ANALYSIS

New Science Policy Measures in Russia: Controversial Observations

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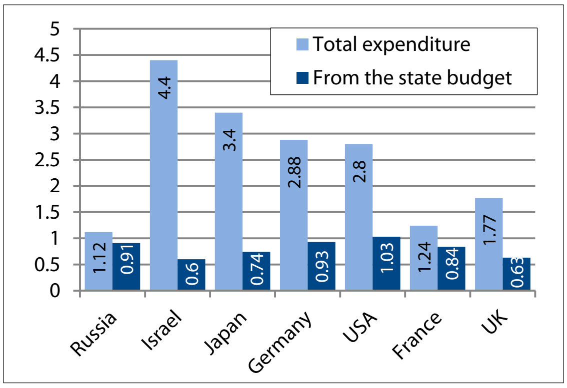
Abstract
In June 2013, a fundamental organizational reform began in Russian science with the transformation of three state Academies—the Russian Academy of Sciences, Russian Academy of Medical Sciences, and Russian Academy of Agricultural Sciences—into one expert "club." The reforms were to be implemented using "shock therapy." However, the first attempts to create something new following the destruction of the old system seem to be inconsistent and controversial. In part, this resulted from the lack of transparency and ill-conceived decisions in government policy.

State of Science and Rationale for Recent Reforms

During the post-soviet years since 1991, the key macro-indicators for the Russian research and development (R&D) complex remained relatively unchanged: Russian science is still funded mostly by the federal budget (Figure 1), while the business sector contributes less than 30% of total R&D expenditures.

Figure 1: Expenditures on R&D, as % of GDP (Russia: 2012; other countries: nearest year available)



Source: Main Science and Technology Indicators, OECD, 2014.

The research workforce continues to shrink, despite several government programs aimed at supporting young researchers, scientific laboratories, and attracting foreign scholars to Russia. Since 2000, the total number of researchers has decreased by 12.5%, and in Academy institutes by 14.5%. The declining workforce by itself would not be an issue if it reflected restructuring of R&D institutions and elimination of "dead wood." However the process was spontaneous. Different sources (anecdotal stories) indicate continuing brain drain, especially among young researchers. The start of the organizational reform gave researchers another reason to search for work abroad. The age structure is another indicator of the continuing stagnation. The proportion of researchers who are 40–60 years old is decreasing steadily and fewer young people are entering the field.

The results of financial, structural and workforce problems are clearly reflected in the bibliometric data: Russia generates fewer publications than other BRIC countries (Brazil, India, China), which are all far behind the world leader, the USA. (Table 1). The number of citations per article (which is an indicator of impact on a research community) for Russia is one third that for the USA.

Table 1: Articles and Citations, BRIC and USA, 2008–2012, World of Science

Country	Number of articles	Citation per article
Russia	135,363	2.56
Brazil	160,443	3.22
India	207,086	3.87
China	699,044	4.01
USA	1,664,136	7.43

Source: Indikatory Nauki: 2014. Statistichesky sbornik (Science Indicators: 2014. Statistical yearbook). M.: National Research University—Higher School of Economics. 2014. p. 373–375.

Thus, the government reforms of the last 22 years failed to produce visible results at the macro level. There are several explanations for this failure. First, significant increases in the federal funding of science, which officials often cite as improvements and achievements, followed the sharp decline and long stagnation in the government funding of R&D after the breakup of the USSR. Such a "catch up" in funding, coming at a low point for Russian science, could not yield fast results, especially because other conditions for research remained unfavorable. Indeed, the scientific workforce has deteriorated, some areas of research either ceased to exist or lagged far behind the world level, and the educational system lost the infrastructure and skills necessary for training modern specialists. Second, the increase in federal funding was not accompanied by support from industry; applied research was in decline and the gap between research and its practical applications, as well as an overall disconnect between science and industry became unresolved issues. Third, the government science policy had few breakthrough ideas while retaining old research-theme priorities (which have barely changed since 1996, when the first "priority list" of major directions in R&D and "critical technologies" was approved by the President) and implementing organizational changes in the science sector at a rather slow pace. The Academy system remained unreformed for a long time, and the universities were managed mainly as a teaching system.

Therefore, recently the government focused on a transformative organizational reform of Russian science, because its outdated structure has been seen as a major reason causing low research productivity. The government proceeded in two primary directions. First, universities were encouraged to do more research, including fundamental studies. Second, after years of confrontation, in 2013, the Academy system, as a quasi-ministry of fundamental research, was abolished and replaced by a new agency—the Federal Agency of Scientific Organizations (FASO), which inherited 1,007 Academy institutes.

