Mikhaylova, A. Anna; Mikhaylov, Andrey S.

Article

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Application of the Global Innovation Network Concept for the Russian – European Cooperation

Mikhaylova A. A

Immanuel Kant Baltic Federal University, A. Nevskogo str.14
Kaliningrad, 236041, Kaliningrad region, Russia
E-mail: mikhaiov.andrey@yahoo.com
Tel: +79052400526

Mikhaylov A. S

Immanuel Kant Baltic Federal University, A. Nevskogo str.14
Kaliningrad, 236041, Kaliningrad region, Russia

Abstract
The article discusses an important issue of Russian integration into the global network cooperation in innovation. The first part of the study addresses differences in types of knowledge flows between the country of the firm-innovator and the host country. Three main directions of globalization of innovation are identified. Each of the given cases provides insights on the possible forms of cooperation and the degree of codification of new knowledge arising within the framework of the innovation process. The second part of the article is devoted to global innovation network (GIN) concept, which combines all three types of globalization of innovation. The characterizing features of GIN are highlighted. The key reasons for its formation are examined. The third section reflects research results on the degree and directions of integration of Russian companies in the world economic processes. The most promising areas of innovation networking are given. The factors contributing to the development of Russian-European cooperation network as a first step to enter the world arena and integration into global innovation networks are defined.

Keywords: Global innovation network, globalization of innovation, network cooperation.
JEL Classification Code: R11, F23, F63

The modern stage of development of the world economic system is characterized by intensification of integration processes between countries. The process of globalization provides opportunities to improve competitiveness of cooperating parties by using cumulative external resources and competencies. The main sources of competitive advantage in the post-industrial transformation period are new knowledge, advanced manufacturing technology, expertise, specialized skills, and other types of competences, which are strategic resources of high value. Degree of the regional attractiveness in the context of its integration into the global innovation space can be determined from the position of the level of foreign actors’ interest in a set of strategic resources localized on its territory. Assignment of the certain goals and instruments of state policy on concentration capacity of scientific and technological potential (STP) is paired with development of ideas about the desired global cooperation in innovation, as well as with modeling a prototype of actors for which the region will be of interest in the future.
The strategic interests of Russia relate to the implementation of the main directions of the country's integration into the global innovation ecosystem¹, namely the support for exports of high-tech products, attracting FDI, including in the sphere of research and development, increased international scientific and technological cooperation (Shugurov, 2012). The issues that determine the prospects for the country’s role in the globalization of innovation activity gain increasing attention. Important aspects are to find effective forms and mechanisms of cooperation in science and innovation at the international level. This article reflects on a relatively new form of transnational networking - the global innovation network (GIN) concept. The capabilities of the network cooperation between Russia and the EU are analyzed in order to create new knowledge-exchange-flows and the joint development of innovation.

From Internationalization of R&D towards Globalization of Innovation

The concept of globalization is complex and in a general sense defined as an expansion, deepening and acceleration of global relations (Zverev, 2009). In the context of innovation activities, globalization is seen as a qualitative phenomenon, as opposed to the quantitative process of R&D internationalization. The transition from R&D internationalization to globalization of innovation on a global scale is caused by the changes in the structure of national innovation systems under the influence of the rapid development of science and technology and the formation of a polycentric model of excellence centers’ distribution. The new paradigm of transnational innovation is characterized by (Gerybadze, 1999): 1) the intensity of market and technological interactions; 2) the presence of a plurality of geographically dispersed knowledge centers; 3) the cross-functional training; 4) a combination of internal and external training; 5) the exchange of technology, as between different geographical areas, between organizational units and individual firms.

The globalization of innovation can theoretically be divided into three areas: 1) the international exploitation of technology developed at the national level; 2) the global generation of innovation by multinational corporations (MNCs); 3) global scientific-technological cooperation. All of the above mentioned areas are not mutually exclusive; however evolution can be traced from internationalization to globalization of innovation. Each of these areas relate to specific forms of cooperation that evoke between the actors under the number of factors. Among the complex of internal factors are: firm size, sphere of activity, characteristics of products, the type of innovation to be introduced, degree of codification of the transmitted knowledge; the external factors include: the capacity of the national and foreign markets, the economic situation, the level of research and development in home and host countries.

By acquiring a global scale the sustainable exchange of new knowledge (implicit and codified) promotes the formation of specific information channels between key centers of competence in the world (Chaminade, 2012). The degree of integration into such knowledge flows determines a country's ability to confront with the strengthening hyper-competition in innovation on a global scale. The degree of integration of actors into such knowledge flows within each of the areas of globalized innovation is different.

