ETLA
ELINKEINOELÄMÄN TUTKIMUSLAITOS
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
Lönnrotinkatu 4 B 00120 Helsinki Finland Tel. 358-9-609 900
Telefax 358-9-601 753 World Wide Web: http://www.etla.fi/

Keskusteluaiheita – Discussion papers

No. 953

Sergey Boltramovich – Pavel Filippov

– Hannu Hernesniemi

THE INNOVATION SYSTEM AND BUSINESS ENVIRONMENT OF NORTHWEST RUSSIA

The report was financed by the National Technology Agency of Finland (Tekes). It was carried out under cooperation between Etlatieto Ltd., a project research unit of Etla, Advansis Oy, which specialises in R&D management and consultation, and the research and consulting company Solid Invest from St. Petersburg. In connection with the study a fact finding trip was made to the research units and the R&D support organization of St. Petersburg. Separate strategy recommendations were given to Tekes during the reporting stages of the study.

ISSN 0781-6847 07.12.2004

BOLTRAMOVICH, Sergey, **FILIPPOV,** Pavel, **HERNESNIEMI**, Hannu, **THE INNOVATION SYSTEM AND BUSINESS ENVIRONMENT OF NORTHWEST RUSSIA**. Helsinki: ETLA, The Research Institute of the Finnish Economy, 2004, 47 p. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; No. 953).

ABSTRACT: This study, commissioned by the National Technology Agency of Finland (Tekes), evaluates the current innovation system and business environment in Northwest Russia and identifies opportunities for mutually beneficial cooperation in R&D.

The innovation system in Northwest Russia shares common weaknesses with the Russian national innovation system, including insufficient funding, low efficiency in many types of operations, excessive government regulation, low commercialisation of research and development findings, as well as underdeveloped bridging institutions and public-private partnerships. There is, however, also clear evidence of substantial scientific and technical potential, given the vast knowledge and diverse skills accumulated in the region, the high concentration of innovation infrastructure in St. Petersburg, and the willingness to cooperate internationally.

Northwest Russia, which shares a border with Finland, is the chief focus of Finnish investors receiving about 80% of all Finnish investment in Russia. The growing number of international investment projects indicates a gradual improvement in the investment climate in Northwest Russia. This region holds a substantial potential for advancing international cooperation in many areas, including science and technology.

KEY WORDS: Northwest Russia, Innovation System, Business Environment, International Cooperation.

BOLTRAMOVICH, Sergey, **FILIPPOV,** Pavel, **HERNESNIEMI**, Hannu, **THE INNOVATION SYSTEM AND BUSINESS ENVIRONMENT OF NORTHWEST RUSSIA**. Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, 2004, 47 s. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; No. 953).

TIIVISTELMÄ: Tutkimuksessa, joka tehtiin Tekesin tilauksesta, kuvataan Luoteis-Venäjän innovaatiojärjestelmä ja arvioidaan sen toimivuutta. Lisäksi tarkastellaan Luoteis-Venäjän teollista rakennetta, siellä toimivia ulkomaalaisia yrityksiä ml. suomalaisyritykset sekä liiketoiminnan olosuhteita. Tavoitteena on tunnistaa yritysten kannalta tärkeitä T&K-toiminnan yhteistyömahdollisuuksia ja yhteistyökumppaneita.

Luoteis-Venäjän innovaatiojärjestelmä kärsii samoista puutteista kuin koko Venäjän innovaatiojärjestelmä. Näitä ovat mm. riittämätön rahoitus, toiminnan tehottomuus, liiallinen valtion sääntely, tutkimuksen ja kehitystoiminnan tulosten puutteellinen kaupallistaminen, T&K-toiminnan tukiorganisaatioiden alikehittyneisyys sekä julkisen vallan ja yritysten yhteistyön vähyys. Luoteis-Venäjällä on kuitenkin huomattava tieteellinen ja teknillinen potentiaali. Varsinkin Pietarissa on innovaatiotoiminnan ja sen organisaatioiden merkittävä keskittymä ja halukkuutta kansainväliseen yhteistyöhön.

Suomalaisyritysten suorista sijoituksista 80 prosenttia on tehty juuri rajantakaiselle Luoteis-Venäjälle. Ulkomaiset investoinnit Luoteis-Venäjälle ovat kasvaneet, ja lähitulevaisuudessa on odotettavissa suomalaisinvestointien merkittävä kasvu, mikä kuvastaa myös parantunutta investointi-ilmapiiriä. Toistaiseksi investointien motiivit ovat olleet pääsy Venäjän markkinoille tai hyötyminen edullisista tuotantopanoksista. Merkittävä ja käyttämätön potentiaali sisältyy T&K-resurssien hyödyntämiseen.

AVAINSANAT: Luoteis-Venäjä, innovaatiojärjestelmä, liiketoimintaympäristö, kansainvälinen yhteistyö.

1. Introduction

The main objective of the study is to give an overview of the current innovation system and business environment in Northwest Russia. The research focuses on R&D activities and actors as well as R&D financing and support structures. In the study we also briefly describe Northwest Russia's industrial structure.[1] In this study, there is also a survey about foreign direct investment in Northwest Russia including Finnish investments. The role of FDIs is very important in technology transfer.

The National Technology Agency of Finland (Tekes) financed the study and the results of the study will be utilized by it. For this purpose it was important to identify and evaluate possible Russian co-operation partners for Tekes and possibilities for co-operation between Finnish and Russian companies and organization in research and development projects. During the study a fact finding trip to St. Petersburg was organised. A list of the organisations visited is presented in Appendix 1. Separate strategy recommendations were given to Tekes during the reporting stages of the study.

The study was carried out under cooperation between Etlatieto Ltd., a project research unit of Etla, Advansis Oy, which specialises in R&D management and consultation, and the research and consulting company Solid Invest from St. Petersburg. In Etlatieto Research Director Hannu Hernesniemi was responsible for project co-ordination, management and minor parts of the text. The tasks of Directors Kimmo Halme and Tarmo Lemola of Advansis were responsible for supervising the project, commenting on the project report and offering their technology, innovation system and policy know-how for the policy proposal. Field work was carried out by the research team of Solid Invest. The team members were Managing Director Grigori Dudarev and co-authors of the report Dr. Sergey Boltramovich and Mr. Pavel Filippov, data mining expert Mr. Vladislav Yurkovsky and Mr. Leonid Rubinov, who organized the fact finding trip to St. Petersburg and took care of connections to the number of different other innovation system organisations and firms.

The study will focus on Northwest Russia. Those unfamiliar with the geographical boundaries of Northwest Russia will find a map of the region on page 36. The Northwest Russia is one of the seven federal districts in Russia neighbouring Finland, located to the west of the Urals and to the north of the Central Federal District surrounding Moscow. Its territory is approximately 1,678 thousand km^2 or ten per cent of Russia's entire territory. The population of Northwest Russia is 14.3 million people.

The centre of the region is St. Petersburg, which is the second important science, research and education centre of Russia after Moscow. In many fields the research institutes and universities of St. Petersburg are ahead of Moscow. Thirteen Nobel Prize winners have worked or grown up in St. Petersburg. It is time to become familiar with this Northwest Russian innovation and technology centre and also with other smaller concentrations like Arkhangelsk and Severodvinsk, Murmansk, Cherepovets and Syktyvkar, which are important to selected industries.

In Chapter 2 we will speak about the current Russian innovation system and financing of innovation activities. In Chapter 3 focus is on innovation-related organization - universities, key research institutions and science parks. Chapter 4 describes the industrial structure of Northwest Russia and Chapter 5 lists foreign direct investments made in the area. Conclusions and recommendations are included in Chapter 6.

---

[1] Those needing more detailed information about the industry structure and emerging clusters of Northwest Russia are advised to familiarize themselves with the comprehensive study "Advantage Northwest Russia" (Dudarev-Boltramovich-Filippov-Hernesniemi, Sitra Reports series 33 and ETLA B 206, 2004).

2. Innovation System

Russian innovation system, just as the entire Russian economy, is undergoing the process of restructuring and adapting to new market conditions. The breach or weakening of ties within the innovation system that functioned in the Soviet days has lead to rapid decline of the efficiency of the entire system and the need to radically reform it. These difficulties are aggravated by a steep decline of government funding (both absolute and comparative funding) of research and education activities in comparison with the Soviet period.

Table 1. R&D in Russia

	2001	***2002***	***2003***
Total expenditure on internal R&D, USD million in current prices	3,607	4,306	5,641
As of GDP, %	1.16	1.24	1.30
Government budget expenditure on internal R&D, USD million	2,029	2,470	3,267
As of GDP, %	0.66	0.71	0.75
Non-budget foundations' expenditure on internal R&D, USD million	194	177	231
As of GDP, %	0.06	0.05	0.05
Number of researchers (employed in research positions), persons	422176	414676	409300
As of total labor force, %	0.6	0.6	0.6
Total R&D output, USD million	5,679	6,352	8,361
R&D output per person involved in R&D, USD thousand	6.4	7.3	9.7

Source: Goskomstat

The most important negative factor impeding the development of the innovation system under the new conditions is an extremely low demand for results of scientific research, which characterises today's Russia. Only high education is in great demand, although students pursuing higher education do not plan to work in the R&D field (where average wages are extremely low today – even by the Russian standard), but in order to pursue career in other branches of economy.

The private sector that has emerged in Russia during the last decade so far shows little interest in investing in R&D. The first early signs of such interest are displayed only by some of the largest raw material companies, which have been able to adapt to new market conditions sooner and accumulate sufficient financial wealth to invest in long-term strategic development. Companies operating in various processing industry branches, whose demand for innovation is potentially much higher than that among raw material companies, are, at least as far as the majority of them is concerned, do not have the financial capabilities to make sizeable investments in R&D.

Yet another problem, which seriously aggravates the situation, is low competitive strength of Russian applied research. Research organisations use primarily old approaches in their activities, which are not oriented to maximally meet quickly changing demands of their customers, and are not able to offer their customers in the manufacturing sector a comprehensive package of necessary services as required today. Only a small portion of private research institutions (which have set themselves out from the core of large parent research organisations and inherited their competitive strengths) have been able to adapt to new conditions and provide competitive comprehensive services.

As a result the companies, that are in need of upgrading, are currently purchasing not only imported equipment, but also imported technologies. In 2002 only about 10% of industrial enterprises have been evaluated by Russian statistical authorities as 'innovation-based' (i.e. engaged in innovation activities). At the same time, 62% of all expenditures in innovation fell on pur-

chases of equipment (including, to a large degree, purchases of second-hand units), 18.3% fell on purchasing new technologies (including 10.5% on the purchase of patens and licenses). Among specific branches those that displayed the most innovation activity in 2002 were:

- Fuel industry – 33.3% of the entire number of companies in this branch were targeting innovation;
- Chemical production – 26.4%;
- Production of electrical machinery, electronic and optical equipment – 24.4%;
- Production of vehicles and equipment – 20.2%.

Finally, one more important problem faced by the Russian innovation system is the extremely low degree of commercialisation of results of scientific and research activities. Currently, less than 1% of scientific findings find application in the economy. This, to a large degree, is a result of legal regulations: results of studies conducted to government orders (which still by far outweigh all other research) remain the property of the state and may be commercialised only very slowly due to low efficiency of respective government mechanisms.

IPR regulations in Russia

All the key laws governing intellectual property rights in Russia (Patent Law, Law on Copyright and Related Rights, Law on Trademarks, Service Marks and Origin Marks) were enacted in 1992-1993, and have hardly changed since. These laws were developed along similar lines as most typical European and international regulations in this field and differ from them only slightly. The Russian Federation has signed all key international agreements on intellectual property protection.

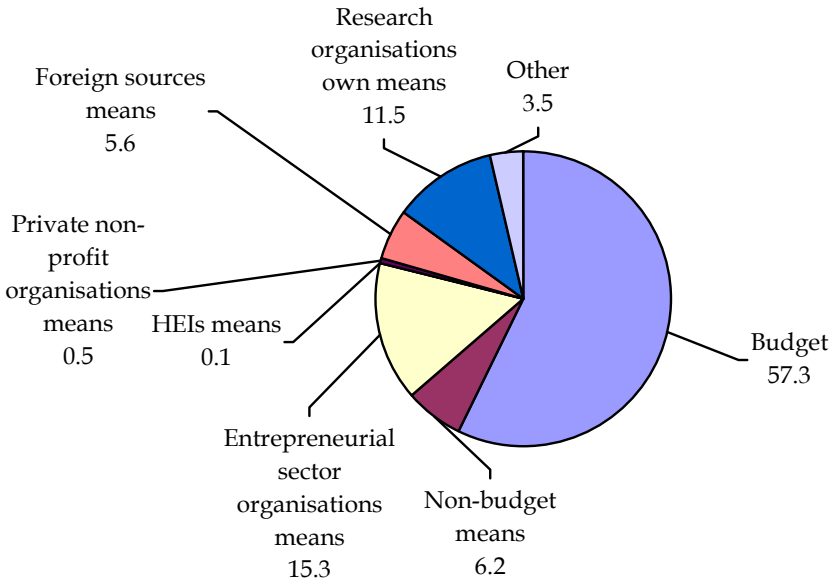
But the existing norms – as is so often the case with Russian legislation – are applied only selectively. Administrative mechanisms of intellectual property protection are extremely inefficient: they put no serious obstacles in the way of pirated copies or other grave violations of intellectual property laws. The absence of regulations protecting trademarks (brands) and intellectual rights on the Internet can be noted as yet another major weaknesses of the current intellectual property law in Russia. Since the trend towards tougher government rules has been evident in many areas in the recent years, we can expect that these vulnerability spots in the Russian law will be gradually eliminated.

We can also expect changes soon in so far as the ban on using results of science and technical projects is concerned. Representatives of the Federal Government have repeatedly stated that this ban will be lifted soon to give researchers an opportunity to commercialise their research findings and results (as long as they are not secret) inside the country.

Researchers are not given the opportunity to show business initiative and commercialise results of their studies in the small-sized business are. The same obstacle (as well as the excessive degree of secretiveness applied to results of research and development which in some manner relate to the defence sector) does not allow Russian R&D organisations to access international markets, which could partially compensate for the rapid decline in domestic demand.

Government funding continues to remain the main source of funding for most R&D organisations. In the recent years volumes of this funding have been growing not sufficiently quickly to at least partially correspond to growing needs. The Russian innovation system is seriously lagging behind the standards adopted by developed nations. The Russian government is on the whole aware of this lag. It regularly proclaims that priority is given to the development of fundamental and applied science in the context of Russian economy, but does not invest enough effort to overcome the gap.

Figure 1. Sources of R&D Financing in 2002, % of total



Source: Goskomstat, 2003

The government's innovation policy (including the distribution of funds) can be described as not sufficiently focused. Various programs for science and technology development, which are being evolved by different government agencies, do not sufficiently interact with each other. Direct funding of research institutions prevail, which is then pulverised among numerous low-efficient links in the chain to the prejudice of the most promising lines of research and projects. At the same time, frequent changes to the system of government regulation and to the distribution of functions among various government bodies leads to too frequent changes in priorities: many earlier adopted programs remain not completed. Thus, the latest crucial change in the government of Russia took place in the spring of 2004, while the adaptation of government bodies to this new structure is not complete yet.

Table 2. Allocation for the section "Basic Research and Contributing to Scientific and Technological Progress" of the federal budget in 2002, USD million

Total	***956***
Ministries and departments	***705***
Out of them: for federal target programmes	*136*
Target budget foundations	***78***
Out of them: Russian Basic Research Foundation	*55*
Russian Humanitarian Scientific Foundation	*9*
Foundation for the Assistance to Small Innovative Enterprises	*14*
Priority trends of science and technology development	***173***
Out of them: financing R&D for federal target programmes	*84*
International projects and programmes, support of international scientific and technological cooperation	*18*
Creation of computer communication networks and databases for basic science and education	*6*
Others	*65*

Source: Ministry for Education and Science of Russia

Among other shortcomings of the Russian innovation system we can name the so far extremely weak development of many key elements of innovation infrastructure: public and private venture financing (especially seed and start-up funds), bridging institutions, information supply, science and technology parks. Another significant drawback is the fact that there has been virtually no public-private partnership in the innovation sphere yet.

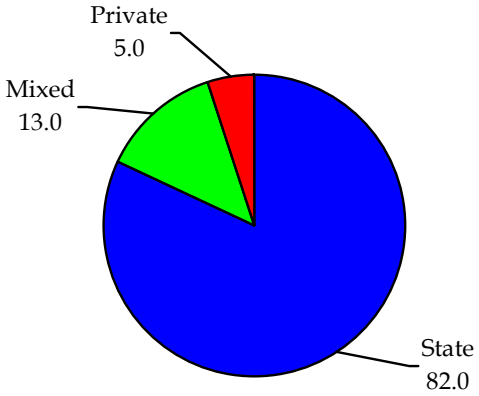
Contemporary legislative base in Russia open rather broad opportunities for using various organisational and financial instruments in order to develop partnerships between the public and the private sectors on the basis of elements of innovation system that are already in place, and elements that are being created. But all the efforts on behalf of the government in this respect have been low efficient, while the speed with which the Russian administrative culture evolves is on the whole much lower that the speed with which the business culture changes. Yet another major hurdle to the development of public-private partnerships is still low degree of interest among the private sector in participating in high-risk activities in the R&D sector.

An important characteristic of the Russian innovation system that distinguishes it from those of OECD nations is a high share of state organizations. Today the state is the owner of 72% of the entire number of R&D organisations. The share of state enterprises is even higher if we look at the value of fixed capital in the R&D sector.

