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The review provides a detailed analysis of main trends in Russia's economy in 2015. The paper contains 6 big sections that highlight single aspects of Russia's economic development: the socio-political context; the monetary and credit spheres; financial sphere; the real sector; social sphere; institutional challenges. The paper employs a huge mass of statistical data that forms the basis of original computation and numerous charts.

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The situation in the science and innovation sphere in Russia in 2015¹

5.4.1. Budget constraints

In 2015, the budget allocations to civilian research and development (R&D) were cut by approximately 8% at current prices by comparison with the targets set in the basic version of the *Law on the 2015 Federal Budget and 2016–2017 Budget Plan*² (Table 13). The reduction in the amount of budget funding is of critical importance for the science sector, because the federal budget has remained the principal source of funding for research and development, covering about 70% of the aggregate expenditures on R&D.

Table 13

Changes in budget allocations to R&D in 2015, by core program, bn Rb

Title	Law No 384-FZ*	Actual allocation**	Deviation, %
<i>State Program of the Russian Federation for the Development of Science and Technology in 2013–2020</i>	164.4	151.68	-7.7
<i>Federal Targeted Program Research and Development in the Priority Areas of Development of the Russian Scientific and Technological Complex for 2014–2020</i>	23.7	21.39	-9.7
<i>Subprogram Fundamental Scientific Research</i>	109.0	102.0	-6.4

* Federal Law of 1 December 2014, No 384-FZ (amended as of July 13, 2015) on the 2015 Federal Budget and 2016–2017 Budget Plan.

** Summary of the quarterly spending profiles of the federal budget as of October 1, 2015.

Source: RF Ministry of Finance.

Although fundamental research represents an expenditure category that has been cut in the least degree, the overall downward trend displayed by it has become obvious. While back in 2008 the allocations to fundamental research amounted to 25.7% of the aggregate expenditures on R&D, by 2013 their share had shrunk to 17.4%.³ In 2015, the most substantial budget cut was made to the programs of the Russian Academy of Sciences (RAS), as the actual funding allocated to them amounts to only half of the initial planned target. At the same time, the amount of basic expenditure allocations to the Academy's subordinated institutions was reduced by only 5%⁴.

The plans for 2016 indicate that in spite of the increased funding allocated to some special expenditure items, the allocations to fundamental research will be subject to major cuts. This conclusion is vividly illustrated by available data on changes in the amount of budget funding earmarked for the foundations set up to support fundamental research (Table 14). The planned budget allocations to the following three entities – the Russian Science Foundation (RSF), the Russian Foundation for Basic Research (RFBR) and the Russian Humanitarian Science Foundation (RHSF) – are below the corresponding indices for 2015, even in absolute terms.

¹ Author of this section: Dezhina I. – Gaidar Institute for Economic Policy.

² Federal Law of December 1, 2014, No 384-FZ (amended as of July 13, 2015) on the 2015 Federal Budget and 2016–2017 Budget Plan.

³ *UNESCO Science Report: towards 2030*. Paris: UNESCO, 2015, p. 347.

⁴ A. Subbotin. *Program malfunction. The sequester disrupts scientific research plans*. *Poisk* (in Russian), No 43 2015, October 23, 2015 <http://www.poisknews.ru/theme/science-politic/16167/>

However, the situation faced by each of the foundations is by no means the same: thus, the RSF was able to offset the loss of budget funding by the gift of Rb 14.9bn received from OJSC *Rosneftegaz* to cover its research projects. In this connection, *Rosneftegaz* put forth no specific conditions as to how the funding should be spent (for example, that it should be earmarked for those projects that are of interest to the sponsor)¹. Earlier, the RFBR had also received gifts of money from commercial companies, but on a much more modest scale and always to cover the costs of targeted contests, where projects were to be launched in those fields that were relevant for the sponsoring companies.

Table 14

Budget allocations to science foundations, bn Rb

Foundation	2015	2016 – law	2016 – draft	Draft to law, %
1	2	3	4	5 = 4/3 x 100
Russian Science Foundation	17.2	18.8	15.5	90.1
Russian Foundation for Basic Research	12.2	14.0	11.0	90.2
Russian Humanitarian Science Foundation	2.0	2.3	1.8	90.0

Source: RF Ministry of Finance.

The *State Program of the Russian Federation for the Development of Science and Technology in 2013–2020* retains its central place among the budget-funded civilian R&D. The amount of expenditures on this program has shrunk by 12.5%, while that allocated to the Federal Targeted Program *Research and Development in the Priority Areas of Development of the Russian Scientific and Technological Complex for 2014–2020* (large-scale applied research) has remained practically unchanged. It is important to maintain the planned level of allocations to R&D in the framework of that program because it is mostly from this source that the creation of new technologies (for example, photonics, neurotechnology) is being funded.

At the same time, the cuts in budget expenditures on R&D at the macrolevel occurred approximately in the same proportion as the cuts on other items. Therefore, when taken as a share in GDP, the volume of funding allocated to the principal research and development fields has demonstrated no change either on the targets set in Federal Law No 384-FZ or on the previous year, and its indices are as follows²:

- basic research – 0.2% of GDP;
- applied research in the field of national economy – 0.2% of GDP;
- applied research in the field of national defense – 0.4% of GDP.

5.4.2. New target indication in the field of research and development

In 2015, the *Strategy for Innovative Development of the Russian Federation Until 2020* was revised, and some relevant alterations were made in respect of its targets and the content of tasks to be accomplished. The *Strategy*, in its new version, has undergone significant alterations both with regard to the targets set therein, and the essential features of the planned measures.

First, it is suggested that the share of funding competitions in the field of research and development should be increased, while the principles governing the operation of the science funds be left unchanged. At present, it is expected that the work carried out in the framework of research projects funded by grants issued by the RFBR and the RHSF should be done in the

¹ N. Volchkova. *To begin and to continue. The RSF's grants will grow in size and in time*. Poisk (in Russian), No 46, November 13, 2015. See <http://www.poisknews.ru/theme/science-politic/16440/>

² In accordance with Annex 8 to the Explanatory Note attached to the draft of the *Federal Law on the 2016 Federal Budget*.

researchers' spare time, on their days off and holidays, while the travel to conferences covered by conference participation grants should take place during their vacation periods. So, it appears feasible to increase the amount of funding allocated to grants alongside the introduction of new terms for spending these funds.

Second, it is intended to make it compulsory for the RFBR and the RSF to conduct more competitions that will require co-funding from private sources. Given the low business activity in the field of R&D, such a requirement will translate into pressure on scientific research organizations and higher educational establishments, but not into positive incentives for commercial companies. In addition, the government has already voiced its demand that the science foundations should not only provide financing for fundamental and exploratory research project initiatives, but also to develop medium- and long-term programs along the lines of the current government programs – that is, to single out priority themes. This requirement is stipulated in the alterations to the Federal Law *On Science and State Scientific and Technological Policy*, introduced in July 2015.¹ So, the amount of funding allocated to fundamental research projects addressing the issues suggested by the scientist community is being reduced, and so the new progressive research fields that cannot be properly identified and recognized by the priority-setting government agencies may suffer from lack of funding.

The logic behind the government's actions can be perceived as a threat to the independence of the RFBR and the RHSF (and consequently to the allocations assigned to them in a separate line in the state budget, which can also be lost), when these two foundations will become subordinated to the RF Ministry of Education and Science. The Ministry has already released for public discussion the drafts of its decrees whereby alterations are to be introduced in the RFBR and the RHSF's charters², in accordance with which 'some of the functions and powers of the Foundation's founder envisaged in the charter shall be executed by the Ministry of Education and Science of the Russian Federation'. To be more precise, 'some powers' include those of appointing and dismissal of the Foundation's director, approving the membership of the Foundation's Board, preparing and approving government assignments, and a number of other important regulatory and supervisory functions. If the governance functions should be divided in this way, the foundations will have to reorient their activities to the achievement of those goals that are important not from their own point of view, but from the point of view of the RF Ministry of Education and Science. Thus, only one foundation will remain independent – the RSF.

The alterations introduced into the *Strategy for Innovative Development of the Russian Federation Until 2020* with regard to the main R&D targets are also noteworthy. By comparison with the *Strategy's* previous version, most of these targets have been downgraded. Thus, it is planned that the expenditures on research and development should be increased to 1.77% of GDP by 2020, while earlier this target was already to be reached by 2015. The new target, while being low, is sufficiently realistic, if one is to consider the general movement pattern displayed by Russia's expenditures on R&D as a share in GDP over the past decade. At the same time, in the developed countries the R&D expenditure index varies from 2.6% to nearly 5% of GDP. So, the new low target implies that the gap between Russia and the developed countries will be widening, as far as the intensity of investment in R&D is concerned.

¹ Federal Law *On Introducing Alterations to the Federal Law 'On Science and State Scientific and Technological Policy' in the Part of Improving the Financial Instruments and Mechanisms of Support of Scientific and Technological Activity in the Russian Federation*, No 270-FZ dated July 13, 2015. See <http://pravo.gov.ru/laws/acts/54/5055484510601047.html>

² A. Gorbatova. *Alterations will be made to the charters of the RFBR and RHSF*. August 20, 2015. See http://www.strf.ru/material.aspx?CatalogId=221&d_no=103488#.Vm3FQb8yTOA

Another index describing the performance level in the sphere of scientific research – the share of publications by Russian authors in the total number of publications in international scientific journals indexed in the Web of Science database – was likewise moved to 2020. Initially, this index was to rise by 2015 to 2.44%. In the *Strategy* it is stated that as of 2014, it amounted to 2.05%.¹

5.4.3. Science at higher educational establishments

The development of science-related activities at higher educational establishments remains one of the priorities of the government policy in the field of science. Much attention in this connection was paid to the universities participating in Project 5-100.² Their latest ranking in the world's top ratings were discussed, as well as the movement of their scientific research indices and the factors that can either speed up or slow down their development. The current estimates of the progress of scientific research at Russia's leading universities demonstrate that none of the 15 higher educational establishments that have received hefty chunks of budget resources specifically for that purpose were able to follow the letter of the Executive Order of the RF President (which requires that no less than five universities should by 2020 be ranked among the world's top hundred).³ So, *de facto* this goal has been adjusted, and Russia's universities are now expected only to get into the top segments of by-subject rankings, which is achievable in view of the current trends. Thus, for example, the Times Higher Education (THE), two of Project 5-100 higher educational establishments – National Research Nuclear University MEPhI and Novosibirsk State University⁴ were ranked among top 100 for 2015 in the field of physics. The other fields where Russia ranks above average in the world publication stream (and so its higher educational establishments specializing in these subject areas have the potential for getting ranked among top 100), are outer space exploration, Earth science, mathematics and chemistry⁵.

