

Venture investment and its role in the technological development of the russian economy

La inversión de riesgo y su papel en el desarrollo tecnológico de la economía rusa

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ABSTRACT:

Relevance of the research topic is stipulated by necessity of improving competitiveness of the Russian economy on the basis of the technological progress acceleration. The purpose of the present study is identifying trends and assessing potential for venture investment in the Russian economy. The research has been conducted using statistical, comparative, dynamic, coefficient-based, and structural research methods. The article reveals the major tendencies, problems and prospects of venture investment in Russia over the period of 2005-2016. It is noted that the most widespread in Russia are venture investments in IT technology, while investments in industrial and biotechnology sectors are advanced to a lesser extent. The authors define the most innovation-active companies in each sector of venture investment. The effectiveness of venture investment has been assessed based on indicators of profitability, innovation activity of organizations, the number of elaborated advanced manufacturing technologies, which are new to Russia, the proportion of innovative products (works and services), the number of developed nanotechnologies, index of physical volume of capital investments, and foreign direct investment over time period from 2005 to 2016. The article presents the comparative analysis of innovative activity in Russia and foreign countries, as well as

RESUMEN:

La relevancia del tema de investigación está estipulada por la necesidad de mejorar la competitividad de la economía rusa sobre la base de la aceleración del progreso tecnológico. El propósito del presente estudio es identificar tendencias y evaluar el potencial de inversión de riesgo en la economía rusa. La investigación se realizó utilizando métodos de investigación estadísticos, comparativos, dinámicos, basados en coeficientes y estructurales. El artículo revela las principales tendencias, problemas y perspectivas de la inversión de riesgo en Rusia durante el período 2005-2016. Cabe señalar que las más difundidas en Rusia son las inversiones de riesgo en tecnología de TI, mientras que las inversiones en sectores industriales y de biotecnología se adelantan en menor medida. Los autores definen las empresas más activas en innovación en cada sector de inversión de riesgo. La eficacia de la inversión de riesgo se ha evaluado sobre la base de los indicadores de rentabilidad, actividad de innovación de las organizaciones, el número de tecnologías avanzadas de fabricación elaboradas, que son nuevas para Rusia, la proporción de productos innovadores (obras y servicios), el número de nanotecnologías desarrolladas, índice de volumen físico de las inversiones de capital e inversión extranjera directa en el período de 2005 a 2016. El artículo presenta el

between the federal districts of Russia. The authors have drawn conclusion about the necessity of venture investments in the consumer sector, which is actively developing in Europe, India, and China. Regional analysis has shown the dominance of the Central, Ural and Volga Federal districts, while North Caucasian and Siberian Federal districts are less active in terms of innovation activity and venture investments.

Keywords: Venture investments, technological sector of the economy, innovation activity of organizations, nanotechnologies, advanced manufacturing technologies

análisis comparativo de la actividad innovadora en Rusia y en otros países, así como entre los distritos federales de Rusia. Los autores han sacado conclusiones sobre la necesidad de inversiones de riesgo en el sector de consumo, que se desarrolla activamente en Europa, India y China. El análisis regional ha demostrado el predominio de los distritos Central, Ural y Volga Federal, mientras que los distritos del norte de Cáucaso y Siberia son menos activos en términos de actividad de innovación e inversiones de riesgo.

Palabras clave: inversiones de riesgo, sector tecnológico de la economía, actividad de innovación de las organizaciones, nanotecnologías, tecnologías de fabricación avanzada

1. Introduction

The social, political, innovation and technological, as well as communicational aspects of development of countries and regions are becoming crucial factors of competitiveness in the present conditions of strengthening the international business competition among national economies. The level and quality of most of the components of the global competitiveness of countries are determined by the scientific and technical potential, which indicates the propensity of economic actors for venture investment. The venture capital market that initially has been advanced in the United States is now one of the fastest growing markets covering up to 15% of the world capital market. A leading role in this market is played by venture capital investors, entrepreneurs and consumers, as well as the system of financial and economic relations among them.

Venture investment can be considered as a special type of investment, which is characterized by certain features. Firstly, venture capital investments have a high level of financial and investment risk, which is reflected in the fact that only 15% of their total volume gives positive returns. At the macrolevel this is reflected in the growth of gross domestic product (GDP) and gross national income (GNI). Secondly, venture investments are implemented primarily at the early stages of the innovation process. Thirdly, venture investments contribute to the growth of innovative potential of the national economy, because they are implemented in the most promising sectors of economic activities and future-oriented companies. Fourthly, this type of investment is characterized by a huge reserve of profit and ensured high profitability of financial and economic activities. And fifthly, the effect of venture investment is manifested through a quite long period of time, which usually lasts five or six years.

