Study of key risks in the process of formation and implementation of the state science and technology policy in modern Russia

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***Abstract*–Modern state policy is developed and implemented in conditions of high uncertainty: the number of dangers and threats increases not only by type (financial, political, environmental, technological, space, ideological, etc.), but also by the scale of the possible consequences of the occurrence of probable events. The relevance of the study outlined in this article is due to the high degree of uncertainty in the results of scientific and technological development, as well as the practical absence of a unified risk management methodology in the process of forming and implementing state policy in Russia. At the same time, risk management in the field of public administration has long been a practice in Western countries. Currently, it has become the basis for the modernization of public administration in the United Kingdom, Canada and the United States of America, which makes it relevant to study the experience of these countries and its adaptation to national realities. Summarizing the practice of risk analysis in the development and implementation of government programs and policies in Russia, it can be noted that at present, risk analysis is only part of the practice of government bodies. The developers of state programs are limited to listing risks and distributing them in three (high, medium, low risk), and even two groups (high risk, low risk). Such an approach makes it difficult to develop effective measures for managing risks and leveling them, and limits control over the implementation of the program. As a result, program adjustments are usually suggested as risk management measures, but solutions to problems or the use of alternative risk management strategies are not considered.**

At the same time, by now, risk management is increasingly being incorporated into the activities of state and local authorities, becoming a regular function of government. Certain authorities actively use risk management in their practice (for example, the Ministry of Emergency Situations, the Government of Moscow), however, the scientific and methodological basis for risk assessment in the Russian authorities is only beginning to take shape. The latter circumstance even more actualizes research in the field of public policy risk management, especially in the field of science and technology.

In the course of this study, the authors attempt to substantiate the method of expert assessments of key risks arising in the process of the formation and implementation of the state science and technology policy in modern Russia. The experts were asked to assess the degree of influence of eight hypothetical risks on the processes of formation and implementation of the Russian Federation policy in the field of science and technology or to add their own risk formulation, as well as assess their significance on a 5-point scale, predict the dynamics of the risks presented and specify these risks as applied to priority directions of development of science and technology of the Russian Federation.

Expert evaluations and their generalized proposals can be used in the risk management practice of the Ministry of Science and Higher Education of the Russian Federation, as well as the Russian Academy of Sciences.

Keywords–state policy, science and technology policy, risks, risk prevention, risk management

I. INTRODUCTION

It seems obvious that risk management in modern society often becomes a matter of not only efficiency, but also the very survival of the state. The pressure of external and internal threats, unforeseen circumstances can have such a significant impact on the results of public policy that the results may be directly opposed

to given. And this is fraught with significant losses of public resources, a decrease in living standards, the formation of a new round of risks of a socio-economic and political nature with little predictable consequences of a negative nature.

Analysis and assessment of risks in the process of forming and implementing state policy is a special methodological and practical problem. Its acuteness is emphasized not only by the high “price of the issue” in the event of errors and failures in the implementation of public policy, but also by the absence of a unified risk management methodology in the system of government. At the same time, it is impossible not to note the increased attention to this issue in the process of developing various directions of state policy. It should be noted that in the real sector of the economy, a great deal of methodological and practical experience in risk management has already been accumulated: principles have been developed, processes have been described, several conceptual approaches have been developed, etc. However, in the area of public policy, little attention is paid to risk management issues. Among the few successful practices worth mentioning the work of the Ministry of Emergency Situations and the government structures of some regions. In this regard, it seems reasonable to believe that risk management is gradually becoming a regular function of government. [1].

The issue of risk management is covered in sufficient detail in management science. It is worth mentioning the works of Vitselyarova KN, Zakharova Yu.N, [2-4] and others. Foreign authors such as [5], [6], R. Merton, and others have made an undoubted contribution to the development of the theory and practice of risk management. However, it should be noted, despite on the indisputable relevance, the practical lack of work on risk management issues in the process of formation and implementation of public policy. Among the few scientific publications, the works of N.V. deserve priority. Blinova, E.V. Gaganova, I.A. Bronnikova [7].