In part, the increasing number of publications assigned to higher educational establishments can be explained by the fact that their authors, who hold academic posts at those higher educational establishments as a second job, in addition to their research posts at the institutes belonging to the RAS system, have begun to state their university affiliation. As a result, the share of

¹ Bibliometric experts note that this index may vary depending on the specific methodology applied in the calculations. As a result, according to data released by the National Training Foundation, the Web of Science citation index of the articles written by Russian authors had increased by 2014 to 2.28%, and that of Russian publications of any type – to 1.7%. As stated by Thomson Reuters, the overall citation index of Russian publications amounts to 1.73%. According to data released by the RF Ministry of Education and Science for 2014, the share of Russian publications over that year amounted to 2.17%. Source: *To improve the quality and increase the number of scientific products by Russian authors*. Presentation materials, Ural Federal University, October 6–7, 2015. See http://urfu.ru/fileadmin/user_upload/common_files/events/Pismo_v_Institutu_UrFU_Seminar_po_naukometrii.pdf

² Project 5-100 is aimed at boosting the competitive potential of Russia's leading universities among global research and education centers. Its goal is to maximize the competitive position of a group of leading Russian universities in the global research and education market. Source: <http://5top100.ru/>

³ Executive Order of the RF President dated May 7, 2012, No 599 *On Measures on Implementation of National Policy in Education and Science*, see <http://5top100.ru/documents/regulations/671/>

⁴ K. Bolokhova. *From general to specific: why are the by-subject ratings of higher educational establishments more attractive for Russia?* November 23, 2015. See http://www.strf.ru/material.aspx?CatalogId=221&d_no=110329#.Vm2mf78yTOA

⁵ V. Ivanov, V. Markusova, L. Mindeli. *Money and its yield. Analysis of the cost-effectiveness of investment in Russia's higher school, with regard to publications*. Poisk (in Russian), No 22, May 29, 2015. See <http://www.poisknews.ru/theme/science-politic/14780/>

articles authored jointly with RAS research institutes in the total number of publications released by Project 5-100 universities has increased¹. Some higher educational establishments developed special programs for boosting the citation index of their publications. A noteworthy example is the Hirsh citation index program launched by Tomsk Polytechnic University, nicknamed the *Hirsh Rocket*, which offers services that involve translation and publication of scientific articles in international journals². A number of higher educational establishments began to pay for the publication of their articles in India's and China's journals, where the access was much easier³, and by doing so they managed to boost their international citation indexes. However, this effect proved to be temporary, because the databases run by the Web of Science and Scopus are subject to regular cleanups, when all 'trash' journals are removed from their data sets. Besides, the ranking criteria for scientific publication are also being regularly revised – as did QS in 2015⁴, when it began to reject articles signed by more than 10 names and introduced coefficients when counting the citation rates for each subject. The upshot was that eight of Project 5-100 higher educational establishments (that is, more than half) got downgraded in their QS ranking⁵. Thus, the incentives for getting a higher ranking boosted ingenuity in finding ways to improve formal citation indexes, but not a genuine interest in scientific research.

In this connection, the official have pointed out many times that getting the required ranking should not be a goal *per se*⁶, but only an indicator of a higher educational establishment's profile in the international landscape, and its quality market in the fields of science and education. Project 5-100 was officially recognized to be successful, and the funding allocated to it (which was initially geared to a three-year period (until 2015) was increased to last until 2020⁷. Meanwhile, the number of higher educational establishments competing for a higher ranking increased: after an additional contest in October, another 6 higher educational establishments were included in Project 5-100⁸.

Almost simultaneously, the report *5-100: The price of a failure* prepared by the social movement organization *Supervision in Education in Science*⁹ was released, where it was concluded that the budget resources to the value of Rb 30bn that had already been spent yielded no relevant results, and that the project management system is inefficient and expensive. Indeed, over the

¹ The champion was the National Research University Higher School of Economics (NRU HSE) where, as demonstrated by data for 2014, the number of publication increased 8.8 times, and the number of articles co-authored by written by scientists working in the RAS system - 13 times on 2010, respectively. Source: V. Ivanov, V. Markusova, L. Mindeli. *Money and its yield. Analysis of the cost-effectiveness of investment in Russia's higher school, with regard to publications*. Poisk (in Russian), No 22, May 29, 2015. See <http://www.poisk-news.ru/theme/science-politic/14780/>

² *Hirsh Rocket* (Hirsh citation index): *We can help you in getting your article published*. See <http://rh.tpu.ru/>

³ *QS has run out of citations* // Kommersant, September 22, 2015. See <http://www.kommersant.ru/doc/2815455>

⁴ QS World University Rankings is a global career and education network that highlights the world's top universities, set up by (QS) Quacquarelli Symonds Ltd, a UK consulting company.

⁵ Ibid.

⁶ See, for example, A. Chernykh. *Universities will be distributed among industries*. Kommersant, No 193, October 19, 2015 <http://kommersant.ru/doc/2836046>; K. Bolokhova. *From general to specific: why are the by-subject ratings of higher educational establishments more attractive for Russia?* November 23, 2015 http://www.strf.ru/material.aspx?CatalogId=221&d_no=110329#.Vm2mf78yTOA

⁷ K. Bolokhova. *From general to specific: why are the by-subject ratings of higher educational establishments more attractive for Russia?* November 23, 2015 http://www.strf.ru/material.aspx?CatalogId=221&d_no=110329#.Vm2mf78yTOA

⁸ *6 new higher educational establishments were selected for Project 5-100*. October 26, 2015. See <http://5top100.ru/news/20951/>

⁹ Published on November 20, 2015, see <http://обрнадзор.рф/вдействи/5-100/>

three years while the project was being implemented, only two higher educational establishments were able to get ranked in the third hundred in one of the ratings (THE). To be fair to university researchers, it should be noted that the policy towards higher educational establishments has continued to be restrictive rather than conducive to increasing their visibility on an international level. We are speaking first of all of the human resources policies, when in order to boost their average salary indices¹ the administrations of higher educational establishments began to increase the academic workload of their staff.² Such an approach can hardly improve the incentives for scientific research growth in terms of volume and quality. Some problems have also occurred in Project 5-100 management system, where the rate of red tape in reporting is higher than in the projects funded by grants or under government contracts.

5.4.4. The main directions of reform in the RAS

The ongoing reform in the Russian Academy of Sciences has continued to be the focus of public attention in the science sphere. When cleared of all the hullabalos, it all boils down to this: a lot of ideas, programs and measures have been discussed, but few of the actually adopted decisions can be called truly reformatory - that is, reaching beyond the inventory and record-keeping issues. Among these, the following ones are the most noteworthy:

1) doubled amount of the special supplementary payments to Academicians and Corresponding Members of the RAS; the introduction of the title of Professor of the RAS;

2) rotation of the directors of research institutes in order to get younger people occupy major administrative posts in the field of academic science;

3) continuation, in an 'initiative mode', of the process of merger of institutes within the RAS system, and not only those with similar profiles, but also some of the institutes with different profiles, including those situated in different cities at a considerable distance from one another.

Among the innovations introduced in 2015, we may also note the palliative solution to the issue of division of functions between the RAS and the Federal Agency for Scientific Organizations (FASO) - the so-called 'rule of two keys', whereby the areas of responsibility for each of the two entities should be clearly outlined.

All the other initiatives are now undergoing the discussion phase, including (1) the system for assessing the performance of scientific research organizations, where the discussion hot-point was the principles to be applied in creating the reference groups for comparative assessment of organizations;³ (2) the principles of drawing up government assignments for fundamental and exploratory research, including definition of the types of activities to be funded through a competitive process, and their relative proportions; (3) the program for creating a reserve of human resources for the FASO (training of efficient managers for scientific research organizations).

The progress of reform in the academic sector is estimated by scientists and experts be on the whole more negative than positive. Thus, the academicians and the activists of the scientist

¹ In accordance with Executive Order of the RF President No 599 *On Measures on Implementation of National Policy in Education and Science*, by 2018 the average salary level of the faculty members of higher educational establishments should be twice above the average salary of the region where a given higher educational establishment is registered.

² By way of illustration, see the case of Moscow Institute of Physics and Technology (State University): A. Arutiunov, M. Balashov, R. Karasev, D. Tereshkin. *MIPT: Questions without answers*. *Troitsky Variant - Science (Newspaper)*, No 193 of 8 December 2015, p. 5, see <http://trv-science.ru/2015/12/08/mipt-voprosy-bez-otvetov/>

³ This discussion was underway throughout 2014. See *The State of Science and Innovation. Russian economy in 2014. Trends and outlooks* (Issue 36) – M.: Gaidar Institute, 2015, pp. 348–349.

community (for example, those who are members of the Council on Science under the RF Ministry of Education and Science) believe that negative consequences prevail.¹ At the same time, the officials responsible for the development of science in this country² estimate the reform to be positive. It should be noted that the critics of reform have used many arguments to support their negative viewpoint, while its proponents can offer practically nothing to counter those arguments.

For the scientist community on the whole, the major threat associated with the measures that are being implemented as part of reform is that they may bring about a dramatic shrinkage of the human resources potential involved in scientific research, the liquidation (by means of a merger) of some of the existing research institutes, and distortions in the structure of scientific research as a result of cuts in basic budget funding. On the positive side, as noted by some academicians, the ongoing processes resulted in the following major achievements:

- 1) the transfer of the function of managing the economic activities, properties and land from the RAS to the FASO in the situation of a perpetually changing normative-legal base and the high costs associated with the procedures of property right formalization and property registration;³
- 2) the appointment of younger people to the posts of heads of scientific research organizations (the Presidium of the RAS should coordinate the list of candidates for the posts of heads of scientific research organizations);⁴
- 3) the temporary character of the increased bureaucratic workload. It has increased because the initial phase of reform involves inventory checks; meanwhile, the scientists working in the well-run research institutes do not feel any additional workload.⁵

The decisions concerning human resources

From 1 July 2015 onwards, the supplementary academic payments for the titles of Academician and Corresponding Member of the RAS were raised to Rb 100,000 and Rb 50,000 per month respectively.⁶ The amounts of supplementary academic payments for the other state

¹ Thus, in particular, the Council on Science under the RF Ministry of Education and Science, at its meeting on October 29, 2015 stated that 'no positive changes have occurred so far in the institutes of the RAS, a surge in paperwork was noted'. Source: http://sovet-po-nauke.ru/sites/sovet-po-nauke.ru/files/data/Presentation_A.R.Khokhlov_29_10_2015.pdf

² Andrei Fursenko, Aide to President of Russia, saw some positive shifts in the development of Russian science after the launch of reform in the RAS (Fursenko sees positive shifts in the development of science after the reform in the RAS. TASS, August 26, 2015. See <http://tass.ru/nauka/2211616>; RF Minister of Education and Science Dmitry Livanov views as the positive outcome of the reform that science '...will increasingly move into universities' (Livanov: *Every higher educational establishment gets money to increase its salaries, but not every one of them uses it in the right way*. Business FM.RU, November 3, 2015. See <http://www.bfm.ru/news/307034>. However, at the same time the Livanov noted that so far, 'only the zero phase has been passed, the phase of alterations introduced into the order of subordination'.

