TURUN KAUPPAKORKEAKOULU
Turku School of Economics

Irina Dezhina & Peter Zashev

Linkages in innovation system in Russia – Current status and opportunities for Russian-Finnish collaboration

Electronic Publications of Pan-European Institute 14/2007

ISSN 1795-5076

Linkages in innovation system in Russia – Current status and opportunities for Russian-Finnish collaboration

Irina Dezhina[1] *& Peter Zashev*[2]

14/2007

Electronic Publications of
Pan-European Institute

http://www.tse.fi/pei/pub

The authors express their gratitude to both the Finnish Academy of Science and The Russian Foundation for Humanities for supporting the research project "International Dimension of Innovation System in Russia – Improving the Functionality via Networking" to which belongs this publication.

[1]Head of Division, Ph.D., Institute of World Economy and International Relations, Russian Academy of Sciences, Moscow, Russia

[2] D. Sc., Senior Research Fellow
Pan European Institute, Turku School of Economics

CONTENTS:

1. Introduction

The creation of market-oriented innovation system in Russia started 15 years ago but still many components, and especially R&D sector, possess features of centralized economy.

The government sector of science is absolutely dominating, industry is supporting R&D at a very modest scale, and linkages between R&D sector and industry are weak. During the last ten years the Russian government has undertaken an effort to create market-oriented innovation system with a special emphasis in recent years on stimulating development of linkages between government R&D sector, universities, and private companies. The related goal is building Russian innovation system into the world, and utilization of advantages brought by globalization. In this way Russia was quite successful in R&D area, and science services constitute at the present time the largest share in the Russian export of high-tech products. At the same time innovation activity, including the sector of small innovative enterprises, is underdeveloped. International collaboration may be a tool for improving the situation in Russia as well as beneficial for countries wishing to cooperate.

The paper analyzes to what extent the government measures were successful and contributed to the creation of innovation system. The special attention is given to such instruments as direct financial support of small companies, public-private partnerships for innovation, and legal regulations of intellectual property rights.

The paper further explores one of existing possibilities for mutually beneficial international collaboration – between Russia and Finland. The recent developments in Russian-Finnish collaboration are analyzed, and further opportunities are identified.

2. Creation of Linkages in Russian Innovation System: Government Policy

2.1. Overview of the Russian R&D complex and the role of the government

R&D complex consists of three large sectors: 1) government, including institutes of the Russian Academy of sciences and five other government academies, 2) higher education, and 3) the so called industry sector that also includes many government-owned R&D organizations[3]. In terms of R&D performance, the correlation between the three sectors is 26,1% (government sector) – 5,8% (sector of higher education) – 67,9% (industry sector)[4] (Science in Russia at a Glance, 2006).

At the same time if to look at the structure of R&D expenditures by type of ownership, it becomes clear that in reality the government sector is much larger – 74,2% of all R&D is performed at government-owned R&D organizations, and only 15,6% is performed by private organizations[5] (Indikatory nauki, 2006). For comparison, governmental R&D organizations perform 8,6% of R&D in the USA, 8,9% in UK, 11,7% in Canada, 13,7% in Germany, 17% in France, and 11% is an average figure for OECD countries[6] (Science Indicators, 2004; OECD, 2004). The government sector of science is also the largest by the number of employees and by the amount of financing it receives from the federal budget. There are more then 80% of total R&D manpower employed at the government sector; 98% of financing from the federal budget is spent in government-owned or government-controlled R&D organizations. This also indicates that private firms almost do not receive government support for R&D.

The so called "industry R&D sector" includes both private companies and government-owned organizations. Private companies contribute only 22,4% of the national R&D expenses and this indicator stays almost unchangeable for the last 8 years[7] (Science in Russia at a Glance, 2005; Science in Russia at a Glance, 2006). The distribution of gross domestic expenditures of R&D (GERD) in Russia by major sources of support and by performing sector (table 1) demonstrates that the share of industry in financing R&D stays at the level of about 30%. Much higher percentage for industry as performer

[3] These are former so-called "branch" institutes that were under auspices of different ministries.
[4] Data for 2005.
[5] Data for 2004.
[6] Data for 2002.
[7] Data for 2005. In 1998 it was 22,8%.

of R&D may be explained by the fact that many organizations counted statistically as "enterprise sector" are in fact federally-owned former industrial institutes.

Table 1. GERD by funding source and by performer, %

	1995	1998	2002	2004
GERD by funding source, %:				
Government	61,5	53,5	57,4	60,6
Industry	33,6	34,9	33,6*	31,4
Other national sources	0,3	1,2	1,0*	0,4
Abroad	4,6	10,3	8,0	7,6
GERD by performer, %:				
Government	26,1	25,8	24,5	25,3
Industry	68,5	69,0	69,9	69,1
Higher education sector	5,4	5,2	5,4	5,5
Nonprofits	0,0	0,1	0,2	0,1

*-Approximate assessment

Sources: 1. Science and Technology Main Indicators and Basic Statistics in the Russian Federation. OECD CCET/DSTI/EAS(98)12, 19 Feb. 1998. 2. Comparative Study of National R&D Policy and R&D Data Systems in the United States and Russia. AAAS/NSF, 2001. 3. Science in Russia at a Glance: 2003. Statistical Yearbook. M.:CSRS, 2003. 4. Indicators of Science. Statistical Issue. M.: State University – Higher School of Economics, 2006, p.62.

The higher education sector is very modest by the amount of research done there because universities (except a small number of well-known, like Moscow State University or Physics-Technical Institute) mostly teach and teaching loads by law are so high that it does not allow space for research. Therefore research and teaching are still to a considerable extent separated from each other.

In such a system of research the development of linkages between science and business is complicated because government sector of science does not have real stimulus to cooperate with industry. Then, the creation of small firms that in many countries happens through spin-off from universities, in Russian case is hampered by lack of research potential concentrated in universities, aside of legal obstacles to creation of such spin-off companies by universities as government establishments.

In post-Soviet Russia the government started a variety of activities in order to link R&D organizations, universities, and business sector. The major initiatives were undertaken in the following areas:

1) support of small innovative enterprises through R&D grants and creation of technical infrastructure (such as technology parks, innovation technology centers and such);

2) encouraging cooperation between R&D sector and private companies through support of joint projects;
3) creation of favorable legal environment for innovation (IPR regimes, etc.).

There are successes and failures in all of the abovementioned activities. The paper further elaborates the approaches government used, the results achieved, and identifies directions and opportunities for further development.

