INNOVATION CAPACITY OF RUSSIA AND THE BALTICS: A COMPARATIVE APPROACH

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This article considers the possibility of Russian integration into a common research, technological, and innovative space of the Baltic region. The author presents the results of a comparative analysis of innovative development in Russia and the Baltic Sea countries based on the calculation of an integral research and technological potential index for the Russian Federation, the Northwestern Federal District of Russia, Sweden, Denmark, Finland, Norway, Germany, Poland, Estonia, Lithuania, and Latvia. The paper describes the level of research and technological development of Russia in 2008—2010 in terms of human resources, R&D, material and technical components, and the transformation capacity of innovative potential. The author identifies the key issues in the field of research and innovation that inhibit the growth of research and technological potential concentration, as well as innovative development of the Russian Federation. The article considers the prospects for the development of research and technological potential in Russia through the use of instruments of international research and technological cooperation in the Baltic Sea region.

Key words: research and technological potential, comparative assessment, Baltic Sea region, international research and technological cooperation

A transition to the innovative model of economic growth as a strategic priority of the development of Russia until 2020 [9; 21] suggests the consolidation of the existing and the formation of new competitive advantages through increasing the scientific and technological potential (STP) of the country and intensification of activities of businesses in the

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field of innovations. Among efficient mechanisms of increasing the STP of the Russian Federation is international cooperation with the developed European countries, which includes the implementation of joint projects in the field of research and innovations, the formation and development of a common research infrastructure, the provision of access to the objects of research and technological infrastructure of international significance, and the development of priority research fields [14].

Russia's potentiality to become a full partner in international research and technological cooperation stems from a combination of internal (the general level of socioeconomic development, the capacity of scientific and technological potential, including the efficiency of exploiting its transforming ability, the development of the education system) and external factors (the priorities and nature of Russia's current foreign policy, the degree of the country's involvement in international cooperation, also in the field of education and research, common interests shared with European countries in the research and innovation areas identified as priorities in Russia).

This article aims to identify the possibilities for Russian integration into the common European innovation space on the basis of an assessed scientific and technological potential as compared to the Baltic Sea states: Sweden, Denmark, Finland, Norway, Germany, Poland, Estonia, Lithuania, and Latvia. Of interests is a comparison at the level of not only individual countries, but also the region as a whole. The following practical tasks were fulfilled to achieve this objective:

1) a calculation of an integral STP evaluation for Russia (the Northwestern Federal District is singled out as one of the most innovatively developed regions) and Baltic countries;

2) an analysis-based description of Russian potential in the field of research;

3) an assessment of prospective increase in Russian STP concentration with the help of international cooperation tools in the Baltic Sea region.

As the methodological framework for the study, I used the method of integral STP assessment in the "region-country" cross-section [1]. The empirical material was compiled on the basis of official statistical sources, including the databases of Rosstat, Eurostat, Statistics Norway, Central Statistical Office of Poland, World Bank, European Cluster Observatory, and statistical compilations on research and innovations issued by the Higher School of Economics of the RF. The study period covers 2008—2010, which is explained by the lack of sufficient data for each country for 2011—2012. The final values of integral evaluations of the STP of the Baltic countries for the period under review are given in the table below.

The integral evaluation of the scientific and technological potential of the NWFD and the Baltic Sea states for 2008—2010

Country	2008	2009	2010	Increase rate, 2010 as compared to 2008, %
RF	0.163	0.181	0.183	12.3
NWFD	0.215	0.207	0.226	5.2
Germany	0.624	0.650	0.586	– 6.1
Denmark	0.629	0.664	0.668	6.2

End of table

Country	2008	2009	2010	Increase rate, 2010 as compared to 2008, %
Latvia	0.191	0.213	0.245	28.4
Lithuania	0.260	0.282	0.288	10.7
Norway	0.489	0.524	0.533	9.0
Poland	0.190	0.227	0.252	32.5
Sweden	0.680	0.701	0.652	– 4.0
Finland	0.728	0.744	0.678	– 6.9
Estonia	0.426	0.483	0.454	6.7

Source: calculated on the basis of [2; 4—8; 16—18; 20; 24; 25; 27; 30].