³ Academician Fortov: *About the reform of the Academy – without anger or bias*. The Independent Newspaper, February 10, 2016. See http://www.ng.ru/science/2016-02-10/9_reform.html

⁴ Academician A. Aseev. *Reform of the RAS as a threat to national security*. REGNUM, December 8, 2015. See <http://regnum.ru/news/innovatio/2029988.html>; Academician Fortov: *About the reform of the Academy – without anger or bias*. The Independent Newspaper, February 10, 2016. See http://www.ng.ru/science/2016-02-10/9_reform.html

⁵ Academician A. Kuleshov. *Science is degrading every year, every hour*. Gazeta.ru, December 9, 2015. See http://www.gazeta.ru/science/2015/12/09_a_7943969.shtml

⁶ Decree of the RF Government No 480 *On Introducing Alterations into Item 1 of Decree of the Government of the Russian Federation of 22 May 2008, No 386* dated May 19, 2015. See <http://government.ru/media/files/FW9S5mwJevWvkqKAdUAkc4zrpldwRYX.pdf>

academies were also doubled. The government explained the increase in the size of supplementary payments by the planned increase of the expert responsibilities of the academicians.¹ Indeed, the range of these supplementary responsibilities had become so wide that the Presidium of the RAS also approved the introduction of a new academic title - that of Professor of the RAS. In this way, they hope that some new human resources can be attracted for performing expert estimations and other duties.² The title of Professor of the RAS is not associated with any money benefits, but its bearer must shoulder many responsibilities, including an active participation in the achievement of the goals set for the Academy, promotion and consolidation of the links between education and science, and popularization and promotion of scientific knowledge. It is intended that Professors of the RAS will be putting forth proposals concerning the choice of priorities, participate in the academic, expert and coordinating councils, and act as experts on behalf of the Academy. A Professor of the RAS may not be older than 50 years of age; he or she must have the degree of doctor of science or an academic degree awarded by a foreign state (the title Professor of the RAS may also be awarded to foreign scientists). The attractiveness of this title, in addition to it being prestigious, is that Professors of the RAS have a greater chance, by comparison with the rank-and-file scientists, to be promoted later on to the status of a Corresponding Member of the RAS or an Academician of the RAS.

In December 2015, the RAS Departments held their General Meeting, where 497 candidates for the title of Professor of the RAS were approved (out of a total of 656 submitted applications)³. The title of Professor of the RAS was granted by the academicians at their own discretion, the list of candidate was not made public, and there was no public discussion of it, and so this event compares rather unfavorably with the procedure of elections to Academy members (just to name one example). Such an approach caused some sharp criticism on the part of the scientist community, who made the conclusion that the very title of a Professor became devalued⁴.

Alongside this 'rejuvenation' of the RAS, the replacement of those directors of research organizations in the FASO system who had reached the age of 65–70 years took place. According to data released as of mid-2015, 48% of the directors were older than 65 years,⁵ and so the scale of the forthcoming 'rotation' will be impressive. Last year, the process, once started, gave rise immediately to several scandalous situations. Thus, in particular, a 'sample group' of the newly appointed directors (its list is published at the FASO's website) were subjected to a 'quality test' on the basis of the Russian Map of Science. Although the Russian Map of Science has been criticized in many of its aspects, it is promoted by the RF Ministry of Education and Science as the most complete source of information on human resources in the science sphere, because it contains data on publications and citations, as well as on patents, completed R&D projects, and

¹ I. Dezhina. See *The State of Science and Innovation. Russian economy in 2014. Trends and outlooks* (Issue 36) – M.: Gaidar Institute, 2015, p. 355.

² Decree of the Presidium of the RAS *On introducing the title of Professor of the RAS and approving the Provision on the title of Professor of the RAS*, No 204 dated September 29, 2015. See <http://www.ras.ru/presidium/documents/directions.aspx?ID=adf67dc8-84b3-4350-b4be-7e1dce9b71ec>

³ M. Aleksandrov. *Adding reinforcements. Professors of the RAS will add energy to the Academy*. Poisk, No 52, December 25, 2015. See <http://www.poisknews.ru/theme/science-politic/17007/>

⁴ A. Moiseev. *Professors as a substitute for representatives?* *Troitsky Variant - Science (Newspaper)*, No 2, 2016, p. 12; A. Fradkov. *One step backwards, then bury your head in the sand*. *Troitsky Variant - Science (Newspaper)*, No 2, 2016, p. 12.

⁵ Source: FASO. A. Mekhanik. *The management of science is impossible without well-defined procedures*. *Expert*, No 23, June 1, 2015. See <http://expert.ru/expert/2015/23/upravlenie-naukoj-nevozmozhno-bez-opredelennyih-protsedur/>

distribution of grants. The database is renewed on a regular basis. The selective screening of the new directors in accordance with the Map of Science demonstrated that many of them lack not only notable achievements in scientific research, but even proper degrees in science.¹ Such an outcome would have been easily explainable if the relevant decisions had been made exclusively by the FASO on the basis of only two criteria: 1) suitable age, 2) administrative (managerial) experience. However, the candidates were agreed upon with the Presidium of the RAS, and so this state of affairs can only be explained by the fact that the Presidium of the RAS is actually subordinated to the Federal Agency even in those spheres where the Academy does not simply offer advice, but coordinates the decision-making process.

The truth of such a conclusion is further supported by the evidence that the 'rule of two keys', in accordance with which the relevant functions are clearly divided between the RAS and the FASO, is effectively dysfunctional, and that the main 'governance' functions are consolidated to the FASO; in an event of a major conflict, it is resolved 'in a manual mode' at the government level. Indeed, in accordance with the RF Government's Decree approved in May 2015,² the RAS conducts independently the performance assessment of the scientific research organizations of the FASO and the expert estimations of the results of scientific research projects, while all the other functions are performed by the FASO; meanwhile, the RAS either coordinates the FASO's decisions (the development programs and scientific research plans for the scientific research organizations subordinated to the FASO), or puts forward proposals (government assignments to organizations). According to the CEOs of the RAS, the goal of proper delineation between the functions of the two entities have not been achieved, and a 'soft variant' has been implemented instead.³ Another remarkable feature of the procedures applied in 'renewing' the 'director corps' is that, while the appointment procedures are more or less coordinated with the RAS, the dismissal of directors is solely the FASO's prerogative. And so their rotation, and consequently the choice of new cadres, depends on the FASO.

In addition to the replacement of directors, the FASO suggested that the performance of the administrative staff of the institutes could also be improved, and developed for that purpose a draft program for creating the reserve of human resources for scientific research organizations.⁴ The reserve of human resources, according to the FASO, is to consist of three categories: operative reserve – the candidates for the posts of deputy directors or directors of institutes; perspective reserve – the specialists desiring to work as project directors; and development reserve – the researchers capable of commercializing the results of their research. The project continues to be discussed, and its critics believe that the FASO is going to retrain scientists to be employed as managers, which will be detrimental to science proper.⁵ This project was also opposed by the members of the Science *Coordinating Council* under the FASO, who estimated it to be of

¹ E. Kalle. *Rejuvenating glee in the RAS: lower, lower and lower we direct the flight of our ...* REGNUM, October 16, 2015. See <http://regnum.ru/news/1992799.html>

² Decree of the RF Government *On Some Issues of the Activity of the Federal Agency for Scientific Organizations and the Federal State Institution 'Russian Academy of Sciences'*, No 522, dated May 29, 2015. See <http://pravo.gov.ru/proxy/ips/?docbody=&nd=102372866&rdk=&backlink=1>

³ The opinion of President of the RAS V. E. Fortov. Source: Yu. Medvedev. *The keys to the RAS. Vladimir Fortov: the hardest part of the Academy's reform has not been started yet.* The Russian Newspaper, No 6790 (219), September 29, 2015. See <http://www.rg.ru/2015/09/29/fortov-site.html>

⁴ See <http://fano.crowdexpert.ru/personnel-reserve>

⁵ *The triad of the cadre reserve.* August 17, 2015. See http://www.ng.ru/editorial/2015-08-17/2_red.html

little use, unpractical and costly,¹ and beneficial only for a few institutes and universities directly involved in the retraining programs. While all these observations are certainly true, it should be noted that the governance culture practiced in the institutes formerly belonging to the RAS is far from being up-to-date. That is why they encounter problems associated with the increased bureaucratic load on their staff involved in scientific research, which means that the responsibilities of administrative departments are being shifted onto scientific research departments. It is by all means necessary to improve their managerial skills, but now is not the best time for setting such a goal, in view of the shortage of budget funding allocated to the most vital expenditure items of scientific research institutes.

Restructuring of the FASO's network of institutes

In 2015, the FASO planned to establish 23 merged scientific and research centers; the decisions were finalized for 15 of these centers. Typically, this speedy reorganization took place in absence of any clear-cut criteria for placing each organization in one of the four specific categories (federal research centers, national research institutes, etc.)² The Presidium of the RAS, as well as the institutes that were being merged, quite often disapproved of their merger plans, which triggered several scandals, when the institutes revolted against the decisions made by the FASO. In some cases it was possible to prevent a merger;³ this possibility arose, among other things, due to the fact that the relevant organizations were participating in major government projects, and so their restructuring could negatively affect the outcome of those projects of national importance. In this connection, the Presidium of the RAS suggested that the restructuring should proceed gradually, after its principles, criteria and procedures had been properly tested in the course of pilot projects.⁴ However, the mergers occurred not on a systemic basis, but on the initiative of certain groups or individual scientific research organizations. Moreover, in some cases the institutes put forth the proposal of a merger as a 'preventive measure', not because they really wanted to improve their performance, but because they feared that later on they would be forced to merge against their will.