So, V.V. Lobanov considered risk management as the formation of a protective mechanism and the development of preventive measures that reduce the degree of risks, which allows not only to identify them in advance, but also to take measures for their localization and prevention at early stages [8]. Representatives of the scientific school of the State University of Management N.V. Blinov and E.V. Gaganova adds to the above definition a function of analyzing and assessing potential risks, the implementation of which should underlie the development of a mechanism to protect and reduce risks [1].

The purpose of the research presented in this article is to confirm the hypothesis of key risks arising from the formation and implementation of the state scientific and technical policy of the Russian Federation at the present stage.

In the light of the above, the relevance of risk management should be emphasized for such a public policy direction as science and technology policy [9]. Indeed, this direction is characterized by a fairly high degree of uncertainty - which represents one of the main factors of high risks. The Strategy of the Russian Federation in the field of development of science and technologies adopted in December 2016 directly identified a number of risks in the relevant field (in the document they are called "big challenges": a) the exhaustion of the possibilities of Russia's economic growth based on the extensive exploitation of raw materials, against the background of the formation of digital the economy and the emergence of a limited group of leading countries with new production technologies and focused on the use of renewable resources; b) the demographic transition caused by the increase in life expectancy of people, changes in their lifestyles, and the associated aging population, which together leads to new social and medical problems, including an increase in the threats of global pandemics, an increase in the risk of the emergence of new and return infections; c) an increase in anthropogenic pressures on the environment to the extent that threatens the reproduction of natural resources, and the increase in risks to the life and health of citizens associated with their inefficient use; d) the need to ensure food security and food independence of Russia, the competitiveness of domestic products on world food markets, reduction of technological risks in the agro-industrial complex; e) a qualitative change in the nature of global and local energy systems, the growing importance of the energy supply of the economy and increasing the volume of generation and conservation of energy, its transmission and use; f) new external threats to national security (including military threats, threats to the loss of the national and cultural identity of Russian citizens), caused by the growth of international competition and conflict, global and regional instability, and the strengthening of their interconnection with internal threats to national security; g) the need for effective development and use of space, including by overcoming imbalances in the socio-economic development of the country, as well as strengthening Russia's position in the economic, scientific and military development of space and airspace, the oceans, the Arctic and Antarctic.

This indicates the gradual inclusion of risk management mechanisms in the activities of the Ministry of Science and Higher Education of the Russian Federation. At the same time, the study of risks in the sphere of any direction of state policy is a permanent process, which makes the present study relevant.

This article attempts to clarify the key risks in the formation and implementation of state science and technology policy in modern Russia, as well as to assess the degree of their importance both at the present time and in the short and medium term.

The results of the study can be further used in the development and improvement of information-analytical systems of state management and automation of a number of management processes (analogues of

ERP systems from the private sector), allowing to calculate the consequences of risks and the likelihood of their occurrence with high accuracy, speed and on a regular basis, which will ensure a qualitative leap in government decisions, primarily at the level of federal policy.

II. MATERIALS AND METHODS

As a methodological basis of the study, the authors determined a systematic approach to the state science and technology policy. This approach identified a hypothesis about key risks arising in the process of its formation and implementation, among which the authors identified: 1) initially incorrectly chosen priorities of state policy; 2) an error in the choice of universities for priority support; 3) incorrect indicators for assessing the scientific potential of both higher education in general and individual universities; 4) the impossibility of applying scientific results obtained in the course of basic research in applied research; 5) lack of demand for training in universities selected for priority support (and, as a result, impoverishment of the scientific potential of these universities); 6) extinction of existing and the absence of new scientific schools; 7) loss of competitiveness with foreign universities. In addition, it is necessary to take into account a number of general political, macroeconomic and demographic risks.

An expert survey (questioning) of representatives of universities and research organizations in Moscow was chosen as the method of testing the hypothesis put forward. In the structure of the questionnaire, the discovery or half-closed questions prevailed, which allowed the experts to express their opinions on each question more fully. In particular, the experts were asked questions about the assessment of the relevance of risks arising in the process of both the formation and implementation of the state science and technology policy (it was assumed that several answers could be chosen from among the above hypothetical risks, as well as the addition of one's own answer) In some cases, experts were asked to assess (from 1 to 5) the significance of a particular risk in the process of formation and implementation of state science and technology policy in modern Russia, and also to present a forecast of the dynamics of a particular risk for a short-term (1 year) and medium-term (5 years) perspective. As in the previous group of questions, the expert could assess the significance of not only the risks proposed in the research hypothesis, but also add his own version.

