PRACTICE AND PROSPECTS OF CROSS-BORDER COOPERATION IN THE BALTIC REGION

INNOVATIONS IN THE BALTIC SEA REGION AND NETWORK COOPERATION BETWEEN RUSSIA AND THE EU

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Transnational (involving countries) and cross-border (involving adjacent regions of different countries) cooperation and integration are rapidly developing in the Baltic Sea region. Russia lags behind the Nordic countries and Germany as far as innovative development is concerned; yet our national pace here is comparable to that of Poland and the three Baltic States. At the same time, the features of innovative cooperation vary a great deal depending on the group of countries involved in cooperation processes. Independent of its type, however, international cooperation is beneficial for all parties concerned and should therefore be more actively encouraged. Northwestern Federal District traditionally plays a special role in the development of EU-Russia cooperation, since a number of its regions border on the EU countries. The district participates in the development of network innovative structures within the Baltic Sea region. It takes an active part in cross-border cooperation — activities that involve the formation of transborder innovative clusters. There are high expectations associated with the formation of such territorially localised innovative networks, as the Helsinki — Saint Petersburg — Tallinn and Tricity (Gdansk, Gdynia, Sopot) — Kaliningrad — Klaipeda transborder innovative clusters. The city of Saint Petersburg and the adjacent Leningrad region, as well as the Kaliningrad region can become innovative development corridors between Russia and the EU and, eventually, develop into the 'economic growth poles' of the Russian Federation.

Key words: innovations, innovative capacity, network international cooperation, transborder innovative cluster, Baltic Sea region, Northwestern Federal District

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Submitted on January 17, 2013.
doi: 10.5922/2079-8555-2013-1-1

The Baltic Sea region is the only macroregion, where Russia borders EU member states and where transnational Russian-European ties are supplemented by trans-boundary links. The Baltic Sea region serves as a platform for numerous joint initiatives; there is a special body for coordinating international activities — the Council of the Baltic Sea States, which brings together all the countries of the macroregion. It also contributes to the development of cooperation between the states in the field of innovations, which determines the level and dynamics of economic development of the countries and their position in the global geoeconomic system in the age of globalisation. Thus, the Baltic Sea region plays a key role in the gradually (although quite slowly) accelerating Russian-European integration.

The conditions and prospects of cooperation between Russia and the EU in the field of innovations in the Baltic Sea region are intensively studied at the Immanuel Kant Baltic Federal University. A number of articles by the university scholars as well as relevant materials of other Russian and international authors were published in the *Baltic Region* academic journal offering various research results [1—4; 6; 7; 9—14; 18; 20; 21; 26; 27]. This publication attempts to summarise the results of a comparative study into the innovation potential of the Baltic Sea region countries, and the role of international network cooperation in the joint development and use of innovative products.

The innovation potential of the Baltic Sea region countries

The crisis of the 1990s undermined Russia's innovation potential; the measures taken by the 21st century leadership of the country have not yet yielded any tangible results. The number of people involved in academic research and R&D still decreases, although more slowly than in the 1990s (1532.6 thousand employees in 1992, 887.7 thousand in 2000, 736.5 thousand in 2010 [19]). However, even today this number is 1.5 times as high as in Germany (485 thousand people), which ranks second among the Baltic Sea region countries. However, Russia's R&D expenditure ($ 32.6 bln) in 2010 was 2.6 as little as that of Germany ($ 86 bln) [19]. The other countries of the Baltic Sea region cannot be compared either to Germany or Russia in terms of absolute innovation potential indices: the eight countries account for 359 thousand people employed within R&D and $ 40.5 bln of corresponding expenditure. In terms of relevant indices Russia is comparable only to the post-Socialist countries of the macroregion and lags badly behind Germany and the Nordic countries (table 1).

