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Global Innovational Networks: Sense and Role in Development of Global Economy

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ABSTRACT

The starting point for this research is the authors' hypothesis that global innovational networks play an important role in the development of the modern global economy because they stimulate international cooperation in the innovational sphere, the translation of knowledge in the global economic system, and general scientific and technological development and production development.

The purpose of this article is to verify this hypothesis, conduct a complex study on the phenomenon of global innovational networks, and determine their purpose and role in the development of the modern global economy. The methodological basis of this research is founded on the logical modeling of economic systems and methods of structural and functional, systemic, and problem analysis.

In the process of the research, the authors studied examples of global innovational networks created based on modern Europe that include countries from all over the world, namely, Horizon 2020, ERA.Net RUS, and Eurocores (European Collaboration Research). The authors also conducted complex analysis of statistical information on various global innovational networks, the dynamics of the quantity of innovational projects, realized participation in global innovational networks, and the significance of the global innovational indexes of countries of Western Europe (Great Britain, Germany, France, and Italy), Central and Eastern Europe (Czech Republic, Poland, Hungary, and Latvia) and Russia in 2005-2014.

The authors provide a sense of global innovational networks, including their peculiarities and advantages; build a structural and logical model of the global market of innovations; and determine the role of global innovational networks in the development of the modern global economy.

KEY WORDS: global innovational networks, globalization, global economy, economic development

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Introduction

As the global economy develops, it acquires more and more new members. Under the influence of integration processes, modern businesses have taken various

forms. One of the most vivid manifestations is the emergence of transnational corporations in the 20th century, which currently have strong positions in the global economic system. As the concept of innovational economic development in the global economy has expanded, new members – global innovational networks – have appeared. These networks were selected as the object of this research.

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Global innovational networks are a form of international cooperation among enterprises in the sphere of scientific research and development for the creation of innovational technologies and their implementation in production. They can be created in any sphere of economic activity. Their members could include entrepreneurial structures, R&D institutes, and other subjects of economic activities of any ownership form. The organizational structure of global innovational networks differs depending on the specifics of the sphere and its subjects.

In the case of the registration of patents based on joint international developments within global innovational networks, network members possess equal rights to them. Overall, the activities of global innovational networks are regulated by international norms of law. It should be noted that recent initiators and members of global innovational networks have included representatives of developing countries. Joint projects, which are conducted with close cooperation within such networks, provide innovational development of the economies of all network members.

The authors of this research offer a scientific hypothesis that global innovational networks play an important role in the development of the modern global economy because they stimulate international cooperation in the sphere of innovation, the translation of knowledge in the global economic system, and general scientific, technical and production development. The purpose of the article is to verify this hypothesis, conduct a complex study of the phenomenon of global innovational networks, and determine their sense and role in the development of the modern global economy.

Literature review

The theoretical basis of the research comprises the works of various authors in the spheres of analyzing the consequences of the globalization of economic activities, the functioning of transnational corporations, and other international entrepreneurial structures; studying the tendencies of development of international business at modern stage; studying the issues of international production and sales cooperation; studying the transformation of national business environments and business societies and the formation of global business; and determining perspectives for

the further expansion of international movement of production factors. Many researchers have publications on this topic (Bagwell, 2015; Lan, 2015, & Thauer, 2015). The globalization of the world economy has led to transnational corporations, which conduct their business activities at the international scale (Eberlein, Abbott, Black, Meidinger, & Wood, 2014). Transnational businesses strive to place their production in countries with the cheapest natural and human resources (Porter, 2014), through which the least developed countries receive investments and opportunities for development (Lee, Ryu, & Kang, 2014).

This research is based on studies by modern authors in the spheres of studying the sense of the phenomenon of global innovational networks, their differences from other players in the international markets, the specifics of the organization of their activities and the cooperation of members in such networks and studying the issues of cooperation in global innovational networks with the governments of the countries in which they are represented and specific aspects of their activities, including taxation, crediting, and investments (Chaminade & Plechero, 2015; Cooke, 2013; Herstad, Aslesen, & Ebersberger, 2014; Liu, Chaminade, & Asheim, 2013; Ribeiro et al., 2014; Schött, Cheraghi, Rezaei, & Vang, 2014; Silva & Klagge, 2013; van Egeraat & Kogler, 2013).

