

Innovative Potential of the National Innovation System of the Russian Economy for Building a Digital Economy

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Abstract. The article considers the readiness of the national innovation system of Russia to implement the technological concept of industry 4.0 and digitalization of the economy on the basis of the methodology of innovative potential of the object of innovation. Indicators of global economic growth such as state of the labor market, capital market and performance of technology of the economy, as well as indicators of the global innovation index as a tool of global competitiveness in the development of the digital economy, characterizing the provision of innovation resources and the results of innovation in the economy were used as the basic characteristics of the innovative potential of Russia. The study showed that Russian economy has sufficient intellectual potential and willingness of labor resources to use technology. However, the lack of financial sources for financing innovation entails a number of negative consequences: low innovation activity in manufacturing industries, and insufficient introduction of high technologies in business, weak development of small innovative business in the country, insufficient investment attractiveness of the information technology sector due to low creative activity and insufficient intangible value of business in this sector. The reliability of the research conclusions confirms their coincidence with the results of studies of the digital economy in Russia, conducted by other methods.

1. Introduction

At the beginning of the twentieth century, the term "innovation" was determined as a key factor of the global development of the world economy and was considered by the academic circles in economics. However, at the beginning of the XXI century, that is a hundred years later, innovation is regarded as the only source of growth in business, government and society in general [1].

The current stage of global innovation development can be characterized by the completion of the domination stage of the fifth technological wave associated with the restructuring of the economy based on the global diffusion of information and telecommunication technologies in all fields of the world economy. All statements above mean that a new stage begins being determined as a stage of the fourth industrial revolution called Industry 4.0. This term is frequently associated with the construction of a new, digital economy [2; 3] and means that the development of digital technologies in the national economy predetermines its technological leadership in the next technological wave.

In the XXI century, the rate of technological innovation is getting higher and higher, the innovation process is reducing by several times as well as technology develops. The implementation of industry 4.0 tools, including robotics and automation of many processes is the technological basis and the

engine of innovative development of all industries. It is estimated that USA corporations have the technological potential to automate 50% of manual operations [1].

The scale, complexity of innovations and high rate of innovative development radically changed the innovation process. Startups today do not have the range of activities, resources and a set of competencies to master breakthrough innovations. Large corporations become a driver of innovative business development [1] with significant market value, a sufficient scale of production and amount of financial funds. Over the past decade, the number of corporations with a market value of \$ 1 billion has increased more than fivefold in the US [1].

In the modern society, a developed innovation system is built. The composition of participants in innovation is multifaceted and multi-layered. The nature of the relationship is complex. Special conditions should be created for successful commercialization of innovations today including an innovative ecosystem and partnerships created as a communicative tool.

The main criterion of business efficiency today is the intangible market value of the company, which is understood as "innovation, brand image, quality management, the presence of a working strategy and organizational skills" of the company [4]. In the XXI century intangible assets obtained 85% of the market value of the company. All the factors predetermines the role of intellectual knowledge accumulated and created in business. Today's world economy can be named a "knowledge economy".

Thus, the global trend of world-wide development is the large-scale implementation of breakthrough technological innovations in the framework of Industry 4.0 by large industrial corporations with a high share of intangible market value in the value structure of the company. There are some key differences in the organization of innovation at the present stage:

- 1) Changing the object of innovation (national innovation system as a multi-functional set of all participants in the innovation process);
- 2) Changing the subject of innovation: the carrier of innovation activity. Large corporations, not startups, organized by entrepreneurs;
- 3) Changes in the organization of the innovation process. The formation of the innovation ecosystem;
- 4) Change of innovation tools (ubiquitous digital technologies using)
- 5) Changing the criterion of business efficiency. Creating intangible market value of the company, increasing the role of scientific and research activities.

All these factors have led to the need of new tools for assessing global competitiveness. One of them is the global innovation index (GII), which allows countries to compare the level of development of the national innovation system.

The complexity and scope of the changes in the nature and organization of innovative processes at the present stage poses the problem of their consistent consideration to assess the place of Russia in the global technological trend. Therefore, we will focus on the study of problems associated with the development of the national innovation system as an object of regulation of innovation.

The purpose of the study is to analyze the state of readiness of the national innovation system of Russia as a global object of management for the construction of the digital economy based on the analysis of the innovative potential of the country's economy and evaluation of the global competitiveness of the innovation system of Russia.

