SCIENCE AND TECHNOLOGIES: IN SEARCH OF A PARADIGM OF THE FUTURE

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At present, efforts are being taken to form Russia's new R&D Strategy. Goals, formation principles and the main provisions of the document are being debated. The main idea consists in a switchover to management on the basis of challenges. Alternative approaches to development of the Strategy have been considered, and it is shown that in the history of Russian scientific policy there are successful precedents of development of long-term target documents. A number of base issues to which it is important to give answers in formation of the Strategy has been formulated.

An objective was set at the government level to review strategic goals, R&D lines, as well as the main reference points (of a paradigm of the future). So, as a result of the above measures the work was started on formation of Russia's R&D Strategy. The first few steps made in development of that Strategy permit us to make some assessments and draw some conclusions.

Despite the existence and update of the strategy of social and economic development both as an innovative and more general one (as well as a multiple of more specific ones, including sectorial), in the past few years no precise system of R&D priorities both in terms of management and new breakthrough lines whose implementation is important to the country have been formed. In the Russian Federation, the latest list of priority lines in science and technologies was approved in 2011 and since then it has never been updated which fact is evidence of a crisis in that area.

Experts participating in development of the Strategy were asked to take account of "grand challenges". The above term was borrowed a few years ago from the western (mainly European) practice. The concept of Global Grand Challenges is related to a wide range of issues including not only the situation in food, demographic and other areas, but also no less important social aspects, such as ethics, urbanization, democracy and other[1]. At present, the same concept is approved as guidelines for development of the Strategy. The guidelines in question are based on linking of "grand challenges" facing the country to R&D priorities which are to be selected and effective instrument which are to be found for implementation thereof. In addition to the above, the entire system of management which is to be called "R&D and innovation management on the basis of grand challenges" is expected to be changed[2]. It would seem that the objective is formulated rather narrowly as everything comes down to new principles of selection of R&D priorities in their conceptual form. However, it is not quite so. An objective is set to find measures to solve the entire range of issues which are well-known in the research and

1 The Science and Innovations Section within the frameworks of the 13th International Scientific Conference on Development of the Economy and Society. 4 April 2012 https://issek.hse.ru/news/50688272.html

2 The briefing note "International Experience in Identifying R&D Challenges. Conclusions for Russia" prepared within the frameworks of development of Russia's R&D Strategy. M., March 2016.

innovation policy. They include the following: a lack of demand in science, a slow switchover of research to commercial projects, substantial state participation in R&D financing and insufficient competition in the R&D sector.

The idea about what the Strategy should be like was started to be developed by different entities. Surprisingly, the goal of development of the new strategy was not formulated on the part of the state. The Russian Academy of Sciences was the first to determine the objective in its conceptual document having specified that the Strategy was needed to ensure global technological parity of Russia with technological leader-countries[1].

The draft Strategy which was made public on 5 May 2016 and developed by the Center for Strategic Research includes four objectives and all of them are of procedural and administrative nature: concentration of efforts and resources on "grand challenges", formation of a single "science-technologies-innovations" complex, upgrading of efficiency of research entities, researchers, research networks and groups and development of fundamental and breakthrough research.[2] The above list does not provide answers to what kind of R&D one should be after and, in particular, what its efficiency is. Generally, "management on the basis of challenges" appears like a rather narrow approach and not a new one if one remembers the history of formation of priorities in the post-Soviet Russia. So, there is a "Security and Prevention of Terrorism" priority line which has been in effect for quite a period of time[3]. It represents a reaction to challenges of expansion of terrorism. Undoubtedly, this challenge can be attributed to "grand" and even "global" challenges. Unfortunately, the information is not available to the public on how successful handling of R&D issues within the frameworks of that priority line is despite the fact that those issues are attributed not only to closed areas (related to defense) alone. Prevention of terrorism is important in civil life, too, and that objective is solved by technical means which can be developed by interdisciplinary groups (the latter applies to a number of modern trends in development of science and technologies). So, management on the basis of "grand challenges" has been carried out for quite a long period of time and it would be important to understand in advance to what extent it was successful.

Despite the fact that the Strategy is limited only by the R&D field, that format permits to outline the main issues (in terms of "challenges", too) and lines of dealing with them, including those beyond that field. Such a statement would be useful as obstacles on the way of development of science and new technologies are largely beyond the zone of responsibility of the R&D policy and related to a general economic regulation, the condition of the society and the country's policy.

