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Russian innovation system in international comparison - Opportunities and challenges for the future of innovation development in Russia

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1 Executive summary

This report analyses the strengths and weaknesses of the Russian innovation system reflected in international comparisons conducted by the European Union, OECD and World Bank. By using the comparison with international markets the major problems of the Russian system are identified and also the reasons for the differences from other countries are analysed. Some of the major challenges and opportunities for the future development of the Russian innovation environment and policies are also discussed in the report.

Russia's innovation potential is greater than that of many other countries at comparable levels of GDP per capita. The country benefits from a substantial science base and a well developed education system in science and technology. Yet indicators of actual innovation activity remain disappointing. There seems to be a clear imbalance between the public resources devoted to knowledge creation and the observed outputs in terms of innovation as well as stimulating greater private-sector involvement in R&D, which remains limited. These issues constitute some of the major challenges for Russian innovation policy.

There is also a wide gap between much Russian R&D and the demands of the market. The policy has tended to focus on supply orientation and neglect demand. Policies should therefore in the future be directed to supporting more market oriented innovation development and commercialisation of innovations, by means of development for instance public-private partnerships, in order to make the innovation process more effective.

One of the positive characteristics which should better utilised in the future is the large potential market and resources for innovative activities provided by Russia. On the other hand the country's innovation system is still in the phase of transition resulting in problems such as the lack of cooperation and coordination of different organisations in the innovation system and almost nonexistent intermediary system which have had a negative effect for instance on commercialization of innovations. Supporting cooperation on national and international levels should therefore also be emphasised in the innovation policies.

Integration in international markets and attracting more foreign direct investment in technology intensive sectors should also be taken into consideration in the formulation of innovation policy in order to promote technology transfer and accelerate technical progress. In order to improve the overall functioning of the Russian innovation system, the Russian government should adopt a more pro-active innovation policy.

2 Organisation of the innovation system

Russia's economic structure is distinctly different from that of most European countries with a predominance of large companies, concentration on mining and heavy industry, and an almost complete lack of high-tech, consumer goods industries. Therefore, Russia's innovation system also has a quite distinctive outlook.

The state bodies responsible for formulating fundamental innovation policy comprise legal bodies and executive authorities – federal ministries and agencies and corresponding regional bodies. In addition, the presidential council on Science and High Technologies and several departments of the Presidential Administration coordinate and direct the activity of the legal and executive power bodies. The Federal Assembly participates in innovation policy formulation through the Committee on Science, Education, Health and Ecology and by organising discussions with expert panels for monitoring of current policy and generating federal initiatives. The State Duma has several committees that discuss innovation policy. Government activity in the field of science, education and innovation comprises the following organisations (European Commission, 2007):

(a) *policy-making and coordinating agencies*: Ministry of Education and Science (MES), Ministry of Economic Development and Trade, Ministry of Information Technologies and Communication, Ministry of Industry and Energy, the Federal Agency for Science and Innovation, Russian Academy of Sciences and Russian Space Agency;

(b) *financing agencies*: financial support from the State budget is the principal source of funding for R&D. Most funds are distributed through R&D implementing agencies in the form of direct grants, although some competitive allocation of R&D resources takes place as well. There are three State budget funds: Russian Foundation for Basic Research (RFBR), Russian Foundation for Humanities (RFH) and The Foundation for Assistance to Small Innovative Enterprises (FASIE);

(c) *regulatory agencies*: The most important regulatory bodies are the Federal Service for Intellectual Property, Patents and Trade Marks (Rospatent), the Federal Agency for Technique Regulation and Metrology and the Federal Antimonopoly Service.

The four agencies that control most of the Civil State R&D budget are the Russian Academy of Sciences (RAS), the Russian Space Agency (Roskosmos), the Federal

Agency of Industry, and the Federal Agency of Science and Innovation. The latter two agencies are executive branches of the Ministry of Industry and Energy and the Ministry of Education and Science, respectively. The Federal Agency of Industry supports R&D and innovation activities particularly related to the defense industry. It plays an important role in the procurement of defense orders from industry. The Federal Agency for Science and Innovation (FASI) implements government policy, provides governmental services, and manages state property in the sphere of scientific, technological, and innovative activities. This includes overseeing the activities of the federal centres of science and high technology, state-run scientific centres, the unique scientific facilities, the leading scientific schools, national IT research networks and supplying information on science, technology and innovation activities. (European Commission, 2007.) (See Figure 1 for overview of governance the Russian innovation system)