The research methodology is based on the application of the method of analysis of innovative potential of the object of innovative activity, identification of strengths and weaknesses of innovative potential and decision-making on the readiness of the implementation of innovative strategy on the ratio of strength-weakness of innovative potential.

The innovative potential of the national innovation system of the Russian economy is estimated by factors below:

- resource support (human resources, technological resources, financial resources),
- economic performance (global competitiveness) based on the study of the global innovation index).

The research procedure includes the following steps:

1. Analysis of the main factors of global economic growth of the national economy as indicators of innovative potential for the development of the digital economy.
2. Assessment of the global competitiveness of the Russian innovation system.
3. Conclusions on the quality of the innovative potential of the national innovation system of Russia and the digital economy program.

2. Analysis of the main factors of global economic growth of the national economy as indicators of innovative potential for the development of the digital economy

The global indicator of economic growth is the gross domestic product as a set of all created material goods in the country at their market value. It characterizes both the wealth of the state and the possibilities of economic growth. The dynamics of GDP in Russia was negative for the period from 2000 to 2018 [5]. Over the past period, according to the calculations of the World Bank, GDP growth steadily declined from 10% in 2000 to -0.2% in 2016. To the contrary, in 2018 the increase was estimated as 1.5% [1]. According to the IMF [6], GDP growth in Russia was ahead of the world (4.8% versus 3.9%) until 2010. Since 2010, the continued decline in GDP growth rates has led to a sharp lag of Russia in the dynamics of national wealth in 2017–2018 to the level of 1.5% against 3.5% in the world. In the medium term, GDP growth is projected at 3.8% in the world, and in Russia - by 1.5% per year. [6].

To conclude, Russian economy could not steadily enter the stage of recovery. Rapid GDP growth can be achieved through large-scale development of innovations in new sectors of the sixth technological order. Consider the resource support of the innovation potential of the Russian economy.

2.1. Labor market analysis

The rapid promotion of breakthrough innovations leads not only to the scaling of innovative technology companies, but also to a change in the sectoral structure of the economy, resulting in a change in the structure of the labor market and the growth in demand for new competencies and new professions. The current state of the labor market is characterized by such phenomena as the aging of the population and the decline in the relative number of the working age population. The number of disabled people in terms of the number of people employed in the workforce, by 2030 it will have been 78% in Europe and 64% in East Asia. In addition, in the context of accelerated digitalization of the economy, even in large cities, an increase in the shortage of highly qualified personnel and an overabundance of low- and moderately-skilled labor is expected. Digital technologies primarily increase the demand for high-intelligence work. Thus, in Western Europe and the United States, by 2030, automation and the introduction of artificial intelligence technologies will lead to an increase in the demand for technological skills by 55%, and social-emotional skills by 24% while reducing the need for manual workers with basic manual skills. and cognitive labor, 30% [1].

According to Rosstat of the Russian Federation [7] for 2017, the labor market in Russia is much better than world characteristics in its structure: the employment rate is over 77% and has a steady upward trend. In the city, the number of working citizens is about 80%, which indicates a high degree of urbanization.

The strengths of the labor market in Russia are:

- 1) relatively high employment of the active part of the population under the age of 40 years (49% of the number of able-bodied), the average age of the labor force is 39-40 years;
- 2) working at the age from 25 years to 50 years constitute more than 90% of the total population;
- 3) low employment of people in the retirement age (about 29% of the number of able-bodied);
- 4) high level of youth employment (up to 25 years) with higher education: more than 63% of the total number of employed in the youth labor force structure, which indicates the absence of a shortage of qualified labor force, in contrast to world trends;
- 5) a high level of education of the working-age population: the share of employed with higher education as a whole of the total population is more than 81%;

6) low unemployment of specialists with higher education - just over 3% for the period 2010-2017. At the same time, the share of the unemployed in the ICT field is 1% of the number of people employed in this field, in the scientific and technical sphere - 3.1%, in education - 4.5%;

7) the active age of highly qualified specialists in the innovation sphere (in ICT - 33.8 years, in education - 42.3 years, in science - 41.3 years);

8) sufficiently high social stability of people employed in labor activity: a high proportion of married people in the number of employees - 70% (the proportion of married men - 73%), reduction of divorces (from 7.2% to 6.8%).

Responsibility for the family is a strong economic incentive for professional growth and work activity, especially for men.