Global innovational networks are global centers of innovational activities that accumulate new knowledge and stimulate their implementation in the production activities of business structures (Liu et al., 2013). They ensure innovational activity in the global economy; therefore, they often receive tax subsidies and credit resources (Silva & Klagge, 2013). The governments of various countries strive to attract global innovational networks and create them based on their own economies (Cooke, 2013).

The article also uses the works of economists devoted to the analysis of tendencies and factors of development of the modern global economy and the determination of new vectors of its growth and the influence of globalization and integration on the development of the global economy. They study various aspects of globalization of specific markets and spheres of the economy, the functioning and development of integration associations, international cooperation in solving global economic problems of humankind, and

the process of overcoming crisis phenomena in the global economy (Čaušević, 2015; Docquier & Machado, 2015; Ilie & Jaradat, 2015; Klinov, 2015; Larionova, Suslova, Povorina, & Vinogradova, 2015; Vinogradova, Kulyamina, Koroleva, & Larionova, 2015; Wirtz, Tuzovic, & Ehret, 2015; Yakovleva, Azarova, Titova, 2015). The most important tendencies of development of the modern global economy are those of integration and disintegration (Kornev, Maksimtsova, & Treshchina, 2015), the growth of contradictions of individual and collective development in countries of the global economy (Pulselli et al., 2015), and the development of international economic cooperation to solve common economic problems (Dudin & Frolova, 2015).

To understand the sense of development of the global economy, the authors use the studies of various authors, devoted to theoretical, methodological and practical aspects of the provision of economic growth, the modeling of the development of socio-economic systems under modern economic conditions, the analysis of disproportions of economic development of countries and the overcoming of them through the creation and implementation of innovations, concepts of innovational development of modern economic systems, high-quality aspects of the provision of sustainable economic growth, and the development of the global economy (González-Pernía & Peña-Legazkue, 2015; Leonida, Maimone Ansaldo Patti, Marini, & Navarra, 2015; Odhiambo, 2015; Pogosov, 2015; Popkova, Yurev, Stepicheva, & Denisov, 2015; Sarracino & Bartolini, 2015; Zeira & Zoabi, 2015). The provision of stable and sustainable economic growth and development require orientation towards the achievement of common (global) goals (Choi & Shin, 2015), a cautious attitude towards existing resources and the environment (Lee & Oh, 2015), and the protection of interests of society within the realization of state economic policy (Castiglione, Infante, & Smirnova, 2015).

A literature review on the topic of the research showed that despite the large number of publications in the sphere of globalization and development of the global economy, the specifics of the activities and influence of global innovational networks, which are a phenomenon of the modern global economic system, on global economic processes have not been studied. This predetermines the necessity for further research in this sphere aimed at determination of the sense of

global innovational networks and their role in the development of the global economy – which is studied in this article.

Method

The methodological basis of this research comprises the method of logical modeling of economic systems and the methods of structural, functional, systemic, and problem analysis. This methodology was selected due to, first the novelty of the objects of the research and the lack of statistical information on the current state, tendencies, and dynamics of development of the global innovational networks, which makes the use of methods of economic analysis impossible, and, second, the possibility of conducting full study on the sense and role of global innovational networks in the development of the global economy with the help of these methods.

The work also uses the following general methods of scientific research: induction, deduction, synthesis, and formalization. Due to the use of these methods, the scientific character of this research is ensured. The work is based on the hypothetico-deductive principle. The work is conducted within the concepts of innovational development of an economy, globalization and integration of the global economy, and the transnationalization of business.

Results

There are several dozens of global innovational networks in the world that unite various countries on R&D and the creation of innovational products. Let us view examples of global innovational networks that are created based on modern Europe and include countries from all over the world. One of the largest global innovational networks is Horizon 2020, which is oriented at the realization of many international innovational projects in the period of 2014-2020. The total budget of the projects constitutes more than EUR 80 billion (European Commission, 2015).