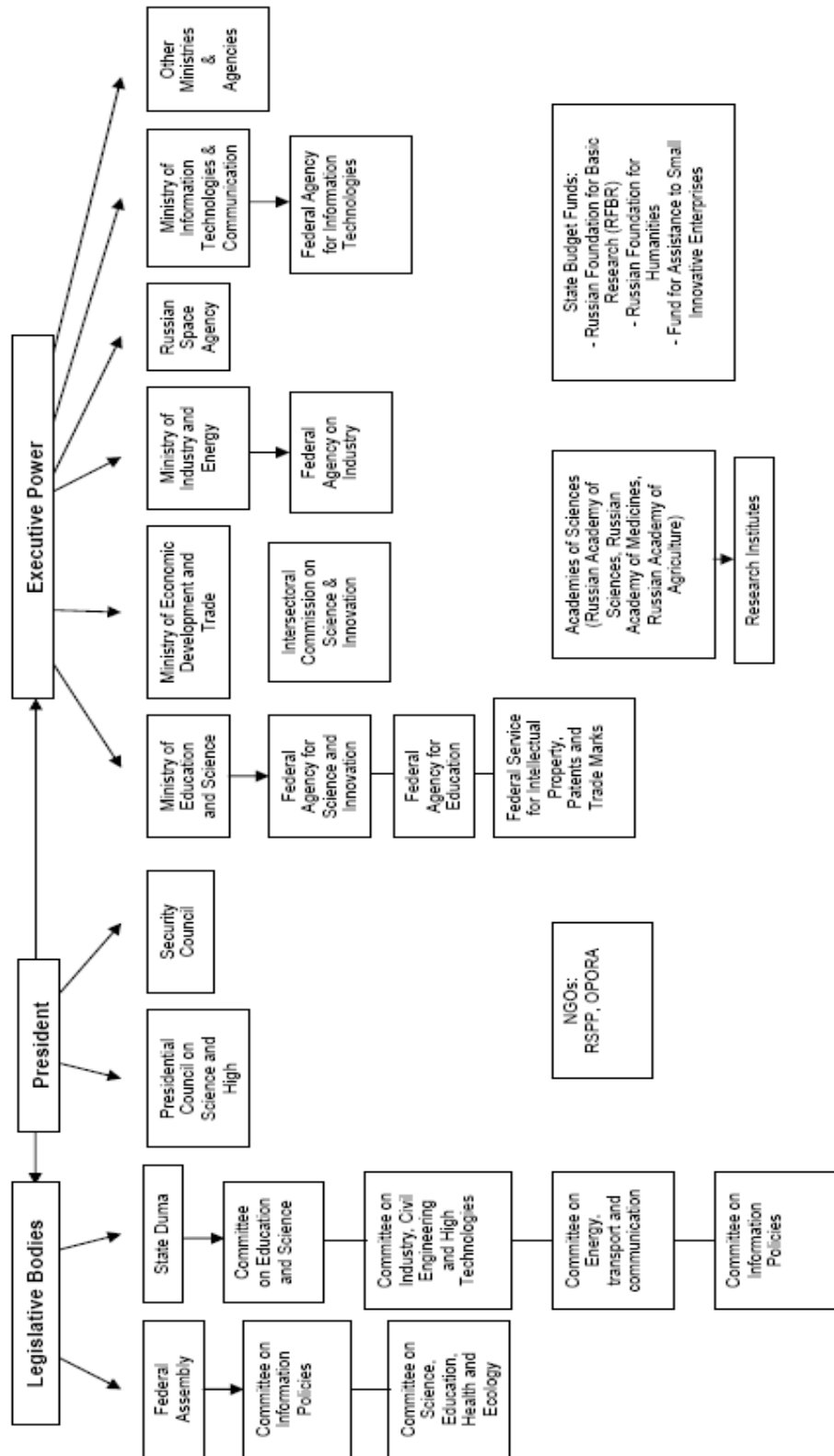


Figure 1 Organisational Chart of the Innovation Governance System (European Commission, 2007)

3 Structure and development of the innovation system

Russia has a number of advantages in the creation of knowledge and innovation. By international standards, Russia has a highly educated population. For instance the enrollment in higher education and the share of researchers in the population place Russia on the level of Germany or South Korea. Despite a high level of inputs, Russia still lags well behind OECD and other large middle-income countries in R&D outputs. This is visible in a relatively low number of patents and scientific publications per capita. (World Bank, 2006.)

Historically, Russia, as part of the former Soviet Union, has been characterised by a well developed system of public R&D institutes. In 2005, Russia's research sector comprised 3656 R&D organisations, employing some 813 207 employees of which 48 % were researchers. During the transitional period, however, this part of the R&D system has experienced severe problems including low level of financial support from the state budget and industry, low salaries for scientists and engineers and stagnation of R&D activity. (European Commission, 2007.)

