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The Evolving Role of Academic Institutions in Innovation Systems and Development

The Russian System of Higher Education and its Position in the NSI

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LUND UNIVERSITY

Research Policy Institute

UniDev Discussion Paper Series Paper no. 7

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ISBN: 978-91-86113-06-3
Published online at http://developinguniversities.blogsome.com/
by Research Policy Institute, Lund, Sweden, 2008

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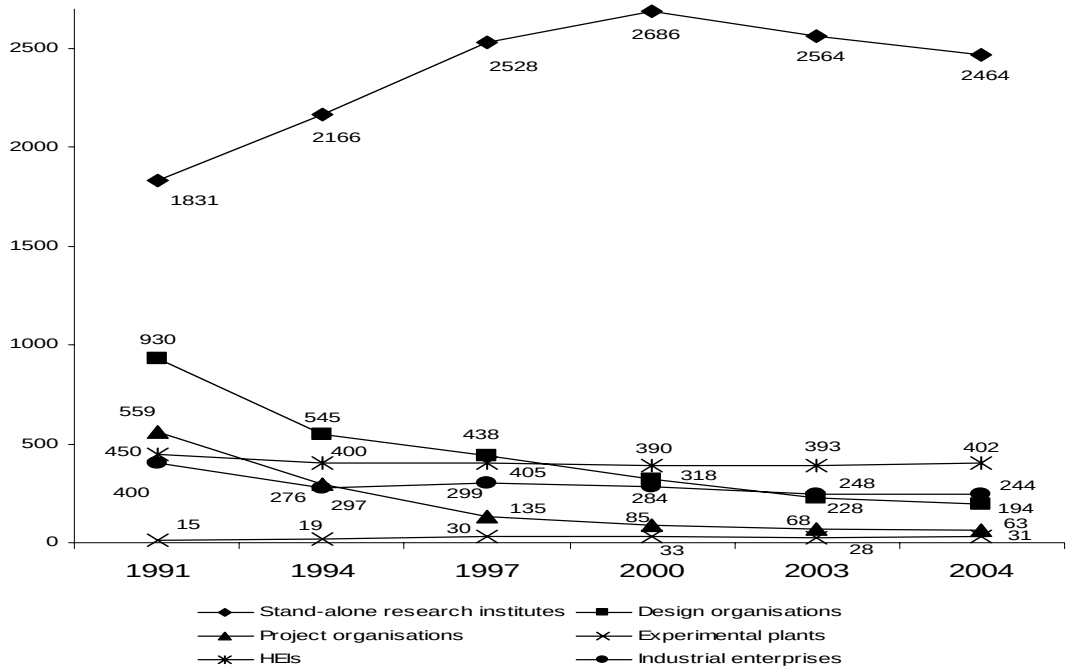
1. Introduction to the Russian context

The post-Soviet system of science have had to confront several new challenges: a necessity of getting adapted to market relations, a substantial reduction of budgetary expenditures, a decreasing demand for R&D on the part of departments, state and private enterprises resulted in considerable changes in the science sector. At the same time the system of science would preserve many features of the Soviet past. Thus, research institutions independent of universities and industrial enterprises still dominate in the structure of science. Experimental and designing organizations are noticeably less presented. As far as the university science is concerned, only few higher education institutions in contemporary Russia combine educational and full-scale research activities; and the share of higher education institutions constitutes only about 10 % of organizations carrying out research work. The share of industrial enterprises is also quite low (7 %) within the science sector (see figure 1).

Figure 1. Russian R&D institutional Structure[1]



A large number of separate research institutions in Russia is explained by the disintegration of large departmental institutions and institutions that were under the Russian Academy of Sciences into smaller entities in the 1990's. A considerable part of

[1] Science Indicators. Statistical Review. – Moscow, State University Higher School of Economics, 2006. p.18. (in Russian)

research institutions that appeared as a result of this disintegration preserved the status of state entities. The isolation of Russian higher education institutions from the scientific sphere was related also with the problem of research financing and the orientation of new, non-state higher education institutions towards the educational activity. As a result less than 38 % of higher education institutions are currently engaged in research activities[2].

Under the conditions of the economic isolation in the USSR, the science had to provide comprehensively for the economic and social development, the production growth and defense capacity. Owing to this reason the Soviet and post-Soviet science do not have an explicit national profile and are characterized by a relatively uniform distribution of the potential in different directions. Such system required enormous resources and was not economically optimal. However the achievements obtained in each area were consumed immediately in other areas, and this produced a considerable synergetic effect. Unfortunately the break-through results were implemented primarily not in the civil, but in the military sphere and in the fields that were important for the national prestige (such as the space race). Among the most highly developed directions of science and technology in Russia both basic and applied sciences are presented equally fully: physics, mathematics and ICT, space research, research in chemistry and materials, medicine, biology, the Earth study.