2.2. Support of small innovative enterprises

Small enterprises are among key components of the national innovation system because they may bridge research organizations and industrial enterprises and take at their own the risks associated with first stages of commercialization process. In Russia the dynamics of the number of small innovative enterprises is negative (see table 2).

Not only was the total number of small innovative companies decreasing but also their share among all small firms in general (table 3). At the same time the firm size has grown from 7 to 10 employees which may be an indicator of the situation when weak firms die faster then new firms are born. And thus the stably working firms at expansion stage dominate the small enterprises sector.

Table 2. Dynamics in the number of small innovative enterprises in the economic branch "Science and science services"

	1997	1998	1999	2000	2001	2002	2003	2004
Number of small innovative enterprises, thousands	43,9	38,8	37,1	30,9	28,5	22,7	22,1	20,7
Change in the number of small enterprises, % to the previous year	-6%	-11,6%	-4,4%	-16,7%	-7,8%	-20,4%	-2,6%	-6,3%

Source: Science in Russia at a Glance – 2005. Statistical Yearbook. M.:CSRS, 2005, p.22.

The decrease in the number of small companies may be explained first of all by the fact that business/innovation infrastructure–tax, capital and financial markets, administrative barriers–inhibits emergence of a vibrant sector of small innovative enterprises.

Table 3. Indicators for small innovative enterprises registered in the economic branch "Science and science services"

	1998	2000	2002	2004
Number of small innovative enterprises, thousands	38,8	30,9	22,7	20,7
Share of small innovative enterprises in total number of small firms, %	4,5	3,5	2,6	2,5
Number of employees at small innovative firms, headcount (thousand)	263,1	191,9	166,0	200,4
Number of employees per one enterprise, headcount	7	6	7	10

Sources: Science in Russia at a Glance – 2005. Statistical Yearbook. M.:CSRS, 2005, p.22; Maloe predprinimatelstvo v Rossii - 2004. State Committee on Statistics of RF. Statistical yearbook. M., 2004.

Government provides support to small companies in the form of grants on R&D, and a number of accompanying activities, including financing of innovative infrastructure. Direct support of R&D at small companies is not large because the only government Fund implements such programs – the Fund for Assistance to small innovative enterprises.

The Fund for Assistance to small innovative enterprises was established in 1994 by the Russian government. It is often called, for brevity, "The Fund for Assistance." The budget of this fund comes from the government and is 1,5% of the total federal expenditures for civilian science. The Fund is independent from any ministry. It supports small innovative enterprises that are at the stage of commercial production, and, since 2003, new companies by providing to them seed financing.

Two foreign programs were important models for the Fund for Assistance: an American program, promoted by various departments and agencies of the U.S. government, called "Small Business Innovation Research" (SBIR) and the French state agency for innovation (Agence Nationale de Valorisation de la Recherche, or ANVAR). However, the Russian government did not simply copy these foreign models, but drew upon different features of each. From SBIR the idea of government money in support of small innovative businesses was adopted, and from ANVAR came the idea of organizing a set of regional representatives. At the present time representatives of the Fund for Assistance have been created in 25 regions of Russia. Both SBIR and ANVAR function on the basis of support through open competitions, peer-review, and decision-making by an independent jury (academic council). These same principles underlay the work of the Fund for Assistance.

The Fund for Assistance has supported a great variety of businesses, ranging from pharmacology, to machine construction, to agriculture, to computer technology. The financial share of the Fund for Assistance in the winning projects can not exceed 50%. Initially the money was given out as loans at preferential rates. This strategy was passive in the sense that the Fund followed developing enterprises and did not directly stimulate completely new products. Working in this relatively low-risk way, the Fund was often successful, with an average level of return on credits of 66% (Bortnik, 2004).

Later the legislation was changed and the Fund now may give only R&D grants. Simultaneously federal appropriations to the Fund increased from 0,5% to 1,5% of the expenditures on civilian science, and at the same time the overall budget for civilian science grew in absolute terms. This allowed the Fund to begin to support companies at the seed stage, obviously a riskier strategy. The new program was called START. Approximately half of the Fund's budget was devoted to this Program ($10 million when the Program was started in 2003; in 2006 approximately $15 million).

The Program consists of two steps. The duration of the first step is one year during which the group of researchers or newly created small firm receives seed financing (up to about 20 thousand US dollars per project). The small firm should conduct R&D, develop the prototype, patent their development and work out a business plan. At the end of the first year the firm should demonstrate commercial potential of its product.

At the second step the firm should find co-investor who is interested in manufacturing of the firm's product or the firm should start own manufacturing of the new product. In this case it will receive next portion of financing from the Fund. After the two steps the manufacturing should be actually started, and Fund stops financing the project. The structure of the program was borrowed from the SBIR and thus it was expected the same rate of success, i.e. that about 10-12% of initially supported firms will be able to move to the second stage. Statistics on the program for the years from 2004 to 2006 are given below in table 4.

In fact, the results turned to be better then expected: 20% of the start-ups[8] entered the second stage of the Program, a fully satisfactory statistic considering the difficulty of finding additional sources of financing for small science-intensive firms.

Table 4. Characteristics of the START Program

	2004	2005	2006
Number of applications	2762	1651	1563
Number of contracts concluded by the Fund	474	428	461
Level of competition, applications per grant	6	4	3
Volume of financing per project at the first step, thousand USD	24,0	28,5	28,9

Source: Fund for Assistance to small innovative enterprises. Annual report for 2006, pp.15, 30.

Aside of that, the Program raised interest among corporations, and some of them were willing to co-finance the program. At the present time there are some projects implemented in interests of such companies as Intel, LOMO, and AFC “Systema”. This shows that demand on high tech products in Russia does exist, and there is a potential to satisfy it.

The Fund also develops a number of other initiatives important for growth of small innovative enterprises in Russia. In 2005-2006 two programs were started: TEMP and PUSK. The TEMP Program is aimed to stimulate innovation activity at small enterprises by linking them to the government R&D sector. The Fund in this Program supports those R&D at small firms which is necessary to conduct after purchase of licenses from university, or research organization.

The goal of the PUSK Program is to raise qualification of specialists working in innovation and technology commercialization spheres. It supports training of new teams that are wishing commercialize science intensive products. The Program is implemented in cooperation with universities. This initiative in fact stimulates creation linkages between small firms and universities: the Fund supports R&D projects implemented by students at small firms, and university professors supervise them and cooperate in this way with small companies’ leadership.