Simultaneously, the leader institutes were determined, later to be made responsible for major fields of research. The three main criteria for selecting these institutes were as follows: their compliance with the established priority directions of development in the field of science and technology; their high importance for achieving certain fundamental and/or socioeconomic goals; and the availability, for a given organization, of adequate human resources and an innovation potential.⁵ In this connection, at the meeting of the *Presidential Council for Science and*

¹ N. Volchkova. *For the sake of a report? Reform of the RAS is put on paper*. Poisk (in Russian), No 18, May 1, 2015. See <http://www.poisknews.ru/theme/science-politic/14414/>

² For more details on the typology of these centers, see *The State of Science and Innovation. Russian economy in 2014. Trends and outlooks* (Issue 36) – M.: Gaidar Institute, 2015, pp. 351–352.

³ N. Volchkova. *With a thought on the meaning. The RAS is against reform imitation*. Poisk (in Russian), No 49, December 4, 2015. See <http://www.poisknews.ru/theme/science-politic/16706/>; A. Mekhanik. *The ball is hosted by interests that are far from being true*. Expert, No 22, May 25–31, 2015; see <http://expert.ru/expert/2015/22/balom-pravyat-interesy-dalekie-ot-istiny/>

⁴ N. Volchkova. *American mixed with German. The models applied in reforming the RAS*. Poisk (in Russian), No 17, April 24 2015. See <http://www.poisknews.ru/theme/science-politic/14333/>

⁵ The Science *Coordinating Council* under the FASO approved the criteria for creating scientific centers, which should conduct a significant volume of fundamental and (or) applied studies and ensure the implementation of projects in the relevant areas of scientific and technological development of the Russian Federation. November 16, 2015. See http://fano.gov.ru/ru/official/news/index.php?id_4=25585

Education held on January 21, 2016, a hot discussion took place with regard to the relative feasibility of the selection of such organizations.¹

So far, we have obtained no ready estimates for making a conclusion as to whether the merger of institutes and the appointment of leader institutes among them is a good or bad undertaking. The experience of merging the institutes accumulated over the past two years has shown neither the obvious benefits nor serious harm produced by of such a change. However, we may rely on the successful experience of the implementation of the nuclear project and the outer space exploration programs in the USSR, when a number of competing research centers were set up in this country. There is also the precedent of incorporating research institutes into the National *Research Center Kurchatov Institute*, which did not improve the performance of that organization. Thus, when budget allocation indices are set against performance indices, it becomes evident that, for example, the productivity of Moscow State University, which is endowed with significantly lower budget allocations earmarked for research and development (Rb 2.68bn for 2016) by comparison with the National *Research Center Kurchatov Institute* (Rb 14.6bn),² is four times as high as that of the latter: in 2014, the citation index in the Web of Science of the articles authored by Moscow State University's scientists amounted to 7.26% of all publications by Russian authors, while the share of the *NRC Kurchatov Institute* was only 2.02%.³ Moreover, the budget of the *NRC Kurchatov Institute* is 1.5 times larger than the entire budget of the RFBR (Rb 10.99bn for 2016), but the cost-effectiveness of the budget resources allocated to it (calculated on the basis of the citation index) is incomparably lower.

Beside the mergers, another painfully important issue for the FASO's institutes was that of budget funding. In 2015, the principles of funding based on government assignments were put forth by the RF Ministry of Education and Science in its draft order *On Approving the Methodological Recommendations for the Distribution of Subsidies Granted to the Federal State Institutions Involved in Government Work in the Sphere of Science (Scientific Research) and Science and Technology Activities*. The Board of Directors of the FASO institutes came to the conclusion that 'the subdivision of a government assignment, as suggested in the draft, into initiative-based (no less than 60%) and directive-based do not alter, in effect, the existing system of developing a government assignment, when it is drawn up by the institutions, in practical terms - by them for themselves'.⁴ However, the suggested per cent ratio of different types of government assignments takes no account of the specificities of the actual research projects, and so it can do harm. Besides, a government assignment does not cover the cost of equipment and reagents.⁵ And finally, the structure of resources to be allocated under a government assignment is geared to a fourfold increase of the salaries of leading researchers, and given the existing budget constraints, this will result in insufficient funding of the other scientists, and then, most probably, in personnel cuts. Therefore, the proposal put forth by the RF Ministry of Education and

¹ Meeting of the *Presidential Council for Science and Education*. January 21, 2016. See <http://krem-lin.ru/events/president/news/51190>

² Annex No 7 to *Federal Law on the 2016 Federal Budget* (The by-department structure of expenditure federal budget expenditure for 2016).

³ Poliakov A. M., RF Ministry of Education and Science. *The publication activity of Russian scientists: current status, main trends and development goals*. Presentation at the Ural Federal University's seminar *Improvement of the quality and quantity of the scientific products by Russian authors*. October 6, 2015. See http://elar.urfu.ru/bit-stream/10995/33921/1/seminar_06.10.15_Polyakov.pdf

⁴ See <http://fano.gov.ru/common/upload/library/2015/07/main/zakluchenie.docx>

⁵ G. Georgiev. *What kills Russian science, and how to struggle against it? Part II. Troitsky Variant - Science (Newspaper)*, No 194, December 22, 2015, pp. 6-7, see <http://trv-science.ru/2015/12/22/chto-gubit-rossijskuyu-nauku-i-kak-s-etim-borotsya-2/>

Science was met with active and diverse resistance¹. Towards the year's end, an agreement had been reached with regard to a number of alterations, but there still remained the possibility of personnel cuts in the future due to the unclear prospects of the government program of reform in the science sector. Among other things, so far the FASO has not officially presented any reform program.

Just as it had happened in 2014, the issue of mergers of the institutes and the principles of their subsequent funding was being dealt with separately from the performance assessment of scientific research organizations and higher educational establishments. The assessment methodology was still in the phase of coordination, one of its core issues being the choice of the correct approach to selecting the reference groups of institutes, for their subsequent comparison on a group level, and the identification of leaders and losers in each group. In the end, it was decided that the reference groups should be formed with due regard for both the areas of scientific research (approximately 40 scientific research areas were identified) and the specific profile of each organization (which could belong to one of the following three categories: generation of knowledge; development of technologies; or services in the sphere of science and technology). The pilot tests of this approach revealed that it can indeed be applied in estimating the performance of scientific research organizations, but much will depend on the quality of data submitted by them². Besides, some additional issues arise in connection with the multi-profile structures, because it is difficult to estimate their performance on the basis of their comparison with other research organizations.

The ongoing reform in the academic complex has begun to manifest itself in the declining number of publications by the former academic institutes. Over the last two years, this index for the FASO's institutes dropped. At the same time, so far the institutes have been demonstrating the highest quality of human resources trained for scientific research in this country. According to *Dissernet*, no instances of fake dissertations have been detected in the RAS system, which is more than can be said of higher educational establishments and some of their rectors³. However, *Dissernet's* estimates refer to the 'pre-reform' period, while it cannot yet be predicted what the institutes will really be like after their merger, replacement of their old directors, and retraining of their staff.

And finally, in spite of the evidence that the RAS is gradually being pushed aside and can no longer manage the FASO's institutes, some academicians do not give up their hopes that the old system may be reestablished. This is confirmed by the repeatedly voiced proposal that the FASO should be subordinated to the RAS⁴. Indeed, some of these hopes have proved to be realistic: thus, for example, RF President Vladimir Putin, at the request of the President of the

¹ E. Onishchenko. *Dismissal vs. support*. *Troitsky Variant - Science (Newspaper)*, No 189, October 6, 2015, p.1, see <http://trv-science.ru/2015/10/06/uvolit-nelzya-podderzhat/>; P. Chebotarev. *On the new principles of funding the institutes*. *Troitsky Variant - Science (Newspaper)*, No 189, October 6, 2015, pp. 1-3. <http://trv-science.ru/2015/10/06/o-novykh-principakh-finansirovaniya-institutov/>; N. Shatalova. *The time to explain. It is important for scientists to see the perspective*. *Poisk*, No 27-28, July 10, 2015, see <http://www.poisk-news.ru/theme/science-politic/15147/>

² *Innovations in Russia often remain on paper only*. November 30, 2015, see <http://www.opec.ru/1896521.html>

³ A. Rostovtsev. *Negative selection*. *Troitsky Variant - Science (Newspaper)*, No 193, December 8, 2015, pp. 1-2. See <http://trv-science.ru/2015/12/08/otricatelnyj-otbor/>

⁴ Academician A. Aseev. *Reform of the RAS as a threat to national security*. REGNUM, December 8, 2015, see <http://regnum.ru/news/innovatio/2029988.html>

RAS, for the third time extended the moratorium (until January 2017) on deals involving property of the FASO's institutes.¹

5.4.5. Trends in the technological innovation sphere

The core problem in the technological innovation sphere was the same as in the previous years: little interest in innovation on the part of the business community, and insufficient investment in research and development by companies. In Russia, similarly to the situation in the developed countries, the bulk of investment in R&D is made by big companies. However, these are, in the main, big state companies, and for five years in a row the RF Government has been attempting to 'force' them to invest in innovation through the 'innovative development programs for the companies with state stakes' (IDPs). In 2015, the intermediate results of applying this innovation policy tool were reported.

According to their formal indices, state companies had been successfully implementing their IDPs. Thus, for example, their annual expenditures on research and development over the program implementation period had climbed 2.1 times at current prices.² At the same time, the situation is highly polarized: 10 companies account for 80% of the aggregate growth of off-budget funding allocated to research and development.³

However, increased funding is by no means always a sure sign of more innovations being implemented. Thus, the resources may be invested instead in the upgrading of the existing technologies. And indeed, the majority of state companies invest in modernization, and only 34% of them invest in R&D projects that are new for the market⁴ (*Fig. 14*).

Such results are quite logical: state companies, in fact, practically abstain from any assessment of priority technologies, technology monitoring, or long-run priority-setting. It is in this respect that Russian state companies differ from the big corporations in Europe, the USA and Japan, where more than 80% of them devise their special technology development plans. In Russia, state companies rely first of all on government orders, and so their planning horizon is short-run, they 'adjust' it to the government budget cycle.

State companies have remained, in many of their features, self-centered: their interaction with higher educational establishments in the science sphere is on the rise, but it is proceeding at a very slow pace, the reason (in the opinion of the companies) being the insufficient competence of higher educational establishments in dealing with research issues. Higher educational establishments are attractive primarily in their capacity as educators. As for the cooperation with small businesses, the most preferable form is the purchase of small-sized companies or stakes in their capital.⁵ Big companies seldom involve them in their outsourcing programs.

