

TECHNOLOGIES TRANSFER IN RUSSIA: CURRENT STATE AND PROSPECTS OF DEVELOPMENT

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Abstract: *In the article problems of formation and development of technology transfer domestic system are considered. The author of the article set a task to consider the current state of the innovative sphere of Russia, to analyse features and dynamics of a technological transfer, to reveal prerequisites of technological development of the Russian economy. In this work the author uses system approach, the comparative and statistical analysis. In the article conditions of interaction of institutional structures (the state, spheres of science and education, the industry) in the course of a technological transfer come to light. Based on the analysis of various indicators of innovative development of Russia and foreign countries (Global Innovative Index, trade in technologies, dynamics of export and import of technologies, etc.), options of scientific and technological development of the country, the conclusion about need of formation of the organizational and economic system promoting creation of hi-tech competitive goods, improvement of structure of export by means of reduction in raw orientation and increases in a share of innovative production in it is drawn.*

Keywords: *technology transfer, Russia, innovative process, export, import, dynamics.*

JEL codes: *O32, O33, O38.*

1. Introduction

Economic development of any state depends on many factors influencing not only on increase in the actual outputs, but also on economic growth in general, increase in his quality. The list of these factors changes in process of development of economies, there is assessment and revaluation of their importance. For the majority of the leading countries of the world development of the innovative sphere, economy of knowledge, a technological transfer becomes the priority direction. Process of transfer of knowledge and technologies, production and a transfer of hi-tech product come to key positions of industrialized countries. It should be noted that in modern conditions the level of national innovative system development creates world economic superiority of the country.

As Klaus Schwab, the founder and the executive chairman of the World Economic Forum notes, "The global competitiveness will be defined by more and more innovative capacity of the country" (WEF, 2017-2018). According to the Global Competitiveness Index it is possible to allocate the following leading economies (table 1).

Apparently from the analysis of the submitted data, traditionally leading places in the world rankings on an indicator of global competitiveness are taken by such states as Singapore, Switzerland, the Netherlands, the USA, Germany – the countries which mostly are engaged not only in development of innovations, but also their transfer. The Russian Federation is far not included into group of leaders today though on this indicator advances the CIS countries.

Formation of the economy of new type based on constant innovative and technological improvement on production and a transfer of hi-tech product with high additional cost brings competitiveness of the developed countries to basic positions. As Edler J. and Fagerberg J. note, "There is a narrow perspective, considering invention only, and there is a broader, more holistic perspective, which emphasizes the importance of looking at the entire innovation cycle from the creation of novel ideas to their implementation and diffusion" (Edler and Fagerberg, 2017).

Tab. 1 The Global Competitiveness Index 2014-2017

Economy	Subindexes															
	Overall Index				Basic requirements				Efficiency enhancers				Innovation and sophistication factors			
	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018	2014/ 2015	2015/ 2016	2016/ 2017	2017/ 2018
Switzerland	1	1	1	1	4	2	2	1	5	4	3	3	1	1	1	1
Singapore	2	2	2	3	1	1	1	2	2	2	2	2	11	11	12	12
USA	3	3	3	2	33	30	27	25	1	1	1	1	5	4	2	2
Netherlands	8	5	4	4	10	7	4	4	8	9	9	8	6	6	6	4
Germany	5	4	5	5	11	8	10	11	9	10	7	6	4	3	3	3
Sweden	10	9	6	7	12	13	7	8	12	12	12	12	7	7	5	5
United Kingdom	9	10	7	8	24	25	23	23	4	5	5	5	8	9	9	9
Japan	6	6	8	9	25	24	22	21	7	8	10	10	2	2	4	6
Hong Kong SAR	7	7	9	6	3	3	3	3	3	3	4	4	23	23	23	18
Finland	4	8	10	10	8	11	12	9	10	13	14	11	3	5	7	8
China	28	28	28	27	28	28	30	31	30	32	30	28	33	34	29	29
Estonia	29	30	30	29	21	21	20	22	27	28	28	27	34	31	33	35
Czech Republic	37	31	31	31	39	31	31	30	34	26	27	29	36	32	35	32
Lithuania	41	36	35	41	37	35	35	34	38	36	36	40	44	37	43	44
Poland	43	41	36	39	55	44	45	45	32	34	34	34	63	57	55	59
Russian Federation	53	45	43	38	44	47	59	48	41	40	38	38	75	76	66	57
Latvia	42	44	49	54	34	37	41	43	36	39	42	49	61	58	58	68
Kazakhstan	50	42	53	57	51	46	62	69	48	45	50	56	89	78	76	95
Georgia	69	66	59	67	48	51	46	54	79	77	69	75	118	118	113	112
Slovak Republic	75	67	65	59	70	56	54	52	51	47	47	44	73	59	57	56
Ukraine	76	79	85	81	87	101	102	96	67	65	74	70	92	72	73	77
Greece	81	81	86	87	76	74	80	70	65	62	67	77	74	77	70	71
Moldova	82	84	100	89	90	89	101	95	88	94	102	94	129	128	131	124