The position of Russia in the Baltic region regarding the concentration of innovative potential is close to that of the Baltics and Poland and is much more modest than that of the leaders — Finland, Sweden, and Denmark, which are among the world's top ten most innovative countries. The dynamics of values of integral assessment for the RF over the period under review is positive, which is indicative of positive changes in the field of research, technology, and innovations (an increase in the ratio of R&D expenditure over GDP, a greater innovative activity of economic entities, a wider Internet coverage, etc.). However, the current rates of STP increase are not sufficient to narrow down a fourfold difference between Russia and the developed Nordic countries. Despite the fact that the STP of the NWFD is somewhat higher than the national average and is comparable to that of Lithuania, Latvia, and Poland, the overall level of information development of the federal district remains rather low in the macroregional context.

A structural analysis of the composite index makes it possible to identify the factors that affected the changes in the concentration of the total scientific and technological potential value in the regions under review (see fig.).

The personnel component of the region's STP is one of the key elements of innovative development. The leaders in terms of personnel potential are Finland, Norway, and Denmark, which can be explained by a high percentage of researchers in the mean annual number of employed citizens (more than 1 %). In the administrative-territorial cross-section, the leading territories in terms of the share of researchers in the mean annual number of employed citizens are the Capital Region of Denmark (2.59 %), Northern Finland (2.23 %) and Central Norway (2.15 %) [27].

The personnel component value is somewhat lower in Russia than the macroregional average. Rich in research personnel resources[1], the country shows negative trends towards the reduction of both the general number of researchers and their share in the economically active population. In the strategic aspect, these processes lead to a significant weakening of STP and a loss of competitive advantages in the field of innovations, also in the framework of the common research, technological, and innovative space of the Baltic region.

[1] In Russia, the number of personnel involved in R&D amounted to 735.3 thousand people in 2011 (among them 374.8 thousand researchers). The total number of those employed within R&D in all other countries of the Baltic region is only 1.8 times as large as this number [27].

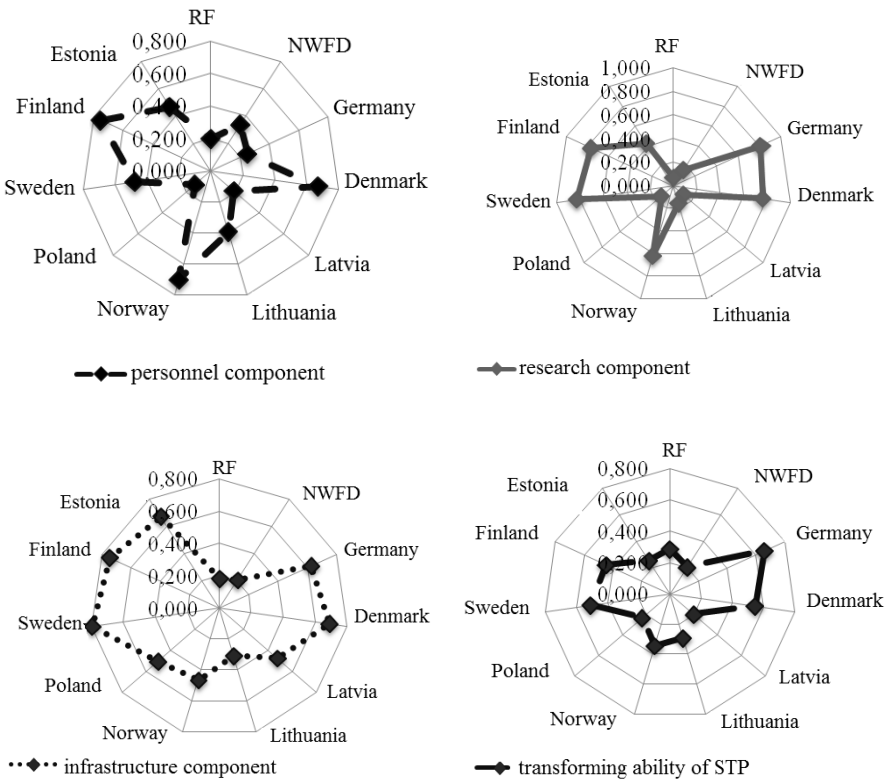

Fig. The structure of an integral assessment of the scientific and technological potential of the NWFD and the Baltic region states in 2010

The concentration of personnel potential in the NWFD is higher than the national average and that of some of the Baltic countries, but is characterised by a considerable degree of heterogeneity. The major growth pole is Saint Petersburg (the city is in the Baltic top five with the highest share of researchers in the mean annual number of the employed — 1.8 %). The personnel potential of other NWFD territories is much more modest. In general, the region exhibits national trends, which hampers further innovative development.