An important task of the study was to clarify the opinions of experts regarding the level of risks in the implementation of various directions of state science and technology policy. In particular, respondents were asked to assess on a 5-point scale the level of risks arising from the implementation of priority areas of scientific and technological development of the Russian Federation, as well as to reveal the most characteristic manifestations of these risks [10].

It should be recalled that the specified priority areas (for the next 10-15 years) in the Strategy for Scientific and Technological Development of the Russian Federation are: a) transition to advanced digital, intelligent production technologies, robotic systems, new materials and methods of design, creation of processing systems large amounts of data, machine learning and artificial intelligence; b) transition to environmentally friendly and resource-saving energy, increasing the efficiency of extraction and deep processing of hydrocarbons, the formation of new sources, methods of transportation and storage of energy; c) the transition to personalized medicine, high-tech health care and health-saving technologies, including through the rational use of drugs (primarily antibacterial); d) the transition to a highly productive and environmentally friendly agricultural and aquatic economy, the development and implementation of systems for the rational use of means of chemical and biological protection of agricultural plants and animals, the storage and efficient processing of agricultural products, the creation of safe and high-quality, including functional, food; e) counteraction against technogenic, biogenic, sociocultural threats, terrorism and ideological extremism, as well as cyber threats and other sources of danger to society, the economy and the state; f) connectedness of the territory of the Russian Federation through the creation of intelligent transport and telecommunication systems, as well as taking up and maintaining leadership positions in the creation of international transport and logistics systems, the development and use of space and airspace, the World Ocean, the Arctic and Antarctic; g) the possibility of an effective response of Russian society to great challenges, taking into account the interaction of man and nature, man and technology, social institutions at the present stage of global development, including applying the methods of the humanities and social sciences [10].

At the end of the survey, the experts were asked to express their views in a free manner on the current and missing but desirable elements of the public science and technology risk management system.

At the end of the survey, experts were asked to express their opinion on the existing and missing, but desirable elements of the risk management system in the field of state science and technology policy in a free form. The survey was conducted from February 15 to March 5, 2019. A total of 20 experts were interviewed, of which 9 were organizations of higher education and 11 were academic institutions. Among those surveyed, 22% are candidates of science, 59% are Doctors of Science, 65% of respondents are men, 35% are women, and the share of young scientists is 15% of the total number of respondents.

III. DISCUSSION

It can be assumed that some of the conclusions of the authors may be the subject of scientific discussions among domestic and foreign scientists - political scientists, experts in the field of both public administration and risk management.

In particular, the authors believe that the requirements of stability, efficiency growth, the

validity of government decisions, minimization of the subjective factor in government can be satisfied with the implementation of the risk management system in the development of public policy. At the same time, it is not possible to shift the principles and methods of managing risks from the private sector to public policy without taking into account the characteristics and specifics of the public administration sector: its specific focus, responsibility, scale, specific restrictions, publicity, unique instrumental management set, etc.

It is important to note the following aspect: risk management is associated with both negative and beneficial consequences. The essence of risk management is to identify potential deviations from planned results and manage these deviations to improve prospects, reduce losses and improve the reasonableness of decisions made. Managing risk means identifying prospects and identifying opportunities for improvement, and not allowing or reducing the likelihood of an undesirable course of events.

Thus, risk management involves the introduction of additional logical and semantic operations into the state decision-making process, which can significantly increase the degree of rationality and optimality of public policy, as well as improve the feasibility and effectiveness of government programs and policies, the overall management effectiveness of the public administration system. The fundamental point that allows to realize the potential of risk management is its integration into the daily work of the governing structures as a regular and regulated function. This requires an appropriate theoretical study, research, development of a specific risk management methodology in relevant processes and systems, development and description of methods for introducing the methodology into the practice of developing and implementing public policy.