Table 1

Research potential of the Baltic Sea region countries, 2010

Country	Number of R&D employees, thousand people	R&D expenditure, mln dollars	Number of R&D employees per 1000 residents	Per capita R&D expenditure, dollars	R&D expenditure, % of GDP
EU member states					
Germany	484.6	85996	5.9	1045	2.80
Poland	100.9	5580	2.6	145	0.74

End of table 1

Country	Number of R&D employees, thousand people	R&D expenditure, mln dollars	Number of R&D employees per 1000 residents	Per capita R&D expenditure, dollars	R&D expenditure, % of GDP
Sweden	72.7*	12383	8.0*	1367	3.39
Finland	57.2	7669	10.9	1461	3.9
Denmark	54.7	6733	9.9	1224	3.07
Lithuania	14.1	483	4.0	136	0.8
Estonia	7.5	437	5.8	336	1.63
Latvia	6.5	220	2.9	99	0.6
Non-EU states					
Norway	44.8*	7004	9.2*	1430	1.69
Russia	736.5	32624	5.2	230	1.16

* 2009.
Sources: [19; 28—30].

In the number of researchers per 1000 residents, the percentage of GDP spent on R&D, and in R&D expenditure per capita, Russia performs better than Poland, Lithuania, and Latvia, but it slightly lags behind Estonia. And Russia is significantly behind Germany and the Nordic countries in R&D funding where the gap is especially pronounced.

Countries with traditional market economy — Germany and the Nordic countries of the Baltic Sea region (except Norway) — receive 58—66 % of R&D funding from businesses and only 25—30 % from the state. International funding also plays an important role (7—10 %, although, not in Germany). In Norway, thanks to its significant income from oil and gas export, the public contribution to R&D funding is much larger than that of business. The role of the state is even more significant in Poland (61 %) and Russia (70 %). In Poland and the Baltic States, the share of international financing is considerable; in Latvia, it even reaches 33 % (table 2).

Table 2

The structure of R&D funding according to the sources of financing, 2010

Country	Sector			
	Business	Public	Higher education and private	International funding
EU-27	53.9	34.6	2.6	8.9
EU member states of the Baltic region				
Germany	65.6	30.3	0.2	3.9
Finland	66.1	25.7	1.3	6.9
Sweden*	58.8	27.5	3.3	10.4
Denmark	60.7	27.1	3.5	8.7
Estonia	43.6	44.1	0.9	11.4
Latvia	38.8	26.4	1.4	33.4

End of table 2

Country	Sector			
	Business	Public	Higher education and private	International funding
Lithuania	32.4	46.0	1.7	19.9
Poland	24.4	60.9	2.9	11.8
Non-EU member states of the Baltic region				
Norway*	43.6	46.8	1.4	8.2
Russia	25.5	70.3	0.7	3.5
Other countries				
USA*	61.6	31.3	7.1	…
Japan*	75.3	17.7	6.6	0.4

* 2009.
Source: [30].

The state allocates considerable funds to the development of Russian innovative sector. However, the business sector does not only avoid investing into innovations; it is hardly susceptible to innovations originated in the country and does not purchase innovative technologies abroad often enough, which is especially characteristic of goods manufacturing. It may be explained by the Russia's processing industry lagging behind the world leaders due to its low share in GDP production and export formation[1] and the insufficient development of large corporations capable of significant investment in production and commercialisation of innovations.

In Russia, the number of organisations involved in technological innovations in the total number of companies amounted to 9.6% in 2008, 9.4% in 2009, and only 9.3% in 2010. The share of innovative goods and services in their total volume amounted to 5.1, 4.6, and 4.9% respectively [19]. In the EU countries, the share of innovation enterprises is much higher — more than 50%; it reaches 80% in Germany, 52—54% in the Nordic countries, 56% in Estonia, 20—30% in Poland, Lithuania, and Latvia (2008). The share of innovative production in its total volume reaches 13.3% as opposed to 17.4% in Germany, and 5.9% in Latvia. However, in Norway, where the extractive industry is strongly developed, this index is similar to that of Russia — 4.6% [30].