Another well-known global innovational network is ERA.Net RUS, which is a platform for the cooperation of countries of the EU and the Russian Federation in innovational and other spheres as follows: the protection of the environment, industrial production, the social sphere, medicine, etc. The total budget of realized innovational projects within ERA.Net RUS is more than \$25 million (ERA.Net RUS Plus, 2015).

Table 1. Dynamics of quantity of innovational projects realized within participation in global innovational networks and values of global innovational index of countries of Western, Central, and Eastern Europe and Russia in 2005-2009

Countries	Year/Indicators									
	2005		2006		2007		2008		2009	
	Q	I	Q	I	Q	I	Q	I	Q	I
Countries of Western Europe										
Great Britain	448	0.08	574	0.10	396	0.07	885	0.16	1,008	0.18
Germany	427	0.18	423	0.18	266	0.11	715	0.30	616	0.26
France	389	0.25	357	0.23	256	0.16	407	0.26	530	0.34
Italy	419	0.38	291	0.26	228	0.20	395	0.35	448	0.40
Countries of Central and Eastern Europe										
Czech Republic	75	0.09	80	0.11	85	0.08	91	0.17	97	0.20
Poland	55	0.05	60	0.05	65	0.03	71	0.09	78	0.08
Hungary	34	0.38	37	0.34	40	0.25	44	0.39	48	0.51
Latvia	28	0.32	32	0.22	37	0.18	42	0.30	48	0.34
Russia										
Russia	3	0.02	5	0.03	6	0.04	10	0.06	17	0.10

Source: Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynoso, Larvin and Wunsch-Vincent (2015).

Note:

Q – quantity of innovational projects realized within participation in global innovational networks;

I – value of global innovational index.

Another interesting global innovational network is Eurocores (European Collaboration Research), which includes 68 innovational enterprises from 24 countries of Europe. Within Eurocores, multiple scientific and research conferences are held, and many innovational projects are realized, the total budget of which constitutes more than EUR 50 billion (European Science Foundation, 2009).

These examples of global innovational networks were created around large European investment funds that conduct wide circles of research, concentrated around the most perspective spheres of science – nanotechnologies, breakthrough medicine technologies, etc. – and, despite their global coverage, have many members from the regions in which they were created.

The sense of global innovational networks consists of the unification of efforts of innovational enterprises and R&D centers from various countries for the joint conduct of scientific research and creation of innovations. The most important peculiarities that determine

the specifics and nature of the activities of global innovational networks are the following:

- the activities of global innovational networks have an innovational character – their acceptance of enterprises and R&D centers from several countries of the world;
- global innovational networks feature the realization of large projects that are characterized by a high complexity and require special infrastructure and large investments;
- projects realized within such networks usually have large social significance, have a revolutionary direction in science and are held in top-priority spheres of activities;
- global innovational networks are created for a certain period of time, have a clear goal, and cease to exist (or are re-organized) after its achievement;
- the initiator of network creation is, as a rule, a large investment fund that is interested in conducting scientific research.

Table 2. Dynamics of quantity of innovational projects realized within participation in global innovational networks and values of global innovational index of countries of Western, Central, and Eastern Europe and Russia in 2010-2014

Countries	Year/Indicators									
	2010		2011		2012		2013		2014	
	Q	I	Q	I	Q	I	Q	I	Q	I
Countries of Western Europe										
Great Britain	1,347	0.24	1,800	0.32	2,405	0.43	3,214	0.58	4,294	0.99
Germany	796	0.33	1,029	0.43	1,329	0.56	1,718	0.72	2,220	0.92
France	600	0.39	679	0.44	768	0.49	869	0.56	984	0.85
Italy	487	0.44	529	0.47	574	0.52	624	0.56	677	0.79
Countries of Central and Eastern Europe										
Czech Republic	104	0.26	110	0.35	118	0.47	126	0.63	134	0.82
Poland	85	0.10	93	0.13	101	0.17	110	0.22	120	0.69
Hungary	52	0.58	56	0.66	61	0.74	67	0.84	73	0.76
Latvia	55	0.37	62	0.41	71	0.44	81	0.48	93	0.77
Russia										
Russia	25	0.15	31	0.18	39	0.23	46	0.27	53	0.66

Source: Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynoso, Larvin and Wunsch-Vincent (2015).