Labor market weaknesses:

1) insufficient development of small and medium-sized businesses: 81% in the structure of employed work in organizations and enterprises, about 17% are employed in the business sector, 93% of them are self-employed, about 5% are self-employed, and 1.3 are employers % of the total number of employees;

2) the conservative age and lack of education of entrepreneurs: more than 50% are people aged 30-50 years, that is, mature people, only 24.8% of them have higher education;

3) a low share of people employed in the innovation sphere (science and education) and in the field of information and communication (the development of digital technologies) - 16.7% of the total number of employees;

4) an insufficient share of employment in accordance with the acquired profession in the innovation sphere (Information Computer Technologies (ICT), science, education) (60-70%);

5) an insufficient level of education in the field of information and communication: 64.4% have higher education, 56.4% in scientific and technical activities, and 55.6% in education. Of these, more than 90% of the total employed in other organizations and enterprises and are employed.

Thus, Russia is sufficiently provided with qualified labor force in active working age, with higher education, which is used in most cases in accordance with the profession. The labor market in Russia is characterized by a high intellectual potential of young people that allows to implement digital technologies and innovative activities. The weak points of the personnel potential are the insufficient level of training of specialists in the sectors that form the conditions for the development of the digital economy and innovation, the low possibility of participation of entrepreneurs in Russia in innovation programs. Therefore, the strategy of actualization and development of higher education in ICT, formulated in the Digital Economy Development Program [8], is relevant and timely.

2.2. Analysis of financial resources of the Russian economy

The main factor in GDP growth is the availability and accessibility of capital to finance innovation. The availability of capital is determined by its value in the financial market. The world has gained experience in stimulating the financing of innovation through low interest rates. If in the early 2000s, interest rates in the world averaged about 4% per annum on financial resources, then in 2015-2016 they approached the zero mark [1]. The low cost of capital, which indicates an oversupply of financial resources, allows to finance innovative projects without any significant financial costs. This fact provides a low financial risk projects and evaluates their attractiveness for investment.

Analysis of the cost of financial resources in Russia gives the opposite picture. According to [9], the key rate of the Bank of Russia for the last four years had a stable growth trend from 7% in 2014 to 9% in 2017, with a slight decrease in 2018-2019 to 7.75%, which is an indicator of the high cost of credit resources in the financial market. The cost of long-term loans for non-financial institutions for the period 2014-2017 was 10-12% per annum. The weighted average interest rate on long-term ruble loans for enterprises ranged from 10-16.5%, only in 2018 it was about 9-9.5% [10]. This means that credit resources for innovation and investment can be used only by those organizations that had economic profitability (ROA) exceeding the weighted average interest rate to repay financial costs, maintain financial stability and return on equity, that is, on average, more than 13%. According to

[11], the return on assets in General by industry and economic activities in the Russian Federation in 2017 amounted to 5.3%. In the sectors that determine the current trend of innovative development (production of computers, electronic and optical products, information and communication, research and development, education), the situation is different from the industry average, but also negative. Thus, the computer industry and the information and communications industry have a profitability above the industry average — respectively 6.9% and 9.1%, and science and education — below the industry level, 3.9% and 3.0%.

It should also be noted a very low economic profitability (ROA) of the banking system of Russia, which in the period 2014-2017 steadily decreased from 2.5% to 1.8%, only in 2018 managed to restore the previous level — 2.5%. Moreover, without taking into account the activities of the three leading banks (Sberbank, VTB, Gazprombank), profitability ranged from 0.5-1.5%, approaching the level of 2.2% in January 2018 [10].

Thus, we can draw the following conclusions about the possibilities of the capital market to Finance innovation:

- 1) today in Russia the capital as a source of external financing of innovations is an expensive resource, inaccessible and unclaimed not only in the whole industry, but also in the branches which are key in innovative development of the country;
- 2) the Russian banking system has low economic potential to Finance investments in the Russian economy;
- 3) the main sources of innovation in Russia in the vast majority of industries remain own funds of organizations and enterprises, venture capital investments, as well as public budget funds and private investments.

2.3. Technology effectiveness analysis

Today there is a rapid introduction of breakthrough technologies related to the development of biotechnology, nanotechnology, genetic engineering, space technology, robotics and automation of production. An important area of technological growth is the change of priorities in the use of energy resources. The structure of energy consumption is changing dramatically. By 2040, it is expected that oil will be accounting for about 30% in the structure of resources, gas consumption will be about 40% in the structure of energy carriers, the share of biofuels will increase to 15%.