The Fund has a set of basic criteria defining the effectiveness of its work. These criteria include: rate of growth of production by small enterprises (must be more than 15% a year), output per employee per year (must be at least $20,000), and the amount of

[8] Data for 2006.

newly created intellectual property which has been transformed into commercial products. By these criteria, about 50% of the small enterprises ever supported by the Fund for Assistance have been successful.

As it may be seen, the basic criteria for defining the effectiveness of the work of the Fund for Assistance do not place much emphasis on profitability, but instead on the measures that seem somewhat similar to old Soviet standards: rate of growth of production of small enterprises, output per person per year, etc. Unfortunately, these criteria, interesting and helpful though they may be, do not give a very clear picture of the profit-making abilities of the enterprises and therefore are rather silent on the question of sustainability.

However, the programs of the Fund, especially in the area of support of seed stage, are very important and seem to be a success. Unfortunately with a budget of about 30 million dollars a year the Fund is not able to make a major change in the situation. It can only demonstrate the success of certain instrument or approach. The experience of the Fund is poorly used by other government agencies, and this cannot make the innovation sustainable.

Small firms receive government support also through access to technical infrastructure the creation of which was financed from the federal budget. The infrastructural projects were not very successful and at the present time the government is reconsidering approaches to its creation and revises criteria for evaluation of results and outcomes. Among all types of infrastructure there is the one which may be considered as Russia-specific and thus deserves special attention. These are innovation-technology centers (ITCs).

The concept of innovation-technology center develops the idea of a technology park but brings universities, research organizations and SMEs closer to large industrial enterprises. Innovation-technology centers represent conglomerates of small innovating enterprises that are located “under one roof”, i.e. in certain compact territory (in case of today’s Russia - even in one building since the scale of most ITCs is modest). Usually the ITC is connected to research organization or university and thus ideally ITC should serve as a bridge between research organizations and industrial enterprises. The first ITCs were established in 1996-1997 under support from the federal budget. Some of ITCs were created on the basis of technology parks and

generally they provide similar services except incubation. Today there are about 60 innovation-technology centers in different regions of Russia, and about half of them were formed around universities. Some of them were established on exclusively federal support and others used combined federal and regional resources.

Small firms located within ITCs are usually on manufacturing stage. They have stable level of production and feel comfortable and safe. They enjoy privileges that give them such location as ITC and they do not have stimulus for growth. The evaluation of ITCs conducted in 2001 revealed that for small enterprises the most attractive features in ITCs are: privileged renting conditions, possibility to take part in investment programs, and geographical location. As much less important were ranked such resources as training programs, consulting services, and exchange of experience with other small enterprises located in ITC. However positive examples and exclusions do exist.

In recent years the state stopped providing support for ITCs and at the same time regional authorities did not increase financing. Among those ITCs which were created at the end of 1990s only few of them continue to implement their primary function. Others turned into organizations that lease office space to different companies, not necessarily related to high tech business. All this shows that initial idea – to connect science and business and to strengthen R&D at industrial enterprises was important and timely, but it was poorly implemented. The government support did not last long, regional authorities did not have either stimulus or friendly legal conditions to support infrastructure, and regulations in ITCs themselves did not provide flexibility and turnover of small firms thus not stimulating them to grow.

Now the government moved to the idea of IT-parks as a new type of innovative infrastructure. The IT-parks will be created in seven regions of Russia. They will receive state financing for construction of infrastructure (communications, roads). It is assumed that with larger government investments in infrastructure and services, the technoparks will be more effective. The worrisome aspect, however, is that project for the creation of new technology parks is advanced without serious study of the past experience of successes and mistakes. The question of the effectiveness of technoparks as elements of the Russian innovation infrastructure is poorly researched. There are no reliable statistics about the extent to which technoparks facilitated successful work, and how they did this. Up to the present time the formation of a set of technoparks in Russia has proceeded without clear rules for their creation and

functioning, a fact that has lowered the yield of most Russian technoparks in comparison to their potential.

2.3. Promotion of science-industry cooperation through mega-projects

At the present time the share of industrial enterprises in Russia that are innovation-orientated is rather low. According to the data from State Committee on Statistics, currently there is 9,7% (Science in Russia at a Glance, 2006)[9] of enterprises that implement innovations. For comparison, in OECD countries this indicator varies from 25% to 80% with an average equal to 44% (OECD, 2002). The share of enterprises that is conducting R&D is decreasing (see table 5): if in 1997-1998 it was about 50%, in 2004 it was already less then one-third of all innovative enterprises.

Table 5. Dynamics in the share of enterprises conducting different types of innovations (in percent to the total number of innovative enterprises)

Enterprises conducting:	1998	1999	2000	2001	2002	2004
R&D	54,3	35,1	42,7	35,5	33,6	30,7
Purchase of equipment	50,7	53,4	62,2	61,0	61,6	64,5
Purchase of software	17,7	28,3	26,2	25,0	23,9	28,5
Personnel training	18,9	20,1	25,4	22,9	23,6	25,4
Marketing	19,7	18,5	19,5	20,1	20,1	20,0

Sources: Intellectual Property in Science and Technology Complex. M.:CSRS, 2004, p.35; Science in Russia at a Glance: 2006. Statistical Yearbook. M.:CSRS, 2006, p.156.

Most of firms purchase new equipment – almost 65%, and thus the largest expenditures firms allocate for this purpose – 62% in 2005. However during the last four-five years there is an indication of a growing interest from side of large Russian industry, especially resource extracting, in financing R&D and in creation own in-house R&D divisions. Thus, R&D divisions were opened at large industrial groups like “TNK”, “YUKOS”, “LUKOIL”, “Norilsk Nickel”, “SYSTEMA”.

In 2002 the government initiated a new program aimed to foster technological development and to create stronger linkages between research organizations, universities, and industrial enterprises. The support was provided at the program basis, through open competition for budget funds. The program is called “Large innovation

[9] Data for 2005.

projects of national importance" (or megaprojects). In this program government provides funds for R&D implemented in R&D organizations or universities and which results will be further commercialized at partner industrial enterprises.

This initiative is aimed to demonstrate that investments in hi-tech may be profitable for industry. Since the risks in the innovative sphere are very high, the government takes technological risks upon itself by giving privileged support to large-scale innovative projects, and thus creates conditions for high-tech business growth. The only criteria for proposals selection was the requirement that after the project realization the commercial sales at least five times exceed budget allocations to the contractor under the government contractual agreement. This has to show Russian and foreign investors the advisability of investing into science intensive part of Russia's economy.