The government views this specific characteristic as a serious factor that decelerates the development of the Russian innovation system. According to the government plans announced in September 2004, the R&D sector needs to undergo a large-scale privatisation. Out of 2338 state enterprises engaged in research and development only 400-700 should remain government property by 2008, and only 100-200 should remain government-held in the more distant future. Only organisations that have the capability to meet the key government orders, primarily in the defence field and those related to defence industry, should remain government property.

A descriptive feature of this and many other government plans is the low degree of transparency in the process of their evolvement. These plans are as a rule developed in some narrow functionary environment without consultations with leading civilian experts. Therefore the public (in this instance, managers of state R&D organisations of various ranking), very often remain extremely displeased with decisions that have been taken, and attempt to contest them. Experience shows that these attempts can lead to partial revisions of the earlier adopted decisions.

Figure 2. Ownership in Russian R&D Sector by Value of Fixed Capital, % of total

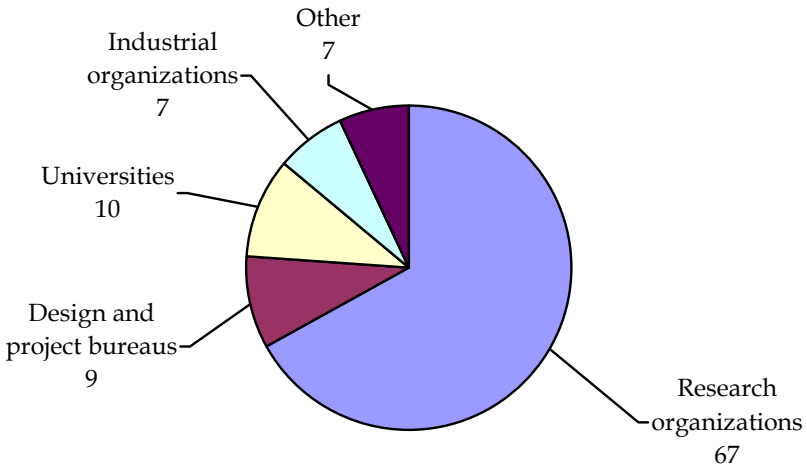


Source: Goskomstat, 2003

Yet another important feature of the Russian innovation system is the low weight of universities and industrial laboratories in the R&D sector – both in terms of the number of organisations, and the volume of delivered products and services. According to 2003 data, the sale of R&D prod-

ucts delivered by research organizations (institutes) was 1.3 times higher than the sales of R&D products delivered by design bureaus; 6.4 times higher than the sales of products delivered by industrial organizations (enterprises); and 10 times higher than the sales of R&D products delivered by higher education institutions (universities). At the same time, the efficiency with which state fund allocated for research and development are used is, in the opinion of many experts, almost two times higher at universities than at research organizations (institutes).

Figure 3. Russian Organizations Involved in R&D in 2002, % of the total number



Source: Goskomstat, 2003

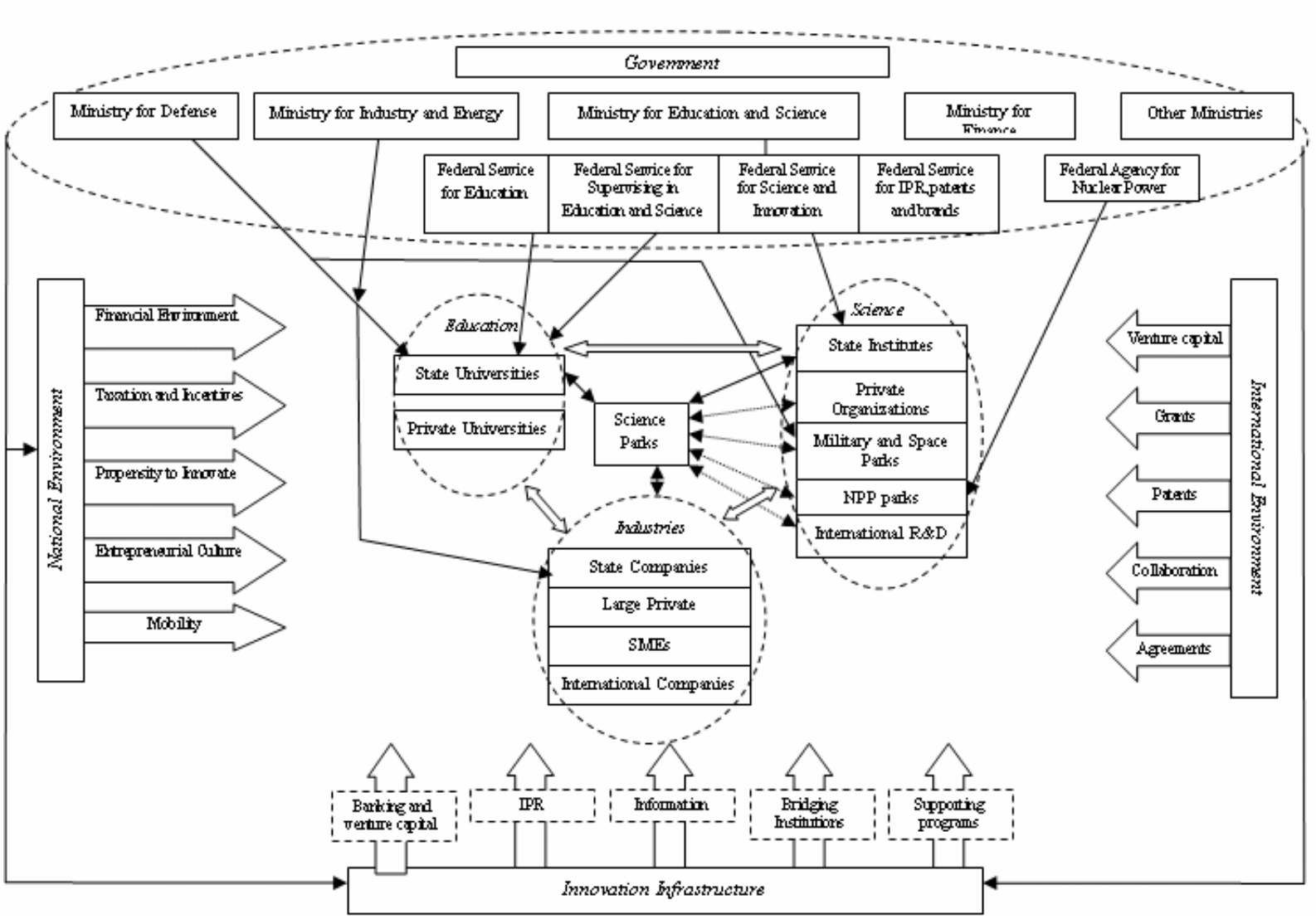
We should also note that the defence sector is of paramount importance for the development of the Russian innovation. In the Soviet days it has been generating the majority of new knowledge, and space industry and nuclear power branch were the derivatives of the defence sector. In the last 15 years innovation potential of these sectors has lowered significantly, but not as much as for the civilian branch of the Russian innovation system. Funding of the so-called 'mailboxes' (specific scientific research institutions, enterprises, as well as entire cities of science, specifically established to meet the needs of the military, airspace and other research) and science parks built around nuclear power plants remain among the top government priorities. All of these sectors are practically closed for international cooperation, although in the future, if the state agrees to lower the level of secretiveness associated with these institutions, their significant innovation potential can be partially commercialised.

The innovation system of the Northwest of Russia is a part of the entire nation's innovation system and does not have any strong distinguishing characteristics. A typical feature here is the high degree of dependence of all elements of the innovation system, which belong to the government, to decisions taken in Moscow. Capabilities of local authorities are severely restricted in this respect. They control only those elements of the innovation system that have specific local significance.

St. Petersburg stands out among the Northwest. It is the second education and science centre in the nation after Moscow and has sufficiently developed links with the world innovation system. The city's innovation potential is considerably higher than for many other regions of the Northwest, and in the medium-term perspective this gap is more likely to become larger than shorter.

In terms of specific technologies St. Petersburg is the centre of microelectronics, optics, nanotechnologies, nuclear technologies, energetic technologies, laser technologies, biotechnologies (primarily in pharmaceutics), information technologies (math modelling, speech recognition and production systems, as well as those for text and image, information security, etc.),

Figure 4. Russian Innovation System



development of new materials (in particular, special alloys and polymers), space technologies, technologies of personal safety, a whole range of specialised technologies in the field of prospecting and extraction of mineral wealth, etc.

In each macro-technological field listed above the city can boast development that can compete on the international level and become a foundation for building specialised networks with elements of specific clusters or even high-technology clusters.

The city authorities view the innovation potential of St. Petersburg as one of the main competitive advantages of the local economy in the long-term perspective. But here, as on the federal authorities' level, words prevail over actions so far – both due to the lack of serious local financial resources (which are many times lower than those available to the federal authorities), and due to unclear understanding of the goals and measures which need to be undertaken to reach these goals.

It should be generally noted that local authorities now have much fewer opportunities to influence the development of innovation system than the Federal Government. And this is not only because local resources are scarcer, but also due to current vertical structure of innovation system – all leading schools of higher learning and research institutes in St. Petersburg are managed from Moscow. Local authorities only have the power to influence the climate for these institutions – making it more favourable or less favourable, but not to make pivotal decisions.

One of the main directions of developments in the near future proclaimed by the city's Government is the development of innovation and technology centres (science parks) on the basis of leading St. Petersburg universities. A Centre for Small Innovation Business is planned to be established in 2004 within the frameworks of non-profit public-private partnership building. The authorities intend this Centre to encapsulate large players in the city innovation market (higher education establishments, technology parks, scientific research institutes, high-tech industrial enterprises, financial organisations), which have already accumulated the experience of small business undertakings in their own segments of the economy, in order to coordinate their efforts and achieve more efficient development.

The Russian Government, especially in the recent years, has repeatedly stated that it pursues the development of a national innovation system. The document of the most general nature that currently regulates activities in this area is called The Foundations of Policy of the Russian Federation in the Field of Development of Science and Technology for the Period up to 2010 and More Remote Prospects. This document (which was indorsed by the Russian President Vladimir Putin on 30 March 2002) is aimed to outline guidelines for government policies in the development of science and technology in the context of the transition from raw material-based development of the country to the innovation-based model of development, as well as to chart out ways towards implementing these policies, develop a legal framework and a system of economic stimulation measures.

The document is rather general and declarative in nature and does not discuss specific sources of funding for projects and objectives proclaimed in it.

The Foundations is a basis for the development of more detailed and focused innovation programs on the federal and regional levels.

The document lists the following main directions of government policy in the filed of development of science and technology:

- development of fundamental sciences and of applied R&D;
- development of government regulation mechanisms in the field of science and technology;
- restructuring of a national innovation system;

- increasing the efficiency of using results of innovation activities;
- preservation and development of human capital in the field of Russian innovation;
- integration of science and education;
- development of international cooperation in the field of innovation.

The following elements are envisaged as forming the national innovation system: creating favourable economic and legislative climate; building an innovation infrastructure; improving mechanisms of government facilitation of commercialisation of results of scientific research and development.

The following measures are aimed at furthering scientific and technical cooperation: state support of innovation projects that have priority for Russia; bringing the national normative and legal frameworks into compliance with international standards in order to attract more foreign investment; stimulating the establishment of international scientific laboratories, centres, etc. on the Russian territory; developing mechanisms of trans-boundary transfer of scientific results and promoting Russian scientific products on the world markets; commercialisation of Russian technologies; expanding the practice of targeted training abroad for Russian researchers and training of foreign researchers in Russia.

Since all the above listed are basic things a priori needed to deepen innovation, we can state that no focused approach to restructuring an innovation system addressing specific priorities and conductive to differentiation has been formulated in Russia yet.

A number of federal targeted innovation civilian and military-use programs have been devised on the basis of the Foundations. Since a detailed review of each of these programs is outside the objectives of our study, we will discuss only two of them: the Megaprojects Program and Electronic Russia.

The Megaprojects Program (implementation period: 2002-2006) is based on the principle of public-private sector partnership and of focusing joint efforts on those areas of technology that can yield a considerable economic return in the near future. At the same time, implementing this type of projects should resolve some key issues faced by the Russian manufacturing sector, such as lowering energy consumption for production, increasing raw material utilisation rates and achieving better processing of raw material. It should be noted that state budget spending should not exceed 50% of costs for each megaproject. It is expected that the rest of funding will be received from other sources. Implementation of each megaproject should involve an entire cycle of innovation: from applied research activities to forwarding finished products to the market.

The fields in which megaprojects are being implemented correspond to the 7 priority areas of development of science and technology in Russia, which have been indorsed by the government:

- Electronics, telecommunications and information technologies;
- New materials and chemical technologies;
- New transportation technologies;
- Industrial technologies;
- Biotechnologies;
- Environmental protection and rational management of natural resources;
- Energy-savings technologies.

The total number of megaprojects is 12. The lead organisations that execute four of the said megaprojects are institutes of the Russian Academy of Science. For four others megaprojects it is research institutes (government and private) of specific branches of science that are entrusted with the execution; finally, non-government research institutions are responsible for the execution of the

four remaining projects. Four of these twelve megaprojects will be realised on the territory of the Northwest of Russia.

Table 3. Megaprojects Implemented in the Northwest Russia

Project name	***Executive***	***Public/private budget, RUR million***
Development and practical tuning of technical, technological, organizational and financial solutions (including complex ones) for raising efficiency of heat supply to the regions of Russia.	Fuel Investment Company, Syktyvkar, Republic of Komi	250/1800
Developing and mastering the production of a family of highly effective steam gas power installations with a single capacity of more than 200 megawatt.	Leningrad Metal Plant, St. Petersburg	450/550
Raising the effectiveness of processing solid wastes on the basis of modern domestic technologies and equipment yielding secondary raw material and commodity products.	Mekhanobr-Tekhnika, St. Petersburg	400/427.5
Creation of technologies and mastering the industrial production of structural metallic materials with a two-fold increase of the most important operational properties.	Prometheus, St. Petersburg	200/200

Source: Ministry for Education and Science of Russia

The Electronic Russia program was developed by the Ministry of Communications of the Russian Federation. It is to be implemented in 2002-2010, pursuing the objective of making the national economy more efficient by means of introduction and broad application of information and telecommunication technologies (ICT), securing rights to free flow of information, broadening and improving the training of ICT specialists.

Funding in the amount of 77.2 billion roubles (over 2.2 billion EUR, based on the exchange rate of 1 EUR = 35 RUR) is secured for the entire period of implementation of this project, of which about 50% comes from the federal budget, about 30% from regional and local government budgets, and about 20% from non-budget sources.

Among expected outcomes of this program are the following:

- development of competitive production of goods and services in the ICT sector;
- broader access of private citizens, companies and organisations to communication services and information systems;
- higher information openness of the authorities;
- increased quality of education;
- development of independent mass media.

Any analysis of these and other government programs in the innovation sphere shows that they suffer from the tendency to make pronouncement for effect, take a far too broad view of problems without the necessary focus on the most urgent and currently manageable problems, insufficient elaboration of mechanisms that are needed to achieve realisation of proclaimed goals. The government's aspiration for developing cohesive market institutions needed for efficient functioning of the Russian innovative system in the new economic environment stands out

as a positive trend. At the same time, current efforts are not sufficient, and much remains to be done in this respect.

The forecast that is brought to your attention in the table below reflect the Federal authorities' view on how the Russian innovation system is going to develop. It may be right to consider this forecast too optimistic as far as timeline is concerned, but it reflects the considerable interest that the government shows in boosting science and technology activities in the country.

Table 4. Governmental Forecast to the Russian Innovation Development

Indicator	***2000***	***2010***	***2015***	***OECD countries on average***
R&D expenditures in GDP, %	1.04	2.0	2.3	3.0
Average age of researchers with PhD degrees, years	54	48	46	44
Annual financing per researcher, RUR thousand	120	450	600	750
Average age of R&D equipment, years	11	9	7	5-6
Share of innovation products in the total industrial production, %	3.7	7	10	15

Source: Basic Directions of Social and Economic Development Strategy in Northwestern Federal District of Russia up to 2015. (2003)

3. Innovation Related Organizations

Main universities in Northwest Russia

In 2003 there were 136 higher education establishments in the Northwest of Russia. This accounts for 12.6% of total number of higher education establishments in the nation. The number of students in higher education establishments of the Northwest in 2003 was 647.7 thousand, which amounts to 10.6% of the entire number of students in higher education establishments in Russia.

Higher education establishments in St. Petersburg are clearly differentiated from those in any other city of the Northwest. St. Petersburg is an indisputable leader of the region in higher education. Ninety-two higher education establishments (according to data for 2003) are located in St. Petersburg, which is over 2/3 of all higher education establishments in the Northwest of Russia, while St. Petersburg population amounts to only 1/3 of all residents of the region. In 2003 380.1 thousand students attended these higher education establishments in St. Petersburg, while the population of the city is about 4,500 thousand.

It is, however, not the quantitative indicators that are important here, but the qualitative ones. St. Petersburg is the second education centre in importance after Moscow. Skilled workers needed by the economy of the entire country are being trained here – nearly 1/3 of all students pursuing higher education in St. Petersburg are arrivals from other cities. Some of higher education institutions in St. Petersburg are Russia-wide leaders in their areas of specialisation. Students from other countries also study in St. Petersburg, mostly from developing nations – China, India, Latin America and Africa. At the same time, as compared with leading universities in the West, the quality of education even in the best higher education establishments of St. Petersburg will in most cases be of considerably lower quality.

Higher education establishments in other cities of the Northwest train specialists chiefly to meet the demand of local economies: teachers, engineers and managers of local enterprises, etc. Quality of education and research capacity of these higher education establishments is considerably lower than those of leading St. Petersburg universities. This is why in the following we will understand leading higher education establishments of the Northwest as leading universities in St. Petersburg.