The basic mechanism for increasing the personnel potential sufficient to ensure a constant staff inflow and renewal in the field of R&D is doctoral and postdoctoral studies. A high and expectedly increasing percentage of postdoctoral graduates is registered in Sweden (3.0 %) and Finland (2.5 %), which is manifested in a strong personnel component exhibited by these countries over the last decade. As to the number of university graduates, Russia occupies an intermediate position with a value twice as great as that of the Baltics and twice as low as that of the Nordic countries [31].

The value of research component depends on the changes in such indices as the ratio of R&D expenditure to GDP, the innovation activity of economic entities, and the employment rate within the field of hi-tech goods and

services production. High integral index values are registered for the period under review in Sweden, Germany, Finland, and Denmark (see fig.). These countries constantly exhibit an increasing ratio of internal R&D expenditure to GDP (more than 3 %) and significant interest of business circles in research activities as a source of competitive advantages in the world market[2]. As to the level of R&D funding, the leading positions are occupied by Swedish and Finnish regions: Northern Finland (6.58 % of GRP), South Sweden (4.73 %), East Middle Sweden (4.55 %), and West Sweden (4.32 %) [27].

The research funding indices in Russia and the Baltics are much lower — between 0.6 % of GDP in Latvia and 1.6 % in Estonia. In Russia, the ratio of internal expenditure to GDP reached to 1.2 % in 2010. The innovative activity of business is rather low in these countries, which is explained by low demand for R&D results among economic entities and an orientation towards the generation of income in a short-term period without taking into account the possibilities for reinvestment of profits and capital expansion.

Almost a twofold increase in the value of NWFD research component in comparison to the national average is explained by a higher ratio of R&D expenditure to GRP than in other constituent entities of the RF. However, the volume of internal R&D expenditure differs significantly among its regions (3.5 % in Saint Petersburg and 0.56 % in the Kaliningrad region [16]), which considerably limits opportunities for increasing the region's STP and cooperation with other regions.

The improvement of infrastructure is one of the factors stimulating innovative development. The value of infrastructure component in most Baltic regions is over 0.5 (see fig.), with the Nordic countries, Germany, Estonia, and Poland occupying the leading positions. Other countries demonstrate high intensity of technological innovation expenditure and use of information and communication technologies. In Finland, Sweden, Denmark, and Germany, almost 100 % of organisation use personal computers and the Internet, more than 80 % have broadband access to the Internet and their own websites.

The rate of information and communication technology (ICT) application at Russian organisations is rather low. Despite the fact that, in 2010, already 93.8 % of organisations were using personal computers and 82.4 % the Internet, only 56.7 % had broadband access to the Internet and 28.5 % their own website [18]. The share of employees using personal computers (41 %) and the Internet (29 %) is much lower than that in the technologically developed countries of the Baltic region (Scandinavian countries, Germany) [5]. The specific weight of expenditure on technological innovations is also rather low at Russian companies.

[2] In 2000—2010, Germany and the Nordic countries (Denmark, Finland, and Sweden) maintained a high level of internal R&D expenditure; each year they were in the top five countries in terms of research funding in the Baltic region. The major source of R&D financing is the business sector (for example, in Germany 20 largest commercial companies account for 57 % of total investment; the major R&D investor in Sweden is Ericsson, whereas in Finland, it is Nokia [10]).

When assessing the values of the component characterising the STP transforming ability, one should take into account the temporal gap between the increase in innovative potential and successful commercialisation of R&D results and innovations. In this respect, the leading position in the Baltic region is occupied by Germany. More than 70 % of all German organisations use innovations in production, which accounts for 10 % of new produce (goods, works, services) turnover. High rates of innovation commercialisation are shown by Denmark, Sweden, Finland, and Norway. The specific weight of organisations conducting innovative activity is three times as low in the Baltics and Poland as in the leading country — Germany; however, the intensity of innovation expenditure in certain areas is comparable in these countries to that in the most advanced countries of the Baltic region.

As to this component, Russian integral assessment values, including those of the NWFD, are comparable to those of Lithuania, Latvia, and Poland, but are significantly lower than those of the technologically developed countries of the macroregion. The weakness of the transforming ability of STP in the Russian economy is indicative of low interest of business sector in applying R&D results, as well as the lack of an efficient mechanism of innovation commercialisation.