Note:

Q – quantity of innovational projects realized within participation in global innovational networks;

I – value of global innovational index.

Due to these peculiarities, global innovational networks have the following advantages:

- the attraction of investments for the realization of complex, high-risk, and long-term innovational projects, which, as a rule, is difficult during the performance of such projects on a national scale;
- the possibility of the creation of unique and costly infrastructure, necessary for the conduct of full-scale R&D projects;
- the unification of resources and leading specialists from several countries, due to which the volume of innovational capital exceeds the possibilities of other members of the global market of innovations by several times.

Based on statistical information of for global innovational networks, the authors of this research determined (Table 1-2) and graphically presented (Fig. 1-6) dynamics of the quantity of innovational projects realized within participation in global innovational

networks and the values of the global innovational index of countries of Western Europe (Great Britain, Germany, France, and Italy), Central and Eastern Europe (Czech Republic, Poland, Hungary, and Latvia), and Russia in 2005-2014.

The analysis of dynamics of the above indicators made it possible to determine the tendency of expansion of countries' cooperation in the creation of global innovational networks, which leads to an increase in the value of their global innovational index. The number of innovational projects realized through participation in global innovational networks selected for the study of countries of Western Europe increased 10 times over the past 10 years. The annual increase was 10-15%. The value of the global innovational index increased proportionally from 0.08-0.25 to 0.85-0.99.

The quantity of innovational projects realized through participation in global innovational networks selected for the study of countries of Central and Eastern Europe increased 2 times over the past 10 years.

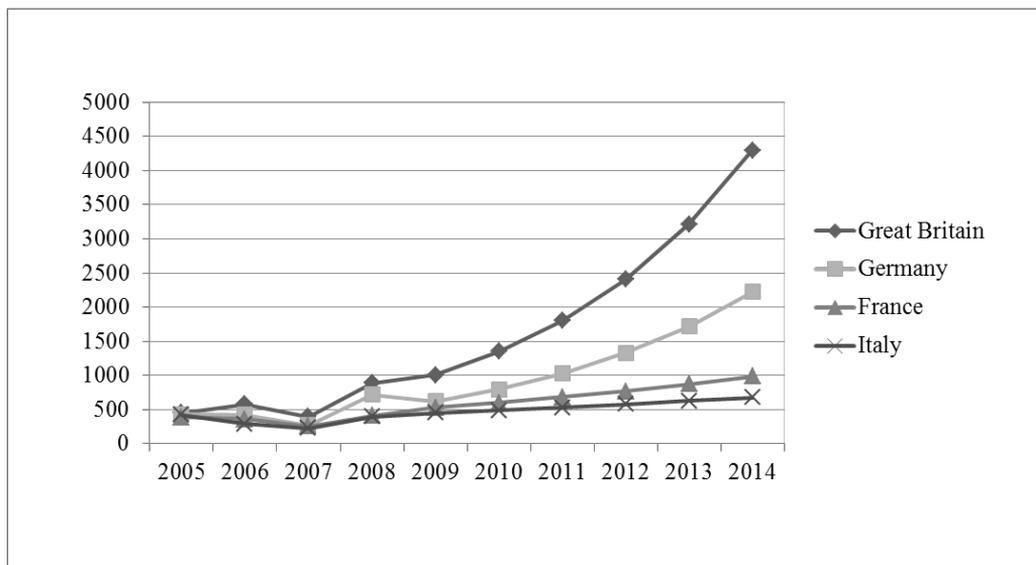


Figure 1. Number of innovational projects of countries of Western Europe realized within participation in global innovational networks in 2005-2014

Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynoso, Lanvin and Wunsch-Vincent (2015). ; "Funded innovation projects" by ERA.Net RUS Plus (2015); "EUROCORES Scheme European Collaborative Research. Final Activity Report" by European Science Foundation (2009).