In addition, the most important feature of the modern world is the global impact of the Internet on information flows in the world; over the past 10 years, communication bandwidth has increased 45 times.

Thus, the modern economy is an economy based on high technology, so the key to the growth of economic productivity is the development of research and development (R&D). An important indicator in the assessment of R & d development opportunities is the amount of R & d funding. According to research [6], the share of R & d expenditures in GDP in the world is 2.2%, and it is expected to reach 2.3% soon. In developed countries, R & d funding should reach 2.7% by 2030, in the US — 3.0%, Japan — 3.8%, in the Euro Area — 2.3%, in Russia R & d expenditures are projected at 1.3-1.5% compared to India (1.4%) and Brazil (1.5%). About 35 thousand dollars (US — more than 383 thousand, Japan — more than 215 thousand dollars) were spent on one researcher in Russia in 2015, by 2035 more than 42 thousand dollars are projected, which is less than in all innovatively active countries, including Brazil (146 thousand) and India (56 thousand). Taking into account the lowest share of Russian GDP in the world total income — 2.0% in 2017 with expectations for 2022 — 1.8% (China, for example — 17.7%, Japan — 5.4%), we can say that this is a very low public spending on science.

Therefore, it can be concluded that R & d financing in Russia does not correspond to global trends and is a weak link in the innovative potential of the Russian economy to ensure sustainable technological growth.

Furthermore, analysis of the effectiveness of technologies includes evaluation of the results of innovation activities in manufacturing industries for the position of "technological innovation" in large corporations as innovation activity sources [12; 13] (see table 1).

Table 1. Indicators of innovation activity of large organizations for the implementation of technological innovations in 2014-2016 (compiled by the author [13]).

indications	2014	2015	2016
Share of organizations implementing technological innovations in the total volume of industrial organizations,	8,8	8,3	7,3
<i>among them:</i>			
by type of economic activity:			
<i>high-tech economic activities</i>	-	30,3	29,4
<i>science-intensive economic activities</i>	-	6,8	6,4
Share of innovative goods in the total volume of shipped goods of organizations that carried out technological innovations,	15,8	16,1	16,6
<i>among them:</i>			
by types of goods:			
products that have been newly introduced or subjected to significant technological changes over the past three years	54	67	73
products that have been improved in the last three years	40	27	22
products related to nanotechnology	6	6	5
by type of economic activity:			
<i>high-tech economic activities</i>	-	25,7	25,5
<i>science-intensive economic activities</i>	-	33,0	29,2
Share of expenses on technological innovations in the volume of shipped goods of organizations engaged in innovative activities,	5,9	5,5	5,4
<i>among them:</i>			
by type of economic activity:			
<i>high-tech economic activities</i>	-	8,3	12,1
<i>science-intensive economic activities</i>	-	28,0	24,4
The structure of expenditure on technological innovation sources of financing in the field of services (communications, activities related to the use of computer technology and information technology, research and development, provision of other services):			
Share of own funds	-	28,7	32,1
Share of public funding	-	55,2	51,4
The proportion of funds of support of scientific, scientific-technical and innovative activities	-	-	1,0
Share of foreign investment		1,3	1,7
by type of innovative activity: (2010/2016)			
Purchase of machinery and equipment	54	-	36,3
Research and development costs	20,8	-	43,7
Engineering	0	-	7,6
Acquisition of new technologies	1,4	-	1,3
Acquisition of software	2,5	-	1,2

The analysis of data shows that the level of innovation activity of large organizations in Russia remains extremely low and tends to decrease. About 7% of industrial organizations in 2016 introduce

technological innovations (about 9% - in 2014), where 6% of them are from the knowledge-intensive sector of the economy. The best innovative activity in high-tech business remains 30%. The share of innovative products in the volume of technological innovations is consistently low (16%), while the share of high-tech and knowledge-intensive activities reaches 55%. The largest share of innovative products is accounted for by newly introduced products with an increase of 20% in three years (54-73%), whereas the share of the introduction of goods related to nanotechnology is consistently low - 5-6%.