Source: Compiled by the author based on data provided by The Global Competitiveness Report 2016-2017, 2017-2018.

As the world practice, development, effective and timely realization of innovations shows as results of intellectual activity becomes an important and relevant problem of modern economies.

In this regard the author sets a task to consider the current state of the innovative sphere of Russia, to analyse features and dynamics of a technological transfer, to reveal prerequisites of technological development of the Russian economy. In this regard in the paper the analysis of dynamics and structure of export and import of technologies (including taking into account groups of the countries), trade in technologies with the countries of the abroad, the loudspeaker of the developed advanced technologies is given. The author considers the most probable options of scientific and technological development of the country corresponding to the main scenarios of development of economy.

2. Methodology and Data

As basic research methods, we used system approach, comparative and statistical analysis of indicative values of innovation and technological development of the Commonwealth of Independent States member countries. So, system approach has found reflection in consideration of set of elements of a technological transfer system, interrelation and interdependence of participants of innovative process (the states, spheres of science, the industry, etc.) that allows revealing prerequisites of technological development of the Russian economy. Investigating problems of a technological transfer in Russia, author analyze a significant amount of the statistical data (both domestic, and foreign sources) including characterizing the positions taken by Russia concerning other countries the analysis of trade in technologies with foreign countries, assessment of structure dynamics of export and import of technologies, etc. is carried out. Methods of the comparative and statistical analysis of data are for this purpose applied.

So, since 2007 the Intelligence Unit of the Economist magazine calculates The Global Innovation Index annually (GII) showing innovative development of the countries which are at the different levels of economic

development including assessment of their potential (see table 2). Thus, in 2017 the research included 127 countries, which constitute 99.4% of the global GDP. The rating is headed by Switzerland with a score 67.69. Russia, occupying the 62nd place in 2013, reached the 45th place in 2017.

Tab. 2 The Global Innovation Index (selected countries, including technological leaders), 2017

Country / Economy	Score (0-100)	Rank	Income	Rank	Region	Rank	Efficiency Ratio	Rank
Switzerland	67.69	1	HI	1	EUR	1	0.95	2
Sweden	63.82	2	HI	2	EUR	2	0.83	12
Netherlands	63.36	3	HI	3	EUR	3	0.93	4
USA	61.40	4	HI	4	NAC	1	0.78	21
United Kingdom	60.89	5	HI	5	EUR	4	0.78	20
Denmark	58.70	6	HI	6	EUR	5	0.71	34
Singapore	58.69	7	HI	7	SEAO	1	0.62	63
Finland	58.49	8	HI	8	EUR	6	0.70	37
Germany	58.39	9	HI	9	EUR	7	0.84	7
Ireland	58.13	10	HI	10	EUR	8	0.85	6
Japan	54.72	14	HI	14	SEAO	3	0.67	49
China	52.54	22	UM	1	SEAO	6	0.94	3
Russian Federation	38.76	45	UM	6	EUR	31	0.61	75
Ukraine	37.62	50	LM	2	EUR	33	0.83	11
Moldova. Rep.	36.84	54	LM	4	EUR	34	0.78	22
Armenia	35.65	59	LM	5	NAWA	8	0.80	17
Kazakhstan	31.50	78	UM	22	CSA	3	0.46	116
Azerbaijan	30.58	82	UM	25	NAWA	15	0.50	103
Belarus	29.98	88	UM	30	EUR	38	0.39	120
Tajikistan	28.16	94	LM	13	CSA	5	0.59	83
Kyrgyzstan	28.01	95	LM	14	CSA	6	0.47	114