Ageing of the national research-and-development plant, lowering patenting activity and some other warning trends in the Russian National Innovation System (NIS) framework are nothing but effects of a severe institutional crisis. The first issue to discuss is the definition and attributes of an *underdeveloped* NIS in the Russian case. Macro-indicators of Russian NIS and especially the cross-country comparisons tie position of Russia close to the developing rather than to industrially developed economies. It is expressed by low R&D-to-GDP ratios. There are evident signs of the institutional weakness, as follows: the key NIS institutions are still absent in Russia or they are incapable of performing their functions properly; certain severe structural disproportions are notable, as well as a number of dramatic legal shortcomings. What is more, the public innovation policy acts of the last decade show off it unsystematic nature. A more advanced analysis reveals more specific problems for different types of organizations including industrial companies and networking firms, research institutes and universities.

Russian industrial firms are characterized by comparatively weak knowledge-intensity of output as a result of their low interest in innovations and insufficient R&D expenditure. In turn this fact leads to a low competitiveness on the foreign markets (and often on domestic markets) and raw-oriented structure of Russian exports. Another problem consists in the absence of innovation networking firms and organizations. The Russian government still neglects active networking policy. As a result its attempts to establish venture-based mechanisms still show no effect: NIS actors are still weak in communicating efficiently outside the government initiative framework.

As for Russian research institutes, in fact they were not modernized during the reforms period of 1990's and still preserve features of the former governing system. On the one hand they usually are not oriented towards market relations and competitive innovation activity. On the other hand there is growing isolation of the national S&T community from the world scientific community and modern state-of-the-art S&T. The private sector

[2] R&D the Higher Education Sector Data Book. – Moscow, State University Higher School of Economics, 2005, p.58 (in Russian).

does not increase its spending on externalised R&D in these institutes while the total spending remains shrinking (especially for research organizations outside the Russian Academy of Sciences). As a result, the human, scientific and financial resources of this sector are reducing.

Russian higher education institutions (HEIs) traditionally occupy a marginal part in national R&D vis-à-vis trends for mature market economies. Their central function is still considered to be education and training of professionals and researchers. However there exist some R&D areas, which are not still/already occupied by certain research institutions and therefore monopolized by HEIs.

The position of the Russian research institutions in the National System of Innovation

The administering of science at the federal and regional levels is implemented within the framework of the legislative and regulatory acts effective in Russia. The Federal Assembly of the Russian Federation, the Government and the President of the Russian Federation participate in adopting general legislation and policy decisions in the scientific and technical sphere. On the part of the Federal Assembly the Committees on education, science and culture take part in making science-related decisions at the state level. However the main administrative decisions are made at the government level – at the Ministry of Education and Science of the Russian Federation. These include the issues of the state priorities in the scientific sphere, the adoption and implementation of the state scientific programs, the state financing of science, etc. The system of the state financing of science and technology involves also ministries and departments that are not directly related with science, namely: Ministry of Finance of RF, Ministry of Defense of RF, Ministry of Industry and Energy of RF, Ministry of Information Technologies and Communication of RF and others[3].

At the present time the main instrument of state management in the field of science and technology is the system of orders and R&D financing in the directions that are of priority for the state. In this connection a significant management mechanism in this area is the system of federal economic programs approved by the Ministry of Finance and the Ministry of Economy of RF. The elaboration and implementation of programs related with the sphere of science and technology is performed with the participation of the Ministry of Education and Science of RF.
Following the provisions of the Constitution of the Russian Federation over the past 15 years the laws regulating the S&T sphere were modernized and added substantially. In the first place this refers to the framework and strategic documents, such as the Doctrine of development of the Soviet science dated June 13, 1996, the Federal Law “On science and state scientific and technical policy” dated August 23, 1996, “Basics of the state policy of the Russian Federation in the area science and technology development up to 2010 and for further perspective”, “Strategy of the Russian Federation in the area of science development and innovations for the period up to 2010”. The recent framewoking document was «R&D and Innovation Development Strategy in the Russian Federation until 2015 » approved by Interdepartmental commission on R&D and innovation policy in 2006. Besides the S&T regulation involves quite different branches of the Russian legislation: the regional S&T policy, legal forms, civil laws, budget, IPR, anti-monopoly laws, investments regulations, taxation, labor laws, conversion and others.

[3] S&T and Innovation in the Russian Federation: the Government Support Actions. – Moscow, TACIS, 2006 (In Russian)

For the present the legislation system in the S&T sphere is not sufficiently flexible for an efficient implementation of the country's scientific and technical potential, but continuous work is carried out in this respect.

Apart from the legislative and executive bodies of the federal and regional levels the Russian S&T system includes an enormous academic system covering institutions of the Russian Academy of Sciences (RAS) and its regional divisions, as well as the branch Academies (Russian Academy of Medical Sciences, Russian Academy of Agricultural Sciences, Russian Academy of Education, Russian Academy of Architecture and Construction**,** Russian Academy of Arts). The system includes industrial entities carrying out R&D and providing support to scientific research and innovations: sectoral research institutions, federal and regional unions and associations, financial and industrial groups. The higher education sector is presented not only by universities and academies, but also by a number of certain research centers. Finally both budgetary (The Russian Foundation for Basic Research, The Russian Foundation for Humanitarian Studies) and non-budgetary foundations (Russian Foundation for Technological Development, Non-Budgetary Foundation for R&D of the Ministry of Fuel and Energy of and others) are functioning within the system.