The innovative projects were chosen by a commission consisting of not only government officials and researchers, but also business representatives, and this was a novelty for Russia. Each megaproject received from the federal budget 20 mln US dollars for two years, which was quite a considerable funding for the Russian scientific-innovative sphere when the first projects started. The government had to provide not more then half of the needed funding, and the rest had to be obtained from interested investors. In fact, two-thirds from the total number of megaprojects received budget financing that was equal to or exceeded 50% of the total project budget (table 6).

Table 6. Structure of budget financing for mega projects (data for 2005)

Leading organization in megaproject	Share of budget financing, %	Number of projects
RAS institutes	More then 75%	4
Government and non-government research organizations	50-75%	4
Non-government industrial enterprises	Less then 50%	4

Source: Ministry of education and science of RF

As of today 18 projects are under implementation in the following subject areas:

- Information technologies, communications and electronics;
- New materials and chemical technologies;
- New transportation technologies;
- Production technologies;
- Technology of life support systems;
- Ecology and rational use of nature;

- Energy-saving technologies.

6 megaprojects were finalized in 2006 with very different results. By major criteria of (volume of sales) three are considered as a success. In our view, there are some flaws in the megaprojects as an instrument to stimulate business to innovate. The major flaw in the scheme is that financing of R&D is provided only from the federal budget, and companies do not support R&D. Another flaw is that R&D is conducted, as a rule, by research organizations (mostly government-owned) and universities, while companies join the project at the stage of manufacturing and sales. Such distribution of responsibilities does not stimulate business to increase in-house R&D and reminds the Soviet scheme of adoption of new technologies. In market economies another approach proved to be effective, when universities and business co-finance R&D. This approach also indirectly encourages the establishment of small innovative companies.

2.4. Creation of legal environment for innovation: IPR Regime

Intellectual property rights (IPR) allocation is one of the most discussed problems in Russian science and technology sphere. The epicenter of discussions is around regulations of intellectual property (IP) created at the budgetary expense. This focus is not accidental. It has been calculated that about 90% of all IP in Russia result from federal budget. And at the present time the share of government in total R&D expenditures on science is still very high.

The legislation on rights allocation for IP created on budgetary expense is controversial and has a number of flaws. This is a fundamental problem because it is impossible to commercialize something if the ownership is unclear or uncertain. While clarifying ownership is necessary, titling is only a means to an end. The ultimate objective is not clear titling *per se* but rather the creation of an efficient system of industrial innovation and technology commercialization based on the efficient transfer and dissemination of IP "from the lab to the market" (World Bank, 2002).

In the Soviet Union all inventions were state-owned and theoretically they were freely available for anyone without special permission, licenses or royalty payments. Under the Soviet system, an inventor received public recognition in the form of an author certificate (*avtorskoe svidetel'stvo*). In addition the inventor could receive a modest

single monetary bonus–in average equal to 50 dollars. The inventor did not have an exclusive right to his invention. Then, industrial enterprises could use inventions without special permission or license. The State had the authority to be a bridge between research institutes and industrial enterprises; it handled this task as part of the overall planning function. The State also had the exclusive right to control the use of these inventions outside the USSR by entering into license agreements or applying for foreign patent protection.

Such strictly controlled system did not allow rapid commercialization. The average lead time (defined as the time elapsed between the registering of an invention and its applications) was four years while in the USA and Germany, as OECD surveys showed, this time was a little more than one year for 50% of surveyed inventions (Martens, 1999).

After the dissolution of the USSR new laws came into force, and the patent law adopted in 1992 was the major challenge in IP protection system. In all important aspects Russian IP legislation of the early 1990s complied with the Trade Related Aspects of Intellectual Property Rights requirements setup by World Trade Organization. According to the patent law of 1992, ownership rights of government-funded IP were assigned to the institutions where activity was conducted.

When the Russian legislation on IP was adopted, all organizations were state-owned. Irrespective of whether IP rights were delegated to an institute, the State directly or indirectly remained the owner of publicly-funded IP. But after the privatization started, it appeared that rights to government-funded IP would be assigned to newly privatized entities–a situation that was never taken into account when IP laws were passed. These developments encouraged the government to formulate its position concerning intellectual property previously created and currently arising in the scientific-technical sphere. This has led in 1998-1999 to a series of conflicting decrees, State concept papers, and proposed amendments to IP sections of the Civil Code. If before 1998-1999 the role of the State was to some extent underestimated, after 1999 the situation has changed on the opposite. It was stated, that all government-supported R&D results belong to the Russian Federation[10].

[10] Decree of the President of the Russian Federation #863, "On the Public Policy of Introducing into the Economic Turnover Results of Scientific and Technological Activities and Intellectual Property in the Sphere of Science and Technology," July 22, 1998; Resolution of the Government of the Russian

In 2003 a new Patent law came into force and it clarified the case when the IP was created at the federal expense and under the federal contractual agreements. According to a new Patent Law, the State owns the title if it is stated in the contract and it belongs to the organization where the invention was made in all other cases.

Since January 1, 2008 Part IV of the Civil Code comes in force. It is devoted exclusively to the IPR and it substitutes all major laws on intellectual property. Concerning the allocation of IP rights for the R&D results created under budgetary expense, it defines that source and volume of financing are key factors for assignment of IPR. It means that if budgetary financing was the primary source, then the government decides concerning the allocation of IPR. The Civil Code contains also some framework conditions according to which Russian Federation possesses IPR in case R&D were defense or security-related or if government takes responsibility for commercialization.

This demonstrates that the Civil Code inherited major statements from previous legislation and thus has the same flaws. The major problems continue to be the following:

- There are no clear criteria for identification of R&D results that government is ready to commercialize by itself;
- Responsibilities of an organization that receives ownership are not listed;
- Legal conditions for organizations allowing them to have income from their IP are absent.

International experience shows that government should provide a framework for IPR protection, and detailed regulations may be developed at the level of universities and research institutes. More countries are moving towards a concept according to which IP should be assigned to organizations where invention was created. The rationale for legislative moves is that ownership by institutions, as opposed to ownership by individual researchers or government as a whole, provides greater legal certainty for firms interested in exploiting research results, lowers transaction costs for partners and encourages more formal and efficient channels for knowledge and technology transfer (OECD, 2003).