At the same time, the highly remunerative economic activities that flourished in Russia in the post-Soviet period often develop quite successfully. So, computerisation and, especially, mobile communication actively penetrate both the Russian economy and everyday life of Russian people.

Over 2002—2011, the number of work stations connected to the Internet increased. In 2011, there were 30 Internet connections per 100 residents in Russia (61 in the Northwestern Federal District), 93 in Sweden, 89 in

[1] In Russia, the share of processing industries in GDP production amounts to only 13.6%, whereas in all other countries of the Baltic Sea region (except for Lithuania), this index is more than 1.5 times as high. See [19].

Finland; whereas, in 2002, this index was 2 in Russia, 4 in the Northwestern Federal District, 58 in Sweden, and 51 in Finland [26]. The dynamics of the number of SIM cards sold to the population is even more impressive. In 2006, in the Russian Federation, this index reached and, in 2007, exceeded that of Finland and Sweden. In the Northwestern Federal District, it happened even one year earlier. The number of SIM cards sold in the Russian Federation amounted to 172% of the total population in 2011 (196% in the Northwestern district), whereas this index reached 159% in Finland and 117% in Sweden [26].

So, the lagging behind of the Russian economy in production and introducing innovations is shaped by the features of the modern Russian society and its insufficient interest in intense research as a source of competitive advantages in the world market. However, Russian science, which suffered a lack of funding in the crisis years of 1990s and faced the emigration of highly qualified staff, still cannot provide solid grounds for private investment. It does not have skills necessary for operating in the global innovation market as a result of long-term functioning under the conditions of administrative command economy. Thus, international cooperation, which does not only make it possible to combine the efforts of international scholars, but also contributes to improving the organisation of the Russia's innovative sector and ensuring its connection with business, becomes increasingly important.

According to the level of economic and innovative development, there are at least three different groups (clusters) of countries in the Baltic Sea region.

1. Germany and the Nordic countries. These highly developed states are characterised by a low rate of economic development. They allocate significant funds for research and development and actively introduce innovative technologies in different industries. Within the EU, they are leaders in innovative development. The relative (per capita) indices are higher in the Nordic countries, but as for the absolute values, then Germany has a higher innovation potential.

2. Poland and the Baltic states. These countries demonstrate a lower level and a higher rate of economic development. They exhibit lower — in comparison to the pervious cluster — absolute and relative volumes of R&D funding and a much lower level of innovation commercialisation. At the same time, the dynamics of innovative potential development is rather high — as a result of heavy financial support from the EU structural funds and EU programmes.

3. Russia. The country demonstrates a low level of economic development, but a high economic development rate. Russia has relatively high research and technological potential, but the degree of its use is rather limited. Russia's economy exhibits a low level of innovations. The number of people employed in the R&D is decreasing; however, investment in the development of scientific and technological potential is increasing rapidly, predominantly, through public donations. The advance of innovations into the economy is rather slow.

Clusters identified in other countries of the Baltic Sea region can be divided in two groups according to the nature of current as well as possible connections with Russia in the field of innovations:

1) exporters (suppliers) of technologies and innovations (Germany, Sweden, Denmark, Finland, and Norway); joint research on mutual priority areas;

2) partners in the development of joint projects; a possibility of exporting innovations originating in Russia (Poland, Lithuania, Latvia, Estonia).

Germany and the Nordic countries achieved a high level of innovation due to large investment, a well-devised investment policy and mutually beneficial cooperation between science and business. Thus, one should focus on the means to achieve such a high level of innovation development.

Speaking about cooperation with Poland, Lithuania, Latvia, and Estonia, one should not forget about certain similarities in problems faced by Russia and these countries in the development of innovations. First of all, it is poor technological infrastructure, which is a result of the unfavourable economic situation and transition to market economy; it is the weakness of the system of research and innovation support as well as the severed connections between science, industry, and business. However, in the 2000s, Western-oriented science parks and other institutions supporting innovative activities were established with the help of the EU; a number of industries have good prospects for developing cooperation with Russia.

