13450,2	98,7	129,07	0,95	30,88
2014	13902,6	98,6	204,37	1,45	42,11
2015	13897,2	98,7	251,74	1,79	45,95
2016	14639,8	97,7	343,22	2,29	56,16

* Data obtained by regression method.

Source: the table is compiled by the author on the basis of the source [12].

It is worth noting that, according to world statistics, the share of private investment in RIA in the world practice is not less than 60% of the gross investment. Today in Russia this figure does not ex-

ceed 17%, which indicates a low involvement of private investors in the progress of research and development (R & D). At the same time, the long-term forecast of socio-economic development of the Russian Federation until 2030 [18] shows that in a negative development scenario, the share of private investment in RIA will reach 25% by 2030, and in an optimistic scenario – 50%. At the same time, China (the world leader in patent activity in 2018) enjoys 85% of RIA investment and the figure continues to grow.

Russia also has a critically low percentage of GDP spent on research and development. The average value of this indicator for developed countries is the share of 4% of GDP [19], and the critical value of the indicator ensuring growth is considered to be 1.8%. The Russian economy today cannot ensure a satisfactory indicator, although it shows a positive tendency in absolute figures (table 2).

Table 5. Russian domestic R&D costs.

Indicator	2000	2005	2010	2013	2014	2015	2016
Total costs, % of GDP	1,05	1,07	1,13	1,06	1,07	1,10	1,10
Total costs, bn. RUB.	76,7	230,8	523,8	749,8	847,5	914,7	943,8
of which:							
Budgetary funds, bn. RUB.	no data	140,5	360,3	493,5	569,1	617,3	622,3
% of the costs	no data	60,9	68,8	65,8	67,2	67,5	65,9
research institutes and universities funds, bn. RUB.	no data	20,9	47,9	92	101,6	112,2	130,7
% of the costs	no data	9,1	9,1	12,3	12	12,3	13,8
Business sector funds, bn. RUB	no data	47,8	85,9	129,1	145,8	150,9	154,9
% of the costs	no data	20,71	16,4	17,22	17,2	16,5	16,4

In view of the objectively insufficient investment activity in the intellectual property market, an important factor in the development of knowledge-intensive industries are public investment programs that can generate the growth of the intellectual property market in Russia (table 3).

Table 6. Government funding programs contributing R & D, billion rubles.

Program	2019	2020	2021
Science and Technology development	134,18	143,19	154,63
Economic development and innovative economy	45,22	48,11	46,53

In examining the impact of investment activity on the IP market in Russia, we analyzed the correlation coefficient of innovation activity and financial support of RIA. The patent activity of residents [12, 9] was used as the benchmark for innovation activity, the research period is 2000-2016. The results obtained by the author are presented in Fig.1.

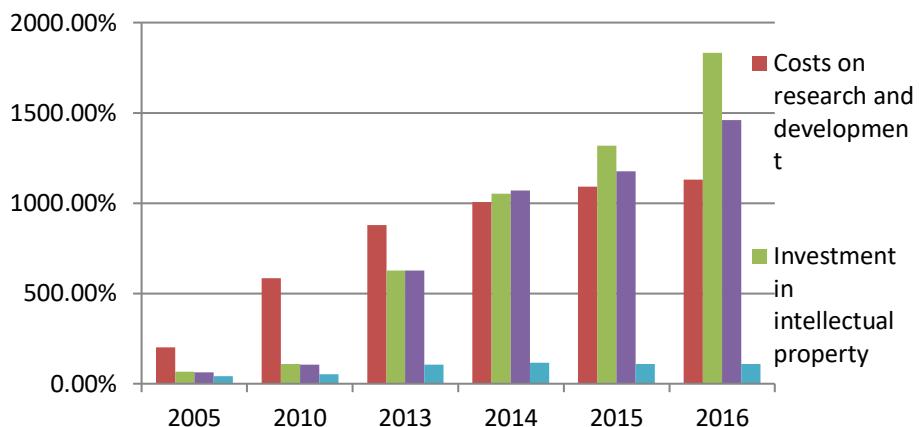


Figure 3. Dynamics of changes in patent activity, costs and investments in RIA in Russia against the base year 2000.

5. Discussion

Today we face divergent opinions on the impact assessment of investment activity on the formation and development of the intellectual property market [19, 21, 22, 23]. At the same time, there are many important issues that needed to be discussed, and the core one, as we see it, is the question: what reasons and circumstances make the Russian Federation remain an outsider in the world market of intellectual product, innovative technologies and competitive goods and services.

Analysis of the reports of the Federal State Statistics Service of the Russian Federation shows that funding for research and development is growing every year, but the ratio of funding to GDP for the past 14 years remains between 1 and 1.15%, while the corresponding developing country average is 2.5–3% of GDP, and for developed countries this index is 4–5.5%.

In our opinion, Russia is still going through the initial stage of formation of the intellectual capital market. While the world has accumulated extensive experience in the use of intellectual capital in economic activity, in the Russian Federation this experience is still being developed, private capital activity in the process of investing in an intellectual product is low. In world practice, the most effective scheme for creating an innovative economy is one in which private investors constitute at least 50% of the total of research and development costs.

In developed countries, the creation of intellectual product is provided by institutional conditions, stable development of education and science [24]. In Russia, the institutional frameworks of the intellectual property market are still being formed, and the reforms of education and science have turned to be a logically incomplete process. Meanwhile, the investment activity of research and educational institutions, which have increased their share of funding by almost 24% over the past 10 years, is considered positive.

Despite a number of measures taken at the state level on the creation of intellectual capital market in Russia, the holders of RIA copyright are poorly protected, little motivated, do not receive a decent reward for their scientific developments and new technologies. For a long time, the R&D financing remained far beyond the main priorities of the country's development. As a consequence, creative and interested in research work young people do not choose science careers, and this, in turn, leads to the situation when the intellectual resource of the country as a necessary factor of innovative development is running out.

According to Strategy for Innovation Development of the Russian Federation till 2020 [25], it is planned to increase the financing of research and development to 2.5–3% of GDP (of which more than half would come from private investors), and by the year 2040 the rise is expected to be 4–5% of GDP. But the US and the EU, for example, plan to increase the share of research and development costs to 5.5–6% of GDP by 2020 [26], which may again leave Russia far behind.

6. Results

In the world IP market, the undisputed leaders are the United States, China, EU countries, Korea and Japan. These countries account for more than 90% of the intellectual product of the world market. Russia is an outsider in this market.

The study shows a substantial lag of Russia in the formation of domestic and foreign market of intellectual products, the institutional foundations of knowledge economy market are still evolving. To be integrated into the global process of innovation economies creation as soon as possible, Russia will have to address the complex challenges, first of all, to create an effective national innovation system as the basis of the IP market in Russia.

Investment alone is not enough to meet this challenge. The study of the correlation in the growth deviations of investment activity, R & D costs, and patent activity, as the main indicator of R & D efficiency in Russia, revealed that the change in patent activity is not correlated with the dynamics of investment growth ($K=0.17$) and the dynamics of growth in R & D costs ($K=0.21$).

The study revealed no direct correlation between funding increase and changes in patent activity in the intellectual property market. However, it should be recognized that today the market of intellectual property in Russia is not investment-attractive, but rather subsidized. Increasing the attractiveness of the Russian intellectual property market is the topic of our further research.

7. Acknowledgments

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