The institutional structure of the Russian S&T system has its specific features. In Russia more than 70% of organizations performing R&D are independent institutions (research institutes of the Academy of Sciences and departmental institutions), while the share of research entities at the enterprises and universities both is about 10%. In the European countries there is an opposite proportion: the industrial sector is the leader but independent research institutes represent quite a small share in the system of science. While in the countries of Europe and in the USA the science is oriented towards market innovations, in the Russian system there prevails a traditional approach of performing state orders for R&D, this being related with the former centralized administrative and planning system in the USSR.

A large number of separate research institutions in contemporary Russia is explained also by the disintegration of large departmental institutions and institutions that were under the Russian Academy of Sciences into smaller entities in the 1990's[4]. A noticeable concentration of research institutions in the state sector is stipulated by the fact that a considerable part of research institutions that appeared as a result of this disintegration preserved the status of state entities. As far as the university science is concerned, only few higher education institutions in contemporary Russia combine educational and full-scale research activities. At the same time the universities performing R&D are characterized by a high quality of their research activity and their personnel.

The research institutions of the business sector were established in the course of the privatization of the state enterprises, design and research state organizations in the 1990's. At the present time this is the most market-oriented part of the Russian research system. However industrial enterprises are not active in carrying out R&D activities owing to a lack of financial resources and insufficient development of the necessary skills and material and technical base.
The isolation of the Russian higher education institutions from the scientific sphere is related also with the problem of the R&D financing and the orientation of non-state

[4] Nekipelova, E., Gokhberg, L., Mindeli, L. Emigration of Scientists: Problems, Real Estimations. CSRS, Moscow, Russia. 1994. (in Russian)

higher education institutions exclusively towards the educational activity. As a result less than a half of higher education institutions are engaged in the research work.

As for the private non-profit sector, this kind of scientific activity is still new and poorly presented in Russia. Nevertheless it is growing: over the past decade a number of such organizations increased fivefold and now includes almost fifty scientific societies and academies.

Mapping the S&T system in Russia

The foundation of high quality standards of R&D were laid as far back as the tsarist Russia. At that period the research activity began to develop not only at the Academy of Sciences, but also at the leading universities and at military laboratories. Thus the history of development of the Russian scientific potential started since the pre-revolutionary time.

After the revolution of the 1917 the activity of the scientific sector was directed primarily to an accelerated buildup of the defense capacity and industrialization and it is in these directions that science mainly developed. During the period before the World War II there was established the "Soviet" style of science when higher education institutions focused on the implementing of education on a large scale and personnel training, while the research activity was performed primarily at the institutions under the Academy of Sciences and departmental research organizations.

After the war the political order in respect of the defense capacity addressed to science was enhanced; the principles of the economic feasibility gave up their place to the considerations of prestige and arms race; the expenditures on science increased; the system of research institutions expanded[5]. However in the 1980's there began to manifest itself the inefficiency of the rigid Soviet research system with the centralized managements. The development changed to decline; the outcome lowered; the order and financing of research began to shrink. In the late 1980's – early 1990's the lack of an internal adaptation mechanism intensified the research system crisis that took place on the background of a general social and economic collapse in the country.

As a result at the present time an S&T system that is unusual for many countries as far as its proportions is concerned exists in Russia (see figure 3). The sector of research institutions that still possesses a considerable potential (but has not established effective links with the business sector) is a base of a research system while the higher education sector that is not sufficiently developed as an R&D institute appears to be an area of growth of the scientific knowledge and of new directions of research activity. Currently one third of higher education institutions create principally new technologies in this country, although the expenditures on R&D do not reach 5% of the total national amount of the science financing (see figure 2). Unfortunately an effective development of the research system in Russia needs to remove the grave and interconnected obstacles such as an insufficient competitive and innovative activity of the business sector, the legislation drawbacks, the insufficiently developed mechanisms of the intellectual property protection, etc.