The innovation potential of the Northwestern Federal District

The Northwestern Federal District has ample opportunities for cooperation with other countries of the Baltic Sea region, including in the field of innovations. In comparison with the national average, the NWFD exhibits a rather high innovation potential and a level of commercialisation of innovations close to the average. Being home to 9.5% of the population of Russia and accounting for 10.6% of the total GRP of Russian administrative districts, the Northwestern Federal District accommodates 14% of organisations carrying out R&D activities and 13% of people involved in R&D; it accounts for 13.5% of the total research expenditure and 17% of all advanced technologies used. The introduction of research results (a significant part of innovations originating in the NWFD are channelled to other Russian macroregions) is less intense. The technological innovation expenditure accounts for 9% of the national total, the percentage of applied advanced technologies is 8% of the total, and the volume of innovative goods, works, and services is 9.7% [17].

The major research potential of the NWFD is concentrated in Saint Petersburg. Approximately 80 thousand people work in R&D (83% of those employed in the field in the NWFD and 11.3% of those employed nationally). The volume of R&D expenditure amounts to 59.2 bln roubles, or 84% of the district total and 10.8% of the national total. As to the relative indices (per 1000 residents), the gap between Saint Petersburg and all other NWFD regions is not very wide, but still rather noticeable. However, individual research areas exhibit certain potential for growth.

Saint Petersburg and the adjacent territory of the Leningrad region have the best opportunities for integration compared to other NWFD constituent entities. However, a serious disadvantage is the periphery geographical position of Saint Petersburg both in the Baltic Sea region, and in Russia. A favourable geographical position in relation to international partners is a strong advantage of the Kaliningrad region (however, it lacks the potential of Saint Petersburg and the Leningrad region). It is not a coincidence that the Kaliningrad region and its municipalities participate in 5 out of 7 Baltic Euroregions in which Russia is a participant.

The NWFD has developed and implements a strategy for socioeconomic development [22]: similar documents — and often regional innovative development programmes — have been adopted in each region of the district. These documents — especially in border regions — include measures aimed at the development of international cooperation in the field of innovations. So, the NWFD Strategy pays special attention to "international cooperation in the field of innovations, joint R&D, and technology transfer" as an important factor for the development of research and innovations; a special section is dedicated to cross-border cooperation.

The development of network cooperation

The most popular forms of international cooperation — also in the field of innovations — are direct bilateral agreements. Different forms of network cooperation are playing an increasingly important role.

The term "network", which is progressively associated with information (computer) networks, has a broader meaning. The concept of "network projects" bringing together several research centres is broadly used in scientific circles. In this sense, one can speak of a university network as an aggregate of cooperating universities, or an innovative network as a network of innovative agents brought together by cooperation in research[2]. The innovative cluster is an innovative network having territorial borders.

Border regions of neighbouring countries exhibiting sufficient research potential can serve as a platform for the formation of international (transboundary) innovative clusters. One can also speak of larger innovative networks covering transnational, rather than trans-boundary systems, for instance, the whole Baltic Sea region.

Networks are a type of system that represents an aggregate of homogeneous elements bound by substantial connections, which can be both horizontal (equidirection) and vertical (subordination). Any network is a system of predominantly horizontal connections. Its formation requires sufficient independence of agents — the elements of future network, which make their own decisions on establishing connections with similar agents. It is a major difficulty of network formation in the post-socialist countries with the

[2] A research network can be interpreted as an aggregate of interacting research agents, but it usually stands for a specialised computer network designed for supporting research [22].

traditions of administrative command economy dominated by vertical subordination, whereas market economy contains numerous horizontal cooperation ties alongside the vertical ones. Connections in the field of innovations are indicative of the formation of innovation systems.

Territorially localised horizontal cooperation connections between agents in the field of research and innovation determine the formation of innovative clusters, which bring together research, project and commercialisation organisations exhibiting close mutual — predominantly horizontal — connections. The principal external ties connect the innovation cluster with economic entities — the consumers.