Organizational Reform

"Research" Universities

The university system has been the center of government attention since at least 2006, when the first large portion of funding was provided to a select group of universities (57 higher educational institutes). Later, the Ministry of Education and Science bestowed the status of "Research University" on 29 higher education institutes. This status was awarded following a competitive selection process and accompanied by generous financial support for a 5-year period. Finally, in 2013, a new program, called "5 in the top 100" was initiated and 14 universities received generous amounts of additional federal funding. The aim of the government support is to propel 5 of these 14 into the world's top-100 lists by 2020. Thanks to this program, the average yearly budget of "elite" Russian universities has grown from 523 million RUR in 2006 to 1,125 million RUR in 2012.[1]

For the chosen universities, strengthening research is only a part of the agenda. Nevertheless, the set research goals and the conditions for achieving them are not quite in line. These universities have to boost the number of publications and citations, while placing more papers in international journals. Moreover, they have to attract foreign students (their share has to be at least 15% compared to the average 3%) and professors, which in turn, requires more teaching and research to be done in English—a serious challenge since most universities have no adequate capabilities for doing this. In the current political environment (i.e., sanctions), these goals become even more difficult to achieve.

Additionally, while research is encouraged and highly ambitious goals are set for publications, teaching loads for university professors continue to be large compared to Western countries, where universities play an important role in fundamental and applied research. At present, the Ministry of Education and Science, which regulates universities, recommends that teaching loads should not exceed 900 hours per year. Informally, universities take this number as the recommended minimum.[2] A separate recent government order dictates doubling the salaries of the teaching staff at universities relative to the average salary in the respective regions, and that universities "meet this goal" by increasing teaching loads. As a result, at some universities, teaching loads were increased up to 1,000–1,200 hours per year, which does not stimulate university professors to be more involved in research.

The above facts show that the contradictory actions taken by the government to reform science frequently undo its own intentions. New instruments are developed without considering their compatibility with the existing requirements introduced by previous (or even concurrent) government orders.

Academy Transformation

Last year's Academy reform was the most important change the institution faced in the last 100 years. The transformation remains incomplete since the President announced a moratorium for the year 2014 on any property operations as well as workforce changes (personnel cuts) at the former Academy institutes.

Structural changes in the governance of the Russian Academy of Sciences (RAS) were certainly needed. The Academy's problems have been discussed for quite a while. RAS, Russian Academy of Medical Sciences and Russian Academy of Agricultural Sciences were the three largest state institutions in the academic sector. In 2012, RAS covered 436 scientific organizations, employing 48,400 scientists. The average age of the Academy scientists was 51.9 years and steadily increasing over the last ten years. RAS is often compared to the French National Centre for Scientific Research (CNRS) and the German Max Planck Society. RAS is closest to the Max Planck Society in terms of total funding; however, its funding per scientist is half the size of its German counterpart. Consequently, Russian academics produce fewer pub-

1 Data from National Training Fund, 2014.

2 The discussion on this subject many be found at "How to decrease teaching loads of university teachers?"—Troitsky variant, 2014. no. 14. p. 4.

lications: according to 2009 data, a Russian Academy scientist on average had 1.43 publications, whereas scientists employed by the Max Planck Society averaged 9.17. The gap in citations for Max Planck scholars was smaller (11.97 citations versus 2.66 citations for RAS).[3]

As a result of the reform, the Academy lost its network of subordinate research institutes, along with the right to manage the Academy's property. Conflicts of interests among the state Academies, which previously had the power to both distribute and spend resources, were eliminated.

After the reform, the productivity of scientists should eventually grow—at least this was a major reason for implementing the reform. However there are at least three challenges. First, the Academy is "old" in terms of the average age of its scientists. In 2012, 26% of researchers in Russia were over 60 years old, whereas in the Academy, this number was 34.3%.[4] Therefore, serious changes in policies directed toward the workforce should be implemented. Indeed, FASO plans to cut staff, though only those employed in administrative and auxiliary services (from 51.7% (2013) to 40% (2018)) will be affected. FASO also plans to increase the share of young scientists (up to 35 years old) while retaining the same total number of researchers. Enacting workforce changes takes time and so does growth of productivity. Also, this plan implicitly implies that small organizations, which have a greater share of administrative staff, will be either merged with larger organizations or closed. This approach creates a basis for changes in organizational composition without considering the quality of research conducted in affected organizations. Therefore, the quality of research is at risk.

Second, there is an ongoing discussion about future changes in the executive leadership of the former academic institutes. According to the draft legislation, directors and deputy directors will have to retire from their positions at the age of 65. Estimates show that 70–80% of the current leadership will change if the bill is approved.[5] Whether the successors will have enough experience to lead the new institutes remains an open question because many current directors have not groomed potential successors.

Third, FASO plans to evaluate and reconfigure former Academy institutes. As a result, only a part of them will be involved in fundamental research. The idea is to strengthen the practical component and to create organizations that are aimed at solving different tasks:

- Research in areas defined as government priorities;
- Development of technologies that are critically important for technological modernization;
- Scientific support for regional development.

Whether this positively influences scientists' publication record is very doubtful.