[5] Gokhberg, L. Basic Research in Russia: Human Resources and Funding. Economic Systems, 18(2) p. 159-178. (in Russian)

Figure 2. Comparison of the RAS' and Russian HEIs' R&D performance[6]

	R&D funding, %	Non-budgetary R&D funding per 1 ruble of the budgetary R&D funding, rub.	New technologies created, %
Total	100	0,98	100
Higher education institutions	4,3	0,99	32,1
Russian Academy of Sciences	11,1	0,31	8,9

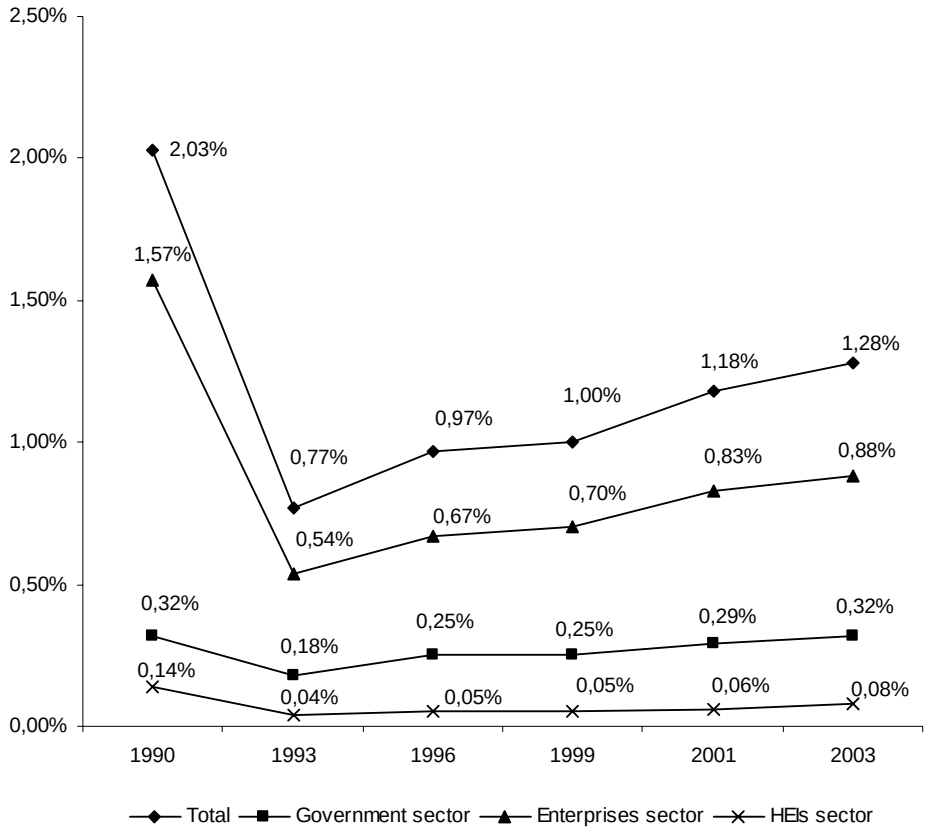
The problems of the R&D financing are one of direct consequences of the institutional and structural non-conformities of this kind. The goal-oriented establishment of the market financial mechanisms and an infrastructure in the scientific sphere started in Russia as far as mid-1990's, but owing to the institutional and regulatory and legal obstacles the have not developed to a due extent. The major part of resources comes to the science sector from the state (about 60 %) in the framework of tenders, state orders, support and development programs[7]. Despite a substantial amount of the state financial resources allocated for science (about 0.7 % of the GDP) the total level still remains low (see figure 3). Three large research foundations are working in Russia but the scale of their activities have not yet reached an acceptable level. This refers also to other sources of non-state financing of science and innovations. Also a disturbing warning is the ageing and insufficient renovation of the material and technical base of R&D**.** As compared with 1997 the cost of fixed assets of science in constant prices reduced by 2,4 fold.

Figure 3. R&D fudging structure in Russia (% of the GDP)[8]

[6] According to the estimations of the Institute for Statistical Studies and Economics of Knowledge and Rospatent

[7] R&D in the Higher Education Sector Data Book. – Moscow, State University Higher School of Economics, 2005, p. 228 (in Russian)

[8] R&D in the Higher Education Sector Data Book. – Moscow, State University Higher School of Economics. p.29 (in Russian)



The activity of using the scientific knowledge, inventions and developments is not high so far in Russia. In respect of using the objects of the industrial property including inventions the leading position (over 90 % of facts confirming the use of inventions[9]) is occupied by the enterprises of the state, federal, private and mixed property. In spite of the fact that the majority of enterprises fall under the private property their share in the innovation process does not correspond it. At close joint stock companies and limited liability companies there prevail useful models with the technical significance and the expenses on their launching being lower as compared to inventions. The inventions are extremely little used by the entities that are the property of the subjects of the Russian Federation, municipal property, property of public organizations, property of foreign legal persons or citizens, mixed foreign property, mixed property combining Russian and foreign participation.

The expenditures on technological innovations in the industry constitute an insignificant part that is clearly incomparable with the actual demand of the domestic economy for renewal of fixed production assets and expanding of the range of principally new competitive produce (less than 1.6 % of the total production volume). Over the past decade one can trace the tendency of lowering of R&D expenditures related with the innovation – from 27 % to 14 %.