So far, IDPs have not become a suitable tool for developing new technologies and creating value added chains. Therefore, on the basis of their performance assessment, the RF Ministry of Economic Development recommends that the companies should improve the procedures for elaborating and implementing their programs. The programs revised in accordance with the

¹ List of assignments, based on the results of the *Presidential Council for Science and Education's* meeting. February 11, 2016, Order Pr-260, Item 1g). See <http://kremlin.ru/acts/assignments/orders/by-date/11.02.2016>

² M. A. Gershman, T. S. Zinina, M. A. Romaniv et al. *Innovative development programs for companies with state stakes: intermediate results and priorities*. Ed. by L. M. Gokhberg, A. N. Klepach, P. B. Rudnik et al. National Research University Higher School of Economics (NRU HSE). M.: NRU HSE, 2015, p. 18.

³ *Ibid*, p. 22.

⁴ *Ibid*, p. 12.

⁵ *Ibid*, p. 91.

new regulation procedures must be submitted by April 2016¹. Their main new features should be the elements of strategic planning, the top-down approach to priority setting (so that the priorities could be relevant for an entire company), and the assessment of the commercial potential of projects to the value in excess of Rb 1bn². Thus, the planned improvements have to do with reporting procedures and some organizational and logistic issues, while the overall paradigm of 'enforced innovation' remains intact.

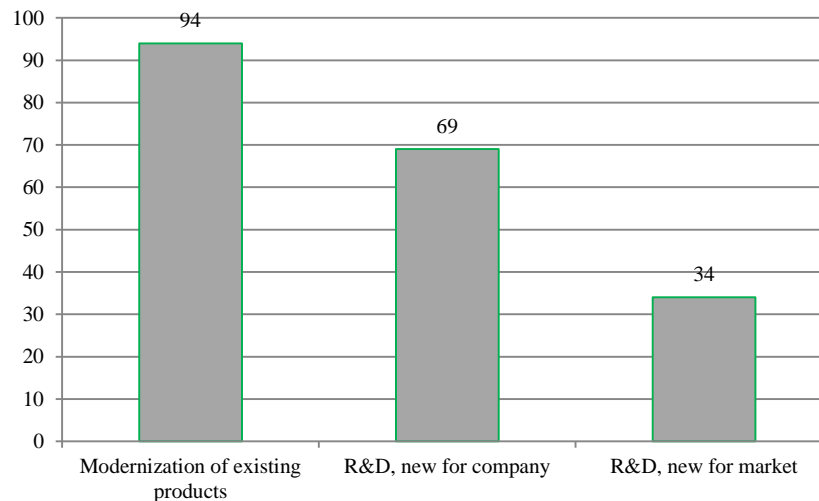


Fig. 14. The degree of involvement of state companies in various types of innovative activity, % of the number of respondents

Source: M. A. Gershman, T. S. Zinina, M. A. Romanov et al. *Innovative development programs for companies with state stakes: intermediate results and priorities*. Ed. by L. M. Gokhberg, A. N. Klepach, P. B. Rudnik et al. National Research University Higher School of Economics (NRU HSE). M.: NRU HSE, 2015, p. 12.

For all its importance, strategic planning is only indirectly linked to companies' interest in innovative activity. Under the government's pressure, companies may indeed learn how to better draw up their long-term plans, but it will hardly boost their motivation for investing in innovation. The problem encompasses a broader sphere of economic regulation of state companies, and so one-time targeted measures aimed at the innovation component of their activity yield only negligible results.

In contrast to big businesses, the medium-sized hi-tech ones are not involved in special government measures. Nevertheless, it is in this segment that a group of rapidly growing hi-tech companies is currently demonstrating impressive results in boosting their investment in R&D, their proceeds, and their hi-tech exports. The results of a study of such companies based on a sample of 75 entities, which were published in 2015, reveal that the companies were established in the main about 20 years ago - that is, on the basis of resources created in the Soviet period. Throughout the entire period of their development, 77% of the companies received various

¹ A. Gorbatova. *Weightless innovations*. July 6, 2015, see http://www.strf.ru/material.aspx?CatalogId=223&d_no=100667#.VnBdvb8yTOA

² T. Edovina. *Innovations look for a bigger share*. Kommersant, July 3, 2015, see <http://www.kommersant.ru/doc/2759787>

forms of government support (which vary from grants and loans to tax and duty-free exemptions). However, such support was of critical importance only for 17% of the companies.¹ Not unexpectedly, the companies highly estimated subsidies and the grants received from the Bortnik Fund, while the role of development institutions was considered to be of little importance (*Rusnano*, Skolkovo, the Russian Fund for Technological Development, Russian Venture Company (RVC)). Of little use was indirect regulation in the form of duty-free exemptions granted to the residents of Skolkovo and special economic zones.² In this connection, companies believe that the most serious obstacle to growth is not the inefficiency of government support, but the administrative barriers set up by the government. The development process suffers primarily from the lack of proper normative base for the use of new technologies, as well as the cumbersome procedures of government control over business activities.³

As far as value added chains are concerned, medium-sized companies are rather actively getting involved in such structures: nearly half of them collaborate with higher educational establishments in the field of R&D, and they heavily rely on contracts with state companies in their supplies of necessary products. However, state companies are also interested in getting government order, and so the circle closes: everybody expects money from the government. Thus, in particular, out of all the types of available government support, medium-sized companies prefer direct financial support (on preferential loans, R&D grants⁴), and only 15% of the respondent companies are interested in tax exemptions.

The survey demonstrates that the rapidly growing companies are not the startups that have unexpectedly rushed forward, but the steadily developing small businesses that have gradually been evolving into medium-sized ones. It is rather typical that in 2015, it became fashionable to launch startups⁵ in absence of any system in Russia for their further support and monitoring. The launch of startups became a goal in itself for some development institutions, and so it does not translate into an increased input of small-sized innovative businesses into the national economy. So, according to experts, the government support of small-sized innovative businesses is still inadequate (*Fig. 15*)⁶.

One of the components of government support, which is important for the development of small business, startups including, is the existence of technology infrastructure (technoparks, incubators, special economic zones) and availability of venture capital. While Russia does display some development (while not always with successful results) with regard to the first parameter, venture funding in this country has nearly halted. This is the upshot of the new geopolitical situation on the one hand, and the lack of proper attention to the creation of venture funds on the part of the development institutions, on the other. In effect, after RVC had been reoriented to the National Technology Initiative, no new public-private venture funds were created.

¹ D. Medovnikov, S. Rozmirovich, T Oganessian. *The candidates for champions: the peculiarities of rapidly growing Russian technological companies, their development strategies and the potential of the State for supporting the implementation of these strategies*. RVC, NRU HSE, PWC, SME Bank. – M., NRU HSE, 2015, p. 28.

² D. Medovnikov, S. Rozmirovich, T Oganessian. *The candidates for champions: the peculiarities of rapidly growing Russian technological companies, their development strategies and the potential of the State for supporting the implementation of these strategies*. RVC, NRU HSE, PWC, SME Bank. – M., NRU HSE, 2015, p. 28, p. 29.

³ *Ibid*, p. 31.

⁴ *Ibid*, p. 30.

⁵ B. V. Kanin. *Why startups are no longer needed by anyone*. RBC, November 9, 2015, p. 19, see <http://www.rbcdaily.ru/industry/562949998112082>

⁶ The survey was conducted in May 2015 and involved 176 respondents from the business community (46%), government structures and development institutions (21%), the science and education spheres (12% each), and consultants (9%). Source: *Russia: a course towards innovations. Issue III*. M.: RVC, F&S, 2015, p. 100.

This is one of the reasons why Russia's venture market is shrinking.¹ Besides, according to data released by the OECD, all this occurs against the backdrop of Russia falling behind the developed countries in terms of its investment volume, which now is below 0.012% of GDP. For reference: in Israel this index amounts to 0.38%, in the USA to 0.28%, in Canada to approximately 0.1%.²

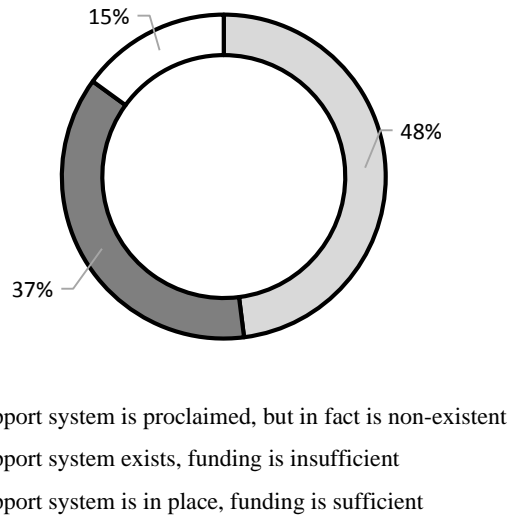


Fig. 15. The estimated role of government support of small and medium-sized technology companies, %

Source: Russia: a course towards innovations. Issue III. M.: RVC. M.: RVC, F&S, 2015, p. 65.

Technoparks, as one of the important infrastructure entities designed to support small-sized innovative businesses, has become once again the focus of increased attention due, among other things, to the emergence of big territorial infrastructure projects like *Innopolis* and the Technological Valley of Moscow State University. In UNESCO's Science Report released in 2015 it was noted that Russia had 88 technoparks, of which only 15 were truly functional.³ A more detailed analysis of technoparks can be found in *Insider's Guide to Russian Hi-Tech Hubs*,⁴ where some of the reasons of the deviation of Russian technoparks from world standards are explained. In Russian technoparks, only 27% of companies actually survive, while in foreign countries this index can be as high as 85–90%.⁵ Experts believe that this happens because technoparks have poorly defined development goals, while the government has not created an efficient system for providing them with funding and other means of support.⁶ As a result, the CEOs of technoparks derive their income in the main from leasing their premises (about 70%

¹ According to data released by the Russian Venture Investment Association, over the first 9 months of 2015, the capitalization index of venture fund lost 8%, and the volume of investment in Russian companies shrank threefold on its previous year's index. Source: T. Edovina. *Venture investors are afraid of taking risks*. Kommersant, December 11, 2015, see <http://www.kommersant.ru/doc/2874219>

² Source: *OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society*. OECD Publishing, Paris, 2015, p. 174.

³ *UNESCO Science Report: towards 2030*. UNESCO, Paris, 2015, p. 359.

⁴ *Insider's Guide to Russian Hi-Tech Hubs*. Russia Direct, No 9, June 2015.

⁵ *Ibid*, p.6.