In relation to the above features, more thorough and detailed approach is needed to assess the expediency, effectiveness and financial feasibility of innovative venture projects.

2. Methods

To analyze and assess the influence of venture investment on the technological development of the Russian economy, we have used various research methods. The dynamic method has allowed defining the venture investment stages. The dynamics of the key indicators of socio-economic and innovative development of Russian economy have been investigated using the coefficient-based method along with and statistical analysis. Based on materials of sample survey conducted by Rosstat (Federal State Statistics Service), we have conducted the assessment of objectives of the investment activities and their conformity with the latest international trends in socio-economic and technological development.

Strengths and weaknesses of Russia in comparison with other countries in terms of the venture investments and innovative and technological development have been identified based on conducted comparative analysis. Also, comparative analysis has allowed conducting research among the federal districts and identifying leading, catching up, and lagging federal entities. Based on the structural method, we have identified types of economic activities for venture investment, which promote technological development of the Russian economy.

3. Results

The development stages of venture capital market in Russia. Venture capital in Russia is developing a little more than twenty years and over this period has passed a number of stages. The first stage (1994-1998) was characterized by the emergence of the venture investment market. During this period, the first venture capital funds were created. By the end of 1998 their number had reached 40. In addition, foreign investors had studied the opportunities and the willingness of the companies of the Russian economy to venture capital investments. The second stage (1998-2002) was characterized by a decrease in venture investment due to the financial and economic crisis. During this period venture capital funds in the majority of cases ceased to exist or never started their activities. Still weak Russian economy was unable to retain a venture investor due to the sharp growth of the financial and investment risks. The third stage (2003-2012) was the stage of sustainable development of the venture capital market. In this period, financial and investment risks had progressively reduced that had a favorable impact on the investment process in general and venture investment in particular. A key trend in this period was the globalization of the venture capital market, which was manifested by the growing involvement of foreign investments attracted by the companies, access into foreign stock exchanges, sales of venture business to a foreign strategic investor, and opening of foreign offices by venture funds. The fourth stage of venture investment in Russia started in 2013. It is marked by a new wave of slowdown in innovation activity. The number and volume of venture capital transactions during this period are reduced, while business risks are rising. Majority of foreign and domestic venture capital investors leave the Russian market, while "new" investors take a wait-and-see attitude, and reluctantly invest in the innovative and technological sector of national production.

Purposes of venture investment in Russia and their compliance with contemporary international trends. Venture investments in Russia are developing, but their pace is not enough to ensure high competitiveness on a global scale. According to the materials of sample surveys, the main objectives of investments in the Russian economy in 2010-2016 consisted in the replacement of worn-out machinery and equipment (67– 72%), automation and mechanization of the existing production processes (46–55%), reduction of production costs (38– 48%), energy savings (38–48%), and environmental protection (37–49%) (Russian statistical yearbook, n.d.) It should be emphasized that last two objectives (energy savings and environmental protection) meet the modern trends of the world technological progress, i.e. represent a positive tendency.

Besides, over the concerned period of time, positive trend among the surveyed companies includes also the increase in the proportion of investments on implementation of new production technologies from 32% in 2010 to 43% in 2015, the creation of new jobs - from 18 to 25%, the increase of production capacity with expanded product range - from 29 to 36%. This inspires some optimism with regard to the future of the Russian economy (Russian statistical yearbook, n.d.; Market Snapshot - China. Qualified Domestic Institutional Investors (QDII). The Australian Government Research, n. d.).

Evaluation of the impact of venture investments on the technological development of the Russian economy. Financial and economic results, as well as investment processes of the Russian economy development for 2005-2016 are presented in more detail in Table 1.

Table 1
Results of venture investment in Russia in the 2005-2016.

Indicators	2005	2010	2013	2016
The profitability of sold goods, works, and services in the economy in general, %	13.5	10.0	7.0	8.1*
Including:				

in the manufacturing sector, %	15.3	14.8	8.8	11.9*
in mining operations, %	35.6	31.9	22.1	24.9*
The index of physical volume of capital investments over the previous year, %	110.9	106.0	100.8	95.1
Foreign direct investments, bln. USD	53.7	114.7	69.2	6.4*
Innovation activity of organizations, % Including:	9.3	9.5	10.1	8.4
in the manufacturing sector	10.9	7.8	7.6	7.4
in mining operations	5.6	13.0	13.3	13.3
The proportion of innovative goods, works, and services, % Including:	5.0	4.9	9.2	8.5
in the manufacturing sector	7.0	6.7	11.6	8.4
in mining operations	2.7	4.9	8.9	8.4
in activities related to computer and information technology, scientific research and development (R&D)	9.7	4.0	11.2	11.9
The number of developed advanced production technologies, which are new to Russia, Including:	538	762	1276	1342
in the manufacturing sector	...	215	374	491
in mining operations	...	5	12	25
The number of developed nanotechnologies	...	202	411	494

* Data for 2015, Source: Russian statistical yearbook, n.d.