Note: World Bank Income Group Classification: LI – low income; LM – lower-middle income; UM – upper-middle income; HI – high income. Regions are based on the United Nations Classification: EUR – Europe; NAC – Northern America; LCN – Latin America and Caribbean; CSA – Central and Southern Asia; NAWA – Northern Africa and Western Asia; SEAO – South East Asia, East Asia and Oceania

Source: Compiled by the author based on data provided by The Global Innovation Index (2017).

Change of indicators of Russia in the Global Innovative Index deserves attention (tab. 3).

Tab. 3 Dynamics of a position of the Russian Federation in the Global Innovative Index, 2013-2017

Years	Rank	Score (0-100)	Innovation Input Sub-Index	Innovation Output Sub-Index	Innovation Efficiency Ratio
2013	62	37.20	52	72	104
2014	49	39.14	56	45	49
2015	48	39.32	52	49	60
2016	43	38.50	44	47	69
2017	45	38.8	43	51	75

Source: Compiled by the author based on data provided by The Global Innovation Index (2013-2017).

As appears from table 3, indicators Innovation Input Sub-Index and Innovation Output Sub-Index vary. So, positions on the Innovation Input Sub-Index improve, at the same time the Innovation Efficiency Ratio in 2017 hasn't reached the positions taken earlier that speaks about insufficiently effective realization of innovative potential.

Russia on the GDP level per capita in the rating of GII is in the 39th place from 50 states and in the 29th place among 35 countries of Europe, entering, thus, into group of the countries with high GDP per capita.

However, despite considerable positive dynamics of innovative development, Russia at the moment isn't among the countries – technological leaders. Now the country spends only 1.5% of GDP for the innovative sphere and its development. In comparison with other countries the Russian investments into innovations are very insignificant. So, in 2014 investments of the USA into the sphere of innovations have made 2.8% of GDP, Japan – 3.4%, Israel shows the biggest percent of investments – 4.2% (*Global R&D Funding Forecast*, 2014).

The most part of export of hi-tech production is the share of industrialized countries (1.4 trillion dollars), their largest exporters which the USA and EU countries is. The considerable share in the world market of export of high technologies is occupied in recent years by Japan, South Korea, Taiwan, the share of each of which makes 5-8%. In Russia in spite of the fact that the transfer of technologies is the priority direction of the state innovative policy, the share of innovations in domestic production export remains very low. So, in the market of hi-tech production Russia takes the insignificant place – only 0.2% (*Science and engineering indicators*, 2014).

3. Results and Discussion

Technology transfer system existing in Russia today has a range of features, inherent to transient period. Efficiently developing economy features domination of knowledge-intensive new technologies in the structure of imports, and, in its turn, output of mature technologies domination in the export structure. According to information provided by the State Statistic Service (*Russia in numbers*, 2017), the structure of exports in technology sector has scientific researches dominating in total of all subject matters of transactions, and other subjects import share prevails greatly over export one. At the moment total import is significantly dominating over export (one and a half as much) in technology transfer system with foreign partners (table 4), what means predominant import of technology, which has poor degree of novelty from perspective of the global technology market. 87% of developed advanced technologies are brand new for Russia, and as little as 12.5% of them are brand new for the global technology market (table 5).

Tab. 4 Technology trade with foreign countries under subjects of transactions in 2016

Subject of the transaction	Export			Import		
	Number of transactions	Subject cost, mln. USD	Total annual income, mln. USD	Number of transactions	Subject cost, mln. USD	Total annual outcome, mln. USD
Total	2182	27981	1277	3449	14147	2499
Including for the following subjects of transactions:						
Invention patent	6	0.0	0.0	27	109.3	5.4
Patent license for an invention	96	321.5	83.1	171	513.4	80.6
Utility model	9	2.4	2.0	8	0.0	1.1
Know-how	30	44.9	28.7	111	350.3	104.9
Trademark	16	1.7	0.9	211	956.7	444.8
Commercial prototype	5	69.5	50.1	38	12.6	10.5
Engineering services	771	26452.4	819.0	1667	10671.9	1547.9
Scientific researches	800	709.7	140.7	337	405.6	149.1
Others	449	379.4	152.4	877	1126.6	154.5

Source: Russia in numbers (2017).