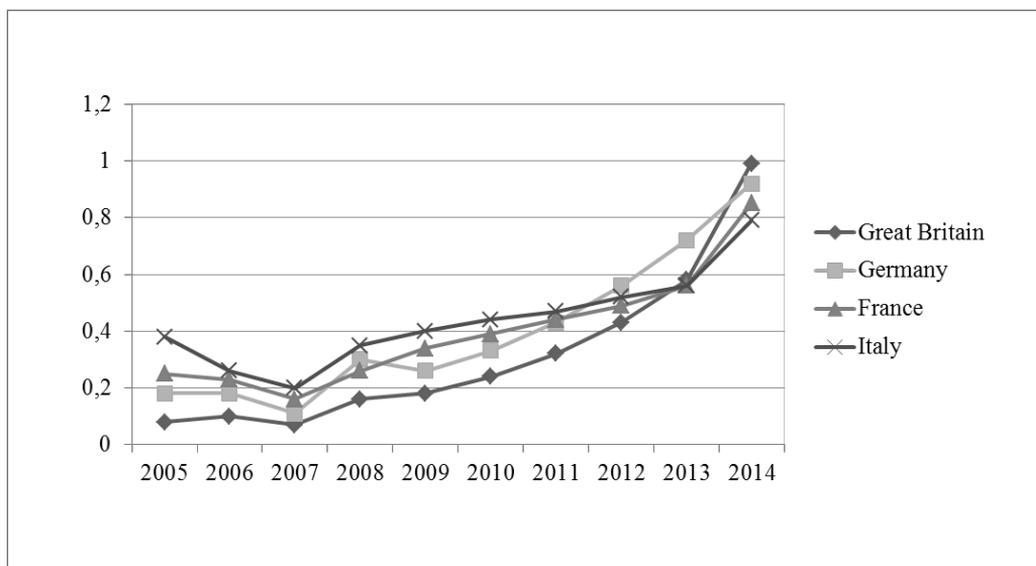


Figure 2. Global innovational index of countries of Western Europe in 2005-2014

Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynoso, Lanvin and Wunsch-Vincent (2015). ; "Funded innovation projects" by ERA.Net RUS Plus (2015); "EUROCORES Scheme European Collaborative Research. Final Activity Report" by European Science Foundation (2009).

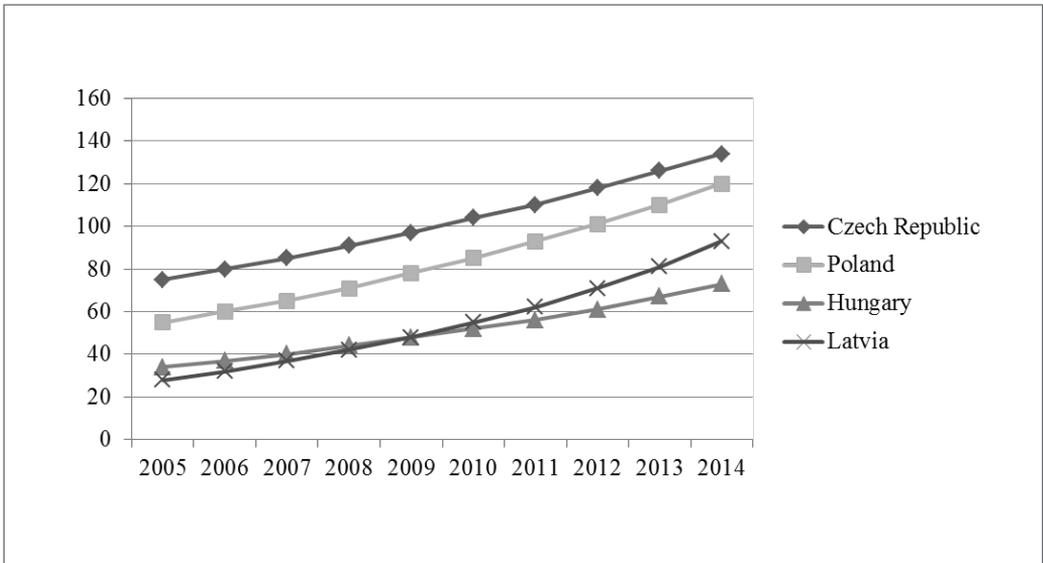


Figure 3. Number of innovational projects of countries of Central and Eastern Europe realized within participation in global innovational networks in 2005-2014

Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynolds, Larvin and Wunsch-Vincent (2015); "Funded innovation projects" by ERA.Net RUS Plus (2015); "EUROCORES Scheme European Collaborative Research. Final Activity Report" by European Science Foundation (2009).