Total R&D spending in Russia amounted to approximately 1.2% of GDP in 2004, which is far below the OECD average. R&D intensity has, however, increased in recent years, recovering from a post-Soviet rate of just over 0.8% of GDP. In any case, part of the gap between Russia and the OECD average reflects the country's industrial structure. R&D activity tends to be lower in resourced-based economies, while countries with a large share of production in sectors like pharmaceuticals and telecommunications tend to have higher R&D spending. (OECD, 2006.)

The level of investment in innovation during 2000-2005 remained low and unstable. Their highest value within this period 1.91% was achieved in 2002 and lowest 1.32% in 2005 (See Figure 2). (European Commission, 2007.)

Although small by comparison with the private industrial research capacity in Western economies, also some Russian companies operate their own research facilities. Many of these facilities were inherited by the companies during their privatisation. Funding for R&D at universities comes primarily from competitive funding schemes and research contracts with industry and government. Financial and human resources in the higher education R&D sector comprise no more than 5% of the national total. (European Commission, 2007.)

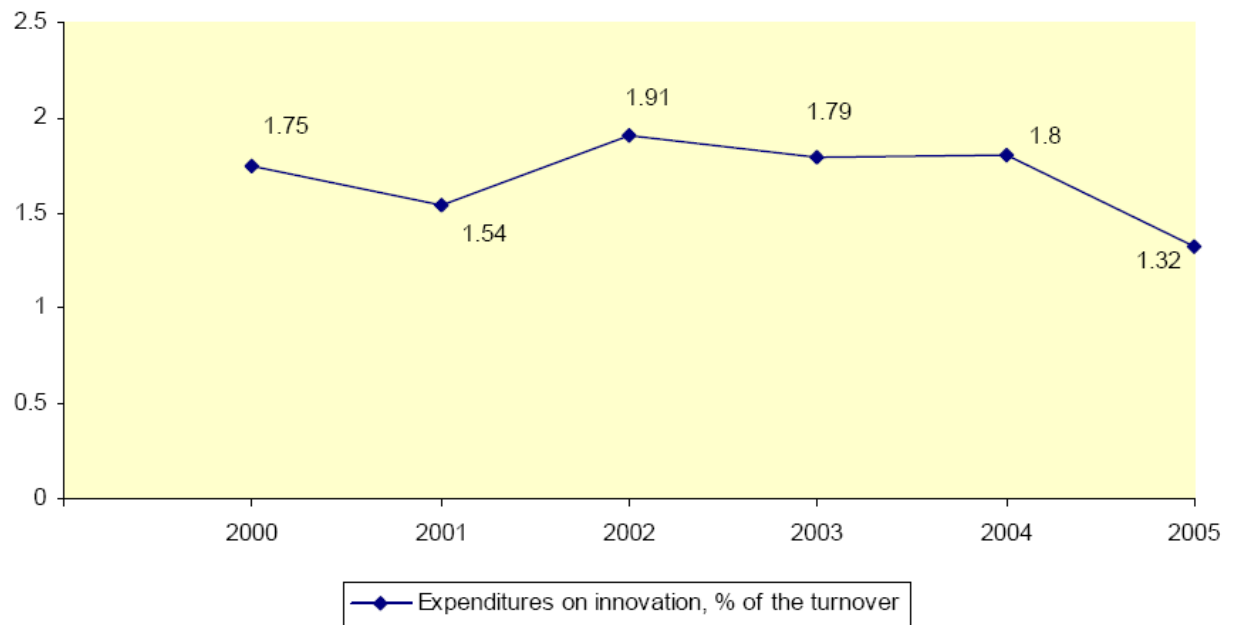


Figure 2 Expenditures on innovation in 2000-2005, % of turnover (European Commission, 2007.)

In contrast to OECD countries, most Russian R&D is financed by the state. Roughly 60% of R&D is publicly financed. Yet the bulk of R&D would appear, at first glance, to be conducted by the business sector. This apparent paradox reflects the fact that state owned companies and branches of research institutes are classified as business entities, and they conduct a large share of publicly financed innovation activities. (See Figure 3 for comparison of the distribution of R&D spending with other countries).

One of the reasons for relatively low value added per capita in Russia is unfinished restructuring. Nevertheless, the overall return on R&D spending in Russia also appears quite low by international standards. As many studies have noted, there is a wide gap between much Russian R&D and the demands of the market. The majority of R&D in Russia is financed by government and at the same time, investment in R&D by the private sector as a share of sales is actually quite low compared to other BRIC countries (see Figure 4). (World Bank, 2006.)

Radosevic (2003) points out that due to its Cold War origin Russian science and technology policy shares has inherited a strong defence character and has a strong focus on the R&D and lack of diffusion of innovations. The policy also tends to focus on supply orientation and neglect demand.