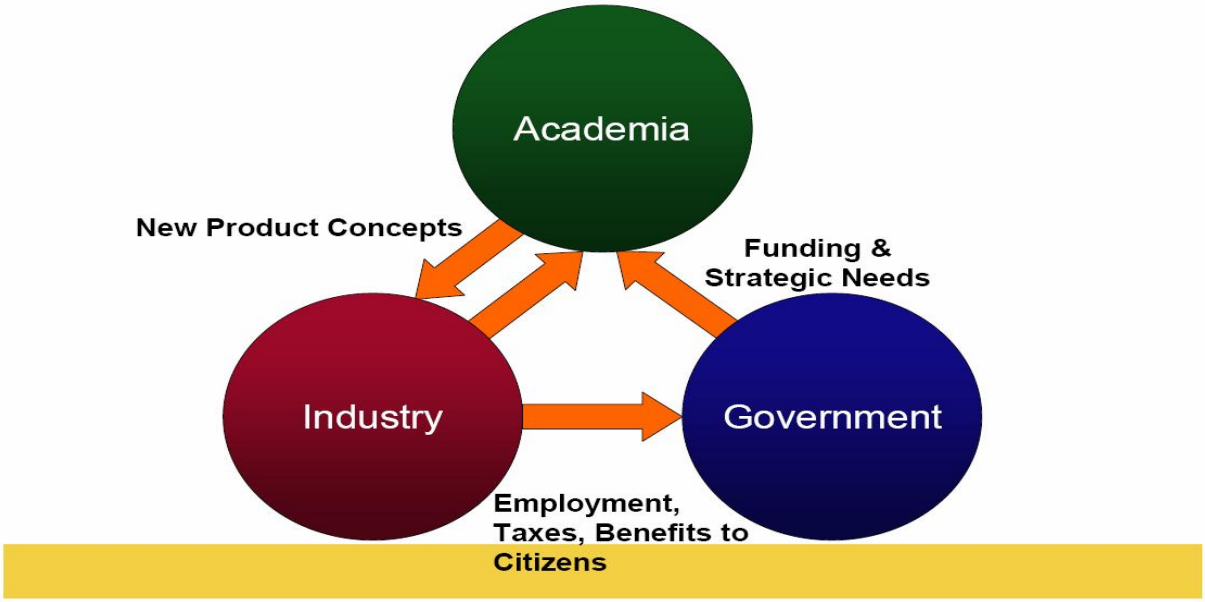
Federation #982, "On the Implementation of Results of Scientific and Technological Activities," September 2, 1999.

3. Broken links in the Russian Triple Helix Model – Threat or Opportunity

3.1. Particularities of the Russian Triple Helix Model

In recent decades three worlds of public research, business and government, which were once very much separate, started increasingly to converge. This convergence has been represented and explained by Etzkowitz through the Triple Helix model, which was further developed by Leydesdorff who has provided theoretical systems with which to develop the idea (Leydesdorff & Etzkowitz 1996, 1997; Jones-Evans, 1997). This model captures multiple reciprocal relationships among institutional settings (public, private and academic) at different stages in the capitalization of knowledge. The model of the Triple Helix resulting by the final convergence of these three worlds could be represented by three factors: the actors, the institutions and the rules and regulations.

Figure 1. The Triple Helix Model of Interaction between Government, Industry and Academia



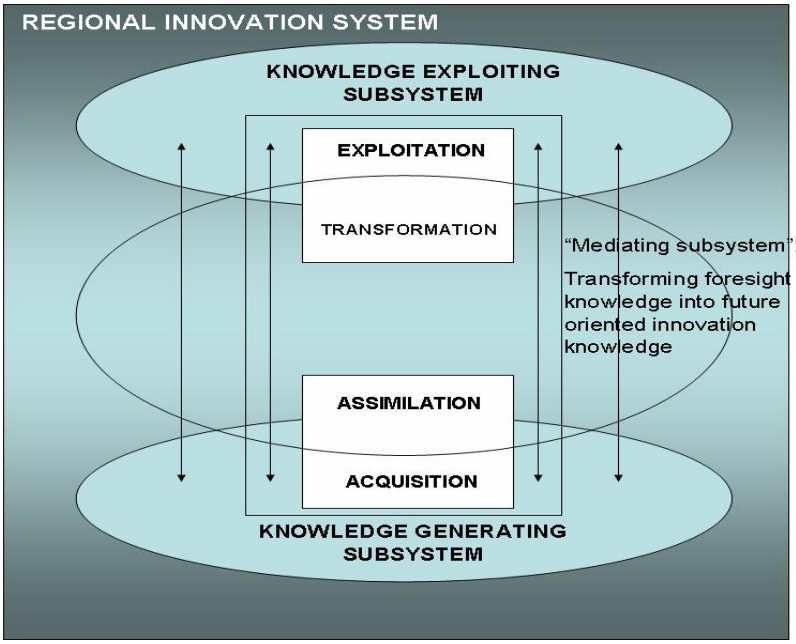
Source: Source: (Etzkowitz & Leydesdorff. 1995)

As the first part of this paper clearly demonstrated the Russian Triple Helix is suffering from a set of distortions in the interaction of the main actors – government, academia and government. The governmental involvement is all too big and all too inclusive. As a

result the other actors prefer the role of idle consumers at the receiving end of governmental policies instead of more active players involved in mutually beneficial interaction. The Russian companies prefer to assume a role at the stage of manufacturing or sales instead of getting closer cooperation between business and academia. In the same way academia does not have somehow the initiative and the entrepreneurial spirit to establish closer relations with business but prefers to remain at the receiving end of various governmental support efforts.

To make the situation worst, as described above, the Russian government fails to demonstrate systemic and coherent approach to supporting the cooperation between business and academia and furthermore the commercialization of innovation. Programs that demonstrate respectable rate of success are under funded or abruptly stopped and /or replaced by other initiatives. As a result it seems the government has one too many ideas how to develop the innovation system and little patience to wait and monitor if a certain policy manages to bring tangible results. Further exacerbating the situation the government seems to lack mechanisms how to evaluate of an initiative works while many success criteria stem from some rather Soviet style economic definitions.