⁶ *Ibid*, p.10.

of their aggregate income), while the international norms require that at least half of a technopark's income should be generated by services rendered to companies.¹ And finally, Russian technoparks operate separately from venture funds, each type of infrastructure functioning independently. But in foreign countries they always cooperate.

However, there exist some exceptions. Thus, Novosibirsk Akadempark has become the biggest floor of its type in the region. Over the crisis years 2014–2015, the average growth rate of the proceeds of companies operating in that technopark was 25%.² Their success, most probably, builds upon the following three factors: a considerable share of private investment in the construction of Akadempark; a low share of government orders; and an original a model of doing business (technological services, the construction of special technological service centers inside the technopark).³ In other words, success was achieved mostly by reliance on private businesses and a good understanding of their needs.

5.4.6. New infrastructure projects

In 2015, two infrastructure projects – the Technological Valley of Moscow State University (MSU) and *Innopolis* (near Kazan) - were actively implemented.

Innopolis is an extension of the Skolkovo model, but it is implemented in the framework of one sector only – that of information technologies (IT). The features that make it similar to Skolkovo are as follows: the construction of urban infrastructure; the establishment of a new university jointly with a US higher educational establishment (Carnegie Mellon University); and the support of innovative companies based on a territorial principle. *Innopolis* evolved from a technology development special economic zone. Since 2013, a total of Rb 12.1bn was spent on its creation, and the state share in total investment amounted to 97.5%.⁴ In June 2015, *Innopolis* was unveiled. That project was remarkable by its very rapid rate of construction work, the large number of students enrolled in the first year (400, which is twice as many as those enrolled in the Skolkovo Institute of Science and Technology – *SkolTech*); all this was achieved on the basis of a relatively modest amount of budget investment (the cost of the other projects - Skolkovo and the Technological Valley of Moscow State University - is much higher).

The project's goal is to attract 60,000 specialists in the field of IT to fill the new jobs created in the town. Seven years ago, a more modest idea – that of attracting 10,000 software developers to Dubna - ended in a failure. Meanwhile, it should be borne in mind that Dubna has a better infrastructure than *Innopolis*, and so, for such an ambitious project to succeed, it is being implemented in a 'manual mode', under the protection of the President of the Republic of Tatarstan and the RF Minister of Telecom and Mass Media.⁵ For the time being, these factors may ensure an inflow of off-budget funding by 'involving' private companies in investing in the project. However, the effect will be only temporary, because no incentives for private initiative have

¹ Ibid, p. 12.

² In 2015, Akadempark became the most productive enterprise in Novosibirsk Oblast. 26 January 2016, see <http://sib.fm/news/2016/01/26/akadempark-samy-proizvoditelnym-v-novosibirskoj-oblasti>

³ For further details concerning the technological service centers, see *The meeting point of ideas and money*. 29 October 2014, <http://sib.fm/interviews/2014/10/29/mesto-vstrechi-idej-i-deneg>

⁴ И.И. Королёв. *The RF Ministry of Telecom and Mass Media established fictitious targets for Innopolis, so as not to repay any money*. November 20, 2015, see http://www.cnews.ru/news/top/2015-11-20_minkomsvyazi_ustanovilo_innopolisu_fiktivnye

⁵ A.A. Shchukin. *An IT town in an open field*. Expert, No 29, July 13, 2015, see <http://expert.ru/expert/2015/29/it-gorod-v-chistom-pole/>

been created. Nevertheless, the project may still give rise to a precedent of a successful construction of a new town with a Western type university.

The 'manual management mode' is also typical of the Technological Valley project launched by Moscow State University. It was first announced in 2013, to be completed in 2018. In accordance with its charter documents, the project is aimed at providing young researchers with well-paid jobs - by creating, among other things, a number of new laboratories, as well as launching joint research projects with industrial companies. Besides, it is intended to erect scientific research facilities and residential buildings in the vicinity of Moscow State University. An important role in this project, including in the procedure of selection of suitable laboratories and research centers to be established in the Technological Valley, is to be played by NPO *Innopraktika*,¹ which functions as an intermediary between young researchers and big businesses that might be interested in participating in the Technological Valley project. In 2015, in cooperation with *Innopraktika*, 16 interdisciplinary laboratories focused on applied research were opened.²

The volume of funding to be allocated to the construction of the Valley is not specified, and it varies in different sources from Rb 110bn to nearly Rb 150bn.³ In this connection, approximately 65% of the funding is to be earmarked for the development and construction of Moscow State University's laboratories. It is also expected that a number of Russia's biggest companies will take an active part in providing the necessary funding and help Moscow State University to replenish the target capital fund. A similar scheme was already applied in the early phase of the *Skoltech* project (Skolkovo Institute of Science and Technology), but later on the government decided that it was not feasible to compel businesses to act as sponsors. In the new project, history repeats itself, but this time the outcome may be different because it was RF President Vladimir Putin himself who addressed the business community with the request to help Moscow State University.⁴

5.4.7. The national technology initiative

The year 2015 was marked by the emergence of a new 'big project' – the National Technology Initiative (NTI). The term *national technology initiative* was for the first time used by President Vladimir Putin in his Message to the Federal Assembly in December 2014, when he announced the launch of the NTI and explained that this initiative was to help in defining the development priorities and goals for the next 10–15-year period.⁵ An ambitious goal was set: to elaborate a mechanism capable of coordinating the global goals of Russia's economic development, the technology priorities created by those goals, and the mechanisms to be applied in their implementation.

In the first phase, at the year's beginning, many different organizations were busily elaborating the notion of the NTI, its content and its component. The Agency for Strategic Initiatives

¹ A lot of speculations and gossip are centered on *Innopraktika* because, according to Reuters and RBC, it is headed by the RF President's daughter Ekaterina Tikhonova. However, this information has neither been officially confirmed nor disproved.

² V. Koriagin. *Why MSU is gaining in the world ratings of best higher educational establishments*. October 21, 2015, see <http://lenta.ru/articles/2015/10/21/msugetshigh/>

³ R. Badanin, A. Voronina, F. Rustamova, E. Osetinskaya. *The valley of knowledge*. RBC Daily, January 29, 2015, see <http://rbcdaily.ru/economy/562949993816447>

⁴ T. Melikian. *The gold Sparrow Hills. Putin suggested that the billionaires should provide solidarity help to MSU*. Lenta.ru, May 28 2015, see <http://lenta.ru/articles/2015/05/28/mgutext/>

⁵ *Annual Presidential Address to the Federal Assembly*. December 4, 2014, see <http://www.kremlin.ru/news/47173>

(ASI), the RF Ministry of Education and Science, and the RF Government Expert Council suggested their own visions of the NTI.

In the draft of *The Fundamentals of the National Technology Initiative* elaborated by the Russian Academy of Sciences, the main focus is placed on the task of ensuring Russia's parity on a global scale with the countries that are leaders in world technological progress; this parity would be impossible to achieve without developing fundamental science: '...the contemporary status of fundamental science determines the situation in business in the long run.'¹ On this basis, substantiation was provided for the goals of import substitution, reindustrialization, and improvement of the methodology applied in setting the science and technology priorities. The draft prepared by the Russian Academy of Sciences determines seven priorities for science and technology development, represented either by entire industries or by more narrow specific technologies and industries – power engineering, national defense and national security, pharmaceuticals, medical technologies, food industry, information technologies, nanomaterials, and new chemical substances².

The Government Expert Council viewed the NTI as a comprehensive program aimed at ensuring Russia's global competitive capacity in its dealing with the developed countries in the most promising sectors of the world economy and specific segments of world markets³. The concepts of the NTI put forth by the Government Expert Council and the Russian Academy of Sciences are alike in many of their aspects; they are largely based on the modifications of approaches that have been traditional for Russia's policy in the sphere of science and technology.

From the viewpoint of the Agency for Strategic Initiatives (ASI), the NTI implies first of all the formation of new, network-based consumer markets: 'the selection will be done with due regard for the basic trends in world development, on the basis of priority network technologies centered around man as the end consumer.'⁴ It was expected that, in 10–20 years, the volume of these markets should be in excess of \$ 100bn, and Russia would have a chance to win a respectable position in that sphere.⁵ The approach applied by the ASI was subsequently applied in developing the roadmaps for the NTI.

In order to precisely identify the markets, a detailed study was launched, which was focused on four interrelated parameters: 'markets', 'technologies', 'infrastructure' and 'institutions'. By May 2015, 9 'markets of the future' had been determined. These are subdivided into three groups – those associated with national security and the provision of necessary resources (food, energy and security markets); the development of the transport system (automobile transport, air transport and sea/river transport); the markets where technologies are currently being upgraded on a revolutionary scale (digital health markets, new financial markets, and neurocommunications markets).⁶ A similar approach with a pre-determined set of priority directions had been applied in 2009, when President Dmitry Medvedev announced the choice of 5 'strategic vectors' of the country's modernization,⁷ which later on were used as the basis for the Skolkovo project

¹ *The fundamental principles of the National Technology Initiative*. Russian Academy of Sciences, Information and Analytical Center. Version as of May 22, 2015, p. 7.

² Ibid, p. 8.

³ *Draft of the Concept of developing and implementing the National Technology Initiative*. RF Government Expert Council. March 16, 2015.

⁴ See <http://asi.ru/nti/>

⁵ *Dmitry Peskov: we are to expect a fundamental restructuring of all the core industries*. Kommersant, April 1, 2015, see <http://www.kommersant.ru/doc/2698958>

⁶ *National Technology Initiative: 'uncomfortable' questions and honest answers*. Foresight Fleet materials, May 12–16, 2015. ASI, RVC, Fund for Assistance to Small Innovative Enterprises in Science and Technology, p. 5.

⁷ Dmitry Medvedev. *Go Russia!* September 10, 2009, see <http://kremlin.ru/events/president/news/5413>

and the clusters created in its framework. In the case of the NTI, the choice of specifically these 9 markets was based on two major criteria – the prospects for development in the global context and the presence, in this country, of companies (or people) prepared to become leaders and assume the responsibility for the development of relevant sectors and entry onto new markets. Consequently, the NTI will be considered to have been implemented in the event of emergence of Russian companies capable of becoming leaders on the global technology markets in 2025–2035.

In October, 4 roadmaps were approved: the development of automobile transport, air transport and sea/river transport (to be supervised by the RF Ministry of Industry and Trade), and the development of neurocommunications (the responsibility of the RF Ministry of Education and Science). This is a speedy process, and the first results are expected to appear as early as 2016.¹

The idea behind the NTI has several new and positive aspects. First, this is the switchover to personal responsibility; second, it means an emphasis on horizontal links; third, this is an open system – the discussion of promising markets can be continued in 2016.