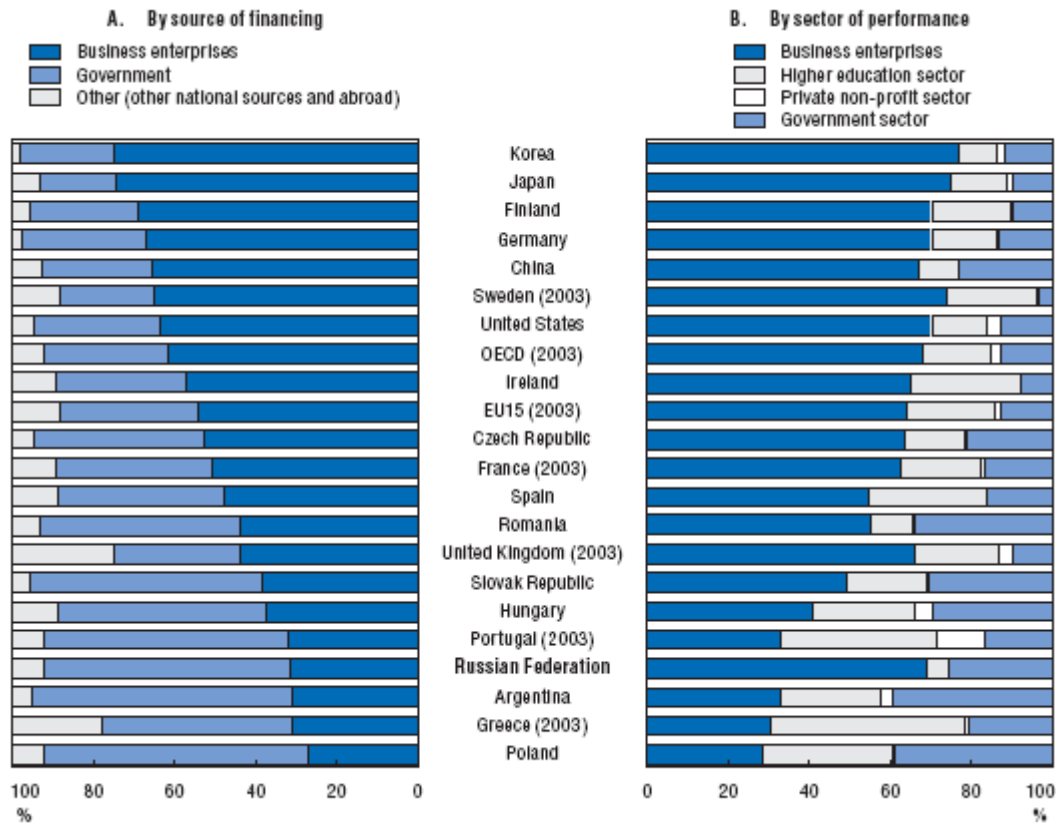


Figure 3 R&D Expenditure by country, 2004 (OECD, 2006)

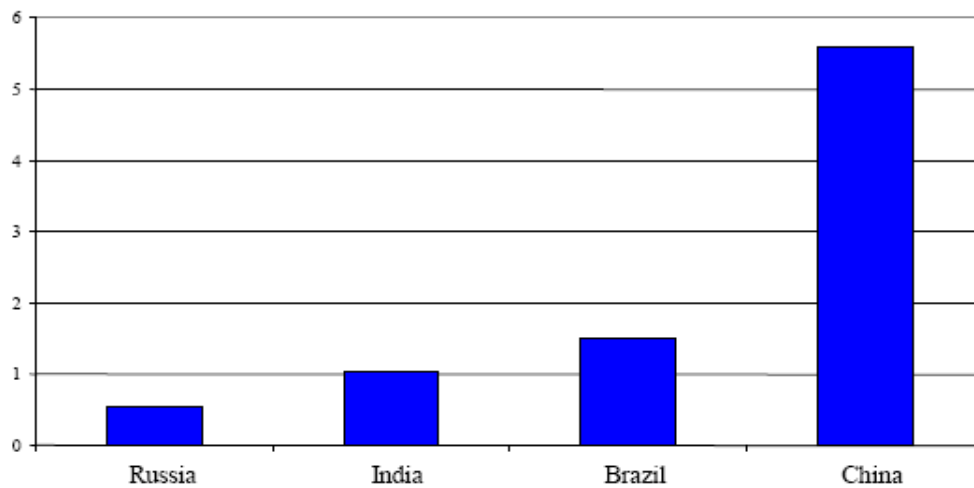


Figure 4 Private (in-house) R&D expenditures as a share of sales (World Bank, 2006)

Innovation performance indexes demonstrate a rather low level of innovation activity amongst Russian companies. For a long time it did not exceed 10% of the total number of enterprises statistically surveyed by Rosstat. In 2005, the number of innovative enterprises represented only 9.7%. The share of stable innovative enterprises is rather low as well (10-20%). (European Commission, 2007.)