Figure 2. Innovative Capacity of a Regional Innovation System



Source: Uotila, et. al, 2006

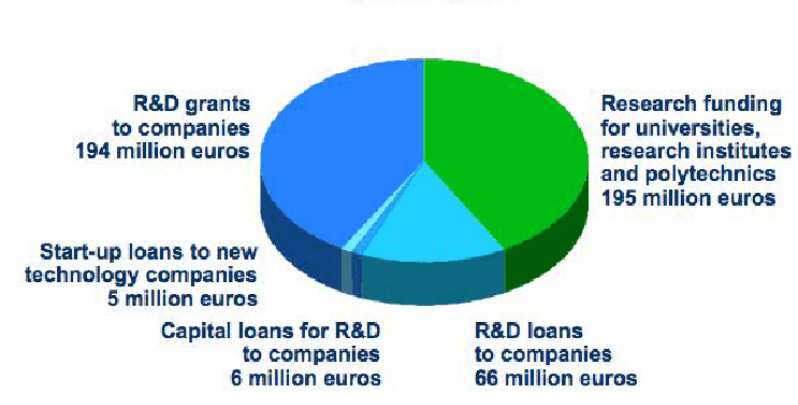
Another very vivid way to demonstrate the weaknesses of the Russian innovation system and the way different actor within it act and interact is offered in Figure 2. As clearly illustrated the biggest problem of the Russian innovation system is the lack of efficient and result oriented mediating system that can link the knowledge generating subsystem (academia) and the knowledge exploiting subsystem be it in the form of industry, entrepreneurially oriented scientists, SMEs willing and eager to commercialize certain technology and offer it to the market, or venture capitalists specializing on innovation projects.

3.2. Adding the international dimension

However what may seem to be the Achilles heel of the Russian innovation system may in fact be an excellent opportunity for foreign organizations that serve as actors within the mediating subsystem. It is not only foreign players that are the beneficiaries. The entire situation changes if add the international dimension in the system. The knowledge generating subsystem may have much better opportunities to find interested partners in both R&D and the following it commercialization through participating in international research projects and networks. Just a brief comparison might underline the point.

While the Russian state support for technology and innovation projects through START Program amounted for approximately 17 million USD in 2006 Fund for Assistance, 2007), and through the Federal Goal-Oriented Program “R&D on Priority Directions on Science and Technology Development” (that includes all applied-oriented competition-based projects and megaprojects) was about 325 million USD (Ministry of Finance of RF, 2006), **i**n much smaller Finland in 2006 the state through its Finnish Funding Agency for Technology and Innovation /TEKES/ invested €465 (approx. US$605 million) in 2 157 R&D projects as shown in figure 3. The total volume of the projects was €924 million.

Figure 3. TEKES R&D Funding in 2006



Source: TEKES, 2007

The most important role for foreign participants in general and particularly Finnish companies and venture capitalists could be, however, in assuming the role of mediators between the Russian knowledge system and not only the Russian but the knowledge exploiting subsystem on a global scale. What could be the missing ingredients for this mutually beneficial cooperation is the lack of international opportunity recognition and exploitation (Zahra et. al., 2005) on the part of Russian scientists and entrepreneurs and the adoption of pro-active approach on the side of Finnish companies and various organizations.

3.3. International entrepreneurship within the Finnish – Russian innovation collaboration

As International Entrepreneurship this article chooses the McDougall & Oviatt (2003) definition stating that IE is “the discovery, enactment evaluation and exploitation of opportunities across national borders to create future goods and services”. This definition builds on the growing view that company’s entrepreneurship centers on the recognition and exploitation of opportunities. Reviewing prior international entrepreneurship research Zahra and George (2002) conclude that greater attention has been given to the content of new venture internationalization strategies than to the processes by which these strategies are developed and implemented.

To what extent Russian and Finnish actors in the innovation systems are aware of the opportunities of their cooperation and its practicality is relatively not researched topic

and definitely not researched when it comes to reviewing their ability to recognize and exploit business opportunities existing on the other side. Currently the Russian national champions launched massive outward investments (Liuhto & Vahtra, 2007). However these are super sized companies mainly in energy resources and raw materials and thus significantly differ in their size and business field from innovation SMEs.

3.3.1. International opportunity perception among Russian innovation SMEs

In the 1990s the number of active researchers plummeted. Many gave up their jobs and many just migrated to the West. Many of those remaining tried to by setting their own innovation oriented companies. In most cases while the level of scientific and technological work was of very good quality, these scientist turned entrepreneurs experienced significant problems when it comes to the commercialization of their technology. In particular the lacked skills and capabilities in critical areas, including, assessing the market potential if their technologies, understanding and fine tuning of their product and / or service offering to customer needs and process and quality management. (Tovstiga et. al, 2004).

Furthermore the problem is deepened by the fact that post-Soviet era generation of scientists and technologists needs to succeed in shifting their mindsets. Especially in their internationalization process a change was needed from central-planning oriented thinking and management styles to market economy entrepreneurship. Regretfully the current Russian political mood tends to favor the planning approach and the Soviet management style trying to reinvent the state owned corporations in many industries and lately also in the field of innovation and technology.

Thus it may appear crucial to have better knowledge and data about the skills and abilities of Russian scientists, managers and entrepreneurs from innovation SMEs in the field of international entrepreneurship in general and particularly opportunity recognition and exploitation. This topic certainly contains potential for further research and may check the assumption that Russian scientists, managers and entrepreneurs from innovation SMEs may be still somewhat isolated and not integrated enough in the international business and entrepreneurial networks.

3.3.2. Finnish-Russian synergies

The cooperation between Finland and Russia in innovations has some tradition especially at the level of academia. Still when it comes to its business dimension and commercialization of innovation it is only starting. Figure 4 outlines the process of new product development in a step by step approach. Where the Russian innovation system demonstrates some advantages is in the phases of idea screening, concept development and particularly strong in the idea generation phase. The latter, being often the innovation itself is of key importance as it reflects the novelty in the future product or service. However where the Russian innovation system so far clearly fails is in key areas leading to commercialization such as business analysis, technical implementation and commercialization. As analyzed above the problems stem from an overactive but unfocused governmental activities and an industry that is willing to participate mostly when the government takes the financial risks and acts as he process initiator.

Figure. From an idea to successful market entry – the new product development stages

Source: Komninos, 2005 / urenio.org

This creates certain vacuum for demand for innovation due to largely inactive industry and certain lack of services be it in consulting, financing, patenting etc. While the capability problem of Russian managers and entrepreneurs in innovation SMEs to

recognize and exploit a national or international opportunities is a persisting problem, in Finland there is a growing interest to plugging the Finnish industry and its interests to the Russian innovation potential.