When we discuss higher education establishments in St. Petersburg (just as higher education establishments in Russia in general) we should differentiate between state and private institutions:

Private schools account for almost half of all institutions of higher learning in St. Petersburg (45 out of 92 in 2003), but they are attended by over five times fewer students than state schools: 69 thousands against 352.8 thousands at state schools in 2003. Private schools of higher learning have emerged during the last 15 years. They prepare specialists only in humanities: economics, law, public relations, culture, etc. No private schools specialising in natural science or technology have appeared yet. This is because large investments need to be made in order to organise training in these fields. The quality of education at private schools is much lower than at state schools, which is regularly noted by state commissions looking into issues of higher learning.

Forty out of forty-seven state schools in St. Petersburg have been inherited from the Soviet period, and some have appeared even earlier – in XIX and even XVIII century. Therefore accumulated wealth of tradition passed over from one generation to the next is apparent. State institutions of higher learning enjoy sufficiently developed educational and scientific infrastructures (libraries, laboratories, etc.), which ensure their considerable – comparing to most private schools – potential. At the same time state schools are facing a multitude of serious problems these days, the most serious of which are discussed in the following.

Table 5. Universities by Northwest Russia Region in 2003

Region	***Number of Universities***		***Number of students, (thousands)***		***Specialization***	***Remarks***
	State	*Private*	*State*	*Private*		
St. Petersburg	47	45	318.9	61.2	The main university centre in Northwest Russia with a large number of universities of various specializations.	
Arkhangelsk	3	2	40.7	2.9	Technology (primary-forestry); teacher training; medicine.	There are also some small private higher education schools oriented towards local needs in training of managers.
Kaliningrad	4	6	24.6	4.5	Teacher training; technology (primary-fisheries); economy and finance.	Among the main areas of training are international relations, business and tourism.
Republic of Karelia	3	0	22.7	0.8	Teacher training; culture.	Other specialists are being trained in St. Petersburg.
Republic of Komi	4	3	26.7	4.4	Teacher training; medicine; technology (primary – oil and gas, forestry).	The training in oil and gas is located in Ukhta, in forestry – in Syktyvkar.
Leningrad	3	1	27.2	0.6	Teacher training; agriculture.	Other specialists are being trained in St. Petersburg.
Murmansk	2	2	23.9	4.3	Technology (primary – fisheries, oil and gas, ship services); teacher training.	An important new area of training is oil and gas.
Novgorod	1	1	23.3	0.5	Teacher training.	Other specialists are being trained in Moscow and St. Petersburg.
Pskov	3	1	18.3	2.0	Teacher training; agriculture.	There are also some branches of St. Petersburg and Moscow universities.
Vologda	4	1	38.8	1.3	Teacher training; technology (primary – machine building); ferrous metals.	Cherepovets (location of Severstal) is the main centre of training in ferrous metals.
Total Northwest	*74*	*62*	*565.2*	*82.5*		
Total Russia	*655*	*384*	*5,228.7*	*718.8*		

Source: Goskomstat, 2003.

There are different ratings used to evaluate St. Petersburg schools, of which none can be used as the basis, since until now there are no common criteria for preparing these ratings. Below is the table of 11 largest state schools in St. Petersburg that, in our view, have the highest capacity educational and research potential in natural science and technology.

Table 6. Key St. Petersburg Universities

University	*Key Competences*	*Number of Students in 2002*	*Number of Researchers in 2002**
St. Petersburg State University (www.spbu.ru)	Many areas of training (sciences).	2,7716	2,623
St. Petersburg State Polytechnic University (www.spbstu.ru)	General technics; energy; metals; ICT.	19,047	1,520
St. Petersburg Electro Technical University "LETI" (www.eltech.ru)	Radio engineering; electronic instrumentation; ICT.	10,103	606
St. Petersburg State University of Information Technologies, Mechanics and Optics (www.ifmo.ru)	Optical & information technologies; optical instrumentation; telecommu-nications; fine mechanics.	7,178	319
St. Petersburg State University of Aerospace Instrumentation (www.guap.ru)	Aerospace instrumentation; radio engineering; ICT.	9,802	347
St. Petersburg State University of Telecommunications named after M. A. Bonch-Bruevich (www.sut.ru)	ICT.	8,500	291
St. Petersburg State Engineering Institute (www.spbgti.h1.ru)	Chemistry; environmental protection.	6,825	435
St. Petersburg State Mining Institute (www.spmi.ru)	Mining; energy; metals.	5,049	355
State Medical University of Saint Petersburg named after I. P. Pavlov (www.spmu.runnet.ru)	General medicine; surgery; physiology.	3,663	577
Russian Medical Military Academy (www.vmeda.spb.ru)	General medicine.	n/a	More than 1000**
St. Petersburg State Technical Forest Academy (www.ftacademy.sp.ru)	Forestry; harvesting; mechanical and chemical wood- processing.	9,248	373

* -- non-training positions
** -- estimation

Source: data provided by universities

The following tendencies have been characteristic of the development of St. Petersburg leading institutions of higher learning in the past 12 years:

- *Increase in the number of students is attended by sinking quality of education.*

Increase in the number of students is achieved primarily through admitting students to read humanities that are not profile disciplines for these schools: economics, law, public relations, etc. As to technical training, main increases in admittance are observed first and foremost in information technology (for most schools) and telecommunications (for schools which have previously been offering this speciality). Deteriorating quality of schooling is the consequence of insufficient funding in over the past 12 years. At the same time schools suffer from flow-out of young and most mobile teachers, while those who remain face the need to earn extra income at other organisations (which results in decline of qualifications). Meanwhile equipment gradually becomes obsolete, and so forth.

- *Gap between learning and practice.*

Schools' links to enterprises that operated in the Soviet days have been disrupted during the last 12 years, and have not been fully restored. Being in isolation from modern production practices is the reason for deteriorating quality of learning. Contacts between state schools and private sector have only started to be forged, and only a small number of students attending focused training groups are involved in sufficient internship programs.

- *Higher education system is being reformed slowly and inefficiently.*

Transition to the globally established system of two-tier system of higher education (bachelors and masters) proceeds slowly because, unfortunately, neither the schools not Russian employers see the need for it. Government funding is distributed within the old and largely obsolete organisational system of most schools, which decreases returns from insufficient – as it were – investments in the development.

- *Educational activities at schools by far exceed scientific activities.*

This is a result of insufficient funding of schools and decreasing motivation to engage in scientific and research activities.

- *Schools are striving to broaden international cooperation.*

Institutions of higher learning view international cooperation both as a possibility to secure additional investments (received in grants, stipends, etc.), and a source of maintaining competitive strength (through knowledge transfer, exchange of specialists, etc.). Virtually every school participates in international projects with various partners, seeking to increase the number of such projects. Direct liaison with international partners for more or less large projects is handled through school management, but lower level contacts can also be found – on the level of departments, laboratories and individual specialists. The efficiency of international contacts of schools is on the whole rather low, which can be attributed to poor command of foreign languages on the Russian side, different motivations of the Russians and their international partners, insufficient economic independence of whole schools and their subdivisions (conditioned by their present status of state schools), etc.

- *Increasing cooperation between higher education establishments*

Schools more and more actively cooperate with each other – both in order to lobby their common interests among authorities, and to implement joint education and scientific projects. According to some experts St. Petersburg system of higher education has big synergetic potential, which remains largely under-utilised.

On the whole it can be said that higher education establishments in St. Petersburg have reasonably high potential for developing on the basis of cumulative experience and knowledge precisely because St. Petersburg offers a rather nourishing climate for education and innovation. Yet, since all major schools of higher learning are currently federally run (and will most likely continue to be so), their performance will be immensely affected by reforms of higher education planned for the coming years.

The need for these reforms has become pressing quite a while ago, but a hot debate continues to rage about specific principles and implementation mechanisms. It is most likely that reforms will proceed towards further expansion of paid education (on the average, between 30 and 50% students of state schools pay fees today), locating new sources of funding and strengthening government control over schools' activities (including adapting education programs to better address current needs of the national economy).

Main research institutes in Northwest Russia

According to 2002 data 590 organisations carrying out research and development were found in the Northwest of Russia, 432 (73%) of them in St. Petersburg. St. Petersburg has even higher share of personnel involved in R&D sector: 94352 (84%) people out of 112478 people engaged in research and development in the Northwest. Therefore it will not be an exaggeration to claim that almost the entire scientific and technical potential of the Northwest is centred in St. Petersburg. Only a few research centres with narrow specialisation remain outside the city and focus around two nuclear power plants (in Leningrad Region and Murmansk Region), as well as in a few industrial cities: Cherepovets (ferrous metals), Syktyvkar (forest), Ukhta (oil and gas), Arkhangelsk-Severodvinsk (forest, submarine building).

St. Petersburg is the second in size (15% of the total number of Russian scientific organizations) scientific centre in Russia after Moscow. Both fundamental science (math, physics, chemistry, etc.) and various applied branches (optics, ICT, new materials, biotechnology, shipbuilding technology, metals, chemical technologies, etc). Fundamental science took near 15% of the total Northwest Russian R&D organizations' internal expenditures (in the total amount of 534.4 USD million) in 2002, applied research and development – 85%. The high international level of fundamental research carried out by leading R&D organizations in St. Petersburg is evidenced by the 40th place held by the city in the international rating of science centres (which was calculated on the bases of international publications) and by the two Nobel prizes awarded to St. Petersburg scientists in 2000 and 2003.

Both institutes that are a part of the system of state academies (of which the largest is the Russian Academy of Science – more than 60 organizations in St. Petersburg and its neighbouring areas only) and non-state institutes are found among the leading research organisations of St. Petersburg. The latter for the most part are former state developers privatised in 1990-ies. During the past decade some non-state research institutions also sprang to being. They are small in size as organisations and have either spun off from larger "old" institutes, or have been established by foreign firms (Siemens, Motorola, Intel, LG, Sun Microsystems, etc.) as their local research divisions. These new R&D institutions are on the whole more efficient than the old ones, since they enjoy a higher degree of flexibility and easily adapt to changing market conditions, usually supplying full sets of services to their customers. But their contribution to the entire R&D sector of St. Petersburg remains not high so far, and to this day most of innovation activities are handled by the "old" organisations.

Reliable ratings of Russian research institutions have not been developed. We can assume there are a few dozens of large and medium-sized R&D companies operate in St. Petersburg, which are of importance not only to the entire Russia, but also internationally (or are potentially important). These organisations specialise in various fundamental and applied disciplines. You can find a list of 12 organisations operating in various fields. In addition to those there is a sizable number of important research institutes in these and other fields many of which are completely or partially classified, as they fill orders from the army on a regular basis.

Table 7. Key St. Petersburg R&D Institutions

R&D Institutions	*Industry*	*Key Competences*	*Number of Researchers*	*Remarks*
All-Russia petroleum research exploration institute (VNIGRI) (www.vnigri.spb.ru)	Oil and Gas	Theoretical base of oil and gas deposits exploration; estimation of oil and gas reserves; environmental R&D.	Total: 456 Include: 27 Prof. and 94 PHD	Takes part in oil & gas reserves exploration in all Russian regions, including water areas.
Giprobum (www.giprobum.spb.ru)	Pulp-and-paper	Engineering; consulting.	Total: 350	The leading Russian pulp-and-paper R&D organization.
Gipronickel Institute, JS (Gipronikel) (www.nickel.spb.ru/index.shtml)	Non-ferrous metals	Non-ferrous and precious metals technologies; engineering.	Total: 650 Include: 9 Prof. and 77 PHD	Subsidiary of Norilsk Nickel Company. The leading Russian nickel and some other non-ferrous metals R&D organization.
Physics & Technical Institute named after A. F. Ioffe (www.ioffe.rssi.ru) (www.edu.ioffe.ru)	Physics	Nanotechnologies; solid state physics; plasma & atomic physics; dielectrics & semiconductors.	Total: near 1000 Leader: Zhores Alferov (Nobel Prize in physics in 2000).	One of the leading Russian physics centres.
St.-Petersburg Research and Development Telecommunications Centre (LONIIS) (www.loniis.ru) (www.niits.ru)	ICT	Design of exchange equipment; development of long-distance telephony equipment; licensing and adaptation of foreign equipment to Russian networks.	n/a	Close contacts to St. Petersburg State University of Telecommunications named after M. A. Bonch-Bruevich
Institute of the human brain (www.ihb.spb.ru)	Medicine	Physiological and neurochemical principles and mechanisms underlying the activity of the human brain.	Total: 146 Include: 12 Prof. and 32 PHD	One of new science organizations.
State Optical Institute named after S. I. Vavilov (GOI) (http://soi.srv.pu.ru/)	Optics	Optical and information technologies.	60 Prof. and more than 300 PHD	The leading Russian organization in fine mechanics and optics.
Radium Institute named after V. G. Khlopin (www.atom.nw.ru/RI/HOME.HTM)	Nuclear studies	Nuclear physics; radiochemistry; environmental radioactivity.	Total: more than 1000 Include:35 Prof. and 175 PHD	One of the leading Russian nuclear science organizations.
Shipbuilding Research Institute named after A. N. Krylov (www.ksri.ru)	Shipbuilding	All areas of shipbuilding both civil and military.	Total: more than 3000 Include:60 Prof. and 350 PHD	The leading Russian shipbuilding R&D organization.
Russian Geological Research Institute named after A. P. Karpinsky (VSEGEI) (www.vsegei.ru)	Geology	General geology; geological mapping; prospecting technologies; environmental research.	Total: near 600 Include: 56 Prof. and 169 PHD	The leading Russian geology science organization.
Institute of Applied Chemistry (GIPH) (www.rscac.spb.ru)	Chemistry	Chemical technologies; engineering; environmental research.	Total: more than 2000 Include:25 Prof. and 262 PHD	Specializes in R&D for industry.
Scientific and Development Association on Research and Design of Power Equipment named after I. I. Polzunov (CKTI) (www.ckti.ru)	Energy	Power equipment.	Total: 630 Include:100 Prof. and PHD	The leading Russian R&D organization in the sphere of power equipment designing.

Source: companies' data

Over the last 12-15 years large scientific organisations and developers of St. Petersburg have been facing a great number of problems, most of which were characteristic for all Russian institutions. The following tendencies can be mentioned among the most important of the period:

- *Rapid decline in funding due to shrinking government orders and the fact that the newly established private sector is not ready to invest in innovation.*

This factor became the major contributor to the decrease of competitive strength of the Russian research sector. Organisations closely linked to the Ministry of Defence found themselves in a better position. Their funding was also cut, but not disastrously so. As to other organisations, acquisition of new research equipment practically stopped there (with the exception of personal computers), wages were cut, which made the most gifted and young researchers leave their jobs. On the whole, the number of staff employed by the research sector of St. Petersburg has dropped twofold over the last 12 years. The prestige of working in the research sector has rapidly dropped, top graduates avoid this area of work, since the current average wage in the research sector is among the lowest in the entire Russian economy.

- *Immediate survival strategies prevail, while almost no long-term development strategies are in place.*

In order to keep afloat and maintain at least some number of highly qualified experts managers of R&D institutions are forced to accept orders that fall outside profile activities of their organisations. This enables them to earn day-to-day means, but is inevitable accompanied by a decline in the main qualifications of the staff.

- *First signs appear indicating that leading industrial companies in Russia are interested in establishing control over research organisations in the related field.*

The developing Russian private sector (in the first place raw material-based holding companies, which are more successful so far) has started to recognise the necessity to invest in innovation activities as one of the key factors contributing to developing competitive strength in the long-term perspective. As an example we can note the acquisition of the Gipronickel Institute by Norilsk Nickel company.

- *Attempts to widen their international activities.*

The majority of research institutions in St. Petersburg attempt to broaden their international contacts, seeking new markets, participation in joint international projects, etc. Until now these attempts have not resulted in considerable internationalisation of the R&D sector due to numerous obstacles on the way of such cooperation:

- Current IPR-legislation does not allow organisations to commercialise results of research conducted to government orders.
- Most organisations do not have the skills to conduct efficient international activities and no qualified personnel to do so.
- Standards of large Russian R&D organizations significantly differ from the international ones in the respective area, in particular, even at this stage far too little attention is paid to interaction with clients.
- Organisations that handle military orders are subject to rigid control on behalf of respective government authorities, whose interests differ from commercial interests of the R&D organisations.

At the same time, despite many unresolved problems and high inertia of the R&D sector of St. Petersburg, its innovation potential is rather high and can be utilised in the medium-term per-

spective. St. Petersburg has accumulated a critical number of research organisations, while their potential interaction (which is currently practiced – and not always – only within one given, or in some cases a few related branches) can lead to considerable synergy effects.

In the past years St. Petersburg has provided a growing number of success stories of high-tech innovation activities in market conditions. So far this relates to chiefly small-size companies, which evidences the need for significant structural changes in the outdated and cumbersome system of regulating the Russian R&D sector, the need to develop commercialisation mechanisms for products of research and development, to broaden the partnership between public and private sector in this field.

Emerging science parks in Northwest Russia

During the Soviet period St. Petersburg (known as Leningrad in those days) already had a whole range of science-and-production complexes, each of which would involve a large higher education establishment, scientific research institution and an industrial enterprise, which would all be closely interlinked and functioning as a part of one system. Such complexes existed in electronics, optics, chemical branch, instrumentation building, shipbuilding, power engineering and some other branches. Each of these complexes has had a considerable high-technology capacity, which was used primarily in the defence, space, or nuclear power fields, and to a lesser degree in civilian good production. The way these science-and-production complexes on the whole reminded of the interaction within one a cluster, but was based on non-market ties and without the participation of small- and medium-sized companies.

When the Russian economy was being reformed in the 1990-ies these ties have been disrupted and certain elements of these science-and-technology complexes started to function virtually independently. This has lead to a considerable decline in the innovation potential of St. Petersburg. Today innovation activities account for, according to expert estimates, only 3-4% of the gross regional product of St. Petersburg.