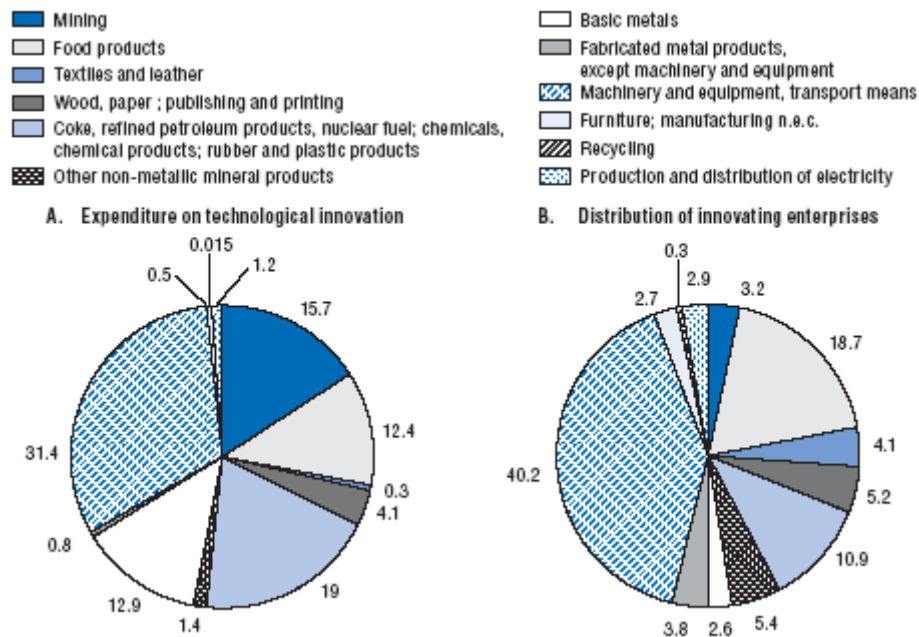


Figure 5 Innovating enterprises and expenditures on technological innovation by economic activity in industry (OECD, 2006)

In metallurgy, machinery, and chemical industry, the share of innovation enterprises tends to be higher than in other industries. No less problematic is the state of small innovation companies in the country as a whole: its share does not exceed even 1% of the total number of small enterprises in Russia. Another factor of concern for science and innovation of the country is the huge dependence of S&T sector of the economy on government R&D expenditures. Despite a relatively high level of expenditure on R&D in the business sector, in comparison with the government S&T sector, the government is still the main donor to R&D. The share of budgetary funds in the structure of the gross domestic expenditures on R&D in recent years has grown steadily. (European Commission, 2007.)

Knowledge creation in the business sector is also hampered by limited interaction with the public R&D sector and the lack of engagement between the science sector and business contributes to relatively poor performance with respect to innovation outputs. One indicator of this weakness is the relatively small number of patents held abroad. (OECD, 2006.) The resources of Russian enterprises to produce radical innovations have also been reported to be limited as lack of finance, narrow strategic focus, weakness for external innovation infrastructure and absence of state support (Gurkov, 2004).

Strong evidence from numerous economic studies supports the notion that integration in world markets, including the attraction of foreign direct investment, can accelerate technical progress and innovation in developing and emerging market economies. Technical progress can benefit from foreign trade by means of imports or transferred through learning. Foreign investment can contribute to technical progress through the direct importation of modern capital, managerial skills, and corporate practices, as well as indirectly through linkages with domestic firms, worker training, and increasing competition on domestic markets. (World Bank, 2006.)

Technological transfer through world market integration has also played an important role in the modernisation of the Russian economy. Still, according to World Bank (2006) several factors have limited the degree to which Russia has been able to profit from technological transfer:

- Although trade volume in Russia as a share of GDP is similar to many other countries, trade volume in manufactured goods is relatively low, particular in the critical parts and components industries where much technology transfer and learning by doing is thought to take place. Furthermore, a large part of both imports and exports in parts and components can be associated with the CIS, where Russia likely receives minimal benefits from technology transfer.
- Foreign direct investment has also been relatively low in Russia compared to other dynamic emerging market economies. While FDI rates have picked up majority of investments has been directed to metals and oil processing.