The demand for technical innovation on the part of Russian enterprises still remains low and does not meet the requirements of a steady economic growth. The crisis phenomena in the economy caused a considerable fall of the innovation activity level: from 60-70 %

[9] The Rospatent data.

in the 1980's to 5-20 % in the 1990's. Practically speaking three branches determine the general situation in the innovation processes in this country: the engineering, chemical and food industries. They cover 70 % of all innovation enterprises and as a rule are characteristic of the highest level of the innovative activity that exceeds twice the average industry level[10]. At the present time the product life cycle is 12.3 years in the industry on the average while in a number of branches it is almost 15 years. A low interest in scientific innovations is a characteristic of enterprises not only in the raw material branches but in the processing branches as well.

The share of the innovative produce in the total sales volume of the innovation-active enterprises has remained at about 10 %-level for many years. A low outcome of the innovation activity is displayed also in the low novelty level of products. An aggregate share of the principally novel and improved products does not exceed 10 % of the total volume of products shipped by innovation-active enterprises.

Despite of the modest outcomes of creating and introducing the technological innovations one can notice the intensive organizational changes taking place in the Russian industry. The share of enterprises implementing the organizational innovations (over 25%) exceeds twice a corresponding indicator related with technological innovations. Such flexibility testifies to the fact that enterprises are open to build up the production innovations.

The infrastructure of the science and innovation support in Russia is arranged based upon the use of the same components as in many industrialized countries. However Russian "technological clusters", qualification improving centers, networking high-tech companies, etc. show the considerably lower-scale activity as compared to the foreign similar entities. This refers to scientific foundations as well. In Russia to date there have not been established structures that are similar to large European scientific communities. However active measures are undertaken in this direction aimed at increasing the level of the scientific and technical infrastructure to that of the leading European countries.

The priority directions of the science and technology development in Russia are determined at the state level and their characteristic feature is diversity. The official list of the priority directions does not allow defining any explicit specialization of the S&T system: the spectrum of directions is so wide that it covers practically speaking the whole system of science and technology, including the basic directions. One can trace a powerful potential of the defense technologies preserved from the USSR epoch in this area judging by the development of electronics, chemistry of specific materials, etc. The dominating share of publications – 36 % and 27 % respectively – refer to physics and chemistry[11]. In Russia the selection and revision of the S&T priorities at the state level is performed following more simple procedures than in some other countries. The methods of implementing large-scale panel studies of the "Foresight" type are only being developed.

In Russia slightly over 1 % of the working population are involved in the sphere of research and development. About one third of those dealing with science are concentrated in the business sector represented mainly by former branch research

[10] Innovation Activity Indicators. Data Book. – Moscow, State University Higher School of Economics, 2006, pp.12-13 (in Russian)
[11] Science in Russian Federation. Data Book. – Moscow, State University Higher School of Economics, 2005, pp. 482-483 (in Russian)

institutions. The state sector is represented primarily by the institutions under the Russian Academy of Sciences. The number of the scientific personnel working there decreased by less than a quarter (22.6 %) over the period 1990-2002, while the highest decrease of employment was noticed in the higher education sector, by 77.4 % over the same period of time[12].

The indicators of volume and quality of the labor potential in the S&T in Russia are as good as the same indicators for Europe. On the whole over 22 % of the economically active population in Russia have higher education, and the share of those involved in the S&T sphere constitutes 0.68 % of the number of the country's economically active population. However the expenditure on R&D per one scientist in Russia is noticeably lower. For instance they are six fold lower than the corresponding indicator for Germany in comparable prices.

In Russia the majority of the large-scale changes are still at a launching stage. The directions of the reforms are determined by the official document "Strategy of the Russian Federation in the field of science and innovation development for the period up to 2010". It includes an intensive development of an efficient infrastructure and financial mechanisms of science and technology, specifying and support of science growth areas, etc. As an example one can mention the branch federal goal-oriented programs of the scientific and technological profile, the state projects on establishing specific economic areas, the support of the research and innovative universities, etc. New mechanisms of the tax motivation and easy crediting in the sphere of science and technology, the programs on the human capital development, the development of funds for the S&T support, the systems of intellectual property protection mechanisms are implemented.

The HEI system as an emerging area of growth for S&T in Russia

University management system underwent certain changes as Russian higher education developed and the country joined the Bologna process. The Ministry of Education was replaced by the Ministry of Education and Science. This move was designed to promote the government policy in convergence of science and education. The policy was first announced in 1996 (a part of the initiatives described therein was reflected in the Presidential Program "Integration of Science and Higher Education in Russia in 2002-2006"), but it had not been implemented until recently.

The next move in this respect is the attempt to reform research facilities within the Academy of Science. (In the USSR research and development facilities were concentrated under the Academy of Science of the USSR, while universities primarily dealt with education and training). The restructuring of RAS is being heatedly debated now that the Government proposed a "Strategy of the Russian Federation for Scientific Development and Innovation up to 2010". The main argument of the RAS trade union against the strategy is that it will likely slash scientific potential of the country. The Ministry of Education and Science argues that the current RAS system is ineffective and a barrier to innovative development.