The intermediate result achieved in 2015 was essentially the choice of new technology priorities, including multi-functional technologies, which are important for the simultaneous development of several targeted markets of the future. The system of priority directions has come to closely resemble the structure of initiatives that are being implemented by the developed countries, which in itself can already be regarded as a step forward. Indeed, in 2015 the issue of priorities was the focus of special attention; thus, in particular, this was the theme of one of the meetings of the *Presidential Council for Science and Education*.² It was a manifestation of a certain 'crisis' in the existing approaches to setting priorities, which had changed little since 1996 (the year when the list of priority development directions in the sphere of science and technology was approved at the federal level).

At the same time, the accepted approach to developing and implementing the NTI makes its success dependent on some rather unpredictable parameters, in particular the following ones:

- 1) correct forecasts of future developments, which means the opportunities and abilities to select appropriate experts;
- 2) opportunities for identifying truly charismatic leaders;
- 3) possibilities for launching the implementation mechanisms and the movement towards the targeted market niches.

The NTI may trigger restructuring of the activity of the development institutions, and not only that of RVC, which has become the project's headquarters.³ In the Annual *Presidential Address to the Federal Assembly* in December 2015 it was noted that the development institutions should be oriented to technology modernization, and for this end their structures and the mechanisms that they employ should be optimized, because 'Unfortunately, many of them, to put it bluntly, have turned into dumping grounds for bad debts.'⁴ However, the first step along this way was not optimization, but the announcement of the creation of yet another structure – the Technological Development Agency (NPO). It is intended that the new Agency

¹ *On the National Technology Initiative*. Meeting of the *Presidential Council for Economic Modernization and Innovative Development*. October 16, 2015, see <http://government.ru/news/20118/>

² Meeting of the *Presidential Council for Science and Education*. June 24, 2015, see <http://kremlin.ru/events/president/news/49755>

³ See <https://www.rusventure.ru/ru/nti/>

⁴ *Annual Presidential Address to the Federal Assembly*. December 3, 2015, see <http://www.kremlin.ru/events/president/transcripts/messages/50864>

should operate in the interests of companies and organize centralized transfer of foreign technologies into Russia (by means of concluding licensing agreements, establishing joint ventures), as well as provide legal and consulting support.¹ Among other things, the Technological Development Agency must look for technologies that can be relevant for the implementation of the NTI and Russia's entry onto new network markets. Thus, the launch of the NTI will influence the 'innovation ecosystem' by means of adjusting and supplementing the system of government instruments employed in promoting Russia's technological development.

5.4.8. The effects of economic sanctions

In 2015, the economic sanctions and the response to them across the country visibly influenced the sphere of science and innovations. The poll conducted in May 2015 among 176 experts who represented both the business and the academic communities revealed that the majority of respondents believed that the new geopolitical situation had an adverse effect on innovative development (*Fig. 16*).

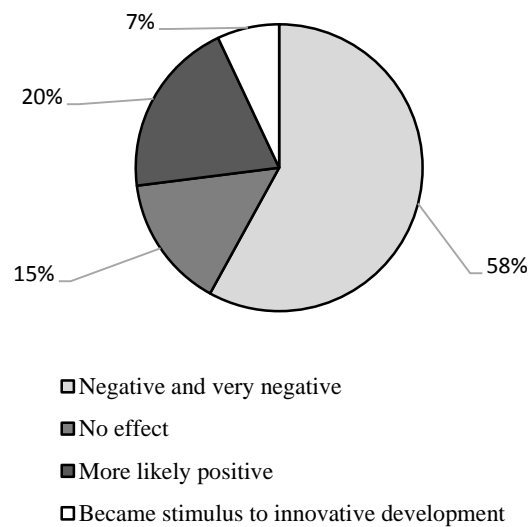


Fig. 16. The estimated effects of the geopolitical situation on the innovative activity in Russia

Source: A course towards innovations. Issue III. M.: RVC, F&S, 2015, p. 15.

The links between the introduction of economic sanctions against Russia and the changes that became visible in Russia's science sector due to the emergence of the new external conditions are by no means direct and clear. In addition to economic changes, the overall atmosphere in the sphere of science is undergoing transformation. To a certain degree, the marker of the onset of changes was the *Law on Undesirable Foreign Organizations*² (introduced in May

¹ *Transfer of technologies – import substitution without detriment to quality for the consumer.* Head of Business Russia Alexey Repik – about the Agency for Technological Development. Kommersant, January 27, 2016, see <http://www.kommersant.ru/doc/2902055>; *On the Technological Development Agency.* Meeting of the Presidential Council for Economic Modernization and Innovative Development. February 5, 2016, see <http://m.government.ru/news/21674/>

² Federal Law 'On Introducing Alterations to Some Legislative Acts of the Russian Federation', No 129-FZ dated May 23, 2015, see <http://publication.pravo.gov.ru/Document/View/0001201505230001?index=0&rangeSize=1>

2015). Coupled with the already existing Law of the Russian Federation *On Foreign Agents*, it launched the process of serious transformations in the system of non-governmental support of science through not-for-profit foundations.

In accordance with the *Law on Undesirable Foreign Organizations*, the fact of an organization being recognized as such means a ban on its activity in Russia. This status is assigned to those organizations whose activity is deemed to be threatening the fundamental principles of Russia's constitutional order, defense potential and security. Often the undesirable organizations are those that provide funding to NPO (non-commercial organization), the latter then being recognized to be 'foreign agents'¹.

The direct consequences of economic sanctions

The direct effects of economic sanctions began to be manifest at an early stage in the form of rising costs and declining competitive capacity of the research projects in Russia. They began to suffer from shortage of foreign equipment and reagents, which had been purchased in the main in those countries that participated in the sanctions, while the cost of that equipment and reagents plunged due to the sharp decline of the ruble's exchange rate against the world's major currencies. Many foreign companies, including those based in the EU, began to refuse to supply equipment² and materials for scientific research to Russia for fear that they might be used in military projects.³

After the sanctions had been introduced, even the IT sector began to experience difficulties, although it is considered to be one of Russia's best-developed and successful sectors. Thus it became obvious that the reliance on foreign software in this country is very high (*Table 15*).

Table 15

The share of foreign software products in the RF, %

Product	Share, %
Office applications	100
Visualization systems	93
Operating systems for computers	93
Databases	86
Operating systems for servers	75
Collaborative software	68
Geoinformation software	45
Engineering software	34

Source: Yu. Voronina. *One's own soft is closer*. The Russian Business Newspaper, 2014, No 46, p. 4.

The initiatives of universities and scientific research organization in restricting the foreign travel of their staff in the framework of scientific research projects and tracing their publications abroad may also be treated as a form of response to the external pressure, and its purpose is not limited to identifying those individuals who are entitled to a supplementary payment for a publication in a highly ranked journal. Special security departments for supervising foreign connections began to be reestablished at universities and research institutes.⁴ In this connection it should be emphasized that no formal orders to this effect have been issued at the federal level,

¹ G. Peremitin. *Putin signed the Law on Undesirable Foreign Organizations*. See <http://top.rbc.ru/politics/23/05/2015/55609f719a794774b30bd2a7> 23.05.2015 г.

² *Sanctions have reached Russian science*. See <http://укроп.org/sanctionsи-дошли-и-до-Russian -science/>, August 14, 2015.

³ For example, spare parts for laser systems.

⁴ E. Gerden. *Russia faces international scientific blockage*. See <http://www.rsc.org/chemistryworld/2015/08/russia-faces-international-scientific-blockade>, August 13, 2015.

and words like ‘internationalization of science’ can still be found in official documents and heard in official speeches.

Indirect consequences

The indirect consequences of the introduction of sanctions was the growing aversion to the activity of the representative offices of those foreign organization providing support in education and science whose countries of origin participated in the sanctions against Russia, or to those Russian entities that were associated in one or other way with the support and promotion of 'foreign' ideas and views.

The upshot of all this was that Russia's science sphere, which could never boast of a large number of non-governmental foundations working there, began to lose those organizations that for many years had been implementing their science support and training programs - in natural as well as in social sciences. The most notorious move was the entry into the list of 'foreign agents', in May 2015, of the *Dynasty* Foundation (a Russian charity). The reason was that the assets of its founder Dmitry Zimin, which were the source of funding for Russian science projects, were kept abroad. *Dynasty* was accused of political activities because of its support of the Liberal Mission Foundation headed by Yevgeny Yasin.¹ Thus, according to the RF Ministry of Justice's logic, Zimin's Foundation deserved to be assigned the status of a 'foreign agent' for its support of political activities from foreign resources.

Many Russian research organization and scientists, the international community, as well as the Council on Science under the RF Ministry of Education and Science, tried to support *Dynasty* and get it removed from the list². However, all protests were in vain, and in July 2015 the board of *Dynasty* Foundation approved the decision of its liquidation³.

The two less publicized events, which followed the same logic and resulted in the same consequences, are the closure of the Russian office of the MacArthur Foundation and the two charities established by George Soros – the Open Society Foundation and the Assistance Foundation.⁴ In July 2015, these foundations were put on the ‘patriotic stop-list’⁵ drawn up by the Federation Council as candidates for the status of ‘undesirable organizations’.⁶

The CEOs of the MacArthur Foundation decided to withdraw from Russia.⁷ The Foundation had launched its first programs in Russia in 1992; it provided support both to individual re-

¹ B. Grozovskiy, N. Epple, P. Aptekar. *Dmitry Zimin and Yevgeny Yasin as a threat to Russian security*. Vedomosti, No 3838, May 26, 2015, see <http://www.vedomosti.ru/opinion/articles/2015/05/26/593621-dmitrii-zimin-i-evgenii-yasin-kak-ugroza-rossiiskoi-bezopasnosti>

² A. Khokhlov. *The disaster is happening before our own eyes*. http://www.gazeta.ru/science/2015/05/28_a_6736753.shtml 28.05.2015; L. Tagaeva, E. Antonova, F. Rustamova. *The decline of Dynasty*. RBC, No 88, May 26, 2015, pp. 10-11 (See <http://rbcdaily.ru/industry/562949995305596>)

³ *The Dynasty Foundation makes the decision of its liquidation*. See <http://newsru.com/russia/08jul2015/dynasty.html>, July 8, 2015.

⁴ *The Open Society Foundation and the Assistance Foundation were recognized to be undesirable in Russia*. Interfax, November 30, 2015, see <http://www.interfax.ru/russia/482304>

⁵ *The Federation Council made public the 'patriotic stop-list' of 12 foreign NPOs*. See <http://www.interfax.ru/russia/452158> 07.07.2015 r.