A very low share of the cost of technological innovation in the structure of shipped products — about 6% in General, 8-12% in high-tech business, 24-28% in the scientific field should be considered to be a weakness of technological innovation in large organizations and companies. This means that the technological innovations introduced are not connected with the use of high technologies and are not expensive.

Thus, summarizing the results of the assessment of technological effectiveness of the Russian economy, we can draw following conclusions:

- 1) there is low innovative activity with a small share of high-tech products in large business, but there is a high share of new products with low use of high technologies at the same time;
- 2) the main source of funding is the state funds of the Federal budget (51-55%), as well as own funds of enterprises and organizations (29-32%);
- 3) funds for support of scientific, scientific and technical innovation activities as infrastructure links of the national innovation system, designed to support and stimulate innovation, practically do not participate in the development and implementation of technological innovations in the manufacturing sectors of the Russian economy. The degree of their participation in financing is negligible and is about 1% in 2016 (see table 1). This means that they do not play their role in supporting innovation.

3. Assessment of the global competitiveness of the Russian innovation system

A universal tool for assessing the state of the national innovation system is the Global Innovation Index. [14]. The global innovation index serves as an integral tool for assessing the effectiveness of innovation in the national economy. It is formed from the evaluation of resources (Innovation Input Sub-Index) and the results (Innovation Output Sub-Index) of innovation.

The global innovation index allows us to assess the level of innovation potential of the country for innovation. The change in the GII dynamics should be considered regarding the potential growth of the innovation activity of the Russian economy.

3.1. Assessment of changes in the Global Innovation Index

In 2018 Russia was the 46th in the world (2014 — 49th place) of the 126 countries in the world with the accumulated value of the coefficient of 37.9 points. In other words, Russia remains a stable "middle man", being at the end of the first third of the list of countries. Generally speaking, the scale of changes over five years can be regarded as a good indicator due to an increase of three positions (see table 2). However, taking into account the decline in the quality of the rating (the overall decrease in points compared to 2014 by 1.2 points), as well as the drop in the rating over the past three years (in 2016 Russia ranked 43rd, and in 2017 — 45th), we can mention that Russia is characterized by low dynamics of innovation activity. It should be noted that in 2018, countries such as Ukraine, moved from the 50th position to 43rd place, Vietnam, Greece, Thailand, Portugal, Bulgaria, which are not traditionally innovation-active economies, turned out to be more technological and innovative, according to the international rating. Thus, there is a contradiction in the dynamics of the global innovation index of Russia, which requires an independent analysis of the constituent elements of the index in order to identify the causes and factors of growth of the country's innovation potential for the formation of the digital economy.

Let us analyze how the state of the national innovation system of Russia has changed over the past five years due to the resource provision of innovations (entry indicators) and the results of innovations

(exit indicators). To assess the influence of factors, it is advisable to take into account simultaneously the position of each factor, the dynamics of its change, as well as the scale of this change, which can be determined by the deviation of the accumulated points for this position (see table 2 —conflicting changes are highlighted with color).

Table 2. Changes in the global innovation index of Russia for the period of economic sanctions: 2014-2018 (compiled by the author [14]).

Characteristics of GII Russia	2014		2018		deviation	
	points	location	points	location	points	location
Global innovation index	39,1	49	37,9	46	— 1,2	+3
Resource provision of innovations	34,5	45	47,89	43	+13,39	+2
<i>Institutes</i>	43,9	88	57.8	74	+13,9	+14
Political environment	43,9	117	41.2	94	-2,7	+ 23
Controlled environment	56,5	98	56.7	90	+0,2	+8
Business environment	68,9	55	75.4	45	+6,5	+10
<i>Human capital & research</i>	44,5	30	48.4	22	+3,9	+8
Education	54,6	28	57.5	27	+2,9	+1
Tertiary education	46,0	30	49.1	19	+3,1	+11
Research & development (R&D)	33,0	30	38.6	27	+5,6	+3
<i>Infrastructure</i>	41,1	51	45.2	63	+4,1	-12
Information & communication technologies	60,6	28	70.3	37	+9,7	— 9
General infrastructure	36,1	57	35.8	73	-0,3	— 16