Tab. 5 Categorized advanced production technologies developed 2016 (items)

Advanced production technologies	Total number of technologies	Category		
		New for Russia	Brand new	The ones using patented inventions during development
Total	1534	1342	192	527
including:				
Design and engineering	402	352	50	149
Production, processing and assembly	509	449	60	171
Automated uploading / downloading actions; materials and parts transporting	34	29	5	9
Automated surveillance (monitoring) devices	160	111	49	76
Communication and control	285	264	21	81
Production informational systems	83	80	3	29
Integrated control and monitoring systems	61	57	4	12

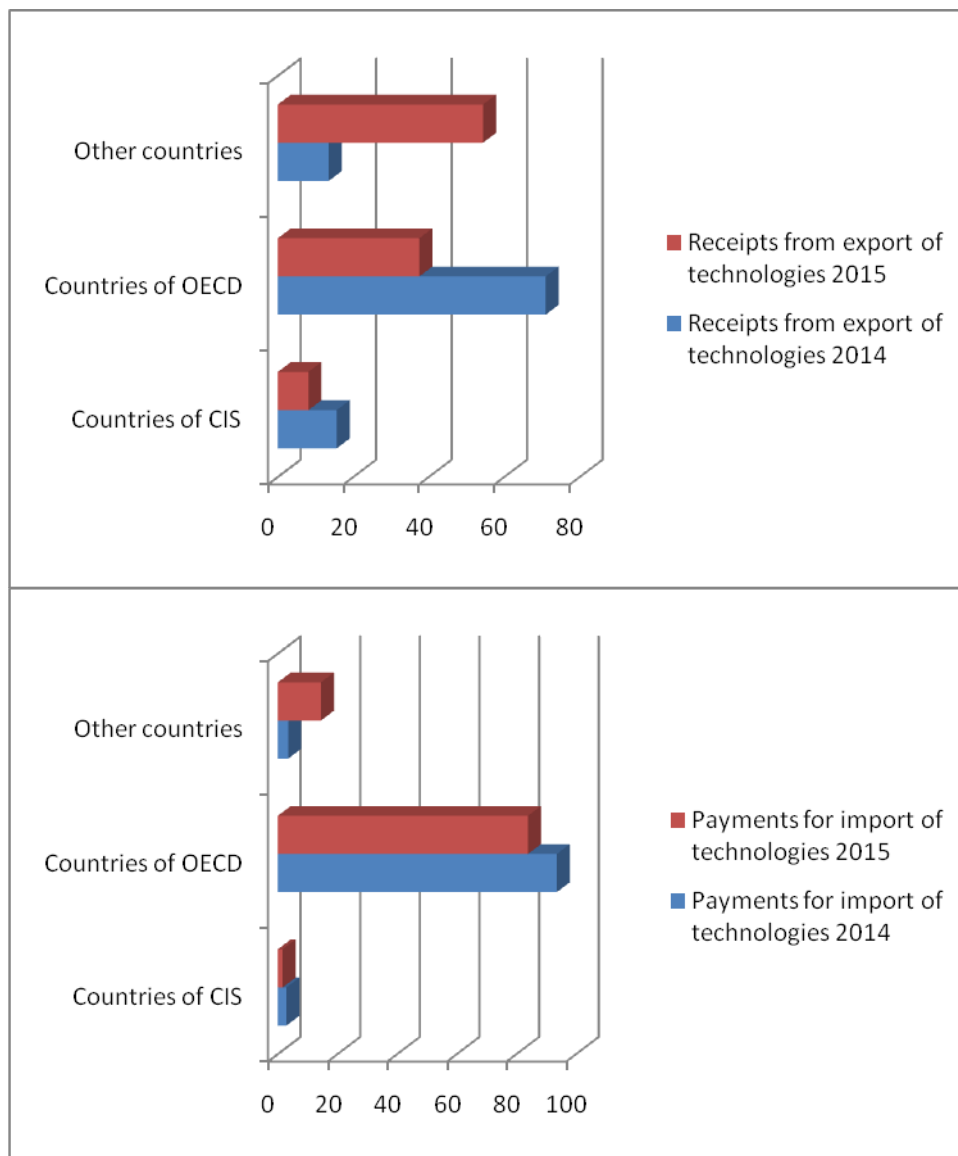
Source: Russia in numbers (2017).