One of the most active participants in this process is the Finnish company Technopolis. The Technopolis business idea is to help customer companies grow and prosper. This is fulfilled especially through the service concept it has developed for the needs of technology companies. The concept consists of three areas: 1) premises, 2) business services and 3) development services. The technology centers are located in the Helsinki metropolitan area, the Oulu region, Jyväskylä, Lappeenranta and Tampere, all of which are top high tech areas in Finland. Technopolis St. Petersburg, a fully-owned subsidiary of Technopolis Plc, has signed a long-term lease on premises that fulfil western requirements and that are located in the Pulkovo district near the airport and near Technopolis Pulkovo, which is yet to be built (Technopolis, 2007).

Also in 2007 a Finnish-Russian innovation center will commence operations in St. Petersburg, Russia. The center will strengthen collaboration and relations between the participating Finnish businesses and public entities and the evolving Russian innovation environment. The new center is a cooperative effort by Finpro (The Finnish state export promotion agency), the Finnish city of Lappeenranta owned regional development company and Technopolis Plc. According to Jorma Turunen, Managing Director of Finpro 'Networking with Russian competence and innovation capacity will enable us to provide a great new window of opportunity for Finnish companies searching for success on the global marketplace.' (Ibid.)

Technopolis and the City of Moscow recently signed a memorandum of understanding with the City of Moscow on collaboration aiming at the establishment of a technology center in the Russian capital. Moscow offers a fast-growing and extremely interesting operating environment for the high tech industry, attracting existing high tech businesses and facilitating the emergence of new ones at an accelerating pace. Pertti Huuskonen, President and CEO of Technopolis, says that this creates an increasing demand for technology centers of international standard and the services offered by them. The intention is also to determine what size and business orientation the technology center should have in order to best meet the needs of the Moscow marketplace (Ibid., 2007).The decisive mood of Technopolis and Finrpo demonstrates

that on the Finnish side the opportunity is recognized and tangible steps are being made to start its development.

Still the possibilities are much bigger and so far underutilized. Nevertheless there are visible signs that Finnish industries (forestry, ICT, biotech etc.), Finnish authorities (governmental (ministries), regional, and municipal (cities) and academia (universities and research centers) become increasingly interested in the opportunities the Russian innovation capacity offers and in well defined and mutually beneficial ways of exploring and commercializing them. That process is undoubtedly of mutual interest as it clearly will contribute for the overall Finnish and Russian competitiveness. Innovation is certainly a top priority of the Russian authorities as its most advanced scenario for the long-term social and economic development of Russia until 2020 is called “scenario of innovation break through” that includes such infrastructure priorities as modernization of universities, completion of techno-parks, industrial parks and business incubators as well as continuation of the plans to develop the Special Economic Zones /SEZ/ (MEDT, 2007). In that respect adding the international dimension will certainly help intensify the processes and improve the quality of the expected results.

4. Conclusions

During the transition period the Russian government pursued a number of initiatives aimed at creation of market-oriented innovation system. Big attention was given, especially in recent years, to support of linkages among major actors of innovation system. A number of successful schemes were found, and some were effectively adopted from the foreign experience. At the same time the average picture continues to be very uneven and less prominent then it was expected.

There are several major obstacles to the smooth development of national innovation system in Russia, and to appearance of different forms of university-industry collaboration. First, the government sector of science is still very large and government failed to conduct its modernization. R&D organizations depend mostly on the federal budget, and the linkages with industry are not their major interest. Second, there is fragmentation of government efforts: some elements of innovation system are supported but without connection to other elements and without taking into account broader economic context. Third, there is lack of monitoring and on-going correction of applied measures. Once introduced, they stay unchangeable till the moment the government stops the support. Fourth, government support is very limited and inflexible, and thus it can not provide wider influence. Some demonstration models may work well but the problem is that they do not become wider disseminated all over the country. Fifth, there is a lack of indirect measures to encourage cooperation between research organizations and industry, as well as minor stimulus for larger industrial enterprises to increase their innovation activity because of underdeveloped regulations in variety of areas, including IPR.

To sum up, the major flaws in government regulations of R&D and innovation activity are: absence of systemic and consistent approach, of regular evaluation and correction, if necessary, of the government initiatives. Finally, there is still large influence of Soviet mentality on the decision-making process.

Nevertheless Russia remains an interesting and promising source of somewhat untapped innovation capacity even if for various reasons its image abroad may imply the opposite. While the Russian dysfunctional Triple Helix innovation model may be serious threat for generating knowledge based economy in the country it may generate

a pure opportunity for Finnish companies and entrepreneurs. The best opportunities for the latter exist within mainly (but not only) the mediating subsystem that generates and secures the link between the knowledge generating and knowledge exploiting subsystems.

There are clear signs that on the Finnish side the business opportunity is recognized and tangible steps are being done to start its exploitation. That is not the case when it comes to Russian entrepreneurs and managers from innovation SMEs. It remains a question mark to what extent they are aware of the opportunities for commercialization of innovation in a global context and to what extent they have the skills and the knowledge to exploit these opportunities. That topic certainly deserves more attention as the competitiveness of Russian innovation system may only benefit from further internationalization and particularly from a more bottom up approach in its reforms.

Sources:

Bortnik, Ivan "10 years of the development of small innovation entrepreneurship in Russia," Innovation (No. 1, 2004).

Etzkowitz, H., & L. Leydesdorff. (1995). The Triple Helix -University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. EASST Review 14, 14-19

Federal Law "On the Federal Budget in 2006". Appendix 47 – list of Federal Goal-Oriented Programs. Ministry of Finance of the RF.

Fund for Assistance to Small Innovative Enterprises. Annual Report for 2006. M.: Fund for Assistance, 2007.

Indicatory nauki. Statistichesky sbornik. M.: SU-HSE, 2006.

Jones-Evans, D. (1997). Entrepreneurial Universities - Cases of Good Practices from the Republic of Ireland, International Conference: Technology Policy and Less Developed Research and Development Systems in Europe, UNU-INTECH, International Conference, Seville, 18-20 October

Komninos N (2006). KNOWLEDGE NETWORKS and COLLABORATIVE INNOVATION, presentation at the conference 'Baltic Dynamics '06', Vilnius Lithuania, May 25 – 26, available at www.ktc.lt/modules/getfile.php?id=9

Leydesdorff, H., Etzkowitz, H. (1996), Emergence of a Triple Helix of University-Industry-Government Relations, Science and Public Policy

Leydesdorff, H., Etzkowitz H., (Eds.) (1997). A triple Helix of University-Industry-Government relations. The future location of Research, Book of Abstracts, Science Policy Institute, State University of New York

Liuhto Kari, Vahtra Peeter (2007). Foreign Operations of Russia's Largest Industrial Corporations – A Typology Building, agreed to be published in Transnational Corporations, United Nations Publications

MEDT /Ministry of Economic Development and Trade, Russia/ (2007): Koncepcia razvitia dolgosrochnogo socialno-ekonomicheskogo razvitia Rossijskoj Federacii, Julu 2007, available at http://www.economy.gov.ru/

Martens, Jack, Measuring Soviet Performance in Industrial Innovations: The Implementation of New Inventions. OECD, Paris, 1999.