Continuation of table 2						
Characteristics of GII Russia	2014		2018		deviation	
	points	location	points	location	points	location
Ecological sustainability	26,7	109	29.5	95	+2,8	+14
<i>Market sophistication</i>	42,5	111	48.1	56	+5,6	+55
Credit	21,6	124	32.4	78	+10,8	+46
Investment	32,0	84	34.6	96	+2,6	-12
Trade, competition, & market scale	73,9	84	77.4	13	+3,5	+71
<i>Business sophistication</i>	34,3	60	39.9	33	+5,6	+27
Knowledge workers	54,7	33	59.7	23	+5,0	+10
Innovation linkages	20,3	126	21.9	92	+1,6	+34
The results of innovation	43,8	56	27.91	56	-15,89	0
<i>Knowledge & technology outputs</i>	37,6	34	28.9	47	-8,7	-13
Knowledge creation	46,9	18	32.8	28	-14,1	-10
Knowledge impact	38,3	70	32.5	80	-5,8	-10
Knowledge diffusion	27,5	91	21.5	51	-5,7	+40
<i>Creative outputs</i>	31,4	72	26.9	72	-4,5	0
Intangible assets	35,2	114	39.0	71	+3,8	+43
Creative goods & services	17,9	70	13.3	81	-4,6	-9
Online creativity	37,4	38	16.2	44	-21,2	-6

The calculations have shown:

1) the resource provision of innovative activity in Russia has improved both in terms of the index (by 2 places) and the quality of growth (+13.39 points). Russia ranks 43rd in terms of resources for innovation.

The following factors remain weak points in the resource provision of innovative activity in Russia:

- institutional support (74) at high positive growth dynamics (14 positions for 5 years);
- infrastructure support with stable negative dynamics (falling by 12 positions to 63 places in the world);
- stability of the market with high positive dynamics on 55 positions to 56 places in the world;

The strengths of the resource provision of innovation results form the following:

- business sustainability as a new factor of innovative growth, with high dynamics of 27 positions to 33 places in the world;
- human capital and research traditionally have a steady growth trend (8 positions to 22 places in the world).

2) the results of innovations remain low as Russia ranks 56th in terms of output, therefore, it is not included in the first third of the innovation-active countries of the world, and the quality of the results decreased by 15.89 points, which indicates a negative trend in the results of the use of knowledge and technology, as well as creative results.

Weaknesses in the effectiveness of innovation:

- the results of the use of knowledge and technology in the field of knowledge creation (falling by 10 positions with a decrease of more than 14 points) and the impact of knowledge (falling by 10 positions to 80 places with a slight decrease in points — 5.8);
- low creative results (72 in the world) in connection with the low creativity products (88) and Internet technologies

The strengths of the effectiveness of innovation activities provided a significant increase in Russian intangible assets in the volume of 43 positions. It should be noted that the quality of growth in the ranking is not characterized by high dynamics (3.8 points). It can be concluded that the growth of the

rating of Russia in the field of availability of global intangible assets is due to the global trend of decline in creative intellectual activity.

4. Conclusions on the quality of the innovative potential of the national innovation system of Russia and the digital economy program

The analysis of the innovative potential of the national innovation system of Russia for the development of the digital economy showed:

1. The state of the factors of global economic growth does not fully provide entry into the digital economy:

1.1. The overall structure of the labour market does not fully meet the requirements of the modern economy and innovative development.

Advantages are formed with the following:

- a sufficient level of education of the country's population for the introduction of digital technologies;

- high intellectual potential of young people for the introduction of digital technologies and the implementation of innovation;

- rather high employment rate;

- low unemployment of specialists with higher education;

- use of higher education in accordance with the profession;

- provision of skilled labour in active working age.

The weakness of the labor market occurs due to:

- insufficient development of the innovative business sector: just over 6% of employees are carriers of ideas, stimulate competition and innovation;

- low possibility of participation of entrepreneurs in Russia in innovative programs;

- insufficient level of training to increase innovation activity in the digital economy: low proportion of specialists with higher education, insufficient number of senior managers and specialists to develop strategies for innovative development, the average age is close to the conservative type of thinking specialist.

1.2. Limited capital market opportunities to Finance innovation in the digital economy remain because of:

- high cost, limited availability and demand of capital for innovation in General in the industry and sectors forming the digital economy;

- low economic potential of the Russian banking system for financing investments in the Russian economy;

- the main sources of innovation in Russia in the vast majority of industries — own funds of organizations and enterprises, state budget funds.