One of the main objectives of economic growth in Russia is ensuring development of domestic hi-tech production, goods, effective and competitive in the world markets, assistance to their advance on the global market of innovations.

Today in Russia foreign technologies are actively used that puts Russia in a dependency from technologically developed countries. Due to such position of the "catching-up" country lag in the sphere of high technologies is observed. It speaks and the fact that development of own technologies often is less favorable, than their import in spite of the fact that the domestic economy possesses all necessary resources (human, financial and so forth), a considerable source of raw materials for active modernization and development of a technological transfer. However presence of potential isn't sufficient advantage to implementation of a transfer of technologies as priority direction of the state innovative policy. Unfortunately, potential innovative and technological advantages don't find full realization in Russia not only in the world market, but also within national economy.

For 2000-2012 the Russian technological export has mainly been focused on the markets of developing countries. At the same time the share of the states of the Organization for Economic Cooperation and Development (OECD) in structure of export of technologies steadily exceeded 40%. In 2013 the tendency has changed: the share of the countries which are a part of OECD has reached 61.3% (fig. 1).

Fig. 1 Structure of export and import of technologies of Russia over groups of the countries, %



Source: Foreign trade in technologies of Russia, 2016.

Such dynamics was observed in connection with reduction of shares both the states of the Commonwealth, and the other countries (respectively on 10.9 and 9.7 percentage points). In 2014 the high specific weight of the

states of OECD (71.0%) is observed, however in 2015 there is a sharp weight reduction up to 37.5%. The largest volume of the Russian export in 2015 is the share of such states of OECD as the USA (319.1 million dollars), Germany (47.2 million dollars), the Netherlands (32.3 million dollars) and France (20.6 million dollars). The share of the Commonwealth countries during the same period has made 8.1%, with a considerable volume of Belarus (79.4 million dollars) and Kazakhstan (27.4 million dollars) which are most actively gaining the Russian technologies. Among the states of Asia the considerable sums fell on receipts from China (460.3 million dollars), Bangladesh (207.0 million dollars) and India (85.9 million dollars).

Such countries as OECD, India and China treat the main partners of Russia in trade in technologies. Their share in 2015 has reached 83.9% of volume of payments and 85.4% of all Russian import of technologies. The considerable sums of transactions by the Russian licensees went to Germany (392.6 million dollars – 9.5%), the USA (254.1 million dollars – 7%), France (174.9 million dollars – 29.3%) and Great Britain (138.6 million dollars – 8%) (*Foreign trade in technologies of Russia*, 2016).

Today there is a variety of reasons, the technologies interfering active participation of Russia in a global transfer. One of the main is the lack of an integrated approach to standard rightly regulation of a transfer of the Russian technologies abroad. The Federal law "About Transfer of Rights to Uniform Technologies" adopted in 2008 and added in 2011 was attempt to change legal support of a transfer of the Russian technologies, having touched on issues of fixing of the rights to results of scientific and technical activity. The regulations adopted earlier demand serious completion as they cover not all aspects of a technological transfer. Adjustment is demanded also by the Customs code of the Russian Federation as the main objective of the code is control of crossing of limit of material values, and it isn't focused on perspective development of export of technologies. Besides, privileges when exporting from the Russian Federation aren't provided of high-tech production. The second reason interfering export of the Russian technologies is competitiveness, namely not debugged competitiveness of conditions of business, insignificant investment of innovative projects and a considerable difference between costs of innovations and commercial effect of their realization.