Changes in Financing

Along with restructuring the Academy sector, the government introduced a new financial mechanism in the form of the Russian Science Foundation (RSF), established in 2013. Due to the redistribution of government resources (closure of a number of initiatives supporting researchers and research groups within federal targetted programs), RSF received generous budget support and became the largest government science foundation in Russia (Table 2).

Table 2: Science Foundations in Russia: Current and Planned Budgets, billion RUR

Name of the foundation	2014	2015	2016
Russian Science Foundation	11.4	17.2	19.1
Russian Foundation for Basic Research	9.2	10.93	14.3
Russian Foundation for Humanities	1.54	1.82	2.37

Source: Ministry of finance of the RF

The RSF leadership, from the beginning, announced several major principles of operation. First, the Foundation supports fundamental and exploratory research. Second, it intends to support the "best of the best" in terms of research and labs. Third, one of the major criteria for evaluating proposals and assessing the results will be bibliometric data (number and quality of publications). Fourth, RSF will be financing comparatively large projects—starting from 5 million RUR per year (to support research groups up to 10 people). For comparison, an average grant size from the Russian Foundation for Basic Research for a similar research project is 500,000 RUR. Fifth, RSF stated that it would welcome foreign participation in research teams as well as encourage young researchers.

To date (August 2014), RSF completed three types of competitions—to support research groups (grants up

3 Q. Schiermeier, "Russia to Boost University Science," *Nature*, no. 464 (1257), 2010, <www.nature.com/news/2010/100427/full/4641257a.html>.

4 Indikatory Nauki: 2014. Statistichesky sbornik (Science Indicators: 2014. Statistical yearbook). Moscow: National Research University—Higher School of Economics. 2014. p. 48; 183.

5 <https://www.ras.ru/news/shownews.aspx?id=21dd12a4-6b38-4ea0-b081-4dbb9e1743b1>

to 5 million RUR per year, for 3 years), existing laboratories (5–20 million RUR per year per lab), and new laboratories (10–25 million RUR per year per lab). The institutional structure of applicants and grantees is presented in Table 3.

Table 3: RSF Support for Research Groups and Laboratories

Type of organization	Applications, % to total	Grants, % to total
Research groups		
Academy institutes	35	59
Universities	57	32
Existing labs		
Academy institutes	41	58
Universities	49	34
New labs (jointly universities and research institutes)		
Academy institutes	26	34
Universities	62	55

Source: RSF data, <http://www.rscf.ru/>

The results of competitions were widely discussed in the research community and opinions were divided. The table shows that universities are active in submitting proposals while former Academy institutes are more successful in winning grants. This may be a confirmation that the level of fundamental research is higher in Academy than at universities. At the same time, there may be some priorities in the Foundation's work—for example, in the competition for establishing new labs, 21 projects out of 38 supported will be implemented at universities. This shows that the Foundation intends to develop new divisions predominantly at universities.

Other data for the first two competitions show that not all the intentions pronounced by RSF were realized: many principle investigators (PIs) are 60–70 years old (labs: 51%; older than 70: 23%). Thus, young researchers have not been intentionally promoted to project leaders.

Another issue was related to expert evaluation—some PIs are top administrators (rectors, directors, vice minister) (in lab grants: 20.5% of the winners are directors and deputy directors of institutes). Therefore, some raised questions about the quality of the peer-review process. The Foundation intends to organize international peer review sessions, but negotiations take longer than expected. In the end, the major question in regard to the Foundation's activity—"Has anything changed dramatically?"—does not have a clear answer yet.

Conclusion

Despite years of reforms, the Russian R&D complex continues to be funded mainly by the government and the government's role is increasing. One of the biggest problems is the workforce—researchers leave, while those who remain are growing older; the lack of younger people is becoming more apparent. The result is low output, as measured by the number of publications and their citations. The government is attempting to reverse this trend by implementing various measures aimed at either gradual (for universities) or sharp (Academy) organizational changes. Both developments are positive because the organizational structure of Russian science was outdated. At the same time, for achieving the new goals (e.g., creating research universities, increasing productivity of the former Academy institutes), the institutional environment also has to be modified. Otherwise, the government decisions will continue to be ill conceived.

About the Author
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Recommended Reading
For an extended analysis of publication outputs for the Russian Academy and universities and of the recent Academy reform see:

- V. A. Markusova, A. N. Libkind, M. Jansz & L. E. Mindeli. Bibliometric Performance in Two Main Research Domains: The Russian Academy of Sciences and the Higher Education sector. Collnet Journal of Scientometrics and Information Management. Volume 8, issue 1, 2014. pp. 49–60.
- I. Dezhina. Russia's Academy of Sciences' Reform: Causes and Consequences for Russian Science. Russie. Nei. Visions. #77. May 2014. Ifri—Paris, 2014. 27 p. <http://www.ifri.org/?page=contribution-detail&id=8097&id_provenance=97& lang=uk>
- F. Clark. Reforming the Russian Academy of Sciences. The Lancet, Volume 382, Issue 9902, pp. 1392–1393, 26 October 2013. <http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2813%2962142-X/fulltext>