Another aspect of the education reform is that some of the ministerial functions are delegated to the Federal Agency for Education and the Federal Service for Control in

[12] R&D in the Higher Education Sector Data Book. – Moscow, State University Higher School of Economics, 2005, pp. 14-15 (in Russian)

Education and Science. In fact, this change in the management system is similar to the OECD model of delegating the ministerial functions to third actors.

The Federal Agency for Education is a federal executive body involved in the management of state property, provision of state services in education, training, youth policy and development of open public educational resources (Government Decree No.288 dated June 17, 2004).

The Federal Service for Control in Education and Science is a federal executive body charged with oversight and control of education and science spheres. Its functions include facilitation of tests, investigations, evaluations, analyses and estimates as required for its oversight role (Government Decree No.300 dated June 17, 2004).

Further changes are to be brought about by the Bologna process and administrative reforms; they will comprise growing autonomy of universities, increasing importance of intermediary agencies, and the central Ministry's functions shrinking to strategic planning only. The quality assessment, certification, accreditation and licensing are already being transferred to the Federal Service for Control in Education and Science.

Still the Ministry's role in the higher education system is huge. It has all financial levers at its disposal. (on average, 70-80 % of university funding comes from the state budget). Ratios differ, but the state contribution is rarely below 40 %. State universities' financial dependence can be lowered by diversification of revenue sources, increase in research activities and integration into the open market.

The developed countries tend to follow the rules that all national education institutions have to combine education with research and innovation. Only 37.5 % of Russian institutions are engaged in research. The total research staff of 29 thousand members of those institutions who combine education with research is insignificant compared to the aggregate teaching staff of over 300,000. The interface between education and research is disintegrating. While in the late 1980's and early 1990's over 70 % of post-graduate students and almost 30 % of full-time students took part in research and innovation activities, the current level of participation is 3-4 times lower.

An average academic salary in 2003 was approximately 4,300 rubles, while research staff salaries averaged 3,300 rubles, i.e. 76 % of the average academic salary. Gross higher education expenses in 2003 amounted to 40 billion rubles , as opposed to 10 billon rubles), of research spending (including 6.3 billion of budget allocations), (1 euro was about 35 rubles in 2003).

Academic research in Russia is disproportionate compared to Europe and US due to budgeting arrangements (research allocations are small and rare, state subsidies are insufficient, other allocations cannot be channeled to research). Consequently, fundamental research allocations keep going down. Currently education institutions account for mere 15 % of the total fundamental research spending in Russia.

What are the major sources of funds for research conducted within tertiary education? What is the balance between government funds and private funds?

The state budget is the main source of research funding in Russian tertiary education. In 2003 it accounted for 61.1 % of total funding, while the private sector finance accounted for 21.9 %. Part of the funding is contributed by foreign sources (4%), research

institutions' funds (5.9 %) and extrabudgetary sources (6%). The contribution of institutional investment (0.9%) and non-profit organizations (0.1%) is marginal[13].

Indeed, the state contribution in 1994-2003 fluctuated insignificantly (it decreased by 5% in total), while the contribution of the private business remained constant. This means that the economic reforms of the past decade had little impact on the structure of the academic research funding. The total funding of academic research as a percentage of GDP has changed only marginally. In 1995 it averaged 0.05 % of GDP (with 0.03 % contributed by the state budget), by 2003 it had grown to 0.08 % (with 0.05 % contributed by the state budget). Overall research funding over this time changed commensurately from 0.79 % to 1.28 % of GDP.

In a single university, the Moscow State University, academic research is now financed through an individual budget item. Tertiary institutions conduct a multitude of projects awarded by ministries and agencies through tenders or dedicated federal programs. They do not enjoy any bidding preferences and have to bid on equal terms with other research institutions. However, the practices of contract execution and signing tend to significantly limit the freedom of tertiary institutions in administration of contract funds.

Teaching staffs' research work

A special survey of the HEI staff performed in the framework of the long-range complex project of the State University – Higher School of Economy "Education economy monitoring"[14] allowed to give an informal assessment of the teaching staffs' research work that, as a specific direction of their employment, is not merely a source of additional earnings but also an investment in their human capital that may cause a positive external effect, thus increasing the quality of educational services provided by higher education institutions. From this viewpoint the motivation of teachers' activity in the sphere of science is of interest for the university management.

For the sample on the whole when answering the question if they are involved in the research activity 79,2% of respondents replied "Yes", those in the state higher education institutions – 81% and in private education institutions – 71,4%. For the majority of them (66,2%) it appears to be writing scientific papers on their own initiative; this kind of work is not always paid for and as indicated above it is often not considered to be an "additional" work, that is to say a "secondary" employment. At the second place is the work under research projects of a higher education institution or a ministry (21% of respondents; approximately equal in Moscow and regions; slightly more at the state higher education institutions than at the private ones). At the third place is the work in the research teams financed by scientific foundations, etc.- 17% of respondents were engaged in such projects, slightly more often at the state higher education institutions than at the private ones. Finally 14% worked under grants within individual projects, this being also slightly more often at the state higher education institutions. A very small share of respondents works permanently at research institutions (4,3%) or at business companies carrying out research activities (3%).