About 2% of innovations take root into the Russian industry now. As note a number of researchers, intellectual property items and other types of intellectual products in the Russian export occupy about 3% of the total amount of export (for comparison it is possible to give such countries as Brazil – more than 5%, China – 25%). It is necessary to consider that 3% of all export makes the technologies transferred according to licenses for a know-how or inventions. Russia isn't the leader in export of the knowledge-intensive products, but it steadily keeps one of the leading positions in the world market of arms (the SU and MiG planes, anti-aircraft weapons, fighting helicopters, submarines, frigates, etc.). Also Russian Federation successfully competes in the markets of the space equipment and services, nuclear technologies, some types of electronic industry.

According to data of the Federal Customs Service of Russia, non-oil not power export has decreased by 8% to 96 billion dollars. If in absolute values non-oil, and including hi-tech, export was a little reduced in 2016, then its percentage value grows in the total amount of export, that is the structure of export improves. The new direction where in the short term Russia can take a leading place in the world market, export of information technologies is.

The majority of export services of the Russian IT-companies are new in the general structure of value added of IT-products, at the same time, according to the Ministry of Telecom and Mass Communications, export of domestic information technologies in 2016 has reached 7 billion US dollars. The position defining priority an exit to the level of the global competitor at the expense of "clever" grocery ecosystems is reflected in The Development Strategy of Russian Technologies State Corporation «Rostec» until 2025 (Strategy-2025). as it is noted in Strategy, "... as the driver of growth of revenue it is offered to consider the fast-growing markets of "clever" production which average growth rate is almost twice higher, than growth rate of the traditional markets (~ 11% a year in dollars). Considering the limited capacity of the domestic Russian market, the main emphasis has to be put on export of production of Corporation, and the market of EurAsEC can be used as the base for global expansion". For the purpose of realization of an integrated approach the profile radio-electronic cluster of Rostec uniting competences of the largest companies of radio-electronic branch in Russia that has already allowed the Russian producers to create a number of large-scale intellectual ecosystems is created. The Russian producers can apply for leadership in a number of segments of hi-tech goods, but for this purpose they have to show more activity to unite within branches and to enter the foreign markets already with package offers

Various strategies significantly differing from each other, but in a varying degree applying innovations are around the world used. The right choice of the development strategy is a key to success of innovative activity. At the same time the sizes and rates of strategy depend on the existing innovative potential and a condition of innovative climate.

In March, 2013 the Government of the Russian Federation has approved The Forecast of long-term social and economic development of the Russian Federation till 2030 developed by the Ministry of Economic Development. The developed tendencies of technological development in the Russian economy, the available risks and possibilities of growth allow allocating three most probable options of scientific and technological development of the country corresponding to the main scenarios of development of economy.

1. Option of inertial import-oriented technological development. In this case there is a further weakening of the national innovative system (NIS), primary use of foreign technologies and the equipment for modernization of productions and branches of economy continues. There is a disintegration of NIS on the separate scientific and technical enclaves concentrated mainly in defense industry. Internal costs of research and development stagnate at the level of 1.0-1.1% of GDP till 2025 and increase by 2030 only up to 1.3%, at the same time the share of private expenses will exceed 30% only after 2025 and by 2030 doesn't reach 40%. In the developed countries, as well as in China, the share of the non-state sector exceeds 80 percent. In costs breakdown on scientific research by 2030 the share of capital investments from 6-7% will increase up to 11% (in the USA on average for 2000-2008 – 11.5%) (*The forecast of long-term social ...*).

At such scenario of development there will be an essential lag from the countries - technological leaders, and in further prospect the new industrial countries can expect competitive loss in the field of innovations, in particular, to China.

Thus, this option doesn't answer the purpose and reference points of development of the Russian economy for a long-term outlook.

2. Option of the catching-up development and local technological competitiveness. In case of development of national innovative system according to this option technical and technological modernization of economy will happen not only on the basis of import technologies, but also by means of introduction of the created domestic developments. Demand for domestic technologies will be mainly formed as according to requirements of ensuring interests of national security and defense, and owing to development of the power raw sector. Internal costs of research and development will increase up to 2.0% of GDP by 2025 and up to 2.5% of GDP by 2030, the share of private expenses will exceed 30% after 2020-2022 and by 2030 will make more than 35%. The sector of fundamental and applied science will be segmented and concentrate around the directions having commercial application. In costs breakdown by science the share of expenses on compensation will be reduced by 2030 to level below 30% (*The Forecast of long-term social...*). At the same time the share of capital investments will increase that will be connected with technological modernization of branch.