Russian companies have entered into partnerships with foreign companies in various ways (such as joint ventures, research contracts, and cooperative research projects) in order to get access to the latest technology as well as managerial and marketing experience. At the same time, Russian research organizations have been very active in mobilizing foreign support and research contracts. In addition to American and European governmental and non-governmental programs supporting non-commercial R&D activities in Russia, there is also a growing number of Western companies that contract out research of a commercial nature to Russian research institutes. Foreign funding makes up for nearly 10% of all R&D expenditures in the Russian Federation. Primary sources of foreign funding are: the EU, the USA, and some Asian countries such as China, Japan, and South Korea. (European Commission, 2007.)

4 Development of the innovation policy

Budgetary expenditures on R&D have been growing but at the same time the structure of allocations on R&D continues to be conservative especially considering the allocation of funds amongst government agencies. In federal goal-oriented programs, government has, however, started to pay more attention to measures aimed at involving business in the selection and financing of R&D projects and to develop public-private partnership instruments in particular.

The most visible change occurred in 2006, when the government started to develop indirect measures to stimulate innovation activity. Government has also tried to introduce measures in the area of technical regulations, ecological control, and temporary cancellation of import custom duties for those types of equipment that are not produced in Russia. These measures are targeted at stimulating demand for innovation at industrial enterprises, mostly through the renovation of their capital equipment, as well as to ease access to global knowledge. The three main policy priority directions initiated by the government can be identified as: 1) growing attention to forecasts and foresights; 2) support of innovation infrastructure; and 3) further development of indirect measures to stimulate innovation. (European Commission, 2007.)

Further support of innovation infrastructure in the form of venture funds and technology parks may be envisioned. In 2007 several government-supported venture funds were created and further development of technology park infrastructure, including the organisation of their management has also been planned and initiated. (European Commission, 2007.)

Russia has tremendous potential in certain leading research and innovation industries. However, the efficient use of vast natural resources on the international market is possibly one of the main challenges posed for Russia's technology intensive industries and its ability to commercialise research findings into marketable products. The governance system faces serious problems in bridging the gap between political visions and ambitions on the one hand and the implementation of the visions. (European Commission, 2007.) Figure 6 provides a SWOT analysis of the Russian innovation system and policies governing it.

<p>Strengths</p> <ul style="list-style-type: none"> • High current economic growth rates create generally favorable conditions for government actions towards innovation activity stimulating • Formulation of several strategic policy documents • Coordination bodies established on higher Federal level • Growing number of Federal and regional ministries and agencies engaged in formulation of innovation • Legal base improvement in the area of intellectual property rights according to international standards • Growing attention to monitoring and evaluation of innovation policy, including international benchmarking, to distribution policy discussion information through Internet resources 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Low coordination with business sector in R&D priority setting process and R&D financial support • Poor implementation of policy directed to problems of technological retardation in manufacturing and integration into international knowledge base • Absence of policy designed for improving intersectoral knowledge and technology diffusion • Comparatively low support for small innovation companies on the early development stages • Small share of competitive funding in the budget support mechanisms • Low level of IPR protection and underdeveloped mechanisms for assignment of IPR • Regular formal monitoring and evaluation of innovation policy measures for corrective actions have not been used
<p>Opportunities</p> <ul style="list-style-type: none"> • More active cooperation between regions in innovation policy formulation and implementation • Development strategy and special development institution for depressed regions • Focus on strategic innovation support for economically advanced industries 	<p>Threats</p> <ul style="list-style-type: none"> • Weak reaction of the NIS stakeholders to important innovation policy measures • R&D system structure and mission as a whole does not correspond to the economic and social needs, it has not been reformed according to this needs

Figure 6 Innovation policy SWOT overview (European Commission, 2007)

In addition European Commission (2007) report lists three major innovation challenges and policy responses to the challenges:

1. *Increase R&D expenditure and non budget expenditure*

In order to bring the level of R&D investments in Russia on the level of the European Union, a substantial boost of investment is needed. While some of this boost would originate from additional government investment, the larger part has to come from the business sector. In order to stimulate the business sector to invest more in R&D, the government is considering the introduction of several incentive schemes. The greatest challenge here is to induce a stronger participation by the Russian business sector in the whole innovation process,

including that of conducting research. A healthy business environment may be considered a precondition for boosting innovative activities.

2. *Increase the number of innovation enterprises*

Competition is what drives companies to be innovative and one of the critical bottlenecks for Russian start-up companies is getting access to capital. In addition to expanding state-owned venture capital funds, the government should also look at how private venture capital funds can be stimulated through tax incentives, simplification of rules and regulations, and solving other specific bottlenecks. R&D investments by the business sector in the Russian Federation are very low in comparison with comparable industries in advanced economies.