Both the government (federal and local) and private companies are currently investing efforts towards the development of the innovation sphere in the new conditions. There is clear understanding of the fact that the development of innovation is one of the main competitive strengths of the economy of St. Petersburg in the long-term perspective. But these efforts are still badly coordinated with each other, and do not receive sufficient funding.

The federal government supports most the so-called “state science centres”, which develop on the basis of large research institutes and industrial enterprises. There are 12 such centres in St. Petersburg today (58 in Russia), and they are all directly linked to the defence industry. This will explain the low level of transparency characterising these centres, and their insufficient readiness to establish broad international contacts.

On the other hand, the government tries to facilitate the development of science parks, in which small innovation companies will have optimal possibilities for development due to infrastructure that has been put in place and high concentration of qualified staff. These science parks have only started to emerge in the past few years in leading scientific centres in Russia, including St. Petersburg. At present, only approximately 150 SMEs engaged in innovation in St. Petersburg operate within the existing science parks.

In addition to the list below, two other science parks exist in St. Petersburg – attached to University of Aerospace Instrumentation and to Technical Forest Academy. At least three more science parks attached to big universities are expected to be established in close future – St. Petersburg State University, St. Petersburg State University of Telecommunications, and Baltic Technical University.

Table 8. Key Emerging Science Parks in St. Petersburg

Science park	*Competences*	*Number of SMEs in 2003*	*Remarks*
ILIP (Innovations of St. Petersburg Research Institutes&Enterprises)	Carbon nanotechnologies; cybernetic "smart houses"; laser optics; medical instrumentation.	17	Established under ILIP company which is St. Petersburg representative of Foundation for Assistance to Development of Small Innovative Enterprises (Bortnik Foundation)
Science park of St. Petersburg State University of Information Technologies, Mechanics and Optics	Information technologies; optics and optoelectronics; lasers.	20	The newest science park in St. Petersburg (established in 2003) equipped with modern infrastructure.
Science park of St. Petersburg State Polytechnic University	Medical instrumentation; energy equipment; environmental protection; technology process monitoring and diagnostics; telecommunications.	15	Established on the base of one of the leading technical universities in Russia.
Science Park of St. Petersburg State Electric and Technical University	Information technologies; medical instrumentation; electronics; radio engineering; environmental monitoring.	27	Established as a department of mother university to support education and research activities. There are no outside firms in this science park.
Science park of Regional Fund for Science & Technology Development (RFSTD) – Svetlana science park	Semiconductors; opto-electronics; microelectronics; ultra high frequency technology; new materials;software development.	26	Established under state control on the base of industrial company Svetlana - St. Petersburg's leader in the sphere of optics and fine mechanics.

Source: companies' data

The Government of St. Petersburg and federal support organisations (for example, the Foundation for Assistance to Small Innovative Enterprises) have during the last few years been regularly allocating financial support to develop science parks. But this funding remains insufficient so far, and the innovation structure is not developing quickly enough. Yet another important factor that holds back the development is, according to experts, the sever shortage of specialists in the field of innovation engineering and management. No such skills were demanded by the innovation system of the Soviet period, and the training of the necessary specialists at Russian institutions of higher learning has commenced only in the recent years.

As to other regions in the Northwest, the emergence of science parks there in the medium-term perspective is possible only at the science centres established around the two nuclear power plants (Leningrad Power Plant in the Leningrad Region, and Kola Power Plant in the Murmansk Region), as well as at some large local universities (for example, at the University of Yaroslav the Wise in Novgorod).

In the past few years – while global oil prices continued to climb, and consequently, the Federal budget became richer, the government started to invest efforts into developing science and technol-

ogy capacity of the country. The target is to make the country on the whole less dependent on world raw materials market conditions. In order to achieve this, authorities analyse world experience in developing high-technology industries, including in the context of cluster approach. Specific implementation mechanisms for new innovation policies are only in the making, so it is premature to discuss their key principles and orientation. Yet there is no doubt that Russia (including the Northwest) has a certain potential of considerable growth in the innovation sphere and increasing its output of science-intensive products – if not in medium-term, than at least in long-term future.

4. Business Environment: General Features

Northwest Russia economy in general

Today the share of Northwest in entire Russian gross regional product is 10%. A rapid slump was observed in 1999, which was in response to 1998 financial crisis responsible for rouble devaluation. Later GRP grow started to recover, and in the recent years the GRP increase has been close to 6-8%, which is very near the average for the entire Russia.

Industry prevails in the GRP structure, which is a trend inherited from the Soviet period. Only in the recent years has it started to change – the service sector is growing (especially in St. Petersburg), while the industries' weight is on the whole starting to gradually decline.

Figure 5. Northwest Russia GRP, USD billion

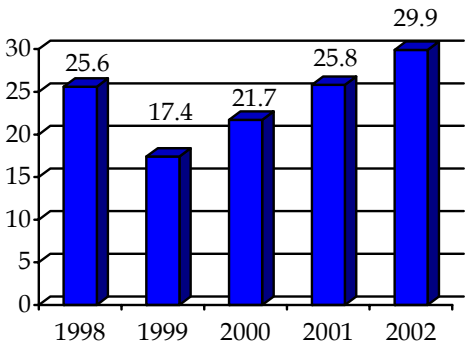
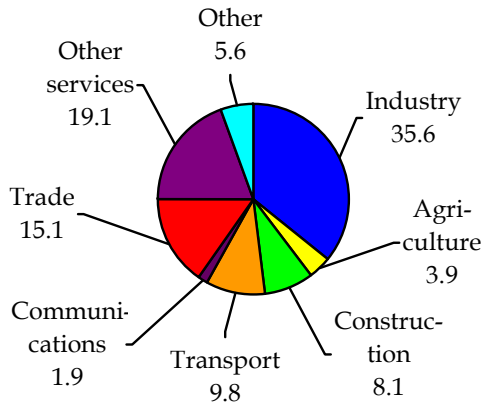


Figure 6. Northwest Russia GRP Breakdown in 2002,%



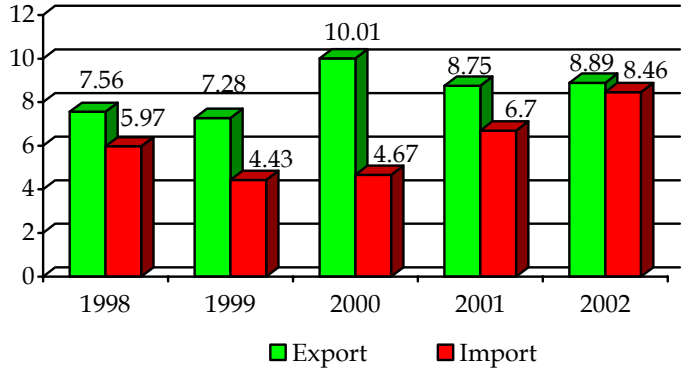
Source: Goskomstat, 2003

The share of the Northwest in Russia's summary exports is on the average 8-9%. In recent years exports have been around USD 8-10 billion a year, which is a 20-30% increase against 1990-ies. The value of export grows not only because export volumes are higher, but also because global raw material prices continue to go up.

Import volumes have dropped sharply after Russian rouble lost much of its value in the wake of 1998 financial crisis. Yet in recent years imports started to grow quickly owning to higher financial resources of enterprises and earnings of the community. We should also not forget that

when many goods are imported into Russia 'grey area' customs-clearing arrangements are often made in order to hugely understate real costs of imported goods (and, therefore, to pay less taxes). Therefore it can be assumed that in reality imports to the Northwest (which are mostly channelled through St. Petersburg) are very likely to be higher than exports.

Figure 7. Northwest Russia Export/Import, USD billion



Source: Goskomstat, 2003

Northwest mostly exports energy products (oil, natural gas, electric power), timber and products from wood, as well as ferrous and non-ferrous metals. Products of machine-building branch (chiefly energy equipment and marine vessels) are exported primarily by industrial companies in St. Petersburg.

Figure 8. Northwest Russia Export Breakdown in 2002,%

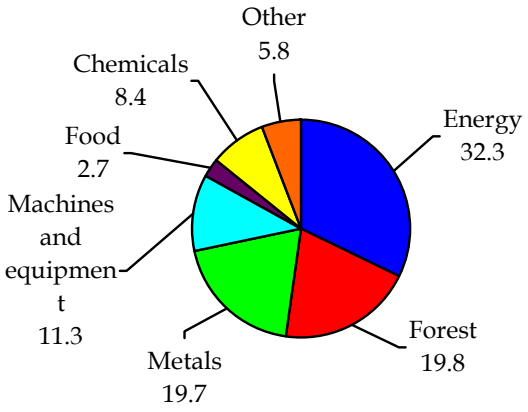
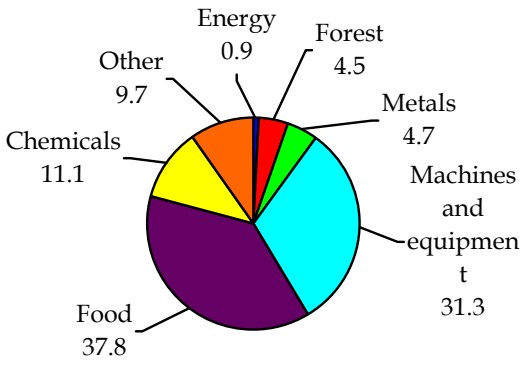


Figure 9. Northwest Russia Import Breakdown in 2002,%



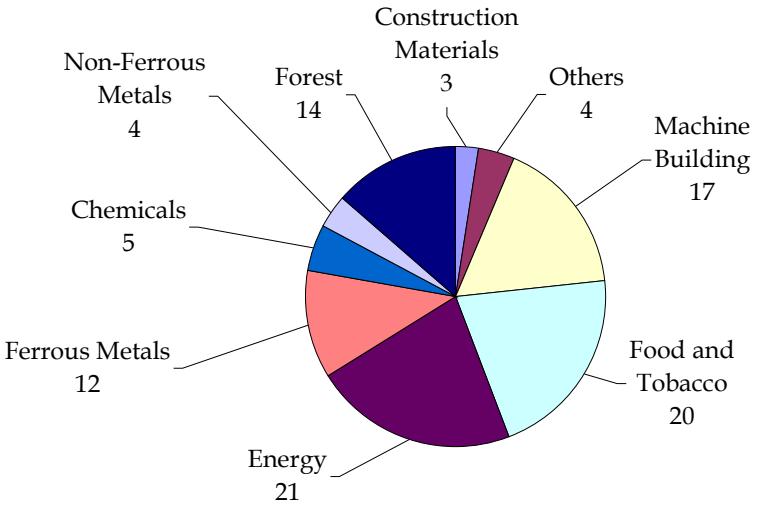
Source: Goskomstat, 2003

The imports breakdown is on the whole the reverse of exports breakdown: key imports in the Northwest are various machines and equipment, as well as foodstuffs and high value-added chemical goods.

Main industries and their agglomerations

In accordance with the industrial specialization that had been practiced in the Soviet Union, Northwest Russia specialized in machine building (first of all, shipbuilding, power engineering, and instrumentation), ferrous and non-ferrous metals, mechanical wood-processing and pulp-and-paper industries. Their agglomerations are still the core of the regional economy and provide near 50% of the total industrial output of Northwest Russia. An important problem that these agglomerations face is the underdevelopment of related and supporting industries.

Figure 10. Industrial Production in Northwest Russia in 2002, % of the total (22.8 USD billion) in current prices



Source: Goskomstat, 2003

Over the last few years, the highest growth rate was recorded in the food and tobacco industries. They have a large domestic market and are the most attractive for foreign investment. Among other industries, the most attractive for foreign investment during the past decade were the forest sector, construction materials industry and oil production, while metals and machine building have been less attractive. The machine building industry has already lost its leading position in the economy of the region, but after the financial crisis of 1998 a certain revival was witnessed in this sector: there are examples of large foreign orders, as well as some foreign investment projects.

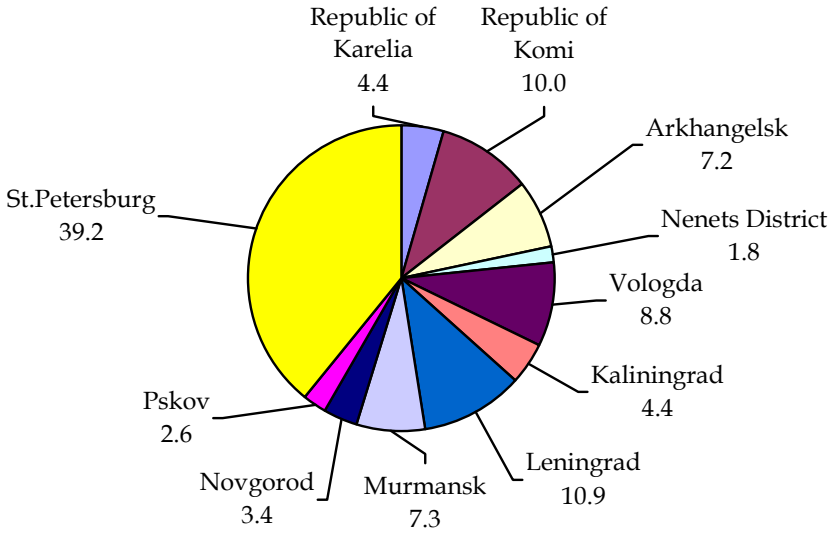
The level of competition in the core industries of Northwest Russia (with minor exceptions, such as some segments of the food processing industry) is still rather low, but the on-going restructuring processes (reforms in the energy sector and other natural monopolies, emergence of new markets, products and services, etc.) cause to life new market segments (industrial services, engineering, manufacturing of specialized equipment, etc.) which from the very first stages develop as highly competitive. At the same time, new market stimuli emerge for the 'traditional' sectors of the economy.

The economy of Northwest Russia is also fully influenced by such all-Russian processes as the low transparency of most business operations, the existence of a strong 'gray' market sector (according to experts, its volume is comparable to the observed economy), and the high influence exerted on the success of private enterprises by the personal connections of their top managers with the government officials who make important regulatory decisions.

Another important feature of the current situation is the high degree of wear and deterioration of the basic infrastructure and equipment at those enterprises which were established during the

Soviet period and were not able to succeed under the new economic conditions. This, on one hand, creates a high level of delayed demand, and, on the other hand, may result in the total loss of competitive advantages by many enterprises.

Figure 11. GRP of the Northwest Russia Regions in 2002, %



Source: Goskomstat, 2003

Each region in Northwest Russia has inherited from the Soviet period its industrial specialization. Over the past decade, significant changes have occurred in the structure of industry in most regions.[2] The share of the food industry and the energy sector has grown drastically – the decline in production in these industries was less than in others, and in some types of products (for example, beer and tobacco) the pre-reform level has already been exceeded. On the other hand, the share of machine building and light industry has significantly decreased – the deepest declines in production have been seen in these sectors.

Table 9. Key Industries of the Northwest Russia Regions, % of the total regional industrial output in 2002

Region (industrial output, USD bln.)	***Key industries (with the exception of electric power industry)***
Republic of Karelia (1.1)	Forest – 45%, ferrous metals – 13%, food – 12%.
Republic of Komi (2.0)	Oil and gas – 44%, forest – 24%, coal – 12%.
Arkhangelsk (1.7)	Forest – 45%, machine building – 14%.
Nenets autonomous district (0.4)	Oil and gas – 97%.
Vologda (3.3)	Ferrous metals – 60%, forest –8%.
Murmansk (1.9)	Non-ferrous metals – 26%, food – 18%, chemicals – 16%
St. Petersburg (7.1)	Food and tobacco – 35%, machine building – 34%.
Leningrad (3.0)	Food and tobacco – 27%, forest – 18%, oil refining – 17%.
Novgorod (0.9)	Chemicals – 27%, food – 20%, forest – 16%.
Pskov (0.4)	Machine building – 30%, food – 27%.
Kaliningrad (0.9)	Food – 31%, machine building – 24%, oil – 16%.

Source: Goskomstat, 2003

[2] For example, in 1990 in St. Petersburg the industrial structure was dominated by machine-building (33%), food industry (19%) and light industry (17%, now – 2%)

During the Soviet period, the economy of the Northwest developed within the framework of a centralized planning system. The foundation of the economic structure was formed by the so-called 'territorial-industrial complexes' (TPK) that had a number of features typical for clusters, but functioned under non-market conditions. Over the last fifteen years, the economy of Northwest Russia has undergone substantial restructuring and now exists in near-market conditions. There are a number of industries in Northwest Russia, in which new rather large clusters emerge on the basis of the current industrial activities. These industries include:

- Forest industry, comprising harvesting, mechanical and chemical processing of timber;
- Metals, both ferrous and non-ferrous;
- Energy sector, comprising oil, gas, coal, electric power, and power engineering branches;
- Food sector;
- Information and communication technologies (ICT).

The forest, energy and food clusters are, on the whole, scattered across all regions of Northwest Russia, but also have a number of specialized agglomerations which serve as industrial nodes of economic structure. The main forest cluster agglomerations are located around the largest PPMs (pulp and paper mills): Neusiedler Syktyvkar (Republic of Komi), Kotlas and Arkhangelsk (both – Arkhangelsk Region), Kondopoga and Segezha (both – Republic of Karelia), Svetogorsk (Leningrad Region).

The main energy cluster agglomerations are:

- Timan-Pechora (Republic of Komi and Nenets autonomous district) – oil and gas production, oil refining (Lukoil), gas processing (Gazprom);
- Vorkuta area (Republic of Komi) – coal production;
- Two agglomerations in the Leningrad Region – 1) oil refining (KINEF), 2) electric power production (Leningrad Nuclear Power Plant – the largest NPP in Russia);
- St. Petersburg - power engineering (Silovye Mashiny);
- Khibiny area – electric power production (Kola NPP).