1.3. The lack of technological effectiveness of the Russian economy creates obstacles to the introduction of digital technologies in the industry:

- low innovative activity of large business with a small share of high-tech products and rare use of high technologies;

- low share of organizations engaged in technological innovation, low share of costs (5-6%) for technological innovation in the volume of shipped products, R & d costs which do not exceed 43%;

- weak participation of funds to support scientific, scientific and technical innovation activities as infrastructure links of the national innovation system in the development and implementation of technological innovations in the manufacturing sectors of the Russian economy.

2. The global competitiveness of Russia's innovation system has increased over the five-year period of economic sanctions, despite the decline in the global innovation index compared to 2017 by one position and the instability of its growth:

2.1. Competitive advantages of the Russian economy are created by such factors as strengthening the institutions of state power for economic growth, growth of market and business stability, high intellectual potential of the nation and a high level of research and development, dissemination of

knowledge and intangible assets. Hence, we can conclude that the Russian economy is self-sufficient and resistant to external threats. In General, this is a good sign in the dynamics of the Russian economy, the growth of its innovation.

2.2. The weakness of Russia for the implementation of the concept of Industry 4.0 and successful entry into the sixth technological mode is manifested in the state of such factors as the infrastructure of the economy, the volume of investment in the economy and financing of innovation, the willingness of business to invest in innovation, import, export and introduction of information and telecommunication technologies, global scientific and technical activities.

The results of the analysis obtained on the basis of the methodology for assessing the innovative potential of the economy, in General, coincide with the results of the analysis of the digital economy in Russia, conducted by the Institute of growth Economics. P. A. Stolypin [2; 3], and also allow to draw a conclusion about the rationality of the tasks set in the program "Digital economy of the Russian Federation" [8]. The program sets as a priority the task of creating institutional and infrastructure conditions for the development of high-tech business, the development of education in the information and telecommunications industry.

References

- [1] 2018 McKinsey Innovation Practice: Innovations in Russia - an inexhaustible source of growth https://www.mckinsey.com/~media/McKinsey/Locations/Europe%20and%20Middle%20East/Russia/Our%20Insights/Innovations%20in%20Russia/Innovations-in-Russia_web_lq-1.ashx
- [2] Titov B 2018 Russia: from digitalization to digital economy http://stolypin.institute/wp-content/uploads/2018/09/issledovanie_tsifrovaya-ekonomika-14-09-18-1.pdf
- [3] 2014 World overview of the implementation of the Industry 4.0 concept https://www.pwc.ru/ru/technology/assets/global_industry-2016_rus.pdf
- [4] Hanna D P 2013 The Organizational Survival Code: Seven Capabilities to Get the Results You Want Mann, Ivanov and Ferber (Moscow)
- [5] 2018 Uneven development of the world *Bulletin on current trends in the global economy* vol 30 <http://ac.gov.ru/files/publication/a/16434.pdf>
- [6] Machavariani G I 2017 Results of the development of the global economy in 2016 and prospects for 2017 Martynov Scientific-theoretical seminar IMEMO RAS (Moscow) <https://www.imemo.ru/files/File/ru/conf/2017/21062017/21062017-PRZ-MAC-01.pdf>
- [7] 2018 Labor, employment and unemployment in Russia (based on sample labor force surveys) *Federal State Statistics Service* (Moscow)
- [8] 2017 Digital Economy of the Russian Federation <http://static.government.ru/media/files/9gFM4FHj4PsB79I5v7yLVuPgu4bvR7M0.pdf>
- [9] The main directions of the unified state monetary policy for 2018 and the period of 2019 and 2020 <https://www.garant.ru/products/ipo/prime/doc/71708066/#review>
- [10] Monthly review of the financial market of Russia https://www.mos.ru/upload/alerts/files/Finansovii_rinok_05_2018.pdf
- [11] 2017 Profitability of sold goods, products, works, services and profitability of organizations' assets by economic activity, in percent <https://www.garant.ru/products/ipo/prime/doc/71840666/#review>
- [12] Ditkovsky K A, Gorodnikova N V, Gokhberg L M et al. 2018 Indicators of Innovation 2018: *statistical book Higher School of Economics* (Moscow)
- [13] 2017 Statistics of science and education Release 4 Innovative activity in the Russian Federation Federal Research Institute of Scientific and Practical Development (Moscow)
- [14] The Global Innovation Index 2018: Energizing the World with Innovation Cornell University, INSEAD, and the World Intellectual Property Organization https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf