

THE FEATURES OF RUSSIA'S INVOLVEMENT IN THE PROCESS OF INTERNATIONALIZATION OF INNOVATIVE ACTIVITY

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Abstract

The penetration of information and communication technologies (further - ICT) into all sectors of the economy and the sphere of vital activity of the population is a key factor of scientific, technical and economic progress in the context of globalization. Opportunities and difficulties of the countries of the world in the transition to a post-industrial economy reflect international ratings. They characterize the unevenness of innovative development and the use of innovations and information technologies. For the analysis of Russia's positions in the world innovation economy, several international ratings of innovative development have been selected (The Global Innovation Index, The Networking Readiness Index, and The Global Competitiveness Index). The analysis showed not only the representativeness of the international innovation ratings chosen for the analysis, but also the high correlation between the indices of the world indices in international innovation ratings and individual indicators of their economic development. The importance of policies in the use of ICT and the digital economy for structural changes in the economy is noted. Russia is inferior to the world's leading leaders in terms of innovation activity and economic development. In the light of the economic sanctions of the economically developed countries of the West against Russia, this gap may even increase. Assessing Russia's position in international innovation development ratings, including R & D spending, has highlighted the need to take into account global trends and challenges, and has offered recommendations for improving the situation in this area. The recommendations will facilitate Russia's early transition to a socially-oriented innovative type of economic development. The main direction is the development of the national innovation system and the inclusion of Russia in the global innovation space.

The purpose of this research is to characterize Russia's position in international innovation ratings, highlight Russia's problems in research and innovation. Based on the analysis of the current situation, to propose recommendations on the activation of Russia's involvement in the process of internationalization in the field of research and innovation.

Results and practical importance are to issue recommendations for improving the activation of Russia's involvement in the process of internationalization in the field of research and innovation. It is necessary to adjust the direction of further development.

Keywords: Russia, internationalization of innovative activity, innovative economy, R&D, ratings of innovative development, ICT

1 INTRODUCTION

The strategy of scientific and technological development, as well as the development of innovative activity, requires that any state takes into account global trends and challenges. In this context, defining the future of

the country for the Russian Federation is an extremely important step. At present, several legislative documents have been developed and approved in the Russian Federation that approve the country's movement in line with the main trends in the development of the scientific world landscape. According to the authors, the most significant document is the "Strategy for Innovative Development of the Russian Federation for the Period to 2020 year" (hereinafter - the Strategy). It is developed on the basis of the provisions of the Concept of Long-Term Social and Economic Development of the Russian Federation for the Period to 2020 year (hereinafter referred to as the Concept) in accordance with the Federal Law "On Science and State Science and Technology Policy", which sets the task of the country's transition to a socially-oriented innovative type of economic development [12]. Within the framework of this Strategy, the task of forming the scientific and technological potential of our country adequate to modern challenges of world technological development is revealed.

It is noted that Russia sets long-term development goals, which are to ensure a high level of the well-being of the population and to consolidate the geopolitical role of the country as one of the leaders that determine the world political agenda. It is noted that the only possible way to achieve these goals is the transition of the economy to an innovative socially-oriented development model. year country's leadership pays much attention to the topic of modernization and innovation. The Commission was established under the President of the Russian Federation for Modernization and Technological Development of the Russian Economy. State scientific and technological priorities have been identified, within which specific projects have been funded.

The global economic crisis of 2008-2009 year complicated the implementation of the set goals, led to a reduction in private business spending on innovation and slowed the development of the Russian innovation system. At the present stage of the development the world economy, in the era of increasing internationalization processes, a number of problems arise: the unevenness of social and economic development, demographic imbalances, and the aging of the world population. They generate serious interstate problems, including powerful migration flows. There are problems of ensuring national security, overcoming the crisis of non-proliferation of nuclear weapons, solving environmental and other global problems. The vector of world economic development is changing. The role of the innovative sector of the economy is growing.

No one disputes the correctness of the problem. However, despite convincing calls of the authorities to switch to a new, innovative course of development, in the Russian Federation far from all the provisions of the Strategy work and will be implemented in the near future. At the same time, when implementing the Strategy for the Development of Science and Innovations in the Russian Federation for the period until 2015 year, the planned level of a number of indicators was not achieved, primarily due to the demand for innovations in the real sector of the economy.

2 METHODOLOGY OF RESEARCH AND SOURCES OF INFORMATION

At the present, several complex indicators (integral indices) characterizing the level of development of knowledge-based economy. They show the differences between countries in the level of the use of innovation and information technology. For the analysis of Russia's positions in the world innovation economy, several international ratings have been selected that show the degree of readiness of the countries of the world for the post-industrial economy: Knowledge Economy Index, The Global Innovation Index (further -GII), The Networked Readiness Index (further - NRI), The Global Competitiveness Index (further -GCI) [8], [17], [18], [19], [20].

It should be noted that the experts of the UN and the World Bank are considering various aspects of innovative development. But in some researches, an alternative (different from the methodology used in the innovation development ratings analysed by us) is used. It forms a chain of influence that examines the mechanisms through which access to ICT and their meaningful use can increase the "information capacity" of countries. At the same time, it is stressed that all this ultimately can lead to improvement of the scientific and social potential of people [5]. The importance of policies in the use of ICT and the digital economy for structural change, equality and social integration has been raised in many articles by domestic and foreign authors [1], [2], [6], [7], [9], [10], [13], [14], [16].

The calculations performed by the authors showed the representativeness of the international innovation ratings chosen for the analysis (correlation coefficients 0.8 to 0.9), as well as the high correlation between the indices of the world indices in innovation ratings and individual indicators of the economic development of states (such as: per capita, expenditure on scientific research, the gross added value of industrial production, including high-tech products per capita) (See Table1).

Table 1: The results of calculations of correlation dependence between indicators by the countries of the world

	Global Innovation Index - GII	The ICT Development Index - IDI	Networked Reading Index - NRI	GDP (PPP) per capita	Manufacturing value added (MVA) per capita
Global Innovation Index - GII		0,87	0,88		0,86
The ICT Development Index - IDI	0,87		0,87	0,87	0,76
Networked Readiness Index - NRI	0,88	0,87		0,78	0,78
GDP (PPP) per capita	0,79	0,78	0,78		0,86
Value added of manufacturing industries per capita	0,81	0,76	0,78	0,86	

Source: calculated by the authors

3 RESULTS

The authors are invited to consider and characterize Russia's positions in international innovation development ratings [17], [18], [19], [20] (See Table 2).

Table 2: The positions of leaders and Russia in international innovation development ratings

The Global Innovation Index (GII), 2017		The Networked Readiness Index (NRI), 2016		The ICT Development Index (IDI), 2017		The Global Competitiveness Index (GCI), 2016	
1	Switzerland	1	Singapore	1	Iceland	1	Switzerland
2	Sweden	2	Finland	2	Rep. of Korea	2	Singapore
3	Netherlands	3	Sweden	3	Switzerland	3	Finland
4	USA	4	Norway	4	Denmark	4	Germany
5	UK	5	USA	5	UK	5	USA
...							
14	Japan	10	Japan	14	Japan	9	Japan
22	China	59	China	80	China	29	China
45	Russia	41	Russia	45	Russia	45	Russia

Source: compiled by the authors based on [17], [18], [19], [20]

The calculation of the knowledge economy index is based on the Knowledge Economy Index (further - KEI). Connected with the World Bank's "The Knowledge Assessment Methodology", which makes it possible to characterize the ability of countries to create, accept and disseminate knowledge [8]. Analysis of rating data allows to assess the positions of countries in the world report card on rank, and also to reveal their position in comparison with the countries of innovation development leaders in terms of integral indices (including such important as institutional regime, innovation, education, ICT). The leading places in the rating are

occupied by small countries of Western Europe (Sweden, Finland, Denmark, the Netherlands, Norway), known for high rates of innovation economy development. In Russia, the positions in this rating are not very high (on the integral index of the knowledge economy - 55th out of 145). Especially low indicators in Russia for one of the components of the index - the institutional regime.

The Global Innovation Index (further - GII) is a study where data on 80 indicators are collected for 127 countries. They cover a wide range of problems that allow analyzing global trends of innovative development in the countries of the world. In the rating table "GII, 2017" Russia is the 45th [19]. The leaders in this ranking are Switzerland, Sweden, Netherlands, USA, Great Britain, Denmark, Singapore, Finland, Germany, Ireland, Republic of Korea, Luxembourg, Iceland, Japan.

The Networked Readiness Index (further - NRI) is based on the calculation of three data blocks: 1) the availability of network infrastructure; 2) readiness for its use in civil society, business environment and state structures; 3) the real level of ICT use [18]. Russia in the rating table of 2016 year is only on the 41st place. But more important is a detailed analysis of the country's positions on individual components of the index, which characterize not only the level of use of network structures (the number of Internet users, mobile phones, personal computers, the access of the population to the Internet, etc.), but also factors contributing to this process. These are: a) the level of access to network technologies from the perspective of infrastructure development, availability of equipment, etc.; b) a policy in the field of network technologies (ICT and business economic environment); c) the level of development of the network society (training using network structures, ICT opportunities, social capital); d) the level of development of the networked economy (e-commerce, e-government, common infrastructure). It is for these positions that there are differences between the leading countries and Russia, which reflects its not too high positions in this rating. And the leaders are: Singapore, Finland, Sweden, Norway, USA, Netherlands, UK, Luxembourg, Japan.

The leading positions in the rating of the ICT Development Index are: Iceland, Republic of Korea, Switzerland, Denmark, Great Britain, Hong Kong, Netherlands, Norway, Sweden. Japan is located at the 14th position, the US - on the 16th. Russia holds the 45th position in the rating of 2016 year [20].

The World Economic Forum (further - WEF) defines competitiveness as a complex of institutions and institutions of authorities and factors of production on which the level of productivity of the economy depends. According to the WEF-calculated annual Global Competitiveness Index (further - GCI), the leading positions in this international ranking are taken by countries that have placed scientific knowledge in the service of their economy, widely implementing information and communication technologies (ICT) and innovations in all spheres of the population. In this Index, many components are grouped into 12 integral positions ("competitiveness bases"), compiled on the basis of a comparison of 113 indicators. One of the bases of competitiveness includes the indicators characterizing higher education in the country (the 5th group of 12). The rating includes data on 139 countries around the world. All of them in aggregate in detail characterize the level of competitiveness of the countries of the world in the global economy. In the group of leaders, as usual, there are developed countries: Switzerland, Singapore, Finland, Germany, the USA, Sweden, the Netherlands, etc. In the rating of 2010-2011, Russia took 63rd place, and now - in the 2015-2016 years rating - already 45th [17].

Russia's positions in international innovation development ratings have tended to grow slightly in recent years. Especially this draws attention to the background of the rapid growth of competitiveness of China, Brazil, India, etc. Russia's low position in the rating of global competitiveness (and in other innovation development ratings) proves the existence of problems in the development of the national innovation system of the country, and also shows that not all safely and with the implementation of the provisions of Strategy 2020.

You can also compare the costs of research. In the world GDP, R & D expenditures are about 2%, and that is mainly due to developed countries. The three-dimensional space of scientific research (USA-EU-Japan) is transformed into a four-dimensional one (USA-EU-China-Japan) [1], [2], [3], [4], [15]. Rapidly increases expenditure on R & D China. It is this fact that allowed China to take a leading position in the world economy and world industry. The quality of Chinese exports of high-tech products is also growing (China is now the world leader in this field as well).

Expenditures on scientific research in the world, in regions and countries are growing. But it is important to note the significant changes that have occurred in the countries of the Asian region in this sphere, including at the expense of Japan, China, India and the countries of the "new industrialization" (Republic of Korea, Singapore, etc.). At the same time, Asia's share rose to 44 % of the world's volume. China's share has significantly increased - up to 20% of the world index. The role of Japan has slightly decreased (to 11%), but this is a very significant proportion (Calculated by: [11]). But, as before, in terms of spending on R & D, the

US is leading (26% of global spending, \$ 514 billion, 2016 year). But it is important that China has already taken the second place in the table of ranks - about 396 billion dollars. Russia is among the leaders - 50 billion dollars. However, for expenditures on R & D per capita, China and Russia lag far behind the leaders [11], [21].

At present, several programs, concepts of innovative, scientific and research development for the period until 2020 year are being implemented in Russia. The main goal is to introduce clear unified rules for the implementation of innovative activities. The main direction is to build our own national innovation system and to include the Russian Federation in the emerging global innovation system.

4 DISCUSSION

Let's characterize the problems of activating Russia's involvement in the process of internationalization in the field of research and innovation. This is a debatable question. The involvement of Russia in the process of internationalization in the field of R & D is a labor-intensive process that requires active action from all participants in the scientific sphere, adopting specialized measures to improve the innovation climate in the country. It is necessary to emphasize once again that Russia's entry into the emerging global innovation system is impossible without building its own innovation system and policy, as well as a developed research sector [2], [4], [7], [14], [15].

According to the main government documents, the state policy of the Russian Federation in the field of innovations and the innovative infrastructure that is being formed should be united by a single concept of development, which will allow the participants of the innovation process to develop and evolve in a unified constructive direction. After all, the absence of links in the chain "science-production" and the almost complete absence of state regulation of the practical implementation of research and development results is a key obstacle to the development of innovative processes in Russia. Innovative policy requires interdepartmental control and coordination.

Based on the analysis of the current situation in the Russian Federation, it is possible to formulate recommendations on the activation of Russia's involvement in the process of internationalization in the field of research and innovation. Let's single out a few blocks of recommendations: institutional, socio-cultural, economic, and others that have a mixed character, but which have a synergistic effect [2], [4].

Undoubtedly, it is necessary to maintain and develop a competitive level of scientific research in universities and research centers related to universities, which is a prerequisite for competitive vocational education, especially science and engineering.

It is very important to provide state financial support for young professionals and researchers. To emphasize the attention of the government of the country to the growth of the level of expenditure per one scientific researcher (Russia is inferior to the developed innovative powers in this indicator). A very important point should be the popularization and increased attention to scientific activities in the country, the restoration of the lost prestige of scientists and scientists. It is necessary to restore the demand for scientific research and development by the state, business, international partners, society.

It is necessary to pay closer attention to the procedure for the commercialization of the development of talented scientists by increasing the availability of financial resources for commercialization, especially at an early stage - before the company's creation phase. The key moment in this matter is the relationship between the researcher, the research institute and the intermediary introducing the product to the market. The experience of other states must be taken into account. In order to regulate these relations, many states legislatively ensured the distribution of profits among the participants in the process. This issue is relevant in Russia, since the country has a large number of researchers whose inventions still do not enter the market. From our point of view, the creation and development of innovation centers and clusters on the territory of the Russian Federation will help solve this problem, as they will be a platform for the meeting and work of all stakeholders of the scientific community, and business access to existing developments will be open, thereby increasing transparency and the competitiveness of research.

To implement the above-mentioned tasks, it is necessary to change and revise the law on technical regulation, which in practice is not being implemented, to update the legislation in the field of intellectual property, to reduce taxation in this area or to introduce a "tax holiday" for the possibility of promotional the start-up business.

The issue of taxation is quite serious for the Russian Federation. It is simply economically unprofitable for enterprises to invest money in the scientific and researcher spheres.

It is necessary to emphasize one more important idea that when formulating an innovation policy, is

necessary to approach systemic issues. Financing science will increase the number of developments but will not increase their investment attractiveness. That is why the construction of a system transfer and commercialization of technology and its effective functioning is the most important moment in creating an innovative economy. Only by solving these issues does it become possible to provide science with sufficient means for scientific and technological progress.

At the universities in Russia (according to the experience of the United States and other countries), technology management offices and technology transfer offices should be established. Their sphere of competence should include: preparation of documents for the protection of intellectual property, financial support for the patenting process, strategic planning for product promotion, commercialization of technologies, etc. Some examples of such organizations are the ANVAR (Agence Nationale de Valorisation de la Recherche) in France, the National Technological Agency (TEKES) in Finland, the British Technology Group in the UK, and others [4]. It is necessary to pay very serious attention to the problems of patenting in the Russian Federation (in the USA, universities are patent holders of their own inventions).

So important to improve the system for obtaining grants for research in the Russian Federation. For everyone is necessary to develop market mechanisms: grant financing; return financing of commercially significant projects; co-financing (referring to the practice of agreements on joint research, subject to the transfer of rights to created objects to organizations of developers and industrial firms, including small businesses).

The author thinks that it is necessary to improve the forms and methods of public-private partnership. The commercialization of technology cannot be wholly tied to the state budget. Basically, it is determined by the demand for research and development from the private sector of the economy, so this partnership should become a key component of Russia's new innovation policy. For example, in the Netherlands there are four main public-private partnership programs, for which about 11% of the government's budget allocated for the development of science and technology is envisaged [4].

State structures need to take appropriate measures to ensure that Russian scientific journals (from the list of Higher Attestation Commission, further - HAC) are widely known in the world (entered the system SCOPUS, Web of Science, etc.). And then it will be easier for Russian scientists to present the results of their research to a wider audience, including the foreign one. Moreover, scientific research and development of Russian scientists meet all the basic requirements for those abroad, in foreign scientific journals.

Very important element in the development of the innovation system is the creation and support of specific venture funds, the development of venture financing. For Russia, we need to improve legislation in the field of its regulation.

Of course, special attention should be paid to attracting Russian multinationals to participation in R & D and scientific activity of universities (universities are preparing personnel for work in corporations). Everyone needs to actively involve international companies in Russia for R & D and other innovative activities.

So necessary to reduce barriers to attracting highly qualified specialists from abroad, including the issue of issuing visas and labor legislation.

One of the elements of the innovation system of the Russian Federation can be an active joint work with international organizations on certain areas of innovation policy. For example, with the World Bank in the implementation of a project-oriented approach, elaboration of issues of preferential taxation; with the research and development elaboration (further – R & D) in the evaluation of selected areas of state innovation policy; with the World Intellectual Property Organization on the problems of regulation of this issue, etc.

Given the raw dependence of the Russian economy, it is necessary to support innovative technological policies in the interests of "traditional" industries.

The authors are deeply convinced that an early solution to the problem of financing science in the country is necessary. It is necessary to maintain, increase public spending on R & D, and not only in priority areas of basic research, but also applied R & D. Against the backdrop of government support, there should be a change in the vision of the problem of investing in R & D by private business.

Based on the analysis of the current situation, we systematize the recommendations on the activation of Russia's involvement in the process of internationalization in the field of research and innovation [2], [4].

To the block of institutional recommendations, authors included:

- Development of a unified Concept for Development and Policy in the field of R & D and infrastructure (in

which the mechanisms for its implementation should be clearly specified);

- Standardization of legislation in the field of education;
- Alignment with international standards of documentation on international cooperation of universities (special double diploma programs, bachelor's and master's degrees, postgraduates, etc.);
- Support for the competitiveness of scientific research in universities and research centers associated with universities both at the state (federal) level and at the level of power structures in the regions;
- Creation of management and technology transfer offices;
- Updating and improvement of legislation in the field of intellectual property;
- Strengthening the system of protection of intellectual property rights.

In the block of socio-cultural recommendations, it should be noted:

- ❖ Restoration of the prestige of the scientist, strengthening the demand for science by the state, business, society;
- ❖ Support and preservation of scientists and qualified specialists in the domestic scientific market, creating conditions for their full-fledged work;
- ❖ To improve of the system for obtaining grants for scientific research in the Russian Federation;
- ❖ Raising the level of international innovation cooperation and academic mobility of scientists;

Among the block of economic recommendations, we will outline the following:

- Reduction of taxation in this area;
- Ensuring demand for research and development from the private sector of the economy;
- Creation of conditions for the commercialization of developments of talented scientists;
- Development of public-private partnership as a key component of Russia's innovation policy.

5 CONCLUSION

Russia continues to yield to the world's leading leaders in terms of innovation activity and economic development. In light of the current economic sanctions of the economically developed countries of the West against Russia, this gap may even increase.

In the next few years, most likely, the tendency of underfunding the level of spending on education, science (in comparison with global standards) will remain. The concept of long-term socio-economic development of the Russian Federation for the period until 2020 year does not intend to reduce the tax burden for innovative enterprises, a strategically important indicator in the whole system of innovative development. In fact, not a single mechanism of the concept has earned in full force. At the significant dependence of the country's economy on its natural resources and their exports only hampers the modernization of the economy in the direction of innovative development.

However, in our deep conviction, the presence of a national innovation system, an effective innovation policy and a long-term strategy for the innovation course will allow our country to take a worthy position in the global innovation system. Although Russia's position in the global innovation system is far from desired.

To include Russia in the global innovation system, it is necessary to develop a national innovation system, especially taking into account the experience of developed countries. It's the time to move from theory to practice. It is important to change the legislative, tax base, reform the scientific community, involve the state, business in the process of more actively integrating Russia into the global innovation system. The Russian Federation can and should take a worthier place in the world innovation economy.

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REFERENCE LIST

- Antipova E., Rodionova I. (2014) Geography of the scientific sphere in the context of the globalization of the world economy. [Geography of scientific sphere in the context of globalization of the world economy]. Vestnik of the Belarusian State University (BSU), Series 2: Chemistry, Biology, Geography 1: pages 71-77 (In Russ).
- Epifantseva A., Rodionova I. (2016) Features of Russia's involvement in the process of internationalization of innovation activity // In a call. monograph. Metamorphoses in the spatial organization of the world economy at the beginning of the XXI century. Monograph / Ed. prof. I.A. Rodionova, Moscow: University Book, pages 221-227. (In Russ).
- G20 Innovation Report 2016. Report prepared for the G20 Science, Technology and Innovation Ministers Meeting. Beijing, China. <http://www.oecd.org/china/G20-innovation-report-2016.pdf>.
- Galkin M, Rodionova I. (2013) National innovation systems in the internationalization of research activities. Monograph / Ed. prof. I.A. Rodionova, Moscow: Econ-Inform. (In Russ).
- Gigler B-S. (2011). Informational Capabilities: The Missing Link for the Impact of ICT on Development. World Bank, Washington. http://siteresources.worldbank.org/INFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/Resources/InformationalCapabilitiesWorkingPaper_Gigler.pdf.
- Isaksen A. (2011) Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy? Canadian Journal of Regional Science. 24 (1), pages 101-120. <https://www.questia.com/read/1G1-82077723/building-regional-innovation-systems-is-endogenous>.
- Kholina, V., Mironova M. Russian Economic Space: Evolution during Period of Reforms, Growth and (1990-2010). //Miscellanea Geographica – Regional Studies on Development. Issue 1 (Oct. 2012), pages 23-29, ISSN: 2084-6118 Versita, Poland. <http://www.degruyter.com/view/j/mgrsd.2012.16.issue-1/issue-files/mgrsd.2012.16.issue-1.xml>.
- Knowledge for Development: Knowledge Economy Index. World Bank (2012). http://info.worldbank.org/etools/kam2/KAM_page5.asp.
- Nagirnaya A. (2014) Telecommunication traffic: global disparities and international flows. Bulletin of Geography. Socio-economic Series no. 24, pages 177-190. DOI: 10.2478/bog-2014-0021. <http://apcz.umk.pl/czasopisma/index.php/BGSS/article/view/bog-2014-0021/3869>.
- Park S.O. Regional innovation strategies in the knowledge-based economy. GeoJournal (2001). Volume 53, Issue 1, pages 29–38. DOI:10.1023/A:1015814611617. <http://link.springer.com/article/10.1023/A%3A1015814611617>.
- R&D Magazine. (2016). Global R&D Funding Forecast. Winter 2016. A Supplement to R&D Magazine. Industrial Research Institute (IRI). (IRI), Washington, D.C. <http://www.iriweb.org/sites/default/files/2016GlobalRDFundingForecast.pdf>.
- Order of the Government of the Russian Federation of December 8, 2011 No. 2227-r "On the Strategy for Innovative Development of the Russian Federation for the Period to 2020». <http://www.garant.ru/products/ipo/prime/doc/70006124/#ixzz3UhTLLr8l>.
- Rodionova I., Gordeeva A. (2010). Human development index and informatisation of society in CIS. Bulletin of Geography. Socio-economic Series no. 13/2010, pages 79-87. DOI: 10.2478/v10089-010-0006-1. http://www.bulletinofgeography.umk.pl/13_2010/06_rodionowa.html.
- Rodionova I., Kokuitseva T., Galkin M. (2013) Expenses for scientific research and leadership of countries in the production and export of high-tech products in the 21st century: the world and Russia // Stage: economic theory, analysis and practice, 50 pages (In Russ).
- Rodionova I.A. (2014) World industry in post-industrial society: tendencies and regional shifts. Miscellanea Geographica. Regional Studies on Development, 18 (1), pages 31-36. DOI: 10.2478/v10288-012-0044-z. <https://www.degruyter.com/downloadpdf/j/mgrsd.2014.18.issue-1/v10288-012-0044-z/v10288-012-0044-z.pdf>.
- Rodionova, I., (2013). Competitiveness of countries in the world innovation economy: East-Central Europe and Russia. Quaestiones Geographicae 32(2), pages 15-24, DOI: 10.2478/quageo-2013-0010. <http://www.degruyter.com/view/j/quageo.2013.32.issue-2/quageo-2013-0010/quageo-2013->

0010.xml?format.

The Global Competitiveness Report, 2015-2016. World Economic Forum. Geneva, Switzerland (2015-2016). http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf.

The Global Information Technology Report 2016. (2016) Innovating in the Digital Economy. The Networked Readiness Index 2016. World Economic Forum. <https://www.wsj.com/public/resources/documents/GITR2016.pdf>.

The Global Innovation Index 2017. (2017) INSEAD (The Business School for the World) and the World Intellectual Property Organization (WIPO). http://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017-intro5.pdf.

The ICT Development Index (IDI). Measuring the Information Society Report (2017). <http://www.itu.int/net4/ITU-D/idi/2017/index.html>.

UNESCO Science report 2015: Towards 2030 (2015). <https://light2015blog.org/2015/11/13/unesco-science-report-towards-2030/>.