A comparison of different types of higher education institutions shows that the teaching staff of classical universities (90%), as well as those working at pedagogical universities

[13] Science in Russian Federation. Data Book. – Moscow, State University Higher School of Economics, 2005, pp. 65-67 (in Russian)
[14] Education Economy Monitoring. – Moscow, State University Higher School of Economics, 2005. (in Russian)

(83%), would carry out research more often, while at the remaining higher education institutions (technical, humanitarian, arts) their share is 72-75%.

Purely technical obstacles for teachers' research activity are quite insignificant. This points to the fact that the research work would require rather a certain aptitude or more substantial material incentive. A high teaching load (and equally a lack of time) also limits substantially a possibility of conducting research work.

According to the survey of heads of higher professional education implemented under the long-range complex project "Education economy monitoring", the research activities that are really profitable for higher education institutions (contributing profit to the institutions' budget) are performed at half the higher education institutions. In the opinion of heads of higher education institutions this kind of activity correlates with education purposes and 80% of respondents involved in higher professional education are planning to speed it up. In general 79% of higher education institutions provide a possibility of carrying out R&D at their research departments, although the heads of the institutions pointed out that approximately 60% of the total teachers' personnel are competent to perform a research. 62% of higher education institutions are implementing the research projects for the state needs. A competition of students' research is organized practically speaking at all higher education institutions (93%). At half the higher education institutions such form as an internal competition of grants for the research projects of their scientists is implemented (47% of institutions).

Norms and regulations

Different norms and regulations have been introduced by ministries and agencies to hamper an effective administration of state contract funds (limits on maximum per hour rates, subcontractor services, overheads, tangible costs, etc.).

There are no comprehensive criteria for project prioritization. The current Russian R&D prioritization practice does not provide for focusing efforts on the most important research objectives. Official priorities contained in the list of the key research areas and critical technologies are formal and defined so vaguely that they do not facilitate the state funding of related projects.

There are a lot of issues around legal qualifications, accounting and tax filings for the funds transferred to education institutions in the framework of state research contracts. It is unclear whether the contractual relations between ministries and institutions as well as relations between institutions and regulators (Accounting Chamber, Auditing Department of the Ministry of Finance, tax authorities) should be governed by the Civil or the Budget Code. Many institutions find it hard to identify whether state contracts under the Tax Code are dedicated state funding or a source of operating revenues. Extracurricular activities of state-funded institutions are considered legal under the Civil Code if they are consistent with the objectives of these institutions as spelled out in their charters. However, the Budget Code explicitly prohibits state-funded institutions from exceeding the limits of budgetary liabilities. Thus a tertiary institution guided by the provisions of the Civil Code (for instance, if its tuition fee exceeds state allocations for a single student) can be found at fault by regulators.

Contracting ministries, the Accounting Chamber and most education institutions consider state research contracts a type of dedicated state funding. Conversely, all other legal entities enter into state contracts on a different basis. Revenues from state contracts for any organization should be treated as proceeds under Government Regulation No.47

dated 19 January,1998. A proper legal status of state contracts should also be established in accordance with Chapter 25 of the Tax Code effective since 2002; the Tax Code and the Ministry of Taxes and Levies state contract revenues are considered proceeds and are subject to income tax.

The Russian Federal Property Foundation (RFPF), Russian Humanities Research Foundation (RHRF) and the Foundation for Promotion of Small Businesses in R&D were created in order to finance key research activities. RFPF is the key funding agency as it provides money for fundamental research. The funding of these agencies is still inconsistent with the number of applications submitted. The funds continue to administrate state allocations but funding quotas are no longer maintained. In 2003 the funds received 6.9 % of the budget (instead of 8.5 %). The 2004 budget provides for 5.1% of total allocations under item 06 (instead of 6%) to go to the RFPF, and 0.84% (instead of 1%) to the RHRF[15].

As a result Russian science, including the academic research, has an acute financial deficit. The state is trying to limit strictly the number of recipients of funds in order to prevent their diffusion. Vague definitions of key research spheres serve the same purpose. The key objective of the state R&D policy is the restoration and development of the scientific potential of the country and consequently, economic development, according to the Outlines of the R&D Policies of the Russian Federation Until 2010 and Later, adopted on 30 March, 2000. However, existing regulations are not consistent with this policy. A selective development of a negligibly small number of organizations (in a given critical research area or two) will not promote the development of other industries.

The low commerciality hampers the development of the Russian science. The academic research is an enabling environment for research and innovation. There are 92 technological clusters, 129 engineering and 256 methodological centers, 133 research plants, numerous technical and information centers affiliated with education institutions across the country. Over 2,200 small innovative enterprises have been created by tertiary institutions in order to research and develop new products.