In our view, the R&D Strategy is needed for identification of framework conditions ensuring effective operation of the R&D field. From this point of view, the Strategy should be linked to the law on science which is under development, but at the same time outline the future paradigm. A strategy is what one should seek to achieve, while a law on science is a method of estab-

1 Russia's Long-Term R&D Strategy. Concept. Moscow. The Russian Academy of Sciences, 10 March 2016, p. 6.

2 Draft RF R&D Strategy till 2035; http://sntr-rf.ru/

3 It is the first priority in the list of priorities of development of science and technologies in the Russian Federation approved by the RF President in 2011; http://kremlin.ru/supplement/987

lishment of regulation in such a way so that one encounters minimum obstacles on the way to the goal. The Strategy's important components include the following:

1. It is noteworthy that science and technology should produce results to the society, state and business (economy), while in desirable future they should seek to be competitive on a global scale. It is to be noted that the issue of formation of priorities is not that simple as in the Strategy not only lines which require high-priority support, but also areas of long-term attention related to public values can be defined. So, priorities can serve not only as guidelines for redistribution of resources, but also carry out a function of information of the society, business and science on the desirable line of movement.

2. To achieve competitive edge, proper domestic and external conditions should be in place. Domestic conditions are constantly created – more funds are allocated, programs for retention and attraction of personnel are in effect, initiatives for the youth in science are implemented and the infrastructure is being built – and there are effective mechanisms, but they all fail to produce a desirable output. Even rather rough statistical indicators point to the fact that problems remain both at the stage of "inputs" (the pattern of sources of funding, personnel and other) and the stage of "outputs" (citing of publications, dynamics of patenting, particularly, abroad and the balance and pattern of trade in technologies). It seems that one of the serious problems consists in the quality of state regulation which is translated by chain to the next level of hierarchy because the R&D sphere is under special patronage of the government.

3. External conditions are related to the general economic regulation and the country's foreign policy. It is difficult to proclaim openness to the world and multiplicity of sources of funding of research amid adoption of laws on unwelcome organizations and foreign agents due to which laws foreign funds leave Russia and Russian non-profit organizations supporting education and science close down. The problems related to tax, customs, administration, migration and other regimes (those problems have repeatedly been outlined and discussed) should be specified in the Strategy as barriers and areas which are to be upgraded.

4. It is important to identify the level of detailed elaboration in presentation of instruments to be used for attaining the goal. It is possible to list specific (priority) instruments (which mode is typical of domestic strategies) or formulate the baseline principles of regulation. In our opinion, excessive detailed elaboration is disadvantageous to the Strategy as a document outlining long-term prospects.

Russia has amassed considerable experience in developing different strategies dealing with R&D and innovation issues. In addition to the above, there is experience in adjusting them related to modification of objectives, as well as target indicators. The more detailed – like a plan of actions – the Strategy is, the more often they have to adjust it. It is for the above reasons the Strategy should be a small framework document.

The experience of the USA, a R&D leader shows that US documents which can be called analogs of strategies are prepared in the form of a list of key objectives, barriers and general proposals on how those goals can be achieved. It is to be noted that in different documents one can find similar provisions which means that there are common long-term objectives for the

entire R&D field. They include, among other things, securing (or retention) by the US of leading positions in all the R&D lines; development of partnership between the state, industry and academic circles; training of high-skilled researchers and engineers; upgrading of the level of information of the society on breakthroughs in science and technologies. Generally, they virtually say invariably about leadership and competitive edge. It is to be noted that similar ideas can be found in the EU's documents along with recognition of areas of priority attention, such as, for example, securing of quality living standards and decent support in old age.

It is interesting that in Russia in the mid-1990s a document resembling the style of present-day strategies was prepared. It was the Doctrine of Development of Russian Science approved in 1996. The above document was made up of six pages on which objectives of development of science, obstacles and the government's obligations were clearly formulated[1]. The Doctrine includes a small preamble outlining the purposes for which it was written. The next section is dedicated to development of scientific potential. It includes a list of base provisions which are shared by the state: freedom of creativity, importance of fundamental science, creation of competitive conditions, multiplicity of sources of funding, tax and customs privileges, formation of conditions for operation of non-government organizations in science and other. Some of the Doctrine's provisions have become outdated, but most values are topical today, too. It is important that in the Doctrine the state officially assumes obligations to ensure all the base provisions.

The Doctrine in question can be regarded as a prototype of a document which is to be written in the form of a Strategy because 20 years have passed since then and both the lexicon and terminology have changed. It is to be noted that recognition and acknowledgement of those domestic and external barriers which are to be overcome to let R&D produce outputs are of top priority.

1 Approved by Order No.884 of 13 June 1996 (edited on 23.02.2006) of the RF President on the Doctrine of Development of Russian Science. http://base.consultant.ru/cons/cgi/online.cgi?req=doc;base=LAW;n=97458;fld=134;dst=1000000001,0;rnd=0.29871542757292335