Among innovation agents, the most active participants of cooperation are universities. In the Baltic Sea region, international university networks have been developing alongside numerous bilateral cooperation agreements. Since 1990, the Baltic University Rectors' Conference has been held in order to facilitate cooperation between universities. Support for Central and Eastern European universities is provided by the projects of the Copernicus programme, which facilitates cooperation between universities in education and research. Another network is the Baltic University Education Programme, which brings together dozens of universities in the macroregion (its headquarters is located in Uppsala, Sweden) in order to enhance distance education; recently, the programme participants have implemented small-scale research projects.

International networks, which bring together universities, non-profit organisations, regional and municipal authorities, are formed within EU programmes for 2007—2013, within the European territorial cooperation (ETC) (in 1990—2006, it was the Interreg-I, II, and III programmes). Numerous international — including research — projects are being implemented in the Baltic Sea region in the framework of these programmes (also with Russian and Norwegian participation). Russia co-finances the projects of the ETC/ENPI (European Neighbourhood and Partnership Instrument[3]) cross-border cooperation programmes.

A number of projects with a strong environmental and social emphasis are funded in the framework of the Northern dimension initiative.

Nevertheless, the major EU instrument for R&D financing is the so called framework programmes. In the seventh framework programme for 2007—2013, Russian organisations participate in more than 300 grant agreements. The projects are co-funded in the framework the Federal Targeted Programme (FTP) for Research and Development in Priority Fields of Russian S&T Sector for 2007—2013[4].

Several international projects are financed by Russian national foundations — the Russian Foundation for the Humanities and the Russian Foundation for Basic Research. However, their number and amount of funding is much smaller than those of international projects initiated by the EU.

[3] For more detail see [2; 23].
[4] For more detail see [1; 2].

Another impetus for the development of innovations and high-tech production in the NWFD may be given by the creation of national and international (trans-boundary) innovative clusters. A study carried out at the Immanuel Kant Baltic Federal University identified 15 trans-boundary clusters in the Baltic region. The highest concentration of clusters is observed at the borders of Sweden (13) and Denmark (7).

Favourable conditions for the formation of trans-boundary clusters have been created at Russian borders with the EU. One can observe a gradual formation of at least two clusters — around the Gulf of Finland and the coast of South-East Baltic.

The theoretical justification of cross-border clusters (including innovative ones) is based on the concept of new spatial forms of international economic integration (NSFIEI): Euroregions, large regions, growth triangles, etc. Transnational innovative clusters also belong to this category.

Euroregions are associations of EU border regions, municipalities and their immediate neighbours. Out of 120 Euroregions, 23 are located in the Baltic macroregion, 7 of them feature Russian regional/municipal participation. The creation of Euroregions gives a boost to international cooperation within different economic branches, which can transform into cooperation in the field of innovations.

Special forms of interregional cooperation in the Baltic Sea region are the so called arcs. The South Baltic arc connects the southern and south-eastern coast of the Baltic Sea stretching from Germany to Latvia through the Kaliningrad region.

Growth triangles include partners from three or more countries (and/or regions) with different factors of production, whose linking activates the principle of relative advantages and create synergy. Urpo Kirvikari (Helsinki, Finland) suggested developing South Baltic and East Baltic growth. The former brings together the regions of North Germany and South Sweden, North Poland, Lithuania, and West Latvia, North-West Belarus, and the Kaliningrad region of the Russian Federation. The latter consists of South Finland, Estonia, Saint Petersburg, and the Leningrad region [31].

The backbone of the East Baltic growth triangle is formed by the key economic, cultural, and innovative centres — Saint Petersburg, Helsinki, and Tallinn. The constituents of the South Baltic growth triangle — Tricity (Gdansk — Gdynia — Sopot), Kaliningrad, and Klaipeda — comprise its special part — the South East Baltic. The area serves as a platform for the Lithuania — Poland — the Kaliningrad region of the Russian Federation neighbourhood programme. Tadeusz Palmowski (Gdansk, Poland) suggested developing a bipolar Russian-Polish territorial system “Tricity (Gdansk — Sopot — Gdynia) — Kaliningrad [16]. In my opinion, there are sufficient grounds for creating a larger — tripolar — system, which would also include Klaipeda in Lithuania. Both tripolar systems (Saint Petersburg — Helsinki — Tallinn and Tricity — Kaliningrad — Klaipeda) form the cores of emerging trans-boundary innovative clusters through connecting large innovative centres (see fig.).