3. *Reform and streamline the research sector to more dynamic and responsive to innovation needs*

The government has already begun realising its declared aim of reforming the R&D sector (as was stated in “The Strategy of Science and Innovations Development in the Russian Federation till 2015”). The number of institutes is slowly decreasing, staff has been laid off, and salaries have risen. The next step is to clarify responsibilities of the remaining research institutes as well as their position in the overall innovation system. In promising to support new science areas, the government established a new agency for priority S&T development – the State Nanotechnology Corporation.

Russian innovation policy is still based on a more linear, research-centered ideology. The most important problem is to bring about a successful innovation climate throughout society, to supplement state support for R&D, industrial enterprises and infrastructure through soft stimulating measures. In order to improve the overall functioning of the Russian innovation system, the Russian government should adopt a more pro-active innovation policy. A healthy business environment may be considered a precondition for boosting innovation activities. Monitoring and evaluation is another bottleneck of Russian innovation policy. While innovation policy should give the innovation system a sense of direction, it should, once translated into a concrete and detailed action plan, be complemented by a monitoring and evaluation system in order to check whether the system is evolving in the right direction and introduce corrective action where necessary. (European Commission, 2007.)

The government has been developing a series of programs and policies aimed at achieving competitive industries outside of resource-based industries and promoting the innovation economy. This strategy consists primarily of selective interventions by the government to promote particular sectors of the economy or particular geographical areas, including special economic zones, IT parks, state venture funds, a state development bank, tax incentives, training programs, export promotion, and direct government participation in some sectors of the economy. (World Bank, 2006.)

5 Discussion and policy recommendations

Russia's innovation potential is probably greater than that of many other countries and Russia has a number of advantages in knowledge and innovation. By international standards, Russia has a highly educated population. The country benefits from a substantial science base and a well developed education system in science and technology.

Yet indicators of actual innovation activity remain disappointing. Despite a high level of inputs, Russia still lags well behind OECD and other large middle-income countries in R&D outputs. There seems to be a clear imbalance between the public resources devoted to knowledge creation and the observed outputs in terms of innovation as well as stimulating greater private-sector involvement in R&D, which remains limited. These issues constitute some of the major challenges for Russian innovation policy.

One of the positive characteristics which should better utilised in the future is the large potential market and resources for innovative activities provided by Russia. On the other hand the country's innovation system is still in the phase of transition resulting in problems such as the lack of cooperation and coordination of different organisations in the innovation system and almost nonexistent intermediary system which have had a negative effect for instance on commercialization of innovations. Supporting cooperation on national and international levels should therefore also be emphasised in the innovation policies. (See Figure 7 for an overview of the participants in the Russian innovation system)