The results of the conducted analysis indicate the insufficient efficiency of national innovation system of Russia in comparison to the countries of the Baltic region. The studies of the World Economic Forum show that the possibility for Russian full-scale integration into the common European innovative space is hindered by a relatively low level of development of research, technological, and innovative sphere, as well as unsatisfactory framework conditions for economic activities. The latter include (in the order of importance): corruption (22.8 %), state bureaucracy (13.3 %), criminal and illegal activities (10.1 %), high level of taxation (9.1 %), limited access to financial resources (7.6 %), inflation (6.7 %), and tax legislation (6.2 %) [33].

An increase in the STP of Russia and its individual regions requires resolving a number of substantial problems. These problems relate to the insufficient funding of research, decreasing personnel potential in the field of research, low interest of the business sector in R&D, a need to trigger and support the innovative activity of business sector and strengthen its connections with research organisations and universities.

One of the efficient mechanisms to overcome these problems can be international cooperation with the Baltic region countries. In the Russian Federation, international scientific and technological cooperation (ISTC) is carried out in the framework of state scientific and technological policy and serves as one of its underlying principles [11]. The key programme document aimed to facilitate international cooperation in the field of research is the State Programme of the Russian Federation “The Development of Science and Technology for 2013—2020” [14]. State authorities are expected to create favourable conditions for research, technological cooperation and foreign investment, as well as to exert control over the transfer of research and/or scientific and technological results (products) to foreign states.

Russia's principal partners in the field of research and technology are the EU states. The legal framework for Russia-EU scientific and technological cooperation is comprised by the Partnership and Cooperation Agreement between Russia and the EU (PCA) [13], Agreement on Cooperation in Science and Technology between the European Community and the Government of the Russian Federation (2000) renewed in 2003 and 2009 [12; 19], the Roadmap for the Common Space of Research and Education including Cultural Aspects (2005)3; the EU-Russia Partnership for Modernization programme; a number of industry-specific agreements in the field of nuclear security and nuclear fusion [23].

According to the Department of International Cooperation of the Russian Ministry of Science and Education, there are active bilateral international agreements in the field of ISTC with 15 European countries and 4 international organisations. Most agreements were signed as early as the 1990s; there is a need to renew them in line with the new priority trajectories of improving the country's scientific and technological potential identified in the Strategy for Innovative Development until 2020 [21].

ISTC between Russia and the EU can be carried out at the levels of:

— pan-European programmes, for instance the European programme for S&T cooperation in the field of high technologies and innovations EUREKA [15]; EU framework programme, in 2007—2—13, the active programmes are the 7th Framework Programmes for Research and Technological Development[4] and the Enterprise Europe Network (EEN) within the Competitiveness and Innovation Framework Programme (CIP)[5];

— partnership academic mobility programmes: Europe-wide programmes include Erasmus Mundus and Marie Curie (within the EU FP), TEMPUS; there are also nation-wide programmes — those of the German Academic Exchange Service (DAAD) and the Swedish International Development Cooperation Agency (SIDA), etc. [3; 29; 32]);

— joint multilateral initiatives and international projects, such as megaprojects aimed at the creation of a common research infrastructure: The European X-Ray Laser Project (XFEL), Facility for Antiproton and Ion Research (FAIR), International Thermonuclear Experimental Reactor (ITER), etc. [26].

A new EU research and innovation framework programme, Horizon 2020, is slated to launch in 2014. It will bring together all existing financial instrument of the EU for the support for research and innovations: FP, CIP, and the European Institute of Innovation and Technology (EIT) [28] — with

[3] The active document is the 2011—2013 EU-Russia S&T Cooperation Roadmap [26].

[4] 391 Russian research organisations took part in the 7th framework programme, 264 grant agreements were signed for a total amount of 45.6 mln Euros [26].

[5] A good examples is the Russian project "Gate2RuBIN" implemented in the framework of EEN by a consortium of three organisations (Russian Union of Innovation and Technology Centres, Russian Technology Transfer Network, Russian Agency for Small and Medium Business Support). Source: Gate2RuBIN project. URL: www.gate2rubin.ru (accessed on 28.01.2013).

a programme budget of $80 bn. The key priority of Horizon 2020 is international cooperation with the third countries in finding solutions to global social problems, conducting basic and applied research, facilitating academic mobility, etc.

A promising area of cooperation in the field of innovations can be the NWFD participation in international cluster initiatives and international clusters in the Baltic region in the field of energy, ICT, nanotechnologies, environmental protection, food manufacturing and biotechnologies, healthcare, etc.[6]

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