International execution of the nationally developed technology is characterized by unidirectional flow of knowledge: from the technologically developed country of a commercial firm-innovator, which is interested in market expansion, towards the host country (Fig. 1). In this case, the

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¹ Concept of global innovation ecosystem is based on an ecosystem approach to building the economy. The term “ecosystem” or “ecological system” is borrowed by economic scientists from biology. Significant contribution to the concept of ecosystems has been done by J.E. Moore, who introduced the concept of business - ecosystems in 1996 as an economic community, based on the interaction of organizations and individuals representing “organisms of the business world” (Peltoniemi, Vuori, 2012). With the growing importance of economic innovation component in the scientific literature, the notion of innovation ecosystem, which is a “network of civil society ecosystems that are the basic units of generation and diffusion of new knowledge, providing a transformative impact on the environment” (Katukoff et al., 2012; p. 15) received an ever-increasing attention. Formation of innovation ecosystems is possible on different levels: the individual firm, region, country or global level.
knowledge is mostly codified and can be transmitted through the export of innovative products or via transfer of licenses and patents.

**Fig.1:** The direction of knowledge flows in international exploitation of technology developed at the national level

In the case of a global generation of innovation by an MNC there are several possible ways to transfer knowledge from the head center to the periphery. Critical factors are the level of subsidiaries’ development, their autonomy and forms of interaction (e.g. acquisition of existing research laboratories in the region, the "greenfield" investments in R&D, etc.). The first option describes a situation where innovation from the core center (headquarters of an MNC) is transferred to subsidiaries for its subsequent adaptation to the local market (Fig. 2). The nature of knowledge flow in this case is unidirectional. Knowledge is easily codified and can be transmitted over long distances.

**Fig.2:** Transfer of innovation to subsidiaries for its subsequent adaptation to the local market

Another possible option is for subsidiaries of an MNC to independently develop an innovation for the local market. Then the interactions between the individual subsidiaries are fairly weak, especially in the development of technological innovations (Fig. 3). Formation of tacit knowledge takes place.

**Fig.3:** Independent development of innovation by local subsidiaries

MNCs desire to use the comparative advantages of different regions resulted in the emergence of another type of knowledge flow, when parts of the innovation process are distributed among subsidiaries, but the general guidance role is held by the core MNC. The flow of knowledge in this case is distributed (Fig. 4), whereas knowledge is well codified.
The most modern way of generation and diffusion of excellence and innovation in the spirit of the open innovation concept is a global scientific-technological cooperation. A cooperation in the field of R&D between different types of actors located in two or more countries (Fig. 5). The formation of knowledge exchange flows takes place, while the combination of explicit and implicit knowledge is achieved.

In the academic field, the scientific-technological cooperation may take various different forms: an exchange of experience and knowledge, the mobility of teaching staff and students, the implementation of joint research projects, etc. Business cooperation model takes form of joint ventures for specific innovative projects, via agreements on sharing technical information and/or equipment. This form of knowledge sharing is of particular importance for industries with highly intensive rate of technological change and high risks of doing innovation.

An increased involvement of regional actors into the global knowledge flows results in the ability of a region/country to confront the strengthening hyper-competition in innovation - a qualitatively new kind of dynamic competition in global markets (Dyatlov, 2012).

The ideas regarding the nature of competitiveness become more and more complex in the global economy. Its multilevel and multidimensional nature brings countries into a continuous search for new strategic advantages in innovation. The specific directions and efficiency of results are determined by the value of STP.

The disparity in the level of scientific and technological development of the countries around the globe is caused by the escalating rate of innovation processes (e.g. reduction of life cycle of innovation, enhancing innovation policy, etc.). It exacerbates the problem of global innovation gap between "Triad" countries (the U.S., Japan, and European Union) and the developing countries (Shugurov, 2012). Under these circumstances, the strategic goal of the latter is to reduce the backlog from world leaders.

Russia according to the World Economic Forum takes a transitional position between the second (striving for efficiency) and the third (seeking to innovate) group of countries on a par with the Baltic states and Poland. To date its capacity of STP does not allow the country to fully compete in the development and commercialization of innovations at the global scale: the level of innovation potential
of Russia occupies 56th place in the world; for the quality of scientific research institutions - 70th place; the level of business spending on R&D - 79th; the degree of cooperation between the scientific and industrial sectors – 85th place. In this situation, one of the strategic directions of the state policy should strive to promote the diffusion of innovation and increase absorptive capacity, the growth of which leads to the firm’s "prior knowledge" - the possibility to predict the success of interactions in innovation and anticipate scoring advanced scientific and technological achievements (Nieto and Quevedo, 2005). One of the promising forms of interactions involving the country's integration into the global knowledge flows with an aim to their subsequent absorption is the global innovation network.