At this option of development both positive, and negative aspects are observed.

Advantages of this option will be: use of ready and well debugged technologies (respectively, innovative risks are minimal); reduction of terms of implementation of innovative projects; emergence of new hi-tech sectors in key branches of economy in a consequence of development of technologies; decrease in risk of mistakes in connection with decision-making decentralization.

When using this option there are also certain risks: existence of fierce competition with the producers of similar production applying similar or more perfect technology; the attraction of direct foreign investments leading to the most effective development of production that demands considerable efforts on improvement of investment climate; the dependence of domestic economy on technological import slows down development of own developments.

3. Leadership option in the leading scientific and technical sectors and basic researches. This option is directed to modernization of the domestic research sector, substantial increase of its efficiency, concentration of efforts on the breakthrough scientific and technological directions. It will allow to expand significantly application of domestic developments and to improve positions of Russia in the world market of hi-tech production and services, to increase efficiency of interaction of the Russian scientific and educational sector and production, to lead to development of technological platforms. Potentially Russia can apply for occupation of the leading positions in the sphere of production of aerospace production, nanotechnologies, biomedical technologies, nuclear and hydrogen power, composite materials, the separate directions of rational environmental management and ecology and some other. At development in this option significant increase in demand for new scientific and engineering shots will be observed, to occur formation of the developed national innovative system, including due to creation of regional innovative clusters. There will be a restoration of the leading positions of the Russian fundamental science. At the same time the chosen option is expensive as assumes large-scale public financing of research and development, first of all fundamental character, assistance of the fastest commercialization of results of research and development, active search and formation of the new markets, niches and segments within the existing markets, support of a contact to them of the Russian companies. Internal costs of research and development according to this scenario will increase by 2020 up to 2.0% of GDP, by 2030 – up to 3.0% of GDP, the share of private expenses by 2030 will reach 50 percent. By 2030 in costs breakdown by science the share of expenses on compensation will be reduced to level below 30% (*The forecast of long-term social ...*).

Essential modernization of the machinery and equipment in this connection the share of capital investments considerably will increase is supposed. Other expenses will also increase that is connected with the increasing cost of high-precision researches for which carrying out expensive expendables are necessary. At this option of development there are considerable innovative risks that it is connected with basic novelty of decisions. The probability of the advancing application by other countries of the most perspective innovations is high.

However, according to author, the last option of technological development can lead to formation of effective organizational and economic system of a transfer of technologies which will allow Russia to occupy one of leading places in the market of hi-tech production, including in a number of the branches included by technologically developed countries (Switzerland, the USA, China, Japan, etc.) in the national programs as the most priority.

4. Conclusions

Having analysed the current state and the possible prospects of technological development of Russia, we come to the following conclusions.

Now the economy of the most developed countries is focused on knowledge, the new ideas, high technologies, scientific achievements in all branches and spheres. The traditional, settled sources of economic growth based on raw material and energy resources, cheap labor, new territories lose the relevance. Scientific and creative achievements of people become the major resource, a factor of economic growth, the economy becomes "intellectual", "innovative". At the same time both development, and effective and timely realization of innovations as results of intellectual activity becomes an important and relevant problem of modern economies.

Development of innovative activity, economic growth of the state requires creation of certain conditions for accumulation of rates of a transfer of progressive technologies. At the same time, during the carrying out researches, development and deployment of new technologies it is necessary to be guided by needs of all participants of innovative process (developers, specific buyers of new technologies, goods, services, requirements of the market, investors, etc.).

Economic growth of the state depends first of all on concentration of scientific potential on the perspective directions, competitive spheres of scientific and educational and technological activity allowing to resolve key issues of development of national economy. In Russia potential in development of the breakthrough scientific and technological directions is rather high: space branch, production of nanotechnologies, biomedical technologies, nuclear and hydrogen power and others. A specific place in this key will be held by the transfer of new knowledge and technologies focused on transfer of hi-tech production not only at the state and interstate level but also taking into account a branch and regional component that is especially important for such country as Russia having non-uniform economic space.