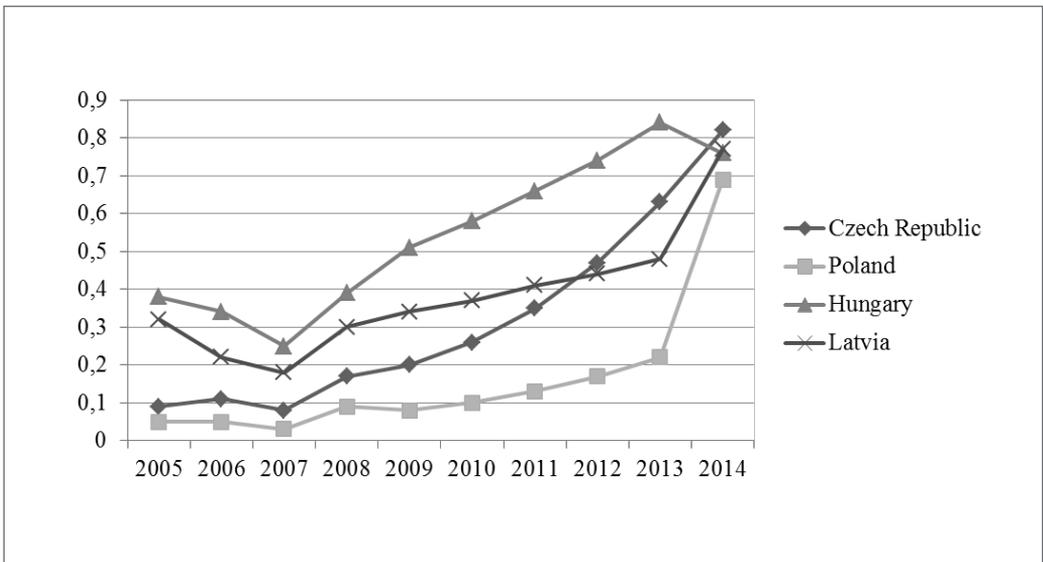


Figure 4. Global innovational index of countries of Central and Eastern Europe in 2005-2014

Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynolds, Larvin and Wunsch-Vincent (2015); "Funded innovation projects" by ERA.Net RUS Plus (2015); "EUROCORES Scheme European Collaborative Research. Final Activity Report" by European Science Foundation (2009).