Global Networking for Innovation

The global networking for innovation is a relatively new phenomenon in modern economic science and practice. It emerged due to the changes in the international division of labor in innovation (Dias et al, 2012). The growing importance of access to the global pool of knowledge and skills combined with an increase in the hyper-competition and deployment of negative demographic trends in the countries marked as the global centers of excellence (e.g. countries of the Triad), were the main driving forces in the formation of the new geography of knowledge distribution. Global innovation network (GIN) in this case is the mechanism by which corporations are trying to diversify and optimize the portfolio of human capital through the use of resources in developing countries (Ernst, 2009).

Global networking is a relevant scientific field for scientists from all over the world. In the last decade a number of major research projects on the driving forces of globalized innovation were held; as well as on their impact and consequences for individual countries, (e.g. «INGINEUS» project of the European Commission; research of the Center "East-West", etc.).

Theoretical basis for studying GIN consists of research papers in the field of innovation networks, national innovation systems, globalization of innovation activity, R&D internationalization, as well as studies on the diffusion of new knowledge and international cooperation.

Analyzing the publications on the concept of GIN we were able to allocate the following characterizing features:

1) A global scale of involvement into the innovative activities; including of developing countries (Chaminade and Liu, 2012; Dias et al., 2012; Kruss and Gastrow, 2012);
2) A wide range of participants: local companies, MNCs, their subsidiaries and representative offices, universities, R&D centers, etc. (Salmina, 2012; Borrás and Lorentzen, 2011; Chaminade, 2009; Chaminade and Liu, 2012; Dias et al., 2012; Miotti et al., 2006);
3) Integration of the internal and external networks (Borrás and Haakonsson, 2011; Chaminade and Liu, 2012; Miotti et al., 2006);
4) A high level of functional integration (Salmina, 2012; Borrás and Haakonsson, 2011; Carleton, 2009; Chaminade and Liu, 2012; Dias et al., 2012);
5) Orientation on creating new knowledge (Borrás and Lorentzen, 2011; Borrás and Haakonsson, 2011; Fuentes and Chaminade, 2012) and on generation of innovation (Borrás and Lorentzen, 2011; Chaminade, 2009; Chaminade and Liu, 2012; Fuentes and Chaminade, 2012).

Thus, GIS is understood as the global collaboration system driven by the exchange of codified and tacit knowledge among a wide range of innovators, concentrated in different geographical areas, with an aim of generating new knowledge and innovation through the sharing of strategic resources.

Formation and development of GIN is typical of economic activities with a high degree of knowledge codification (Dose et al., 2009): telecommunications, electronics (Ernst, 2009), the

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pharmaceutical industry (Haakansson and Ujjual, 2011), automotive (Gastrow and Lorentzen, 2012), information and communication technologies (Chaminade and Fuentes, 2012), etc.

It is noted that the emergence of GIN is caused by qualitative changes in the process of knowledge sharing in global production network (GPN), which is a complex system of interconnected functions and operations aimed at the production and distribution of goods and services (Borrás and Haakonssson, 2011; Chaminade and Liu, 2012; Knell, 2010). The desire of MNCs’ to create a competitive advantage on the market by increasing their specialized capabilities, combined with the need to reduce the time and cost of production of a new product, helped to accelerate the diffusion of knowledge in GPS and facilitate the transition to GIS. According to D. Ernst, the stimulus of global corporations to increase the transfer of highly complex knowledge to companies of the host country in the learning process appeared mainly due to the possibility of more efficient use of their own resources (Ernst, 2009). Moreover participating in GIN allowed MNCs to reduce R&D costs; given access to new sources of innovation and reduced risks associated with conducting internal research projects. Table 1 shows the comparative characteristics of GPN and GIN (Chaminade and Liu, 2012; Cooke, 2012; Ernst, 2009).