The Baltic Sea region is a site of the development of a network of interacting agents involved in innovative activities. It creates prerequisites for the organisation of a special innovative network for research, sharing best practices in the commercialisation of innovations, and attracting investment. The establishment of such a network can be initiated by leading universities and research organisations, as well as corporations, interested in innovative products, and the public structures of the Baltic Sea region's countries, including the Russian Federation.

One must emphasise that, in its "Europe 2020" strategy adopted in 2010, the EU identifies the Innovation Union as the first of seven priorities. Alongside other functions, the Union is designed to:

— combine the efforts of EU member states aimed at creating the European space for research and innovations,

— engage European innovation partnerships between the EU and EU member-states for accelerating the development and redistribution of technologies,

— promote research partnerships and strengthen the interaction between education, business, and innovations [15].

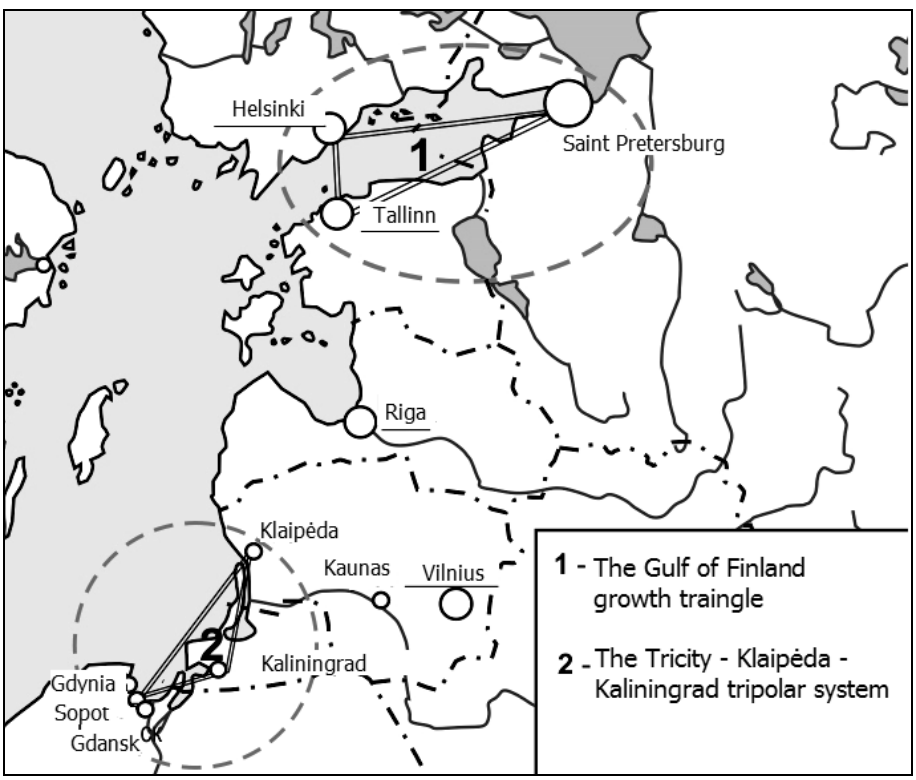

Fig. The formation of trans-boudanry innovative clusters with Russian participation in the Baltic region

Russian participation in the creation of a common innovation space with the EU would be highly beneficial for both parties. One of the factors for its establishment is the implementation of joint initiatives in the field of innovations in the Baltic Sea region accompanied by Russian accession to the emerging transnational innovative space of the Baltic region on equal terms with other partners.