The other large energy cluster agglomeration can emerge in the Murmansk Region. The basis for its development could be the Murmansk' sea port and new oil and gas deposits in the Barents Sea. The main food cluster agglomerations are located in St. Petersburg and its neighbouring areas in the Leningrad Region (many food branches and tobacco industry), and in "fish cities" – Murmansk and Kaliningrad. There are also some smaller food cluster agglomerations in the Pskov, Novgorod, Vologda Regions and in the Republic of Karelia.

The metal cluster is rather highly concentrated. It has four agglomerations:

- Severstal (Vologda Region) – steel production;
- Kola-and-Karelia mining and smelting area – iron ore (Karelsky Okatysh, Olkon, Kovdor Mining Plant), nickel (Kola Mining and Smelting Company – subdivision of Norilsk Nickel), and aluminium (two plants belonging to SUAL holding company) production;
- St. Petersburg - ferrous and non-ferrous metal-working;
- Leningrad Region – bauxite, alumina, and aluminium (Volkhov Aluminium belonging to SUAL) production.

The ICT cluster has its only agglomeration within the city of St. Petersburg. This agglomeration is one of the largest in the Russian Federation due to the rather high innovation potential of the city (a number of leading universities and research institutions are located there). However, some elements of an ICT cluster are currently emerging in other cities of Northwest Russia, which can in future result in the formation of new agglomerations.

The traditional clusters of Northwest Russia (forest, metal, and energy) are characterized by significant depth and breadth, while the new clusters of the region (food and ICT) are still in their development stage, both expanding and deepening their operations. The food cluster has not actually entered the international market, apart from the export of fish, most of which is, however, sold unprocessed.

The new clusters are characterized by a high inflow of foreign capital, as well as imported materials and components. The traditional clusters are based on local resources. Only in the forest cluster imported materials and foreign investments have started to play a significant role.

There are other industrial agglomerations functioning in Northwest Russia, which could also develop into competitiveness clusters, given the necessary conditions are created. Among the main agglomerations those could be mentioned:

- Shipbuilding – St. Petersburg (three shipyards – both military and civil ships and vessels) and Severodvinsk, Arkhangelsk Region (two shipyards - submarines);
- Optics and optoelectronics – St. Petersburg (LOMO and other plants);
- Chemicals – Novgorod (Akron), Murmansk Region (Apatit, Kovdor Mining Plant), Leningrad Region (Fosforit);
- Construction materials – St. Petersburg and Leningrad Region (many medium sized companies).

Over the last decade, the overall technological lag of Russian industry behind the advanced economies of the world has increased. Throughout the 1990-s, when demand volume and structure have been changing drastically, just as 'rules of the game', Russian companies were much more preoccupied with their very survival than with technological development. In the recent years, however, interest in innovation has grown, since it is impossible for many industry players to maintain competitive edge without radically upgrading their production. An important stimulus that will drive innovation in the future will be Russia's membership in the WTO. Growing competition will force many Russian companies to leave the mass markets, changing market strategies in such a way that lead in market niches can be achieved only through technological differentiation of production and services.

The innovation capacities of various branches of the Northwest's economy vary significantly. At this stage companies in the ICT cluster display the highest innovation drive. Companies in various branches of mechanical engineering, optics and electronics also show high demand for innovation, although the majority of players in these sectors do not possess high enough financial capabilities to upgrade their production. This is due to both the shortage of own resources and to underdeveloped financial markets. The demand for innovation among companies engaged in production and primary processing of raw materials is equally high, and, importantly, is backed by higher financial strength. There is nevertheless a number of features specific of this sector that impact innovation: products needed to upgrade this sector are not as science-intensive as those needed for high-tech branches, while modernisation cycles for primary equipment are longer than those for high-tech.

Key companies in Northwest Russia

Four main groups can be distinguished among the industrial players of the Northwest according to their innovation potential:

- Group 1: Companies that have business interests and assets in many regions around Russia, including the Northwest, with their Northwest divisions accounting for less than 50% of entire output.

- Group 2: Companies that are based in Northwest Russia (with over 50% of their output being produced there), but have business in other regions.
- Group 3: Companies, the activities of which are entirely or almost entirely restricted to the Northwest.
- Group 4: Divisions of foreign companies.

Energy monopolies and other monopolies inherited from the Soviet period are in the first group of players, as well as some largest private companies that emerged as privatised public sector companies. These companies have their subdivisions in the Northwest, which will be looked at separately: Gazprom – SeverGazprom, RAO UES of Russia – Lenenergo, VologdaEnergo, KomiEnergo, etc.; LUKoil – LUKoil-Komi, LUKoil-KaliningradMorneft; Surgutneftegaz – KINEF; Norilsk Nickel – Kola Mining and Smelting Company; SUAL – Metallurg, Kandalaksha Aluminium Plant, Nadvoitsy Aluminium Plant; Ilim Pulp Enterprise – Kotlas PPM, St. Petersburg Cardboard Mill; Evrokhim – Kovdor Mining Plant, Fosforit.

Some of the large Russian companies based in Northwest (Group 2) are players of national importance: Severstal (includes Cherepovets Steel Rolling Mill and Karelsky Okatysh), Silovye Machiny (includes St.Petersburg based plants – Leningrad Metal Plant, Electrosila, Turbine Blades Plant), Baltika, Akron. We will look at the activities of international companies in a special section of this study.

Table 10. Largest Energy Companies in 2003

Company	***Region***	***Products***	***Sales, USD million***	***Productivity (Sales/Employees), USD thousand***
Lenenergo	St. Petersburg, Leningrad	Electric and heat power	868	49
SeverGazprom	Republic of Komi	Gas	767	56
LUKoil-Komi	Republic of Komi	Oil and oil products	703	160
KirishiNefteorgsintez (KINEF)	Leningrad	Oil products	557	88
VologdaEnergo	Vologda	Electric and heat power	269	49
KomiEnergo	Republic of Komi	Electric and heat power	260	27
KolEnergo	Murmansk	Electric and heat power	234	44
VorkutaUgol	Republic of Komi	Coal	215	12
LUKoil-KaliningradMorneft	Kaliningrad	Oil	200	74
ArkhEnergo	Arkhangelsk	Electric and heat power	178	31

Source: Expert RA, 2004

Of which large exporters are: SeverGazprom, LUKoil-Komi, KirishiNefteorgsintez (KINEF), Lenenergo, LUKoil-KaliningradMorneft.

Table 11. Largest Metal Companies in 2003

Company	*Region*	*Products*	*Sales, USD million*	*Productivity (Sales/Employees), USD thousand*
Severstal	Vologda	Steel	2,665	67
Kola Mining and Smelting Company	Murmansk	Nickel, copper, cobalt	556	33
Cherepovets Steel Rolling Mill	Vologda	Steel products	264	38
Karelsky Okatysh	Republic of Karelia	Iron ore	166	21
Metallurg	Leningrad	Alumina, aluminium	163	21
Kovdor Mining Plant	Murmansk	Iron ore, phosphoric raw materials	131	23

Source: Expert RA, 2004
All these companies are large exporters.

Table 12. Largest Forest Companies in 2003

Company	*Region*	*Products*	*Sales, USD million*	*Productivity (Sales/Employees), USD thousand*
Titan (based on Arkhangelsk PPM)	Arkhangelsk	Cardboard, pulp, paper	413	20
Neusiedler Syktyvkar	Republic of Komi	Paper, cardboard	342	62
Kotlas PPM	Arkhangelsk	Pulp, cardboard, paper	271	32
Svetogorsk	Leningrad	Paper, cardboard	250	96
Kondopoga	Republic of Karelia	Paper	199	27
Segezha PPM	Republic of Karelia	Paper, cardboard	132	25

Source: Expert RA, 2004
All these companies are large exporters.

Table 13. Largest Machine-Building Companies in 2003

Company	*Region*	*Products*	*Sales, USD million*	*Productivity (Sales/Employees), USD thousand*
Ford	Leningrad	Car assembly	485	n/a
Baltic Plant	St. Petersburg	Ships and vessels	310	48
Sevmash	Arkhangelsk	Submarines	307	n/a
Kirovsky Plant	St. Petersburg	Transport equipment, metal products	175	18
Telebalt	Kaliningrad	TV-set assembly	136	340
Pirometr	St. Petersburg	Apparatus	123	176
Leningrad Metal Plant (LMZ)	St. Petersburg	Energy equipment	113	19
Electrosila	St. Petersburg	Energy equipment	109	19

Source: Expert RA, 2004
Of which large exporters are: Baltic Plant , Kirovsky Plant, Leningrad Metal Plant (LMZ), Electrosila.

Table 14. Largest Food and Tobacco Companies in 2003

Company	*Region*	*Products*	*Sales, USD million*	*Productivity (Sales/Employees), USD thousand*
Philip Morris Izhora	St. Petersburg	Tobacco	752	940
Baltica Brewery	St. Petersburg	Beer	731	93
Petro	St. Petersburg	Tobacco	352	196
Multon	St. Petersburg	Juices	272	n/a
Heineken Brewery	St. Petersburg	Beer	182	n/a
BAT-St. Petersburg	St. Petersburg	Tobacco	149	497

Source: Expert RA, 2004
There are no large exporters among these companies.

Table 15. Other Largest Industrial Companies in 2003

Company	*Region*	*Products*	*Sales, USD million*	*Productivity (Sales/Employees), USD thousand*
Apatit	Murmansk	Phosphoric raw materials	615	44
Megafon	St. Petersburg	Mobile telecommunications	440	n/a
Northwest Telecom	St. Petersburg	Wire telecommunications	402	n/a
Akron	Novgorod	Nitric fertilizers and other chemicals	362	37
Peterburg Products International	St. Petersburg	Consumer goods	172	430
Ammofos	Vologda	Nitric chemicals and fertilizers	128	26

Source: Expert RA, 2004
Of which large exporters are chemical enterprises: Apatit, Akron, Ammofos.

Comparison between innovation potentials of leading industrial companies in the Northwest allows us to draw the following conclusions. Companies in the first and second groups have the highest potential for introducing new technologies, as they have accumulated vast financial resources and started to work out long-term development strategies in the past years. Modernisation is an important element of such strategies. These companies consume both domestic and imported research and technologies.

Innovation potential is also high among Russian subdivisions of large international companies, which also have considerable financial strengths, including the possibility of securing credit from large international financial organisations. These companies are oriented to receive only imported innovation products, and cannot be expected to become buyers of Russian R&D products in the medium-term perspective.

Finally, there are some significant buyers of innovation products among the large companies that operate entirely in the Northwest. These are primarily the companies for which export markets play an important role. At this stage it is first and foremost pulp-and-paper mills operating in the Northwest. Their primary equipment is intended to output products with low value-added and narrow range, but in huge volumes. In addition, their equipment suffers from bad wear and pollutes the environment. Forecasts are made that pulp-and-paper mills will be forced to embrace large upgrades of their equipment in the near future in order to broaden their products range and

cut costs and environmental pollution. Without such upgrade their competitive strength will drop drastically in the middle-term perspective.

Small and medium size companies

Russian legislation defines small-sized companies as businesses employing between 30 and 100 staff members (depending on branch of economy), given that other (i.e. not small-sized companies) hold no more that 25% of their stock. The law contains no definition of medium-size companies, but they are usually understood as businesses employing no more than 500 staff. Only the data for small-size companies is available from official Russian statistics.

According to 2002 indicators, about 132.5 thousand small companies operated in Northwest Russia. This is about 15% of the entire number of small companies in the country. Out of this number, almost 90 thousand, or 68%, are based in St. Petersburg. This disproportion can be attributed to the following main reasons:

- St. Petersburg is the largest city of the Northwest (with population over 4.5 million) and has the most developed consumer market;
- St. Petersburg has initiated liberal economic reforms earlier than most other Russian regions, which gave the city's economy enough time to restructure.

The number of small-size companies in other regions of Northwest is between 2.5 and 6 thousand (2 - 4.5% of the total number), while only Leningrad Region has as much as 11.5 thousand small enterprises (ca. 9% of the total).

Table 16. Employed in Small Enterprises (SEs) in the Northwest in 2002

Region	***Employed in SEs, thousand***	***Employed in SEs/employed in the economy of the region, %***
Russia	7,220	11
Northwest Russia	1,028	15.4
St. Petersburg	621	26.1
Leningrad	119	16.9
Vologda	59	9.4
Kaliningrad	44	10.7
Arkhangelsk	37	6.0
Pskov	32	9.5
Republic of Komi	31	6.1
Republic of Karelia	29	8.5
Novgorod	28	8.9
Murmansk	27	6.2

Source: Goskomstat, 2003

In 2002 small enterprises accounted for 12.6% of the entire Russian gross regional product. In the Northwest small enterprises contributed as much as 18.5% to aggregate gross regional product. The share of small businesses is particularly high in the economies of Kaliningrad Region (28%) and St. Petersburg (26%). On the whole, small businesses are more developed in southern parts of the Northwest and in the Republic of Karelia (19%) than in the north. Small-sized companies accounted for only 6% of gross regional product of the Nenets Autonomous District in 2002, and for 8.5% of the economy of Arkhangelsk Region and 11.6% of the economy of Murmansk Region.

Almost half of all small-sized businesses in the Northwest operate in the wholesale and retail sectors and in catering, but their aggregate output is only slightly higher than the output of small companies working in industry and construction. This can be partially attributed to low transparency that characterises trade and catering in Russia, which are counted among the 'grey' sectors of the economy. In St. Petersburg the share of this sector in small business is higher: 74% of the total number of all small companies operating in trade and catering in the Northwest of Russia and about 72% of the total production of their services.

The weight of small industrial enterprises is higher in other regions of the Northwest than in St. Petersburg, but on the whole their number is not sufficient to ensure growth of competition between suppliers to large industrial firms. This is one of the key problems that prevent the Russian industry from restructuring at faster pace.

The share of small companies engaged in scientific production remains extremely low in the Northwest. Even in St. Petersburg, which is the home to 88% of all small science-intensive companies in the Northwest, accounting for 82% of their total production, this segment remains rather poorly developed and does not fulfil the considerable potential that exists in this city. The development of science and technology parks, which create optimal growth conditions for small companies, have in actuality just started.

Table 17. Number of SEs/Production of SEs in 2002, % of the total

Region	*Industry*	*Construction*	*Transport*	*Trade and catering*	*Science*	*Other*
Northwest Russia	16.0/25.3	12.4/21.1	3.0/2.3	47.0/26.0	3.2/1.6	18.4/23.7
St. Petersburg	13.6/17.6	11.3/18.9	2.8/1.5	51.3/33.8	4.0/2.4	17.0/25.8
Leningrad	24.7/34.0	15.2/30.5	4.3/5.6	36.4/11.1	1.7/1.4	17.7/17.4
Vologda	18.6/24.5	17.6/27.9	2.0/4.5	34.5/17.4	0.8/0.9	26.5/24.8
Kaliningrad	19.1/35.7	13.6/15.0	5.5/6.2	39.8/28.4	1.3/0.5	20.7/14.2
Arkhangelsk	19.2/26.3	13.5/21.1	2.6/1.7	38.7/25.4	1.4/0.3	24.6/25.2
Pskov	22.8/37.7	12.8/16.4	3.0/3.3	40.5/14.5	0.7/0.5	20.2/27.6
Republic of Komi	18.6/26.8	20.6/43.6	3.0/1.8	34.0/10.3	0.9/0.3	22.9/17.2
Republic of Karelia	17.8/45.6	11.0/9.6	3.0/1.0	47.4/21.6	0.6/0.3	20.2/21.9
Novgorod	22.4/36.3	14.0/17.0	2.6/1.2	32.0/19.9	1.1/1.0	27.9/24.6
Murmansk	19.7/51.5	15.0/15.2	3.5/2.8	41.7/12.9	1.5/0.5	18.6/17.1

Source: Goskomstat, 2003

Among the key problems facing the development of small businesses in Russia as a whole, and in the Northwest in particular, are the following:

- Yet low level of entrepreneurial initiative in the community, lack of entrepreneurship tradition and skills;
- High – on the whole – administrative barriers;
- Russian banks and other financial institutions being not ready to extend credit to small enterprises;
- Insufficiently developed legal framework – for example, issues of intellectual property, which are particularly important for small innovation-based companies, are not sufficiently elaborated in the current Russian Law.

Government (both federal and local authorities) continue to proclaim their commitment to the development of small businesses. But programs of government support still remain inefficient – due to the lack of sufficient financial resources and focused policies. In St. Petersburg, for example, funding to small businesses under municipal program of support has in the past years been only slightly in excess of USD 1 million per year.

Venture capital markets

Venture capital markets in Russia started to surface in the early 90-ies, when large institutional investors from abroad appeared in the country: international investment companies specialising in emerging markets, as well as intergovernmental finance and credit organisations. Between 1994 and 1998 about 3 billion US dollars were invested as venture capital in Russia, of which only 3% came from Russian sources. This disproportion between the international and Russian investment was factored, in many senses still is, by the following:

- Non-existence of venture investment culture involving the necessary financial mechanisms in the Russian society.
- Russian investors are highly distrustful of various financial middlemen and managing companies.
- The absence of national financial institutions engaged in long-term diversified investment (especially pension funds and insurance company funds).
- A variety of opportunities to engage in short-term speculative trading, which proves more lucrative than long-term investment through venture funds.
- Underdeveloped venture-financing infrastructure.

After the financial crisis of August 1998 some foreign investors left Russia. Those investors and executives of managing companies who did stay after the meltdown had to rethink their strategies. This found its reflection in shrinking funding: between 1999 and 2004 investment went just slightly over USD 1 billion. At the same time, venture funds operating in different Russian regions have merged and consolidated their activities, while inefficient managing teams were succeeded by more efficient players. Only the strongest among managing companies stayed on market, such as Quadriga Capital from Germany, Eagle from Holland and the Scandinavian company Norum.