Thus, in 2015, compared to 2005, in Russia, the situation on indicators, such as the profitability of sold goods, works, and services in the economy has decreased by 5.4%. The decrease in mining operations amounted to 10.7%, while in manufacturing industries – 3.4%. The index of physical volume of investments into capital assets in 2005 amounted to 110.9%, in 2015 it fell to 91.6%, while in 2016 it increased again to 95.1%. Innovative activity of the organizations in both Russia in general, and in the technology sectors of the economy also had a tendency to decrease in 2016 compared to 2005. Innovative activities are undertaken mainly by large companies, since small businesses are not competitive and do not attract the interest of potential venture investors.

Foreign direct investments (FDI) in 2005-2010 had a steady upward trend and have increased over the past six years by 2.1 times, while then started declining. In 2015, FDI reached a minimum over the past ten years and amounted to 6.4 bln USD, or 5.6% as

compared to 2010. All of the above creates macroeconomic prerequisites for the implementation of narrowed reproduction and adversely affects the macroeconomic situation and the welfare of the population of the country.

To assess the impact of FDI on the development of the socio-economic system, we can use the spill-over effects, i.e. manifestation of any economic activity, which affects the activities of third parties that are not directly involved in the interaction process. The spill-over effects can be manifested through various channels, such as effect of imitation, where the national companies study and copy the best practices of foreign companies; the effect of increased competition on the national market; the effect of increasing the qualification of employees; the effect of export; the allocation effect, which is expressed in the provision of competitive pressure on the recipient country and the domestic demand due to the innovative technologies; as well as effect of backward and forward linkages. The spill-over effects can be horizontal (manifesting within the same industry or region) and vertical (intersectoral and interregional interactions). The analysis conducted for the 2011-2015 has shown that due to attracting FDI, horizontal effects in Russia have a stronger influence than vertical spillovers. Though, both horizontal and vertical spill-over effects have positive trend. From the foregoing it follows that the positive effect caused by attracting FDI to the regions with high investment attractiveness and innovative focus, first and foremost, is disseminated in regions with a similar investment climate, and only then is distributed to less successful regions.

The positive impact of FDI is reflected in economic and financial performance of companies. For example, in 2008-2014 the return on assets (ROA) in most types of economic activity in companies with FDI was higher than that in companies without FDI. The difference was especially noticeable in types of economic activities such as financial activities (the difference is more than 6%), agriculture, as well as hunting and fishing (7%). The average rupture in the value of ROA among the companies with and without FDI was typical for enterprises involved in production of transport vehicles and equipment, as well as machinery and equipment (4-6%). The above mentioned groups of economic activity types are in need of FDI inflows to maintain the level of competition, improve competitiveness, and strengthen the effectiveness of financial and economic activities. The minimum difference in ROA was observed in production of coke and petroleum products, chemical production, electric energy production, distribution of gas and water, as well as in communication area (1-3%). Consequently, the last group of economic activity types differs by quite a high level of competitiveness and innovative potential, and thus is attractive for venture investment.

In Russian economy there is positive dynamics in the proportion of innovative goods, works, and services, as well as in mining operations, the manufacturing sector, and the activities related to computer and information technology, as well as research and development. Though, the level of development of these industry sectors is insufficient in comparison with the international level. In countries such as Germany, Luxembourg, Belgium, the Netherlands, Denmark, Italy, and Austria, this indicator is much higher than 30%, while in Russia it is less than 10% (Russian statistical yearbook, n.d.). Unfortunately for Russia, at maintaining the existing dynamics in the medium term it is an unattainable level that will actually lead to a decrease in global competitiveness.