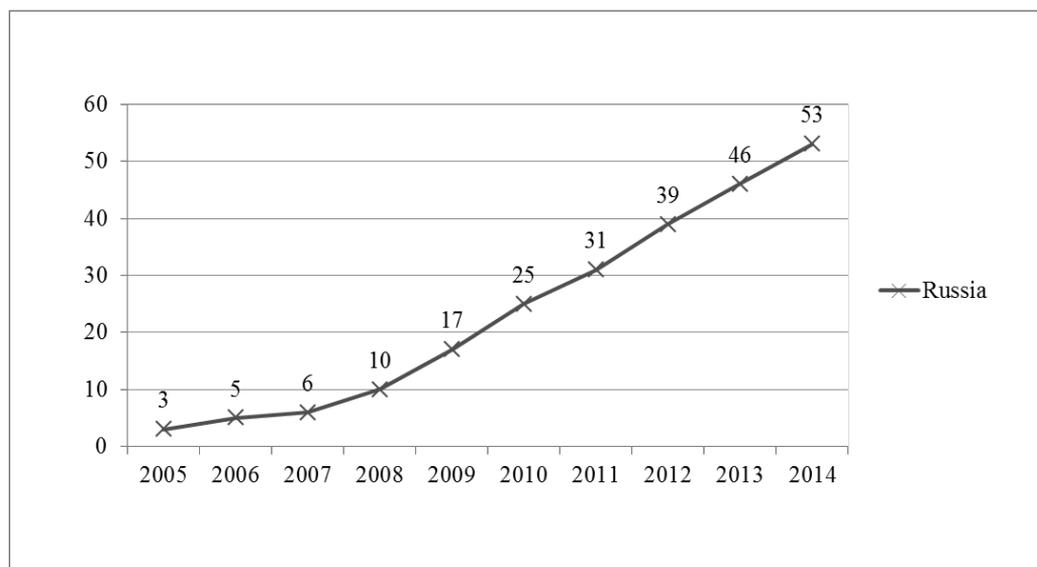


Figure 5. Number of innovational projects of Russia realized within participation in global innovational networks in 2005-2014
Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynoso, Lanvin and Wunsch-Vincent (2015).; "Funded innovation projects" by ERA.Net RUS Plus (2015); "EUROCORES Scheme European Collaborative Research. Final Activity Report" by European Science Foundation (2009).

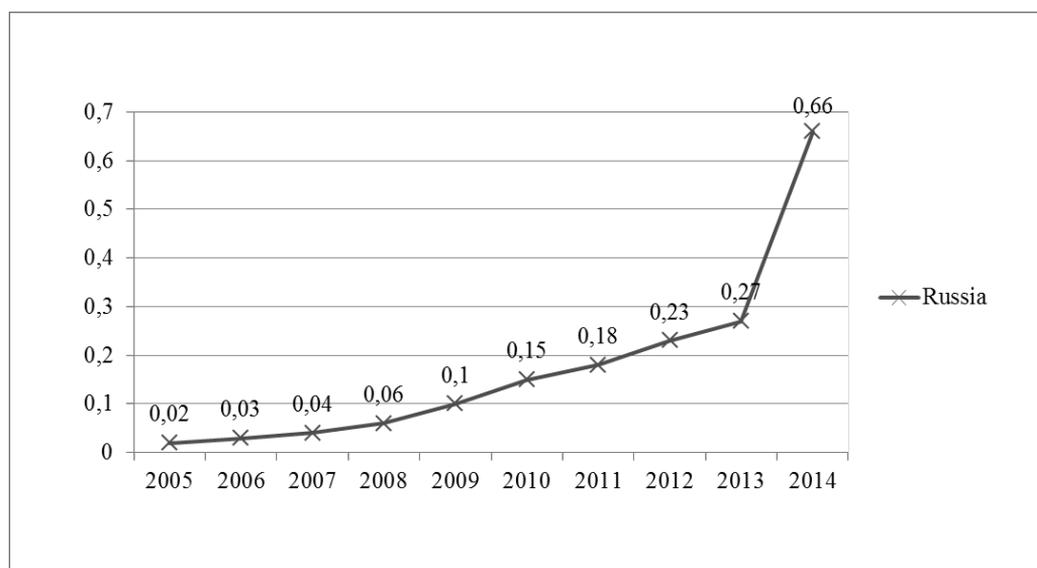


Figure 6. Global innovational index of Russia in 2005-2014
Adapted from "The Global Innovation Index 2015: Effective Innovation Policies for Development" by Dutta, Bernard, Reynoso, Lanvin and Wunsch-Vincent (2015).; "Funded innovation projects" by ERA.Net RUS Plus (2015); "EUROCORES Scheme European Collaborative Research. Final Activity Report" by European Science Foundation (2009).