The downturn in foreign capital's activities was partially compensated by growing interest among Russian investors – between 1999 and 2004 Russian sources accounted for 26% of all invested funds. The most active players among Russian investors are industrial companies and banks. The government's role in the past years has been limited to establishing the Venture Innovation Foundation – "the foundation of foundations", through which the state intends to participate in establishing new commercial venture funds that invest in innovation in different

Figure 12. International Sources of Financing in 1999 - 2004 (total 740 USD mln.), %

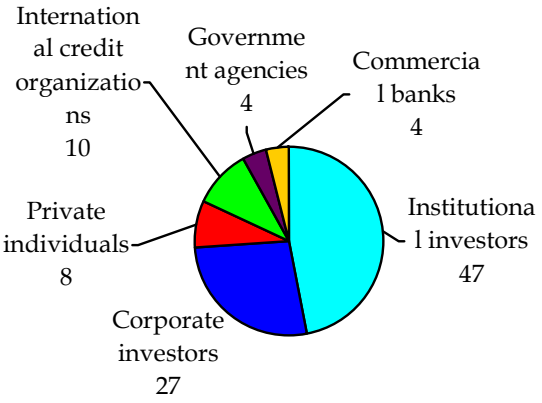
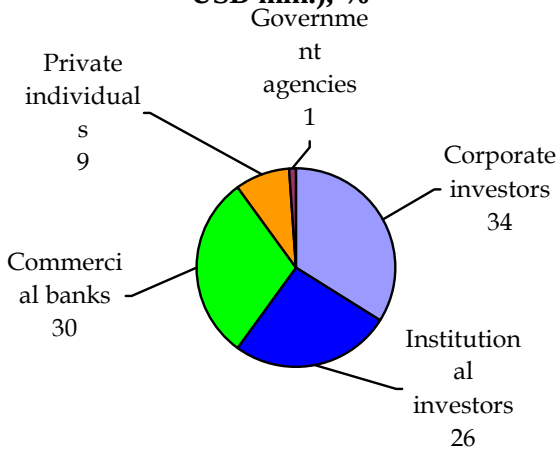


Figure 13. Russian Sources of Financing in 1999 - 2004 (total 260 USD mln.), %



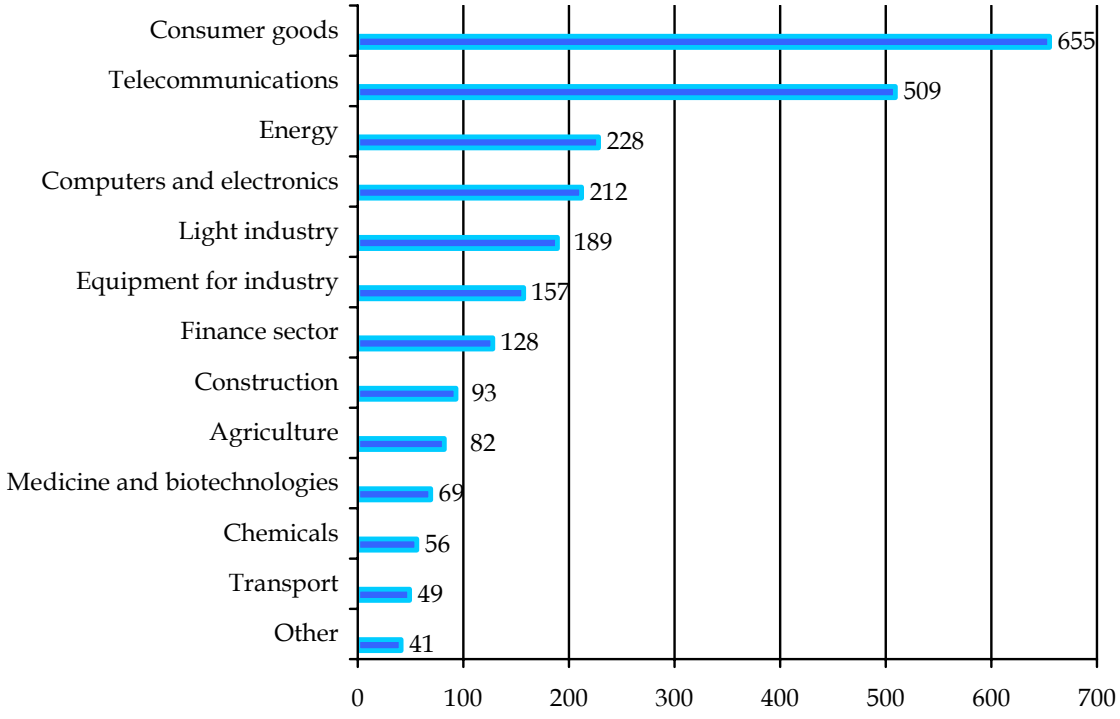
Source: Russian Private Equity and Venture Capital Association, 2004

fields. The share of Venture Innovation Foundation in each newly created commercial fund shall not exceed 10%. Only one commercial venture fund has been established so far under the patronage of Venture Investment Foundation, operating in airspace and defence sectors.

Russian investors have hitherto showed virtually no interest in venture projects because of the reasons stated above. Low enthusiasm among Russian investors contributes to the negative image of Russian venture market that is current among foreign investors. It is also worth noting that because venture capital markets remain insufficiently developed in Russia, no clear demarcation between venture-funding and direct investment has been established in the country yet.

Up to 1998 largest investments have been made in communications, production of tare and packaging materials, beer breweries and food industry. Investment in high-tech industries has been very marginal during this time. The situation has changed later, so that between 1999 and 2004 the investment in high-tech reached about 20% of all invested funds. In this period average volume of deal accounted to 6.7 USD mln.

Figure 14. Breakdown of Investments by sector in 1994-2004 (total 353 deals), USD million



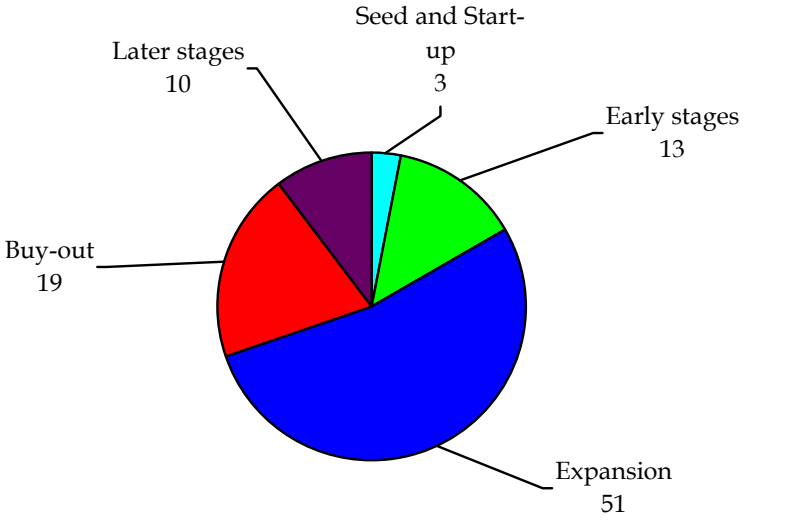
Source: Russian Private Equity and Venture Capital Association, 2004

Our analysis of breakdown of venture investment per business phase indicates that investment in expansion of already established companies clearly prevails today. This goes to show that investors prefer reliable options and are extremely unwilling to take risks. In other words, the venture component of investment in Russia remains extremely small.

The niche of seed and start-up financing remains practically unfilled in Russia. The leading organisation in this niche is the government-owned non-profit Foundation for Assistance to Small Innovative Enterprises (the so-called Bortnik Foundation). Starting from 2004, this foundation has been choosing (on competitive basis) the most forward-looking innovation projects, which then received financing for the period of three years in the maximal amount of USD 150 thousand. In the first year the company receives financing in the amount of USD 25 thousand, while in the second and third years it is financed for USD 50 thousand and USD 75 thousand re-

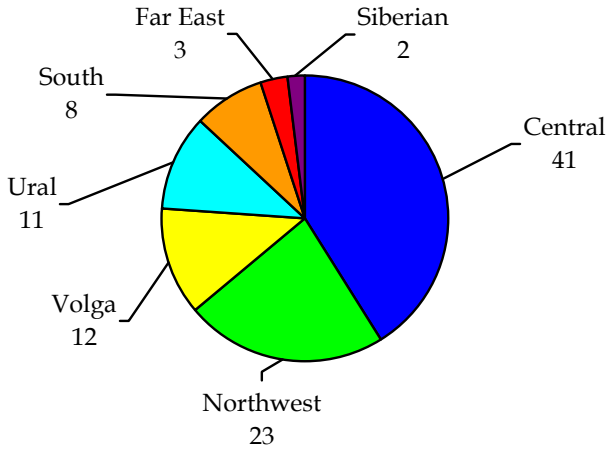
spectively, given that on a par financing from private sector is secured. At the same time the Foundation does not participate in the new company. Bortnik Foundation now handles 1.5% of all financing issued by the Russian government to promote science and technology. In the future it plans to launch one more investment program that will disburse financing for early stages and expansion. Under this programme engineering firms will receive support to purchase patents, develop pre-production models and organize production on a large scale.

Figure 15. Breakdown of Financing by Stages (total 1.02 USD bln.), 1999-2004, %



Source: Russian Private Equity and Venture Capital Association, 2004

Figure 16. Breakdown of Investments by Federal District in 1999-2004, %



Source: Russian Private Equity and Venture Capital Association, 2004

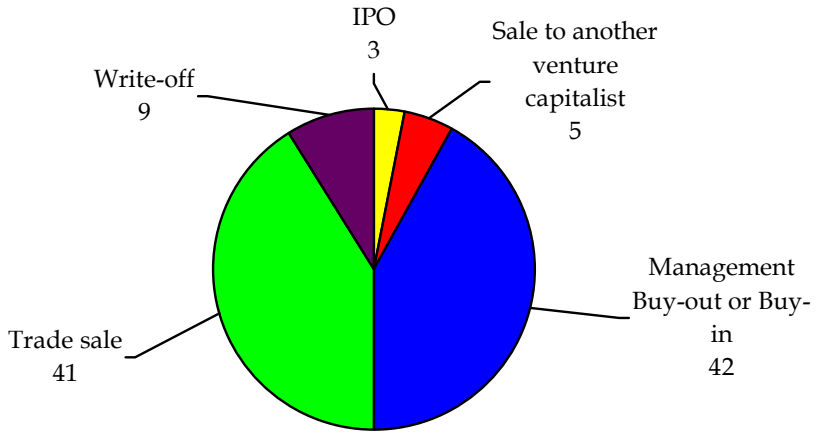
Another important player on the Russian venture capital market is Russian Private Equity and Venture Capital Association. The Association was established in 1997 at the initiative of regional (Russian) venture foundations of the European Bank for Reconstruction and Development. Members of the Association are investment companies and other organisations operating on the Russian venture capital market: Delta Capital, Agribusiness, Quadriga Capital, Norum, etc. The Association pursues the main task of – along with serving the interests of its members – facilitating the formation and development of venture market in Russia by means of providing

information and conducting shows and workshops. Among other activities, the Association holds regular Russian venture fairs, which are aimed at allowing potential partners (investors and developers of innovation projects) to meet each other and network across the venture market.

According to figures from Russian Private Equity and Venture Capital Association, the Northwest is one of the most lucrative regions in Russia as far as venture investment is concerned. Between 1994 and 2004 direct investment foundations have allotted funds in the amount of USD million 600 in the Northwest. St. Petersburg is the clear leader in terms of attracting investment within the Northwest. Thus in 2004, 85% of over 90 Northwest winners of the contest held by the said Bortnik Foundation came from St. Petersburg, and only 15% from other regions of Northwest.

Investment process in Russia continues to lack the necessary transparency: many foundations do not declare volume of their investment and in general provide very scarce information to the public. This makes the evaluation of return for investments already made a very difficult task. Given the average size of initial investment (for all branches), which about USD 7 million, the average size of exits, which is about USD 12 million, and the average duration of ownership of stocks in a company, which nears 5 years, we can calculate the averaged yield throughout the entire Russian venture market as only 11% per annum today. The low profitability of investment can be partially attributed to negative after-effects of the financial crisis of August 1998. During the entire period of venture market's existence in Russia only 66 deals were made on selling shares in companies.

Figure 17. Exits Distribution by Percentage of Number of Divestments (total 66 divestments) in 1996-2004, %



Source: Russian Private Equity and Venture Capital Association, 2004

According to estimates (since no exact data is available), exits have been generated in the first place by companies in such branches as consumer goods production, telecommunications, construction, financial sector – that is in the least risky and the most profitable branches. No exits have been registered among companies operating in the field of high-tech production yet.

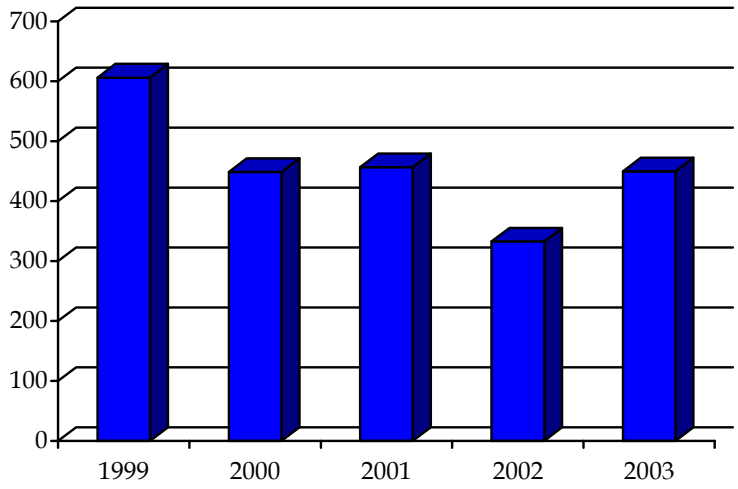
On the whole, Russian venture market of high-tech investment is in its infancy. Only in the recent years have the first signs of interest emerged among banks, companies and private individuals. The infrastructure of venture financing is not sufficiently developed: it lacks specialised foundations and efficient managing companies, suffers from the lack properly developed legal frameworks to guide transactions, etc. The small size of Russian innovation projects has so far not attracted large Russian investors. The government is taking only initial steps towards stimulating venture funding of technology, but has not yet formulated any clear development priorities, and much still depends on personal qualities and interests of top managers of respective government bodies.

5. International Cooperation

Foreign Companies in Northwest Russia

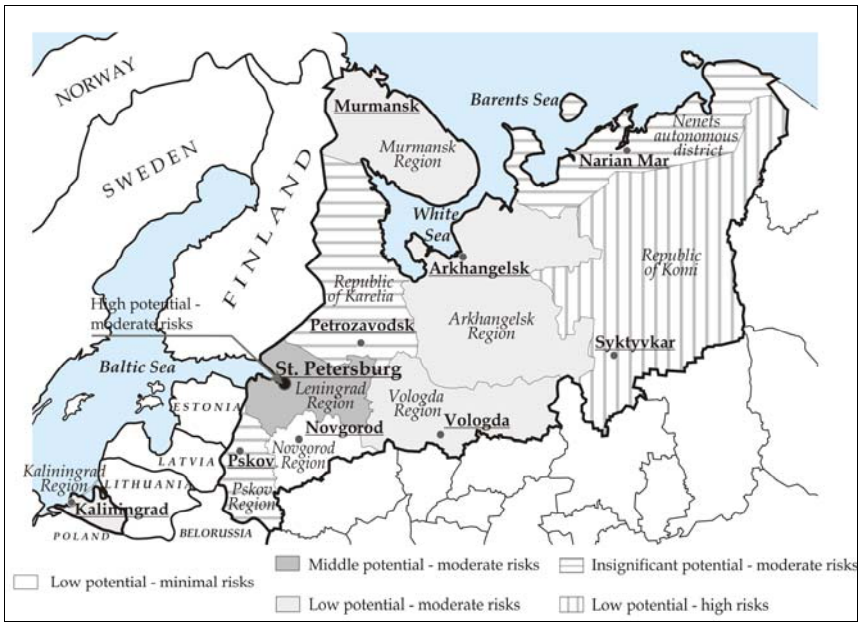
The Northwest of Russia is not particularly attractive to foreign investors at this stage. In 2003 1.9 billion US dollars were invested in the Northwest's economy, which corresponds to 6.3% of the total accumulated foreign investment in Russia. As far as direct investment is concerned, the share of the Northwest in 2003 was 6.6%. These relatively low indicators can be attributed (given that Northwest accounts for 10% of Russia in terms of gross regional product and population) to a relative decline of St. Petersburg's investor attractiveness over the last five years and insufficient efforts of most other Northwest regions aimed at improving local investment climates.

Figure 18. Foreign Direct Investment in Northwest Russia, USD million



Source: Goskomstat, 2004

Figure 19. Investment Ratings of the Northwest Russia Regions in 2001-2002



Source: Expert RA, 2003

The investment climate in Russia was and remains the topic of numerous discussions and studies initiated by international agencies. Currently, the prevailing opinion is that the investment climate in the Northwest is essentially no different from that prevailing in the country as a whole, but there are significant differences among regions, connected both with the availability and various concentrations of basic factors of production (natural resources, workforce, etc.), and with the policies of local authorities.

The largest volume of foreign investment in the Northwest is found in St. Petersburg and the Leningrad Region. Over the last few years the share of these regions in the total volume of foreign investment in Northwest Russia has been steadily growing, with the highest rates of investments being made in tobacco industry, retail trade, communications and services, that is, the most competitive market sectors.