IV. RESULTS

The results of the expert survey showed that the majority of respondents view the scientific and technical policy in the Russian Federation negatively or with moderate optimism ("Rather positive"). However, it should be noted that a significant number of experts (more than 50%) could not name any current project implemented by the Ministry of Higher Education and Science (Russian Ministry of Science) in this area. to testify both about the lack of awareness of experts, and about the unsatisfactory work of the Ministry of Science in the information of the scientific community.

Experts' assessments also show the fundamental validity of the authors' hypothesis regarding the key risks arising in the process of forming and implementing state scientific and technical policy in modern Russia. Thus, only one expert suggested a different answer to the question of existing or potential risks in the area in question (the risk of over-optimistic predictions on possible implementation was highlighted (the risk of over-optimistic predictions of implementation was highlighted projects selected). Among the main risks in the process of forming the state scientific and technical policy experts note the use of incorrect indicators of assessment of scientific potential, the fading of existing scientific schools, as well as initially incorrect selected priorities of state scientific and technical policy, error in the choice of organizations for priority support and inability to use the results of basic research in applied research and development. As for the implementation of policy in this area, the most significant, in the opinion of most respondents, are general political, demographic and macroeconomic risks.

At the same time, experts tend to note the persistence and even increase in the level of these risks in both the short and medium term. in addition, many respondents noted that the results could be applied to applied research and development. tendency to maintain risks of a general political, macroeconomic and demographic nature. At the same time, several risks, according to experts, tend to decrease. These include the risk of errors in selecting organizations for priority support, as well as the risk of fading existing and no new scientific schools.

Assessing the risks in the implementation of the priority areas of scientific and technological development of the Russian Federation, experts noted their highest level (4.5 points on a 5-point scale) in the implementation of such direction as connectivity the territory of the Russian Federation through the creation of intelligent transport and telecommunications systems, as well as the occupation and leadership of the international transport and logistics systems, the development and use of space and airspace, the oceans, the Arctic and Antarctic. Slightly above average (3.75 points on a 5-point scale) the risks in the implementation of basic research, due to the internal logic of the development of science, ensuring the country's readiness for big challenges, not yet manifested and not widely accepted, the ability to assess the risks of scientific and technological development in a timely manner.

In terms of specifying risks in the first of the state's dedicated science and technology policy, experts pointed to a geographical factor (i.e. a huge territory of Russia, which makes it difficult to develop transport infrastructure and international competition and sanctions protectionism. As for the second direction, the key factors of high risks here are the efficiency of public administration (in particular, due to the lack of a well-defined and sought-after society nationalities well as the lack of real opportunities for self-development among the regions.

At the end of the survey, respondents were asked to formulate elements of the risk management system that should be implemented in the practice of the Ministry of Science and Higher Education of the Russian Federation. The creation of expert advice on the areas of scientific and technological development, working strictly within and in accordance with transparent methods of calculus Thus, there is a need not only and not so much in the formation of expert panels (which is partly already being carried out), but also about the

development of a methodology for analysis and risk management in the field of scientific and technological development.

V. CONCLUSION

In the process of public policy development and decision-making in public authorities, the main objective of the risk management system is to reduce uncertainty in the internal and external environment. The main objects of analysis are usually: changes in objects and processes, prediction of future changes in the external and internal environment, in the state of the object or process, as well as the possibility of choosing the subject of management.

Comprehensively recommending practitioners and risk management researchers for public administration, a sequence of issues that are addressed at the risk analysis and policy planning stage, development Government decision or program: 1) area and type of risk, its nature and content; 2) scale, level, frequency of risk, probability; 3) possible losses, damages and negative consequences; 4) risk management strategy; 5) Risk assessment with alternative solutions; 6) Identify options with the least risks; 7) Choosing the best solution.

In the context of public policy-making and implementation processes, risk management should be accepted for the following steps: 1) identifying and describing risk factors; 2) Assessing the likelihood of risk; 3) Assessment of possible consequences and damage; 4) Choosing a risk management strategy; 5) Develop benchmarks to monitor policy implementation; 6) Developing responses and operational decisions. The results of the study may form the basis for the development of a risk management system for the Ministry of Science and Higher Education of the Russian Federation.

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