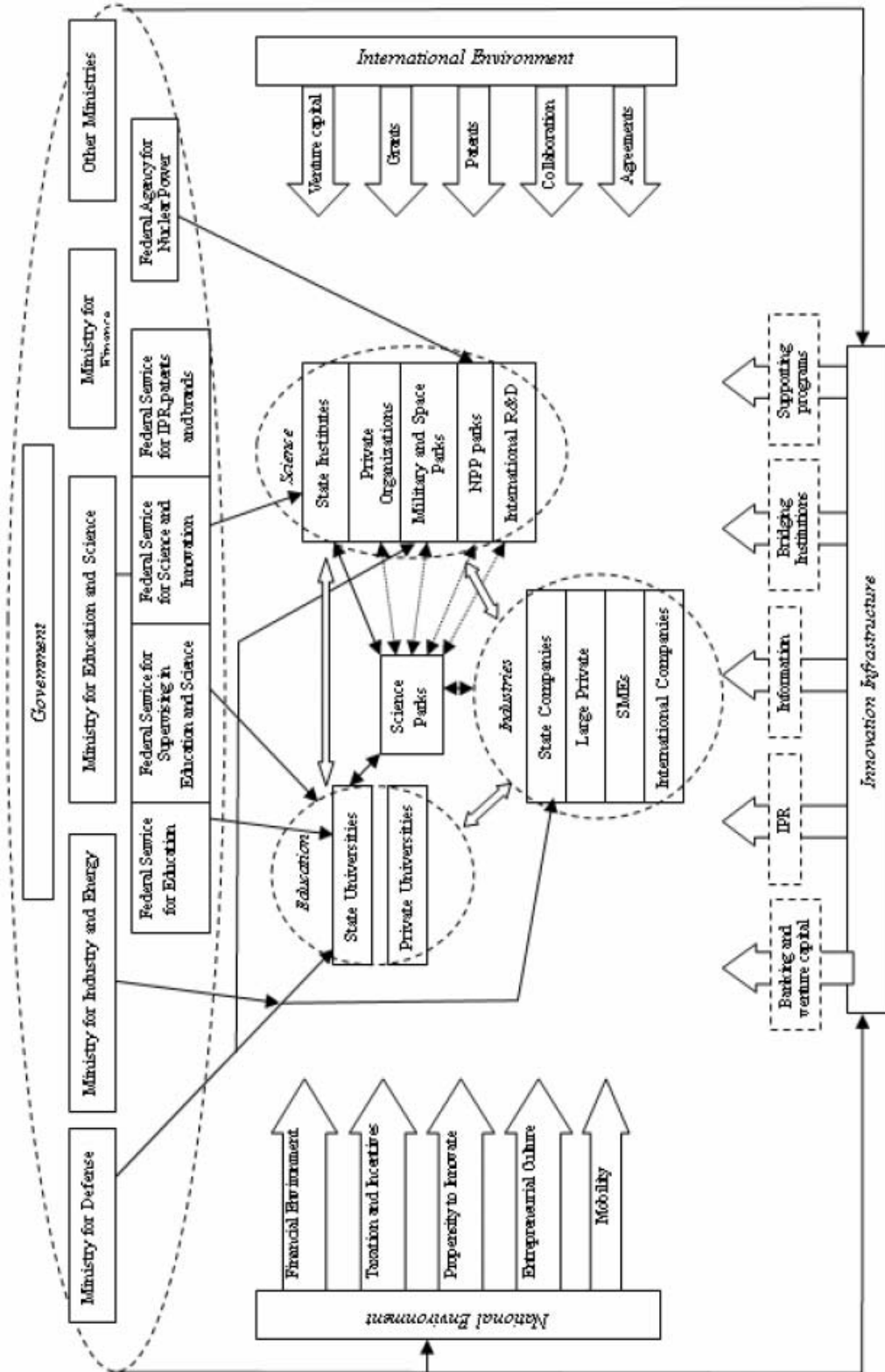


Figure 7 Russian innovation system (OECD, 2006)

The Russian Federation has made a lot of progress in the formulation of innovation policy and the creation of an innovation governance system. The three main policy priority directions initiated by the government can be identified as:

- 1) growing attention to forecasts and foresights
- 2) support of innovation infrastructure
- 3) further development of indirect measures to stimulate innovation

Although Russia has made progress in the development of innovation policy, policies are still largely based on a research-centered ideology resulting in weaknesses such as:

- Absence of large high tech companies
- Low participation of business in financing R&D
- Underdeveloped SME sector
- Absence of policies aimed to improve intersectoral knowledge and technology diffusion, lack of intermediary organisations
- Ineffective technological infrastructure for innovations
- Low level of development of linkages among actors of the innovation system

There is a wide gap between much Russian R&D and the demands of the market. Russian science and technology policy has inherited a strong defense character and has a strong focus on the R&D and lack of diffusion of innovations. The policy has also tended to focus on supply orientation and neglect demand. Budgetary expenditures on R&D have been growing but at the same time the structure of allocations on R&D continues to be conservative especially considering the allocation of funds amongst government agencies. The policies should therefore in the future be directed to supporting more market oriented innovation development and commercialisation of innovations, by means of development for instance public-private partnerships, in order to make the innovation process more effective.

Integration in international markets and attracting more foreign direct investment in technology intensive sectors should also be emphasised in the innovation policy in order to promote technology transfer and accelerate technical progress. Attraction of foreign investment and foreign presences is important as it can contribute to technical progress through the direct importation of modern capital, managerial skills, and corporate practices, as well as indirectly through linkages with domestic firms, worker

training, and increasing competition on domestic markets. Although Russian companies have already entered into partnerships with foreign companies in various ways in order to get access to the latest technology as well as managerial and marketing experience and Russian research organisations have been active in mobilising foreign support and research contracts, this development should be further supported and developed in the government policy level.

Russia has a lot of potential in certain leading research and innovation industries. However, the efficient use of vast natural resources on the international market is possibly one of the main challenges posed for Russia's technology intensive industries and its ability to commercialise research findings into marketable products. The governance system faces serious problems in bridging the gap between political visions and ambitions on the one hand and the implementation of the visions.

One of the important challenges of the Russian innovation policy is to induce a stronger participation by the Russian business sector in the whole innovation process, including that of conducting research as the lack of commitment by the business sector is one of the major weaknesses of the Russian innovation system. A healthy business environment may be considered a precondition for boosting innovative activities and should be developed by relevant policies.

Russian innovation policy is still largely based on a research-centered ideology. Important measures to develop the policy include creating successful innovation climate throughout society, supplementing state support for R&D, industrial enterprises and infrastructure through stimulating measures. In order to improve the overall functioning of the Russian innovation system, the Russian government should adopt a more pro-active innovation policy.

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