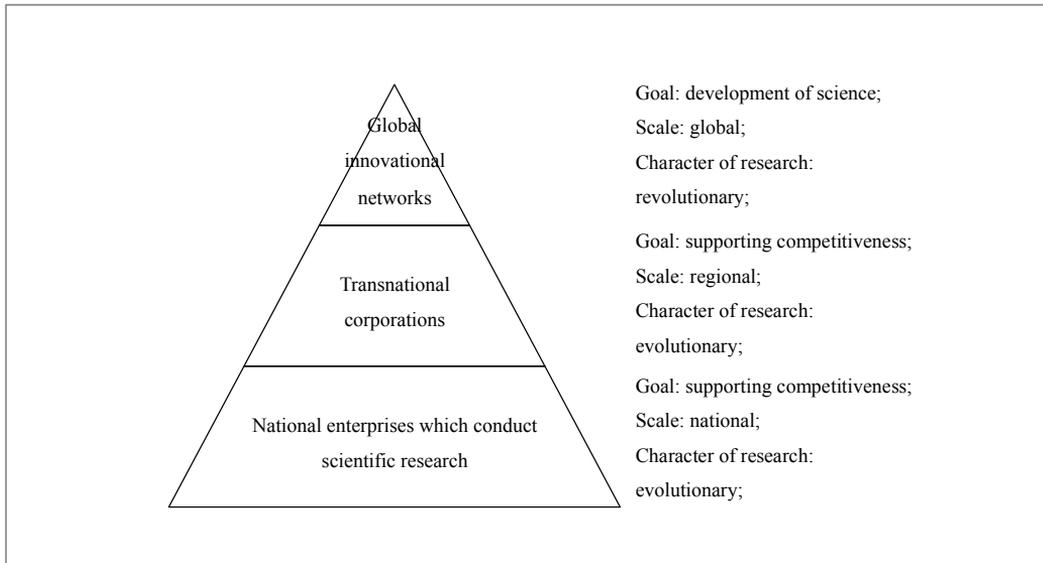


Figure 7. Structural and logical model of global market of innovations

The annual increase was 6-8%. The value of the global innovational index increased proportionally from 0.05-0.09 to 0.75-0.85.

The largest growth in the quantity of innovational projects realized through participation in global innovational networks was found for Russia. Over the past 10 years, it grew 17 times. The annual growth was 25-30%. The value of the global innovational index increased proportionally from 0.02 to 0.66. To determine the position and role of global innovational networks in the development of the modern global economy, let us view the proprietary logical model of the global market of innovations (Fig. 7).

As seen from Fig. 7, the global market of innovations is founded on national enterprises that conduct scientific research. They create most of the innovations. This is necessary for supporting their competitiveness in domestic markets. Their research is focused on a national scale, has an evolutionary character, and aims at slight improvements in manufactured products. Their budget is no more than several thousands of dollars.

Transnational corporations are also in the center of the global market of innovations. They conduct scien-

tific research to support their competitiveness, but in the international markets. Their research has regional coverage and is focused on the regions in which their main centers are located. Their research has an evolutionary character and aims at the significant improvement of manufactured products. The budget of their research may reach several millions of dollars.

On the top of the global market of innovations, there are global innovational networks. They do not seek to support the competitiveness of their members but rather strive for breakthroughs in modern science. They conduct research at the global scale. The character of their research is revolutionary because they are aimed not at the perfection of usual products but at the creation of completely new technologies and development of completely new products. The budget of global innovational networks can be billions of dollars.

Because of the structural and functional analysis of the compiled logical model, it is possible to conclude that global innovational networks are drivers of innovational development in the global economy. Being a locomotive of modern scientific research, they create a scientific and technological base for

the research and development of innovational products by transnational corporations and national innovational enterprises.

Conclusion

The offered hypothesis was proven, and the authors concluded that global innovational networks play an important role in the development of the modern global economy. With vast scientific research, they create a technical and methodological basis for the research and development of innovational products by transnational corporations and national innovational enterprises.

The complex study of the phenomenon of global innovational networks made it possible to determine that they consisted of the unification of efforts of innovational enterprises and R&D centers from various countries for joint conduct of scientific research and creation of innovations.

The most important peculiarities that determine the specifics and characteristics of the activities of global innovational networks are the international character of activities, the realization of large projects, the revolutionary direction of R&D, clear goal setting, and initiation by large investment funds. The advantages of global innovational networks are the attraction of significant investments, the creation of unique infrastructure, and a large volume of innovational capital.

It should be concluded that although the fact that the share of the global market of innovations constitutes 3-5% of the global GDP in quantitative terms, in qualitative terms, this market stimulates the development of the global economic system because it provides fuller satisfaction of global public needs, stimulates the effectiveness of the use of existing resources, and increases the sustainability of the development of the global economy.

The limitations of the conducted research include the limited selection of countries and global innovational networks, due to which, not all the peculiarities and advantages of their activities could be determined. As a direction of further research in this sphere, global innovational networks based around Asian, African, American, and Australian investors could be studied to determine common regularities of their development.

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