Of other regions, the most attractive for foreign investors have been the oil-rich Komi Republic and Nenets Autonomous District, and Novgorod Region. The latter does not possess vast natural resources, but its authorities have created highly favourable conditions for foreign investment within the framework of the unified federal legislation. A different approach is demonstrated by the policy promoted by the government of the Republic of Karelia: this region has favourable prospects for international cooperation, primarily, with Finland, but a number of unsuccessful investment projects initiated in 1990s have resulted in a reserved approach to foreign businesses on part of the local authorities.

Table 18. Accumulated Foreign Investments by Region of Northwest Russia in 1998-2003, % of the total

Region	***Total foreign investments***	***Foreign direct investments***
St. Petersburg	53.0	35.0
Leningrad	15.9	37.2
Nenets Autonomous District	8.2	6.8
Republic of Komi	6.3	4.5
Novgorod	5.4	7.3
Vologda	4.0	1.5
Kaliningrad	2.2	1.6
Arkhangelsk	2.0	1.2
Republic of Karelia	1.5	2.6
Murmansk	1.3	1.7
Pskov	0.2	0.6

Source: Goskomstat, 2003

A large number of foreign companies are currently active in the Northwest. Some of these companies have so far made only initial strategic investments (the size of which is typically dozens of millions of US dollars) in order to carve a niche in the potentially vast Russian market. Other foreign players, which are still few in number, have already established large production capabilities on the Russian soil. The market-driven investments (food and tobacco industries, consumer goods production and services provision, etc.) typically prevail over cost-driven investments. At the same time, foreign players have been showing high interest in export-oriented types of production, especially in the oil and gas sector. Yet another important trend observed in the past few years is that foreign companies exceedingly prefer green field investment or, when old production facilities are acquired, go for a complete modernisation.

Table 19. Selected International Companies (with the exception of Finnish companies) in North-west Russia

Company	*Region*	*Activity*
USA		
Coca-Cola	St. Petersburg	Beverage production plant.
Pepsi-Cola	St. Petersburg	Beverage production plant.
Wrigley's	St. Petersburg	Chewing gum factory.
Kraft Foods	Leningrad	Pre-packing and packing plant in the vicinity of St. Petersburg.
Philips Morris	St. Petersburg	Tobacco factory – one of the largest in Russia.
Gillette	St. Petersburg	Shaving goods plant (Peterburg Products International).
Ford	Leningrad	Assembly plant producing passenger vehicles in Vsevolozshsk.
Caterpillar	Leningrad	Construction and road-building machinery plant in Tosno.
OTIS	St. Petersburg	Elevator building plant, servicing and modernisation of elevator equipment for entire Russia.
International Paper	Leningrad	The owner of Svetogorsk (located in Svetogorosk) – one of the largest pulp and paper mills in Russia.
ICN Pharmaceuticals	St. Petersburg	The owner of one of the largest pharmaceuticals factory in St. Petersburg (Oktyabr).
Conoco Philips	Nenets district, Republic of Komi	Share holdings in LUKoil (7.6%) – the largest oil company in Russia, and 50% of shares in Severnoe Siyanie oil company.
Citi Bank	St. Petersburg	Branch of Citi Bank.
Germany		
Deutsche Telecom	Northwest	Holds a major share in MTS, leading Russian cellular operator.
Siemens	St. Petersburg	Owner of Silovye Machiny, which incorporates three large power engineering plants – Elektrosila, Leningrad Metal Plant, Turbine Plates Plant. Owns a software development centre serving the needs of mobile telecommunications.
Henkel	Leningrad	The owner of household chemical goods plant (Era-Henkel - washing powders, glues, etc.) in Tosno.
Knauf	St. Petersburg	Brick and other building materials factory (Pobeda-Knauf) – one of the largest in the Northwest.
Heidelberg Cement	St. Petersburg	Owner of concrete factory (Petrobeton) – one of the largest in the Northwest.
BMW	Kaliningrad	Joint assembly (with the Russian Avtotor company) of passenger vehicles.
Mustang	St. Petersburg	Jeans sewing factory.
Metro AG	St. Petersburg	Two wholesale and retail hypermarkets.
Dresdner Bank	St. Petersburg	Bank branch.
Lufthansa	St. Petersburg	Participates in construction and holds a large share in the new cargo terminal of Pulkovo-2 – the largest international airport in Northwest Russia.
Radisson SAS	St. Petersburg	Five-star hotel in the centre of St. Petersburg.
Sweden		
TeliaSonera	Northwest	Holds the majority share in Megafon cellular operator, which is among the largest in Russia.
Tele2	Northwest	Founder of the new Russian cellular operator Tele2.
Scania	St. Petersburg	City bus assembly plant.
IKEA	Leningrad	Owns a factory producing components for furniture near Tikhvin and a furniture shopping centre near St. Petersburg.
SCA	Leningrad	The owner of factory producing paper sanitary goods attached to Svetogorsk PPM.
Kurt Kellerman	St. Petersburg	The owner of one of the largest female clothing factories in North-west Russia (Pervomajskaja Zaria) and an outlet.
Bonnier	St. Petersburg	Delovoi Peterburg (Business St. Petersburg) newspaper – one of the leaders among periodical business publications in St. Petersburg.
Great Britain		
British American Tobacco	St. Petersburg	A large tobacco plant owner.
Cadbury Schweppes	Novgorod	Two factories producing chocolate and chewing gum.
Shell	St. Petersburg	Service station network.

Rocco Forte	St. Petersburg	Managing company and a large stockholder in Astoria Hotel – a five-star hotel.
Yellow Pages	St. Petersburg	Publisher of 'Yellow Pages St. Petersburg' – a phone book.
Morrison Construction	St. Petersburg	Builds business centres and other buildings.
Silver Dale	St. Petersburg	Supply, assembly and servicing of equipment to manufacture windows, doors and other prefabricated building elements.
Netherlands		
Unilever	St. Petersburg	Owner of factory producing perfume and makeup preparations (Severnoe Sijanie) and a tea-packing factory.
Heineken	St. Petersburg	Owner of a large brewery (Heineken Brewery).
ABN AMRO Bank	St. Petersburg	Bank branch
France		
Total	Nenets district	Joint extraction at Harjaga oil field (deposits of about 100 million tons) with LUKoil.
Soufflet	St. Petersburg	Malt factory.
Credit Lyonnais Bank	St. Petersburg	Bank branch.
Spain		
Chupa Chups	St. Petersburg	Caramel factory.
Uralita	Novgorod	Insulation material factory Pfleiderer-Chudovo.
Italy		
Merloni	Leningrad	Household hot-water heater factory.
Parmalat	St. Petersburg	Large share (32%) in Petmol milk-processing factory – the largest in the Northwest.
Norway		
Telenor	Northwest	A large share in Vympelcom – one of leading Russia's cellular operators.
Gigante	Murmansk	Industrial fish farm.
Kvaerner	Leningrad, Arkhangelsk	Cooperation with shipyards in Vyborg and Severodvinsk on joint production to shipbuilding orders.
Norsk Hydro	Nenets district	Pursues cooperation with Gazprom on the development of oil and gas fields in the Barents Sea.
Statoil	Nenets district	Pursues cooperation with Gazprom on the development of oil and gas fields in the Barents Sea.
Denmark		
Carlsberg	St. Petersburg	Owner of large brewery (Vena).
Japan		
JT International	St. Petersburg	Owner of large tobacco factory (Petro).
Austria		
Neusiedler	Republic of Komi	Owner of Neusiedler Syktyvkar – one of the largest pulp and paper plants in Russia.
Reiffeisen Bank	St. Petersburg	Bank branch
Malta		
Corinthia	St. Petersburg	Owner of Nevsky Palace Hotel – a prestigious five-star hotel.
South Africa		
De Beers	Arkhangelsk	Struggles to gain control over new diamond deposits.

Source: author's research

The role of foreign companies in the economy is very high. This high role relates not as much to volumes of investments made (which is relatively low – 7.5 billion dollars for the entire Northwest in 1998-2002, including USD 2.25 billions in direct investments), but to new technologies, business cultures and models, international trade and cooperation channels introduced by these companies. It is factories owned by large international players that display the best labour productivity indicators in the Russian economy. It can be said that large foreign companies establish new standards of efficiently conducting business and to a large extent contribute to growing standard of living.

We should also specifically note the rather high interest that exists among leading high-tech companies to reaping the benefits of having access to qualified, creative and inexpensive St. Petersburg's workforce. In the recent years several top-level companies in the ICT business have opened research and development (R&D) or dedicated development centres (DDC) in the city. Some of them are listed below:

- SUN MICROSYSTEMS: The Company has three teams of programmers in Moscow, Novosibirsk and St. Petersburg, totalling around 150 experts. During the summer of 2004 Sun Microsystems established its Engineering Centre in St. Petersburg, with the goal of building strong engineering teams necessary to augment and drive Sun's software engineering efforts in Java™ technologies, developer tools, as well as networking and operating systems, with a total of around 150 developers.
- MOTOROLA has the most experienced DDC in Russia so far. Motorola's DDC was established in St. Petersburg in 1995 and now employs up to 350 developers.
- INTEL: The purchase by Intel of two Russian technology companies, Elbrus and UniPro, has increased the number of Intel researchers in Russia from 900 to 1,550 engineers and staff. With research labs already in Moscow and Nizhny Novgorod, Intel's research and development activity now extends north to St. Petersburg, where it is establishing an R&D centre with over 100 researchers (mostly from the former Sun Microsystems lab), and south to Novosibirsk in Siberia, where one of two mentioned acquisitions is based.
- METACOMMUNICATIONS: This US software development company opened a research and development centre in Saint-Petersburg in May 2004. The Company's U.S.-based engineering team consists of professionals with diverse backgrounds, many of whom originated from the St. Petersburg area.
- LG ELECTRONICS: The Company established a development Centre in St. Petersburg in the 1990s, and now employs up to 30 developers there.
- SIEMENS has founded in St. Petersburg an R&D team which concentrates on optical transmission. Around 1000 people, involved mostly in sales and customer support, are employed at Siemens' Russian headquarters in Moscow.
- TOGETHERSOFT was one of the first DDCs in Russia in the beginning of the 1990s. In 2003 Borland acquired the whole team operating in St. Petersburg, making the Company a strong local player in the field of use of Borland platforms.

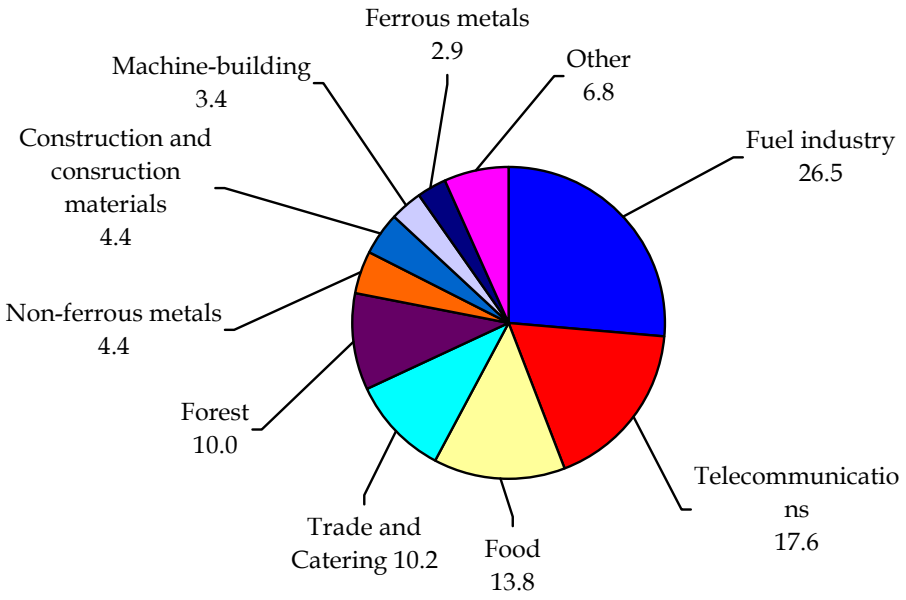
Russia is increasingly competing with India for software outsourcing projects, though some kind of division of labour may also exist. According to Steve Chase, head of the Russian Intel branch, "Give the urgent projects to the Americans, big projects to the Indians, and the impossible ones to the Russians. The Russians can do anything".

Finnish companies in Northwest Russia

Despite the obvious interest displayed by Finnish businesses to the Russian economy, and the economy of Northwest Russia in particular, there has not been major investment projects led by Finnish companies, even though Finland is an active exporter of capital.

At present, Russia is the destination of about 1% of Finnish foreign capital investment. The share of Finland in the accumulated volume of foreign investment in Russia in 1996-2003 accounted for USD 1024 million, which was about 2% of total accumulated foreign investments in Russia for that period. The share of Finland in accumulated FDI in Russia is higher and accounted for 3% of the total (the seventh place among all countries investing in the Russian economy).

Figure 20. Breakdown of Accumulated Finnish Investments into Russian Economy, %



Source: Finnish-Russian Chamber of Trade and Commerce, 2003

The current Finnish investment in the Russian economy is rather precisely located: Northwest Russia is the main playground for the investments, with about 80% of all investment being addressed here. Another 20% were in Moscow and Moscow region, and only under 1% for the rest of the country. At present, Finland is the third largest investor in the Northwest Russia (17% of the total).

In 2002, there were about 700 companies with Finnish participation registered in Russia, and, according to the data of the Finnish-Russian Chamber of Trade and Commerce, about 200 were actively functioning. Finnish companies, both large and medium-sized, now obviously prefer to engage in the Russian economy only to a limited extent. Below is the list of major Finnish companies that are currently active in Northwest Russia.

In Northwest Russia the products of such well-known Finnish companies as Nokia (mobile phones and telecommunications equipment), Wärtsilä (power equipment), Valio (dairy products), Raisio (margarine products), Luhta (clothing), and others are very popular. These companies, however, still do not possess their own production, commercial, or other facilities here, neither do they engage in joint projects with Russian companies. For the time being, their activity is limited to importing products to Russia.

Enterprises opened by Finnish businessmen are usually new ones, but are founded within existing industrial agglomerations. This allows them to gain access to the necessary infrastructure and avoid drawbacks resulting from old production facilities (outdated equipment requiring radical modernization, environmental risks, social burden, etc.). Mainly due to their accumulated negative experience, Finnish entrepreneurs tend to strive for total ownership of an enterprise in Russia, or to have an opportunity to control all major decisions. The moderate volume of investment brought to Russia even by major enterprises results, most likely, from the reluctance of Finnish companies to assume risks connected with operations in Russia.

Table 20. Finnish Companies in Northwest Russia

Company/ Industry	***Region***	***Activity***
Fortum/energy	St. Petersburg, Leningrad Region, Nenets autonomous district	Gas-filling stations, an oil terminal, share holding in Lenenergo (29.6% of the voting shares), joint oil extraction with LUKoil, and construction of the North-Western heat power plant.
Rautaruukki/ferrous metals	St. Petersburg	A service centre and manufacture of metal ware, including roofing tiles. The Russian market is considered as potentially important.
Kuusakoski/metals	Many regions of Northwest Russia	Scrap metal collection and recycling.
Stora Enso/forest	Republic of Karelia, Novgorod Region	Logging and saw mills. An expansion of logging activities and construction of new saw mills are being planned.
UPM-Kymmene/forest	Novgorod Region	A saw mill and a plywood plant. Construction of new facilities for mechanical processing of wood is being planned.
Elcoteq/electronics	St. Petersburg	An electronic equipment components factory. A new, larger plant is under construction and will start to operate in 2005.
PKC Group/electronics	Republic of Karelia, Leningrad Region	Manufacture of cables and electronic equipment for motor cars. An expansion of production activities is going on.
TeliaSonera/ telecommunications	All regions of Northwest Russia	Share holding (about 44% of the shares) in the Megafon telecommunication company, which is one of the leaders of the Russian telecommunication market.
Hartwall/beverages	St. Petersburg	Share holding in Baltika brewing company.
Sinebrychoff/ beverages	St. Petersburg	Share holding in Vena brewing company.
Fazer/food	St. Petersburg	Share holding in the major baking company Khlebny Dom.
Tikkurila/construction materials	St. Petersburg	A glue and paintwork materials factory.
Skanska/ construction	St. Petersburg	Construction of buildings for various purposes, mainly to orders from Western clients operating their businesses in St. Petersburg. The company is planning its entry to the housing construction market.
Stokmann/trade	St. Petersburg	A retail store. The Russian market is considered as promising in the near future.
Metso Minerals/ construction materials	Leningrad Region	Participation in the construction of a plant for the production of crushed rock for paving, jointly with the Russian company Lenstroimaterialy.
Tiivi/construction materials	Murmansk Region	A window manufacture factory.
YIT/construction	St. Petersburg	Construction of buildings for various purposes, mainly to orders from Western clients operating their businesses in St. Petersburg.
Containerships/ logistics	St. Petersburg	The third largest container terminal in St. Petersburg sea port. A significant expansion of facilities is being planned.
At-business	St. Petersburg	Software development.
Helkama	Leningrad Region	Plant manufacturing refrigerating equipment, mainly for commercial purposes.

Source: author's research

6. Conclusions and Recommendations

Our analysis allows us to reach the following main conclusions regarding prospects of scientific and technical cooperation between Finnish and Russian firms.

Russian innovation system is now at the beginning of a reform. Transition to new operating principles, i.e. functioning in competitive market environment, has started much later in this sector of the Russian economy than in most other sectors. It now unfolds in largely spontaneous and chaotic manner, which makes it difficult to forecast outcomes of possible cooperation with much certainty.