The ambiguity of the intellectual property legislation remains the most important barrier for the Russian science. This is especially true in respect of the intellectual property developed through state funding – in order to license this property to third parties, researchers have to register their title to the product/service; establish a local, Russian company for the manufacturing of innovative goods (provision of innovative services); allot a portion of the profits to the inventors and use licensing proceeds for research and development activities.

A successful commercialization of R&D findings will require the support of start-up companies engaged in development and transfer of new technologies through financial aid (such as provided by American SBIR program), tax benefits, legal and information support, establishment of technology transfer centers responsible for industrial application of innovative technologies, patenting and market research.

The current debate on the Russian S&T: the public opinion review

[15] Science in Russian Federation. Data Book. – Moscow, State University Higher School of Economics, 2005, pp. 58-59 (in Russian)

The general interest of the society to science and technology is closely related with the innovational level of the economy, the total contribution of S&T in the economic growth. In this connection particularly significant becomes the practice of the public opinion monitoring on science, technology and innovations. Here we use the results of a public opinion survey of 1995-2006[16]. In 2003 and 2006 the sample size was 2107. All the samples were representative for socio-demographic and regional groups by gender, age, education, macro-region and settlement type.

The surveys showed that the majority of the population is interested primarily in the scientific achievements that are directly connected with their health, comfort and well-being: medicine (37% - high level of interest and 47% - middle level), environment (40 and 45%). At the same time the interest in theoretical areas, e.g., new inventions and technologies (22 and 45%), new scientific discoveries (21 and 45%), space research (15 and 44%) or nuclear power (14 and 38%), is noticeably lower. Only 5% of Russians are interested in specific scientific information sources, 13 % - in popular scientific literature. The majority of people (87 %) would get information on science and technologies from popular TV programs. An overwhelming majority of respondents (71 %) do not attend scientific exhibitions, museums, lectures and other scientific and cognitive events.

An appraisal of the importance of the scientific development is sufficiently high. 50 % believe that the scientific achievements will permit to improve the economic and social situation. On the whole representatives of the educated layers and the youth would hope for the scientific progress to an utmost extent. People mainly believe that science will produce a positive influence on the living standard (78 %), but will have a negative effect on the ecology (53 %). Russians are apt to blame scientists for blunders and failures (apart from 9 % of respondents). They believe that the main reason of the technological (техногенных) casualties and harmful effects lies with the managers and politicians (38 %) who make mistakes in using the novel technologies (or when declining them).

The national significance of science and technology in Russia as a factor of development is decreasing, This was confirmed by 58 % of respondents. Russians are apt to believe that the key factors of their country's prestige nowadays are the rich natural resources (32 %) and the remains of the nuclear armaments (20 %). Mere 4 % believe that Russia may be proud of its science and technologies. In the opinion of many people the main criteria of any country's success is the living standard (30 %), while science is rather an instrument to achieve it.

The prestige of the research activity is also declining steadily in Russia. The crisis of science has gravely lowered the social status of scientists. At the present time only 7 % of Russians think that being a scientist is perspective and 10 % believe that this work is prestigious. In the first place the society appraises the living standard of people involved in science. Mere 26 % believe that it is higher than the country's average and only 13 % of the population – that domestic scientists have got conditions for successful work. Among the urgent measures to improve the position of scientists the respondents indicate the salary increase (67 %).

[16] Gokhberg, L., Shuvalova, O. Russian Public Opinion of the Knowledge Economy: Science, Innovation, Information Technology and Education as Drivers of Economic Growth and Quality of Life. Higher School of Economics, Moscow, 2004.

The appraisal of the state's participation in the science sphere is negative on the whole. Only 16 % of respondents believe that the expenditures of the state on science are sufficient, while 68 % estimate them as too low. Russians have got a clear idea of the state's role in providing support for fundamental research. Only 5 % of respondents doubt its significance. At the same time the majority of respondents consider the reallocation of the budgetary resources in favor of science impermissible if it will affect their own material position (75 %).

The public opinion concerning the innovation climate cannot be characterized unequivocally. 26 % of the population believes that innovations are a factor of the economy development. However the main factors are acknowledged to be the effective legislation (утверждение закона) and order in the country (42 %), the availability of a strong national leader (32 %) and abundant natural resources (39 %). The innovation climate is at the seventh place in this list. In this connection 54 % of the respondents noticed that as far as the technology aspect is concerned Russia is lagging behind the developed countries and mere 8 % believe that she surpasses them in the technology level. 71 % consider the state financing of innovation projects as insufficient.

According to surveys, the innovation behavior of Russians as consumers cannot be called active in some issues. Thus 65 % of the population would not agree to use the genetically modified food products. Nevertheless 23 % of respondents are positive in respect of consuming the technical novelties. Some of them believe that new technologies allow them maintain an acceptable living standard, that is make their life more comfortable (14,4 %). More than 9 % of respondents express fears concerning the interference of modern technologies in their life. The most serious problem of the innovations consumption in modern Russia is evidently the solvent demand. 16,2 % of the population is willing to purchase novelties but they cannot afford it.

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