An essential condition for the integration of Russian regions into Baltic innovative clusters is the forging and further development of close socioeconomic ties between all elements of the system ensuring the creation and commercialisation of innovations: research institutions, business sector, and regional and local authorities. The formation of an association of Russian agents representing all three groups cooperating in the production and application of innovative programmes in the NFWD, as well as the coordination of their international cooperation in the field of innovations, could, in my opinion, contribute to the improvement of Russian standing within innovative cooperation in the Baltic.

Promising industrial areas of international cooperation between the NWFD and Baltic partners in the Baltic region (according to the results of research projects implemented at IKBFU) are listed in table 3.

Table 3

Promising areas of cooperation between Russia and the Baltic region states

Area of cooperation	Country*								
	G	P	S	D	F	N	Li	La	E
Biomedicine and medical technologies	+	+	+	+	+	+		+	+
Biotechnologies	+	+	+	+	+		+		
Pharmaceutics	+	+		+				+	
Nanotechnologies	+		+	+	+	+			
New materials (including materials)	+		+		+		+		+
Microelectronics	+		+				+		
Laser technologies	+	+	+				+		
IT	+		+	+	+				
Introduction of new information technologies developed in other countries									+
New and renewable energy source technologies	+		+		+	+			+
Nuclear energy	+	+	+						
Oil extraction and refinement		+		+		+	+		
Energy conservation, energy efficiency	+		+	+	+	+			
Shipbuilding		+				+	+		
Aircraft building	+	+	+						
Motor industry	+		+						
Space	+	+							
Robotics	+		+						
Timber processing technologies			+		+				
Basic manufacturing technologies	+	+						+	

End of table 3

Area of cooperation	Country*								
	G	P	S	D	F	N	Li	La	E
Materials science	+	+						+	
Biocompatible materials	+							+	
Energy saving materials		+							+
Agricultural technologies	+	+	+	+	+		+	+	
Foodstuff technologies	+	+				+	+		+
Seafood harvesting and processing, aquaculture						+			
Submarine technologies						+			
Green building	+				+				
Technologies for prospecting, exploration. and exploitation of mineral deposits		+	+						
Marine technologies (navigation, oil and gas offshore exploration)	+	+		+		+			
Arctic technologies (including Arctic shipbuilding technologies)	+				+	+	+		
Forest resource management		+						+	
Urban facilities (water treatment, "intelligent systems", "green technologies")	+			+					
Environmental protection and management	+	+	+	+	+	+	+	+	+

* G — Germany, P — Poland, S — Sweden, D — Denmark, F — Finland, N — Norway, Li — Lithuania, La — Latvia, E — Estonia.

A more active participation of Russian border regions in cooperation with international neighbours would benefit from the adoption of a federal law on cross-border cooperation. In particular, the recent draft law on cross-border cooperation contains sections entitled "The development and implementation of joint research and technological programmes and projects" and "Cooperation within the implementation of investment projects and production and technological cooperation…" [24].

Unfortunately, the adoption of this law, which is crucial for the development of cross-border ties, has been delayed; however, cross-border cooperation is rapidly developing along most of the land border of Russia, including that with EU border territories.

As a conclusion to this overview of the development of Russia-EU cooperation in the field of innovations in the Baltic, one must emphasise that it is only logical to adopt the EU practices of organising network associations between agents from different Baltic countries. Russian organisations already participate in such associations, but the initiative most often comes from EU partners, since network projects and programmes are usually developed and financed by the European Union. It is vital to the Russian interest to develop a mechanism for contributing to the development of international projects with due financing and the identification of priorities crucial for the development of the innovative sphere in Russia.

Another promising initiative is the creation of at least two transboundary innovative clusters; in Russia, their centres can be located in Saint Petersburg and Kaliningrad. In this case, Saint Petersburg and the Leningrad region, as well as the Kaliningrad region would get additional opportunities for transformation into corridors of development between Russia and the EU, adopting technologies developed by both partners [8], they would become poles of innovative growth of the Russian economy.

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