⁶ A. Bratersky. *The 'undesirable' George Soros*. See http://www.gazeta.ru/politics/2015/08/12_a_7683475.shtml August 12, 2015.

⁷ E. Mukhametdinova. *The first of the organizations entered in the 'patriotic stop-list' leaves Russia. The closure of its Russian office was announced by the US MacArthur Foundation*. Vedomosti (in Russian), July 23, 2015. See <http://www.vedomosti.ru/politics/articles/2015/07/23/601800-iz-rossii-ushla-pervaya-iz-organizatsii-vnesennih-v-patrioticheskii-stop-list>

searchers in the field of social science and to Russian universities. Its biggest initiative in Russia's science sphere was the Program on *Basic Research and Higher Education*, on which it spent a total of \$ 32m over the period 1998–2009. The program was implemented and financed jointly with the RF Ministry of Education and Science. In its framework, 20 education and research centers (ERC) were established at Russian universities; they specialized in natural sciences. The ERC model was officially recognized to be efficient, and so the centers became to a certain extent the prototype of the ERC yet to be created, the activity of Russian universities and scientific research organization in that direction being funded by the resources allocated to the federal targeted program *Scientific and educational human resources for innovative Russia in 2009–2013*.

In December 2015, one more organization was closed, which had been an active partner of the RF Ministry of Education and Science in promoting the research and innovation activity of Russian higher educational establishments – the US Russia Foundation for Economic Advancement (USRF). The next day after it had been placed on the list of undesirable organizations, the Foundation announced that it was to discontinue its operation in Russia and to close its Moscow office¹.

The closure of foreign foundations is a reasonable act on the part of their management, because once an organization is assigned the status of a 'foreign agent', it can effectively do little. Thus, in actual practice this means a ban on collaboration with budgetary institutions, while the bulk of entities operating in the fields of science and education are budgetary institutions. A similar situation is faced by 'undesirable organizations', because it becomes very risky to receive any grants from them.

The reasons why certain foundations that for many years had been supporting education and science, whose activity had been positively estimated by Russian authorities, were suddenly deemed to be 'undesirables' and foreign agents, are purely political and have nothing to do with their support of science. This peculiar response to the economic sanctions will have a negative impact on the situation in Russian science not only on an economic, but also on a psychological plane, as it will alter the atmosphere inside the academic community.

International cooperation and the sanctions

In face of the rising tension between Russia and the countries that are world leaders in innovation, we are still hearing official rhetoric in support of international cooperation in the field of science. Moreover, it is constantly emphasized that science is international, and that international cooperation in scientific research is the foundation of growth. Thus, Project 5-100 encourages higher educational establishments to publish their works abroad and to participate in international events, as well as to invite foreign specialists. This is indeed important, as Russian publications have low citation indexes, and in this aspect Russia differs from many other countries, even the developing ones. Over the period 2004–2015, only 6% of the Russian articles with high citation indexes were written by Russian authors on their own, while all the rest were co-authored with their foreign colleagues².

¹ *Address to the partners and recipients of benefits from the USRF*. December 8, 2015. See http://www.usrf.ru/news_feed/general_rus/news_article_1449567272.html

² According to data presented by P. Kasianov, Thomson Reuters. Source: K. K. Bolokhova. *Scientists and organizations with high citation indexes were awarded at VUZPROMEXPO-2015*. December 4, 2015, see http://www.strf.ru/material.aspx?CatalogId=222&d_no=110553#.Vm2wAb8yTOA

However, the priorities are gradually changing. On a national scale, the BRICS group is playing an increasingly important role, and on a personal level, new hopes are associated with the developing cooperation with the Russian expat diaspora.

An analysis of scientific research activity indices across the BRICS group shows that so far, the links between its member countries in the field of scientific research have been weak. Moreover, the BRICS members tend to cooperate not between themselves, but with those countries that are world leaders in scientific research¹. The achievements of the BRICS proper are not very impressive.

The diaspora is actively collaborating with Russia, getting involved, among other things, in the creation of modern laboratories at higher educational establishments funded in the framework of Project 5-100.² The recent poll of 150 representatives of the Russian academic diaspora abroad demonstrates that those among its members who are closely interacting with Russia are loyal and tend to promote cooperation while staying away from political issues, including the economic sanctions.³

The diaspora to a certain degree represents a 'soft force' in the situation of imposed economic sanctions and the generally unfavorable geopolitical climate. Its more active representatives are ready to teach, participate in research projects (including those funded by international grants), as well as to train Russian postgraduates. Approximately 2/3 of the respondents suggest some new mechanisms of cooperation or improvement of the existing government initiatives. It is difficult to group all the ideas as a number of 'typical blocs'. However, there are two types of activity that can be readily participated by many representatives of the Russian diaspora. These are international exchange programs (training programs) that can have various formats (including postgraduate and undergraduate training programs and travel by foreign scientists), as well as joint postgraduate and undergraduate training programs. It should be noted that some of these proposals can be immediately implemented by research institutes or higher educational establishments, without developing special federal or regional program for that purpose. In this connection, it would have been feasible for universities and scientific research organizations to grant open access to more information, because foreign scientists are experiencing difficulties in finding on the websites of Russian organizations any well-structured information concerning the existing opportunities for cooperation.

At the same time, the attitude of the Russian public to the expat diaspora activists is controversial. Thus, a poll of those higher educational establishments that collaborate with Russian-speaking foreign scientists indicates that the key problems are as follows: foreign scientists 'cost dear' (they have to be paid a lot of money); they spend little time in Russia; and they do not understand Russian realities. In the academic community, there exists a rather widespread opinion that the qualifications of the diaspora representatives are by no means always so high as to

¹ I. Dezhina. *BRICS countries possible areas for scientific cooperation*. World Economy and International Relations, 2015, No 9, pp. 14-23.

² Russian expat scientists in the USA, Europe and Asia plan to create six laboratories on the basis of Tomsk Polytechnic University. See <http://news.tpu.ru/news/2015/05/05/23341/> May 22, 2015. At St. Petersburg Polytechnic University, the first multidisciplinary RASA (Russian-speaking Academic Science Association) Research center in Russia was established, see <http://www.sdellanounas.ru/blogs/53229>

³ The survey took place in February-March 2015, it consisted in a poll among Russian expat scientists working abroad followed by interviews via Skype with a selected sample group of respondents. Source: I. Dezhina. *Russian scientific diaspora: experience, motivation and prospects for cooperation with Russia*. Sociology of Science and Technology, 2016, No 1 (soon to be published).

enable them to rapidly upgrade that of the Russian researchers.¹ Nevertheless, the cooperation was already established long ago, the universities participating in the poll had a history of 'working with the diaspora' that was on the average twice as long as that of the government cooperation programs.² At the same time, it is the representatives of the academic diaspora that can help strengthen the ties with the international academic community.

In this connection, it appears feasible to place a greater emphasis on network collaboration with Russian laboratories created in recent years with the participation of the diaspora representatives. Russia has already acquired a 'critical mass' of such structures, and network projects can further improve their performance, while simultaneously promote and expand the contacts with Russian-speaking expat scientists. Besides, the training project Global Education³ launched in 2015 can also rely on the expat potential, in particular by involving the university laboratories headed by Russian expat scientists in training Russian specialists in that program's framework.

* * *

The strategic position of the science sphere has altered: we see a transition from the former ambitious goals to those of moderate growth. The key indices of expenditures on R&D and the scientific research targets that were to be achieved by 2015 are now set for 2020. This happened, among other things, due to the shrinkage of budget allocations to science and the uncertainty with regard to the future growth of investment of the business sector in research and development.

The reform in the academic sector proceeds at a slow pace, the coordination procedures between the government departments are tricky, and there are no clearly defined medium-term restructuring plans. The 'civilian science' component represented in this segment by the activity of the Council on Science under the RF Ministry of Education and Science and the Science *Coordinating Council* under the FASO⁴ helped to smooth the controversies and to properly coordinate the standpoints. Nevertheless, the obvious positive results of reform in that sector are yet to be achieved. Higher educational establishments are no alternative for the Academy, although they rapidly increase the formal indices of their performance with regard to scientific research. So far, the potential of universities in the R&D sector has remained insufficient, the testimony of which is the higher quality of the Academy's research and the poorly developed cooperation of higher educational establishments with industry.

¹ See, for example, the interview with Academician A. Aseev: A. Mekhanik. *The ball is hosted by interests that are far from being true*. Expert, May 25, 2015; see <http://expert.ru/expert/2015/22/balom-pravyat-interesy-dalekie-ot-istiny/>

² I. Dezhina. *Answers to open questions*. November 13, 2015 <http://sk.ru/news/b/articles/archive/2015/11/13/otvety-na-otkrytye-voprosy.aspx>

³ In the framework of this program, the RF Ministry of Education and Science pays for the training of Russian students at the best foreign universities, on condition that after graduation they must return to Russia to work in scientific research organizations, higher educational establishments and commercial companies. Priority is given to the technical, medical, and IT fields, as well as to chemistry and power engineering. Source: <http://educationglobal.ru/ns/overview/>

⁴ The Science Coordinating Council was established on November 25, 2014 in accordance with order of the FASO Order *On the Science Coordinating Council under the Federal Agency for Scientific Organizations*, No 1087 of November 25, 2014 (see <http://fano.gov.ru/common/upload/library/2014/11/main/prikaz1087.pdf>), and some of its members also sit in the Council on Science of the RF Ministry of Education and Science.

The most notable development in the innovation sphere was the change in ideology, when the slogan *from science to market* was replaced by another one – *from markets of the future to their technology and scientific projections into today*. The upshot of this change is the National Technology Initiative. The reliance on the potential development of new technologies in a situation where the science sector is weakened by reform is very risky. That is why the Technological Development Agency is being created, which will be assigned the task of purchasing new technologies abroad. In fact, this will mean a switchover to an imitation development model in the field of innovation. Indeed, at present Russia can hardly hope for successful domestic R&D projects and prompt implementation of their products, and so it is reasonable to transfer foreign technologies in order to achieve the goals set in the framework of the NTI. At the same time, within such a pattern, businesses must be highly interested in innovations. In theory, one may rely on the successful rapidly growing medium-sized technology companies. If the production paradigm is also altered (by switching over to new industrial technologies in a broad sense), they may become the foundation for technological development. However, when viewed on a broader scale, the business sector is still underactive – not because of the weakness of the development institutions, but largely due to the existence of administrative and economic barriers created by the government.