Let us study the development dynamics of the advanced manufacturing technologies as one of the most important indicators of venture investment. The number of developed advanced production technologies in the 2005-2016 had a stable growing trend (2.5% for the studied period). In the structure of developed advanced production technologies, the largest proportion is occupied by production, processing and assembly, as well as design and engineering. Rapid growth is observed also in the groups of industrial information system, communications and control, and the automated monitoring and control equipment. In general for Russia, the advanced production technologies are developed in high-tech and medium-tech sectors, as well as in knowledge-intensive types of business operations. However, the proportion of science-intensive types of economic activities tended to decrease in 2012-2015. This resulted from changes in concerned economy sector, which as shown by practice, were largely unsuccessful. Reduction in the number of studies and deterioration of their structure (reduction in the proportion of researchers in the natural, technical, and

agricultural sciences with a simultaneous increase of specialists in the humanities and social sciences) have had a serious negative impact on the performance of knowledge-intensive types of economic activities (Lenchuk and Vlaskin 2015; National innovation system and state innovation policy of the Russian Federation, 2011; Russian statistical yearbook, n.d.)

The development of advanced production technologies is carried out unevenly across the entities of the Russian Federation. Leading positions are occupied by Central, Volga, Urals and North-West Federal districts (more than 85% of all developments in Russia) (Information on the design and implementation of projects (programs) aimed at the implementation of cluster policy in the Samara Region, n. d.; Novikov n. d.) This activity is not sufficiently developed in the North Caucasus, Siberian and Far Eastern federal districts. This is largely due to the prevailing structure of production and historical trends. Equalization of inter-regional development is a key task of the Russian government in the medium term.

In general, in 2016, the production index for high-tech manufacturing types of economic activities amounted to 103.0%, while in January–August of 2017 – to 99.6% as compared to the corresponding period of the last year. In 2017, the production of high-tech materials for the nanotechnology industries was reduced to the greatest extent. Thus, in 2017, there was a decline in the dynamics of the high-tech sector of the Russian economy that indicated a lack of the venture capital market development (Russian statistical yearbook, n.d.).

4. Discussion

4.1. Priority areas for venture investment.

In 2015-2016, the venture capital market in Russia stagnated that was caused by both external and internal factors. The total volume of venture capital market was reduced in 2016 to 0.41 bln USD versus 2.14 bln USD in 2015. The following issues could be referred to the most important problems and trends for venture investment development in Russia. Firstly, it occurred mainly at the later stages of the innovation process (more than 90% of the total volume in 2010-2015). Secondly, practically there were no large transaction volumes of more than 100 mln USD (in 2016, there was not a single large transaction). Thirdly, the vast majority of venture capital deals were done in the information technology sector (67.2% of transactions in 2015-2016), including the software sector, which was characterized by the highest activity (Overview of venture industry market in Russia for 2016) Fourthly, positive dynamics in venture investment was revealed in the industrial technology sector. Fifthly, the venture investment in biotechnology over previous years showed a downward trend. The main investors in this market had become state funds and foundations with state participation. At the same time, it was in this sector that venture investments were made at the early stages of the innovation process that was a significant support of entrepreneurs and insurance of their businesses. Sixthly, a key problem for Russia was the insufficient number of strategic investors interested in acquiring high-tech businesses, as well as underdevelopment of appropriate infrastructure (Gnezdova, Kugelev, and Romanova, 2016; Sekerin, Avramenko, Veselovsky and Aleksakhina 2014)

In the IT technology sector, the focus of venture investors in Russia, as in the world, is directed on cloud technologies and software. The interest of venture investors in investing of advertising technologies in Russia, as well as e-commerce, technology in financial sector, etc. is rising as well. In total, the number of venture investment deals in IT technology in comparison with previous year has increased that is evidence of the enhancement of their role in all spheres of the national economy as well as their commercial efficiency. Therefore, investors are willing to invest in IT projects, which will contribute to the technological transformation of business, and increase its profitability. In 2016, exactly the IT sector companies have headed the Russian rating "Tekhuspeh", namely LLC "Laboratory of Computational Mechanics" (Saint-Petersburg); JSC State Corporation "InfoTeKS" (Moscow), JSC "T-Platforms" (Moscow); LLC "ABBY Production" (Moscow); and LLC "NPP Laser Systems" (Moscow) (Top «Innovation» rating of «Techuspech», 2016)

The number of transactions in the industrial technology sector in Russia also tends to

increase. Active funding is being done at the startup stage. In 2016, most innovative activity in this sector was shown by JSC "Obninsk Research and Production Enterprise "Technology" named after A.G. Romashin" (Kaluga Region), CJSC "NTC "Bakor" (Moscow), JSC "Diakont" (Saint-Petersburg), LLC "Promtekhlogiya" (Moscow), etc. (Top «Innovation» rating of «Techuspech», 2016)