OECD Science, Technology and Industry Outlook – 2004. OECD, 2004.

OECD, Science, Technology, and Industry Scoreboard 2001. OECD, Paris, 2002.

OECD, Turning Science into Business: Patenting and Licensing at Public Research organizations, OECD, Paris, February 2003, DSTI/STP (2003) 22.

Science Indicators – 2004. NSF, NSB, 2004. Vol. 2, Appendix tables.

Science in Russia at a Glance – 2005. Statistical yearbook. M.: CSRS, 2005.

Science in Russia at a Glance – 2006. Statistical yearbook. M.: CSRS, 2006.

TEKES / Finnish Funding Agency for Technology and Innovation/ (2007). 2006 Annual review, available at http://www.tekes.fi/julkaisut/annual_review06/tekes/index.asp

Technopolis (2007). Concept and Startegy, available at http://www.technopolis.fi/index.php?284

Technopolis (2007). Press releases, available at http://www.technopolis.fi/index.php?279

Tovstiga G., Den Hamer P., Popova V., Efimov I., Moskalev S., Bortnik I. (2004). Preparing Russian Small Innovative Enterprises for International Competitiveness: A Scoping Study, in Journal of International Entrepreneurship, N2, pp. 89-108

Uotila, T. & Harmaakorpi, V. & Melkas, H. (2006). A Method for Assessing Innovative Capacity Of A Regional Innovation System. Fennia 184:1

World Bank, From Knowledge to Wealth: Transforming Russian Science and Technology for a Modern Knowledge Economy. Washington, DC, April 2002.

Zahra, S. A. & George, G. (2002). Absorptive capacity: A review, reconceptualization and extension, in Academy of Management Review, N27 / 2, pp. 185-203

Electronic publications of the Pan-European Institute
ISSN 1795-5076

Freely available at http://www.tse.fi/pei/pub

2007

13/2007
Vahtra, Peeter
Expansion or Exodus? The new leaders among the Russian TNCs

12/2007
Kärnä, Veikko
The Russian mining industry in transition

11/2007
Männistö, Marika
Venäjän uudet erityistalousalueet – Odotukset ja mahdollisuudet

10/2007
Kuznetsov, Alexei V.
Prospects of various types of Russian transnational corporations (TNCs)

9/2007
Uiboupin, Janek
Cross-border cooperation and economic development in border regions of Western Ukraine

8/2007
Liuhto, Kari (ed.)
External economic relations of Belarus

7/2007
Kaartemo, Valtteri
The motives of Chinese foreign investments in the Baltic sea region

6/2007
Vahtra, Peeter - Pelto, Elina (eds)
The Future Competitiveness of the EU and Its Eastern Neighbours

5/2007
Lorentz, Harri
Finnish industrial companies' supply network cooperation and performance in Russia

4/2007
Liuhto, Kari
A future role of foreign firms in Russia's strategic industries

3/2007
Lisitsyn, Nikita
Technological cooperation between Finland and Russia: Example of technology parks in St. Petersburg

2/2007
Avdasheva, Svetlana
Is optimal industrial policy possible for Russia? Implications from value chain concept

1/2007
Liuhto, Kari
Kaliningrad, an attractive location for EU Investors

2006

11/2006
Lorentz, Harri
Food supply chains in Ukraine and Kazakhstan

10/2006
Hannula, Kaisa-Kerttu
Doing business in Ukraine - Experiences of two Finnish companies

9/2006
Uiboupin, Janek
Industrial clusters and regional development in Ukraine: the implications of foreign direct investments and trade

8/2006
Avdasheva, Svetlana
Russian furniture industry: Enterprises' upgrading from the value-chain Theory perspectives

7/2006
Food industry value chains in Leningrad oblast and Krasnodar krai
(Finngrain – Vilja-alan yhteistyöryhmä)

6/2006
Zashev, Peter – Vahtra, Peeter
Kazakhstan as a Business Opportunity – Industrial Clusters and Regional Development

5/2006
Keskitalo, Päivi
Internationalisation of Finnish Environmental Technology to Poland

4/2006
Heiskanen, Katja
Internationalisation of Finnish Small and Medium-sized Companies towards the New EU Member States in the Baltic Sea Region

3/2006
Zashev, Peter
Belarus as a Business Opportunity?

2/2006
Johansson, Linda
International Business Operations of Companies with Russian Involvement in Southwestern Finland

1/2006
Vahtra, Peeter
Expansion or Exodus? - Trends and Developments in Foreign Investments of Russia's Largest Industrial Enterprises

2005

10/2005
Hannula, Kaisa-Kerttu
Host Country Determinants and Investment Motives of Finnish FDI in the Publishing Sectors of Bulgaria and Romania

9/2005
Vahtra, Peeter
Russian Investments in the CIS - Scope, Motivations and Leverage

8/2005
Liuhto, Kari - Zashev, Peter - Heiskanen, Katja (ed.)
The Approaching EU Accession of Bulgaria and Romania - New Opportunities for EU Enterprises

7/2005
Liuhto, Kari (ed.)
Kaliningrad 2020: Its Future Competitiveness and Role in the Baltic Sea Economic Region

6/2005
Levando, Dmitry
Investigation into the Structure of Reasoning in Economics

5/2005
Vahtra, Peeter - Pirilä, Hannu - Hietanen, Satu
ICT-sektori Baltiassa ja Puolassa

4/2005
Zashev, Peter
Between the Co-competitors: Belarus, Moldova and Ukraine Economic Integration in a Bi-polar Europe

3/2005
Pirilä, Hannu
Baltian ja Puolan taloudet vuonna 2004 - EU-jäsenyyden ja nopean talouskasvun vuosi

2/2005
Liuhto, Kari - Vincze, Zsuzsanna (ed.)
Wider Europe

1/2005
Lisitsyn, Nikita E. - Sutyrin, Sergei F. - Trofimenko, Olga Y. - Vorobieva, Irina V.
Outward Internationalisation of Russian Leading Telecom Companies

pan-european institute

www.tse.fi/pei/pub