**Table 1:** Comparative characteristics of GIN and GPN

<table>
<thead>
<tr>
<th>Comparative characteristics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common features</strong></td>
<td></td>
</tr>
<tr>
<td>Asymmetry in the strategic management</td>
<td>Inequality of network participants in making strategic decisions. Typically, large TNC is a network leader that forms the organizational structure, affects the allocation other actors; sets strategic direction; oversees the network resources; coordinates the knowledge flow.</td>
</tr>
<tr>
<td>Diversity of governance structures</td>
<td>GPN and GIN can be both formal and informal, which causes a variety of forms of organization and management, depending on the purpose of the interaction of actors.</td>
</tr>
<tr>
<td>Continuous exchange of knowledge</td>
<td>GPN and GIN are characterized by continuous circulation of knowledge and innovation, which is the basis for the development of network and its expansion.</td>
</tr>
<tr>
<td><strong>Distinctive features</strong></td>
<td></td>
</tr>
<tr>
<td>Ability to innovate</td>
<td>Innovation in GPN is predominantly complimentary and occurs because of mergers and acquisitions. Innovation in GIN is the purpose and result of the network.</td>
</tr>
<tr>
<td>Participants</td>
<td>There is a high degree of heterogeneity of participants within a GIN.</td>
</tr>
<tr>
<td>Interconnectedness of actors</td>
<td>GIN is characterized by unequal collaboration of actors and a higher degree of inequality within the distribution of information flows.</td>
</tr>
<tr>
<td>Concentration of actors</td>
<td>GIN is characterized by highly centralized allocation of actors, due to the peculiarities of innovation activities.</td>
</tr>
</tbody>
</table>

Different types of GIN can be identified according to: 1) the mechanism of coordination of the network members: formal / informal (Borrás and Lorentzen, 2011); 2) the degree of interactions with the external environment: open / closed (Knell, 2010); 3) the nature of interactions with simultaneous consideration of the three primary characteristics (globality, innovativeness and networkness): balanced, focused on innovation and on the use of global assets, on network interactions, on participation in global networks (Barnard and Chaminade, 2011); and 4) the nature and degree of participation of developing countries: internal network in which global companies derive offshore to Asian affiliates or outsource specialized Asian suppliers the individual stages of innovation process; own networks of the Asian firms; international public-private R&D consortia; informal social network of students / employees in the research field (Ernst, 2009).

Opportunity to participate in GIN of a wide variety of actors predetermined the existence of different organizational forms of companies’ integration (strategic alliance, research consortium, association, etc.) and the types of business relationships (joint venture, cross-licensing, joint R&D, outsourcing, co-financing of training and retraining programs of scientific personnel, etc.) (Borrás and
Lorentzen, 2011; Knell, 2010). A number of different forms of interaction can be implemented simultaneously in a single network depending on the purpose and nature of innovation activity.

**Prospects for Russia's Participation in the International Network of Innovative Cooperation**

Currently, the share of Russian business sector on a global scale is rather insignificant, especially in the sphere of innovation (Table 2; Fig. 6). Internationalization strategy is mainly typical for large corporations, representing oil and gas, mining and metals industry, telecommunications and the financial sector. Typically, it is an export-oriented company with a strong position in the domestic market. Among the main motives for internationalization are: the desire to strengthen the market position, gain access to resources and new markets, diversification of risks (Tirpitz et al., 2011).

**Table 2:** Characteristic position of Russian companies in the global arena

<table>
<thead>
<tr>
<th></th>
<th>500 largest corporations in the world in terms of capitalization</th>
<th>100 leading innovative companies in the world</th>
<th>world's top 100 non-financial TNCs, ranked by foreign assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>USA</td>
<td>132</td>
<td>43</td>
<td>22</td>
</tr>
<tr>
<td>Japan</td>
<td>68</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>France</td>
<td>32</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Germany</td>
<td>32</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>China</td>
<td>73</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

**Source:** based on

**Fig. 6:** Indicators of the degree of countries’ internationalization in 2011 (bln. $ / thousand applications)

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According to the Skolkovo Moscow School of Management, the degree of Russian TNKs’ integration into the world economic processes grows. The main areas of internationalization includes the countries of Western Europe (42% of all foreign assets), CIS countries (18%), Africa (11%) and Eastern Europe (10%). The share of North America and Asia has increased as well (Salmina, 2012). The key foreign markets for Russian companies by industry / sector are earmarked in the table 3 (Tirpitz et al., 2011).