The major focus in the biotechnology sector was given to the development of new cancer diagnostics methods and new drugs for the treatment and prevention of thrombosis (Overview of venture industry market in Russia for 2016, 2016) In this sector the most innovatively active were CJSC "Biocad" (Saint-Petersburg), LLC "Drugs Technology" (Moscow Region), State Corporation "Gerofarm" (Saint-Petersburg), LLC "Skopinsk Pharmaceutical Plant" (Ryazan Region), LLC "Agroplasma" (Krasnodar Region), etc. (Top «Innovation» rating of «Techuspech», 2016)

The national health care system is in great need of developing medicines, because Russia is still characterized by a high mortality rate. The main category of deaths is dominated by mortality from the circulatory system diseases and neoplasms. In 2010-2015, Russia experienced upward trend in the number of deaths from certain infectious and parasitic diseases, as well as diseases of the digestive system, and neoplasms. The number of newly registered diseases of the population by HIV-infections had increased over the 2005-2014 by 2.2 times and reached 73.5 thousand people, while in 2015 this figure amounted to 87.3 thousand. This is the highest rate in the world that testifies the lack of effective disease control and prevention system, as well as the relevance of the development of venture investment in the biotechnology sector. For example, in the USA in 2014, there were no cases of HIV infection, as well as in Japan over the period from 2008 to 2014 (Russian statistical yearbook, n.d.) Moreover, "social" diseases like tuberculosis and malaria, which were completely eliminated in the Soviet Union, have again appeared in Russia. At the same time, investors are watchful of investments in the biotechnology sector due to their high investment risks and high capital-output ratio of the projects.

In terms of strengthening the innovative potential of the Russian economy, the most important were innovative projects carried out in 2011-2017, such as the "ERA-GLONASS" State System (JSC "Navigation Information Systems"), the construction of the third generation of wireless mobile telecommunications, i.e. 3G telecommunication networks (OJSC "Mobile TeleSystems and 4G), commissioning in the Far East Region of non blast furnace granulated iron making production based on innovative technology of the Japanese company Kobe Steel, the design of MI-38 and advanced high-speed helicopters (JSC OPK "Oboronprom"), the development of Investment Program for 2009-2017, which included reconstruction of the existing thermal power plants and construction of new energy units using combined heat and power (CHP) technology (CJSC "Integrated Energy Systems"), etc. (The largest Russian companies implementing innovative projects, n. d.).

5. Conclusion

Venture investment should be attracted to accelerate the development pace and quality of key sectors and complexes of the national economy. Innovation projects are also needed to develop agro-industrial complex of Russian economy. Unfortunately, currently, not enough companies and investors are willing to implement such projects, because of their low efficiency and high business risks.

One of the largest Russian manufacturers of agricultural machinery, which implements innovative projects, is concern "Tractor Plants". In 2011-2015 this enterprise was involved in implementation of the projects related to the production of wheeled vehicles for cut-to-length (CTL) wood production, as well as new model of hopper car made of aluminum for grain transportation (The largest Russian companies implementing innovative projects, n. d.) Currently, this enterprise is in a quite complicated financial and economic situation that threatens to turn into bankruptcy. The elimination of one of the core companies in the city of Cheboksary, which employs 7.9 thousand people, can become a serious social explosion for the entire region of Chuvash Republic. In recent years, Chuvashia steadily has one of the lowest average monthly nominal accrued wages in the Volga Federal District and in Russia in

general. The bankruptcy of the "Tractor Plants" concern will even more complicate the situation.

Venture capital invested in the consumer sector, which is actively developing in Europe, India and China, has great importance for the development of the domestic economy. In the world, the volumes of investments in consumer services are on the rise due to the increase in the number of smartphone users and the social networks development, including Facebook and Twitter. This is one of the most promising development directions in venture investment in Russia (Pogodina, Veselovsky, Abrashkin and Aleksakhina, 2015; Solvell, Lindqvist, and Ketels 2003; Veselovsky, Gnezdova, Menshikova, Izmailova, and Romanova, 2015).

The accelerated development of the technological sector of Russian economy needs specialists of "new" professions in the field of creative and digital economy, restoration of ecology, human oriented services, etc. Only people with well-developed environmental thinking, high digital literacy, and ability to retrain, can integrate into the new professional standards. The formation and development of such skills require changes in the education system at all levels, i.e. integration of the Russian education system into the global system, development of industrial and innovative platforms that could be used for practical implementation by students of knowledge gained at the university (at present, the students' practical studies in many universities are quite formal in nature) (Veselovsky, Abrashkin, Aleksakhina and Pogodina 2015; Veselovsky, Pogodina, Idilov, Askhabov, and Abdulkadyrova, 2015).

Thus, venture investment has a social orientation and allows not only increasing the innovative potential of the national economy, but also positively influencing the population's life expectancy and quality.

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