The innovation system on the whole develops in the framework of the Western model: many institutions are privatised, various bridging institutions are being put in place, innovation is market-oriented, etc. *But the government retains a very strong role*, and will continue to do so in medium-term future. This makes Russian innovation firms highly dependent on government decisions – primarily those made at the federal level, since local authorities have not yet made much use of their capacity (albeit limited) to impact the development of science and technology sector. Hence the low independence and flexibility of Russian organisations in choosing forms of international cooperation.

State-owned scientific research institutes, universities and other science production institutions, as well as a small number of large privatised design institutes, have the highest scientific and technological potential. Other private companies (primarily small-sized) active in the field of innovation and high-tech are not strong enough to participate in international projects as equal partners yet.

The principal regional characteristic of innovation system in the Russian Northwest is that the majority of research and educational institutions is in St. Petersburg. This does not mean that other cities in the Northwest have no innovation potential at all: there is a number of big universities and research institutes outside St. Petersburg. And yet St. Petersburg provides much greater opportunity for networking and achieving related synergy effects.

Among other competitive advantages characterising innovation organisations in St. Petersburg are the following:

- a vast store of accumulated knowledge and skills;
- availability of world-level development projects, which can be commercialised in international cooperation projects;
- a sizeable stratum engaged in intellectual activities (which took a few generations to form);
- traditions of international cooperation in science and technology and many organisations' willingness to cooperate.

Currently low availability of information (arising from underdeveloped information infrastructure and insufficient openness of many science and technology institutions) makes it difficult to adequately assess the quality of science and technology potential for each branch – even more so for individual organisations. We can nevertheless isolate the most competitive segments of St. Petersburg's innovation market, each with a whole league of strong players, which are as following:

- energy technologies;
- shipbuilding technologies;
- optical instruments and optoelectronics (including laser tech);
- space technologies;
- new materials creation;
- biotechnologies;
- nanotechnologies;
- information technology.

One should exercise caution when choosing specific Russian companies and organisations to establish contacts with and carefully weigh all pluses and minuses inherent in each potential Russian partner in the context of his operating environment. One should also particularly check if the given organisation has international repute (which can be evaluated by looking at numbers of international publications and references, as well as international contacts already in place), scrutinize chief research areas for this organisation, explore how confidential its research is, what are the traits specific for its customers, how many of its personnel have degrees in science, whether the organisation owns any unique equipment, look at the overall condition of this organisation's infrastructure.

Whether contacts are successful largely depends on personal qualities of managers of Russian innovation organisations, be it an institute of higher education, research institute, or industrial firm: their willingness and ability to cooperate efficiently at the international level (and not just receive assistance). Even today an absurd arrangement, whereby international departments of universities and research institutions are headed by state security agents, who are a priori suspicious of any form of cooperation, is not uncommon. Alos, one of the primary prerequisites to establishing productive cooperation with a large Russian innovation organisation is the degree of control exercised over its activities by the state and the possibility of combining and complementing government interests and this organisation's own interests with those of its international partner.

We will now look at chief barriers and risks (in relation to activities in the innovation sphere) that can affect international players. Here are some of these factors:

- IPR barriers;
- Secrecy barriers;
- Institutional risks;
- Personal risks;
- Adoption risks.

IPR barriers arise from insufficiently developed Russian legislation pertaining to intellectual property rights. The fact that the government reserves property rights to all intellectual products commissioned by the state sets a major barrier for foreign innovation companies and organisations operating in Russia. It precludes commercialisation of many new research findings, and even to a large degree commercialisation of already accumulated intellectual wealth, thus circumcising one of the primary advantages of Russian innovation organisations.

We nevertheless expect a serious change in intellectual property rights, as the government plans to toughen guaranteed adherence to intellectual property rights on one hand, and liberalise individual norms in order to make commercialisation of R&D products more straightforward on the other. In particular, it is proposed to allow science workers to use findings from research commissioned by the state for commercial activities inside Russia, given that these findings are outside the domain of state security (the so-called "state secret").

Barriers pertaining to the state demanding secrecy of research are a product of the innovation sector's development in the Soviet years. Virtually all scientific capacity then focused in closed institutions conducting research directly or indirectly related to defence. Any civilian development work was usually spun off well-funded military research. Today, science sectors that are off limits to international cooperation, are still among the leading and most competitive areas of Russian fundamental and applied science.

In this area, unlike in intellectual property rights, no liberalisation is expected in the medium-term perspective. One the contrary, a reverse tendency is observed, as the government has been paying much higher (comparing with the past decade) attention to issues of state security lately.

For example, a number of notorious court cases have been conducted in Russia, sentencing scientists who had commercial contacts with foreign organisations.

Institutional risks are a product of obsolete organisational structure across virtually all levels of Russian innovation system. This is why universities and in particular research institutes make extremely inefficient use of scarce funding made available to them. Funds are pulverised and directed into numerous divisions and projects, many of which have long ceased to be relevant.

Outdated organisational structure precludes efficient international cooperation. Most organisations have no specially trained personnel who have the skills and experience of successfully liaising with international partners. In contrast, those divisions of research institutes that have well-established contacts with foreign organisations are often not sufficiently independent to make important decisions.

Other institutional risks relate to virtual non-existence (or existence only in embryonic state) of many elements of innovation infrastructure common in developed market economies: various bridging organizations, engineering firms, venture funding mechanisms, innovation management training programs, etc.

Risks relating to personnel of innovation organisations are chiefly in overestimating personnel quality. The notion that human capital in Russian R&D sphere is rather high is quite well-spread. Thus Russian researchers and students who go abroad usually exhibit good training and high motivation to work in science.

One should bear in mind that it is usually the best and the most mobile who go abroad. In Russia itself the following situation is more typical. The most experienced and knowledgeable of science workers are already in their senior years (consequently, they are not very mobile and are quite conservative) and have poor command of foreign languages. Conversely, young scientists (who are very few in number due to low salaries – USD 100 a month on the average) have better command of foreign languages and more willingness to establish contacts with foreigners, but do not have the sufficient experience and knowledge. The situation is precipitated by the fact that top university graduates have long been shunning employment in fundamental science, applied research or higher education. The prestige of working in this sector (which was rather high in the Soviet years) has declined sharply in the last 10 to 12 years.

Adoption risks relate to difficulties with adapting the majority of Russian innovation products to comply with world standards. Fundamental research and applied development in the Soviet period have not uncommonly been conducted in isolation from each other, commercialisation mechanisms are not developed yet, and customers receive by far not complete service packages. This is what a foreign party may mistakenly overestimate speed and efficiency of applying development work by Russian parties to international projects.

As to specific recommendations to the National Technology Agency of Finlad (Tekes), we suggest the following. Contacts in St. Petersburg should in the beginning be established through the mediation of, for example, the local office of the Foundation for Assistance to Small Innovative Enterprises (Bortnik Foundation) – the only organisation in Russia whose functions are somewhat similar to those of Tekes. This office has the most complete information on activities of innovation-related organisations in St. Petersburg and the Northwest. It also manages one of the few science and technology parks in St. Petersburg and has connections with all other science and technology parks in the city.

Participation in the development of science and technology parks in St. Petersburg can on the whole be suggested as one of the most promising areas of Tekes' involvement in Russia. Science and technology parks, which are an important element of innovation infrastructure, are only beginning to appear, and Tekes's experience can be of great practical value in establishing more efficient channels for commercialisation of development work.

Yet another possible way to build interaction with Russian organisations is to establish contacts with some of the leading universities, research institutes and industrial companies. The main challenge associated with this solution is in making both parties adopt new approaches enabling them to interact productively in the context of current Russian environment. For example, it appears that in order to implement joint science and technology and education projects, it is advisable to establish new relatively independent divisions within Russian organisations, which would largely free proposed cooperative effort from problems inherent in the organisation as a whole. Some St. Petersburg universities have already successfully implemented this solution (results of cooperation with partners in Germany, Sweden and other countries).

In this respect it might be useful for Tekes experts to analyse the experience (however small) of European innovation organisations (universities and high-tech companies) in implementing projects in Russia.

Yet another efficient way to gather more knowledge about innovation potential of Russian companies and organisations and generate new projects is to establish a regional (Northwestern) technology transfer centre. Such centres enjoy broad support from the Russian federal government, and can become a great vehicle for forging bilateral ties in the field of innovation.

Appendix 1. The list of interviews carried out in the course of fact finding visit in St. Petersburg on 5-7 of October, 2004

Organization	***Person***	***Position***
Physics & Technical Institute named after A. F. Ioffe of Russian Academy of Sciences	*Abgar L. Orbeli*	*Deputy director for international relations*
	Alexey S. Udovichenko	*Deputy director for economic issues*
	Alexey Tolmachev	*Senior staff scientist, supervisor of innovation projects*
St. Petersburg Regional Fund for Scientific and Technological Development (RFSTD)	*Igor V. Gladkih*	*Managing director*
	Vladimir I. Spivak	*Director of project investment division*
	Elena N. Shalaeva	*Director , SOFT IMPACT Ltd*
	Mark S. Ramm	*Head of Software Development Department, SOFT IMPACT Ltd*
	Olga M. Shartukova	*Managing director, NITRIDE CRYSTALS Ltd*
	Sergey Yu. Karpov	*Principle researcher, NITRIDE CRYSTALS Ltd*
	Sergey A. Zaitsev	*Director , OLVIA*
St. Petersburg State University of Telecommunications named after M. A. Bonch-Bruevich	*Oleg V. Zolotokrylin*	*Vice rector for international relations*
	Kirill D. Ovchinnikov	*Vice rector for science*
	Gennady G. Yanovsky	*Head of Telecommunications Networks Department*
St. Petersburg Electrotechnical University "LETI"	*Valentin P. Afanasjev*	*Vice rector on science*
	Mikhail Yu. Shestopalov	*Deputy vice rector on science, Technology Park Director*
	Alexey S. Ivanov	*Head of international project department*
	Natalia N. Shvetsova	*Head of international relations department*
State Optical Institute named after S. I. Vavilov (GOI)	*Yury V. Tsypkin*	*Deputy director general*
	Alexander S. Tibilov	*Deputy director for aerospace optics*
	Yuiy A. Gogolev	*Deputy director for optical instrumentation*
	Leonid Sh. Oleinikiv	*Head of aerospace optics laboratory*
	Mikhail K. Shevtsov	*Principle scientist*
Foundation for Assistance to Small Innovative Enterprises (FASIE) - Innovations of St. Petersburg Institutes and Enterprises (ILIP)	*Nikolay N. Ermilov*	*General director*
	Aleksander Ya. Rats	*Chief manager of international innovative projects*
XJ Technologies Ltd	*Yury G. Karpov*	*President*
	Andrey V. Borshchev	*General director*

The researchers also took part in The 5-th Russian Venture Fair in St. Petersburg (7-8 of October, 2004), where they interviewed many small innovative firms and become familiar with activities of Russian Private Equity and Venture Capital Association (RVCA).

E L I N K E I N O E L Ä M Ä N T U T K I M U S L A I T O S (ETLA)
THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
LÖNNROTINKATU 4 B, FIN-00120 HELSINKI

Puh./Tel. (09) 609 900 Telefax (09) 601753
Int. 358-9-609 900 Int. 358-9-601 753
http://www.etla.fi

KESKUSTELUAIHEITA - DISCUSSION PAPERS ISSN 0781-6847

Julkaisut ovat saatavissa elektronisessa muodossa internet-osoitteessa:
http://www.etla.fi/finnish/research/publications/searchengine

No 927 JYRKI ALI-YRKKÖ – MAARIT LINDSTRÖM – MIKA PAJARINEN – PEKKA YLÄ-ANTTILA, Suomen asema globaalissa kilpailussa – yritysten sijaintipäätöksiin vaikuttavat tekijät. 30.08.2004. 83 s.

No 928 PETRI BÖCKERMAN – EDVARD JOHANSSON – SATU HELAKORPI – RITVA PRÄTTÄLÄ – ERKKI VARTIAINEN – ANTTI UUTELA, Does a Slump Really Make You Thinner? Finnish Micro-level evidence 1978-2002. 01.09.2004. 20 p.

No 929 ANTTI KAUHANEN – HANNU PIEKKOLA, What Makes Performance-Related Pay Schemes Work? Finnish Evidence. 13.09.2004. 22 p.

No 930 KARI E.O. ALHO, Palkankorotusten vaihtoehdot ja talouden kasvu – toimialatarkasteluja Suomen teollisuudella. 04.10.2004. 17 s.

No 931 EDVARD JOHANSSON – HANNU ALHO – URPO KIISKINEN – KARI POIKOLAINEN, Abstaining from Alcohol and Labour Market Underpreformance – Have we forgotten the "dry" alcoholics? 23.09.2004. 12 p.

No 932 MATTHIAS DESCHRYVERE, Health and Retirement Decisions: An Update of the Literature. 24.09.2004. 35 p.

No 933 MATTHIAS DESCHRYVERE, Labour Force Behaviour of Elderly Two Adult Households: Evidence from EU-countries. 24.09.2004. 50 p.

No 934 JARI HYVÄRINEN, EU Outsourcing to the East, Governance and Innovation Systems in the Baltic Countries – A Three-Stage Approach. 27.09.2004. 70 p.

No 935 VILLE KAITILA, Integration and Conditional Convergence in the Enlarged EU Area. 07.10.2004. 17 p.

No 936 MIKA PAJARINEN – PEKKA YLÄ-ANTTILA, Miksi yritykset investoivat ulkomaille? Yrityskyselyyn perustuva analyysi. 08.10.2004. 23 s.

No 937 OTTO TOIVANEN, Choosing Standards. 11.10.2004. 31 p.

No 938 TERTTU LUUKKONEN, Patentointi biotekniikka-alalla. 15.10.2004. 14 s.

No 939 ESSI EEROLA – NIKU MÄÄTTÄNEN – PANU POUTVAARA, Citizens Should Vote on Secession. 20.10.2004. 15 p.

No 940 MIKA WIDGRÉN – PEKKA SULAMAA, Aasian regionalismi vs. globaali vapaakauppa: Simulointitutkimus taloudellisista vaikutuksista. 21.10.2004. 23 s.

No 941 MIKA WIDGRÉN, Suomen, Aasian ja uusien EU-maiden suhteellinen etu ja kilpailuasetelmien muutos. 21.10.2004. 28 s.

No 942 MIKA MALIRANTA – SATU NURMI, Do Foreign Players Change the Nature of the Game among Local Entrepreneurs? 26.10.2004. 22 p.

No 943 JYRKI ALI-YRKKÖ, Impact of Public R&D Financing on Private R&D – Does Financial Constraint Matter? 29.10.2004. 22 p.

No 944 STEFAN NAPEL – MIKA WIDGRÉN, The Inter-Institutional Distribution of Power in EU Codecision. 05.11.2004. 26 p.

No 945 MATHIAS CALONIUS, Luovan yhteiskunnan rakenteet, luovat toimialat ja muotoiluala. 08.11.2004. 31 s.

No 946 ARI HYYTINEN – MIKA PAJARINEN, Is the Cost of Debt Capital Higher for Younger Firms? 11.11.2004. 17 p.

No 947 MARKKU STENBORG, Explaining Open Source. 11.11.2004. 34 p.

No 948 OLAVI RANTALA, Toimialojen T&K-panostusten ja tuottavuuden ennustejärjestelmä – Julkisen t&k-rahoituksen vaikuttavuus ja tuottavuuden pitkän ajan kasvu. 12.11.2004. 54 s.

No 949 CHRISTOPHER PALMBERG – OLLI MARTIKAINEN, The Finnish Telecom Sector Facing next Generation Standards – Indigenous Capabilities Versus R&D Alliances. 17.11.2004. 26 p.

No 950 ARI HYYTINEN – LOTTA VÄÄNÄNEN, Mandatory Auditor Choice and Small Firm Finance: Evidence from Finland. 22.11.2004. 31 p.

No 951 HANNU PIEKKOLA – MATTHIAS DESCHRYVERE, Retirement Decisions and Option Values: Their Application Regarding Finland, Belgium and Germany. 23.11.2004. 46 p.

No 952 TUOMAS MÖTTÖNEN, Turvallisuus ja kilpailukyky – kansainvälisten kilpailukykymittareiden valossa. 25.11.2004. 79 s.

No 953 SERGEY BOLTRAMOVICH – PAVEL FILIPPOV – HANNU HERNESNIEMI, The Innovation System and Business Environment of Northwest Russia. 07.12.2004. 47 p.

No 954 TUOMAS MÖTTÖNEN, Totilaallinen T&K-panostus ja kilpailukyky. 25.11.2004. 29 s.

No 955 RAINE HERMANS – ANNE ARVOLA – LEENA HAUHIO – MAARIT LINDSTRÖM – HANNA NIKINMAA – PANU TIKKA – OLLI HALTIA, Bioteknologisten sovellusten arvonluonti Suomen metsäklusterissa. 03.12.2004. 28 s.

No 956 SATU NURMI, Employment Dynamics and Openness to Trade in Finnish Manufacturing. 01.12.2004. 28 p.

No 957 DEREK C. JONES – PANU KALMI – MIKKO MÄKINEN, The Determinants of Stock Option Compensation: Evidence from Finland. 01.12.2004. 32 p.

No 958 EDVARD JOHANSSON, Job Satisfaction in Finland – Some results from the European Community Household panel 1996-2001. 01.12.2004. 46 p.

Elinkeinoelämän Tutkimuslaitoksen julkaisemat "Keskusteluaiheet" ovat raportteja alustavista tutkimustuloksista ja väliraportteja tekeillä olevista tutkimuksista. Tässä sarjassa julkaistuja monisteita on mahdollista ostaa Taloustieto Oy:stä kopiointi- ja toimituskuluja vastaavaan hintaan.

Papers in this series are reports on preliminary research results and on studies in progress. They are sold by Taloustieto Oy for a nominal fee covering copying and postage costs.