Table 3: Key foreign markets for Russian companies by industry / sector

<table>
<thead>
<tr>
<th>Economic sector / industry</th>
<th>Target market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraction and processing of oil and gas</td>
<td>CIS, Baltic States, Western Europe and the United States. Countries in Africa, Asia and Latin America.</td>
</tr>
<tr>
<td>IT</td>
<td>Countries in Europe and Asia (anti-virus software solutions for PC), CIS (search engines).</td>
</tr>
<tr>
<td>Banking</td>
<td>CIS, some Western European countries, USA, UK. Slowly growing interest in the markets of China, Singapore and countries in Africa.</td>
</tr>
<tr>
<td>Metal processing</td>
<td>USA, Australia, UK, China, Singapore, Japan, Europe, CIS and Africa.</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>CIS countries, Eastern Europe, Middle East, Africa, Southeast Asia (especially India).</td>
</tr>
<tr>
<td>Energy</td>
<td>CIS and Baltic countries, the Nordic countries.</td>
</tr>
<tr>
<td>Food industry</td>
<td>CIS, Central Asia.</td>
</tr>
<tr>
<td>Defence industry</td>
<td>India, China, Latin America.</td>
</tr>
</tbody>
</table>

Russia, as well as other developing countries in Asia and Latin America is characterized by the "delayed internationalization model" (Kuznetsov, 2009). However, given the historical features of Russian development (change of political regime, reduced potential for cheap labor, etc.), the most preferable for the country today is transition towards an intensive economic development. It can be achieved by improving its innovative component, rather than on the basis of internationalization of traditional industries.

Integration of Russia into the GIN can act as an effective way to build its own technological capabilities. A striking example of the successful strategy are the newly industrialized Asian economies that have managed to increase the concentration of innovation capacity through the use of external strategic resources (Ernst, 2009).

Participation in the European network associations is the first step towards the internationalization of Russia at the global level. The European-Russian cooperation platform has an intuitive interface for Russian companies due to the similar business culture\(^5\), dominance of the European countries in the share of the foreign trade turnover of Russia and being a major area of investment of large Russian companies.

Moreover, there are strong partnership ties between Russia and the EU countries in the research area. A number of international bilateral and multilateral agreements are taken over the past few years (Ministry of Education and Science), as well as numerous joint research projects and initiatives are implemented, including affiliate programs of academic mobility (Erasmus Mundus, Marie Curie program, etc.).

The EU has a significant amount of innovation networks, differing in goals of creation, tasks and activities, such as the European Business and Innovation Centre Network (EBN), Enterprise Europe Network (EEN), European Regions Research and Innovation Network (ERRIN), The European Association for the Transfer of Technologies, Innovation and Industrial Information (TII), etc. Participation in such network associations could allow Russian companies to work out the actual mechanisms and forms of cooperation at the international level and to develop further strategy of globalization.

Russia's interaction with the highly developed European countries (Germany, Denmark, Sweden, etc.) in the framework of innovation networks (e.g. international cluster; Mikhaylov, 2013)

\(^5\) Cultural difference was mentioned as the most significant barrier to transnational involvement in GIN by European companies (INGINEUS, 2011).
will improve the competitive position of the country in the global arena by building own STP through access to advanced strategic resources and technology to increase the efficiency of internal resource capabilities.

**Conclusion**

Global market hyper-competition in innovation requires development of a holistic socio-economic policy at all levels: national, regional, local, taking into account the strategic priorities of Russia. Implementation of the strategic policy of innovative development within the individual subjects of the Russian Federation should be accompanied by the formation of a comprehensive long-term strategy; whereas the aim is to fit national priorities into the regional context. One of the most important issues in this regard is to determine the key competitive advantage of the regions. Consideration of the region as a combination of different types of resources that are concentrated in a certain area, and the development of mechanisms for their effective use, makes it possible to simulate the desired scenarios. Competitiveness of a particular region is caused by the presence of strategic assets and the concentration of large quantities of raw materials, cheap labor and high capacity of the domestic market (or the expectation of growth). Given the orientation of Russian innovative way of development, it seems preferable to position itself as an equal partner in the field of science and innovation at the global level (which is associated with increased strategic assets), rather than the "raw materials appendage" of innovation developed countries.

Participation in the global networked forms of cooperation for Russia carries certain benefits associated with gaining access to a stream of new knowledge and skills, acceleration of innovation processes and decrease risks of doing innovation. The ability to combine different areas of globalization of innovation in GINs will allow more efficient use of the competence of the Russian business sector through a combination of targeted training processes and mutually beneficial partnership. For a number of reasons mentioned above, it is highly promising for Russian companies and organizations to penetrate global markets and participate in European innovation networks. Further research should be aimed at finding potential areas of cooperation between Russia and the EU in innovation with existing competitive sectors of the Russian economy, as well as at defining real mechanisms of integration of the Russian economic entities into the European innovation networks.

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