The analysis of the options of scientific and technological development of the country offered the Ministry of Economic Development of the Russian Federation corresponding to the main scenarios of development of economy has allowed revealing merits and demerits of each of possible options. According to us, modernization of the domestic research sector, increase in its efficiency, concentration of efforts on the breakthrough scientific and technological directions will allow not only to expand significantly application of domestic developments and to improve positions of Russia in the world market of hi-tech production and services, but also to take the leading positions in a number of high-tech industries, to promote formation of the developed national innovative system, including due to creation of regional innovative clusters.

References

- Edler J., Fagerberg J. (2017): *Innovation policy: what, why, and how*. "Oxford Review of Economic Policy", Vol. 33(1), pp. 2-23. <https://doi.org/10.1093/oxrep/grx001>
- Foreign trade in technologies of Russia* (2016). Science, technologies, innovations: information and analytical bulletin. Moscow: Institute of statistical researches and economy of knowledge. <https://issek.hse.ru/expressinformation>
- Global R&D Funding Forecast 2014* - http://www.battelle.org/docs/tpp/2014_global_rd_funding_forecast.pdf
- Griffith R., Huergo E., Mairesse J., Peters B. (2006): *Innovation and productivity across four European countries*. "Oxford Review of Economic Policy", Vol. 22(4), pp. 483-498. <https://doi.org/10.1093/oxrep/grj028>
- Hall B.H. (2002): *The financing of research and development*. "Oxford Review of Economic Policy", Vol. 18(1), pp. 35-51. <https://doi.org/10.1093/oxrep/18.1.35>
- Mazzucato M., Semieniuk G. (2017): *Public financing of innovation: new questions*. "Oxford Review of Economic Policy", Vol. 33(1), pp. 24-48. <https://doi.org/10.1093/oxrep/grw036>
- Minner S., Battini D., Celebi D. (2017): *Innovations in production economics*. "International Journal of Production Economics", Vol. 194, pp. 1-2. <https://doi.org/10.1016/j.ijpe.2017.10.017>
- Russia in numbers* (2017): Federal State Statistics Service of the Russian Federation. www.gks.ru

- Sang Y.H., Sung J.B. (2014): *Internalization of R&D outsourcing: An empirical study*. "International Journal of Production Economics", Vol. 150, pp. 58-73. <https://doi.org/10.1016/j.ijpe.2013.12.001>
- Science and engineering indicators 2014*: National Science Board. www.nsf.gov/statistics/seind14/index.cfm/chapter-6/c6s3.htm
- The Development Strategy of Russian Technologies State Corporation «Rostec» until 2025*. <http://rostec.ru/about/strategy/>
- The Forecast of long-term social and economic development of the Russian Federation till 2030*. http://www.consultant.ru/document/cons_doc_LAW_144190/6639fcb651e54a1386f26ea1d905315193274482/
- The Global Competitiveness Report 2016-2017*. World Economic Forum. www3.weforum.org/docs/GCR2016-2017/05FullReport/
- The Global Competitiveness Report 2017-2018*. World Economic Forum. <http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf>
- The Global Innovation Index 2013: The Local Dynamics of Innovation*. World Intellectual Property Organization. http://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2013.pdf
- The Global Innovation Index 2014: The Human Factor in Innovation*. World Intellectual Property Organization. http://www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2014.pdf
- The Global Innovation Index 2015: Effective Innovation Policies for Development*. World Intellectual Property Organization. http://www.wipo.int/edocs/pubdocs/en/wipo_gii_2015.pdf
- The Global Innovation Index 2016: Winning with Global Innovation*. World Intellectual Property Organization. http://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2016.pdf
- The Global Innovation Index 2017: The Local Dynamics of Innovation*. The Global Innovation Index. www.globalinnovationindex.org
- Yatsenko Y., Hritonenko N. (2015): *Algorithms for asset replacement under limited technological forecast*. "International Journal of Production Economics". Vol. 160, pp. 26-33. <https://doi.org/10.1016/j.ijpe.2014.08.020>
- World Economic Forum: News Release 2017-2018*. <http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf>