Review on S&T Cooperation between Russia and India

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Russian Science and Technology Policy

The state policy of the Russian Federation in the field of science, technology and innovation (STI) has recently undergone changes. A new strategic approach to Russia's modernisation has emerged, with key long-term priorities for the national STI complex as well as a new framework for its governance.

The development of a strategic approach to STI issues and its institutionalisation has been an essential part of the modern STI state policy of the Russian Federation. On December 1st, 2016, the President of the Russian Federation approved the Strategy for the Scientific and Technological Development of the Russian Federation (hereinafter – the Strategy). The Strategy sets out the goal and the main objectives of Russia's scientific and technological development, the principles, priorities and main areas and measures for implementing the state policy in this sphere, as well as the expected results of the Strategy's implementation, namely Russia's sustainable, dynamic and balanced scientific and technological development in the long term (till 2035). It also determines the place and significance of a scientist, engineer, technological entrepreneur in society.

The document sets the following context for implementing the state policy in the sphere most successfully:

I. Introducing the definition of «grand challenges», with science and technologies being important tools to meet those challenges by playing a key role in ensuring both the sustainable

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development of civilization and the assessment of risks and potential hazards for humanity. In terms of the scientific and technological development of the Russian Federation, the following grand challenges may be deemed as the most important[1]:

- Exhaustion of Russia's economic growth opportunities based on extensive exploitation of raw materials, against the backdrop of the development of the digital economy and the emergence of a limited group of the leading countries with new production technologies, which drive towards the use of renewable resources;
- Demographic transition caused by an increase in human life expectancy, changes in the life-styles and related ageing of population, which, taken together, results in new social and medical problems, including the growth of global pandemic threats, higher risks of new infections, and the return of currently extinct infections;
- Health and life hazards resulted from an inefficient use of natural resources and an increase in anthropogenic pressure on the environment to the extent that it poses a threat to the renewal of natural resources;
- A need to ensure food security and independence of Russia, competitive strength of domestic products in the global food markets, and reduction of technological risks in the agro-industrial sector;
- Qualitative changes in the global and local energy systems, a growing importance of the economy's power supply capacity and stepped-up generation of power, its conservation, transmission and use;
- New external security threats (including military threats, threats of losing national and cultural identity of Russian citizens), brought about by the growth of international competition and proneness to conflict, global and regional instability and their growing interconnection with internal threats to national security;
- A need for the efficient development of the space, eliminating disproportions in the social and economic development of the national territory, consolidating Russia's positions in the economic, scientific, and military development of outer and air space, the World ocean, the Arctic and the Antarctic Regions.

II. Transition from branch-wise S&T priorities to societal demand-oriented approach.

The implementation of the priority areas in the development of science, engineering and technologies at the first stage of the state scientific and technological policy (1991-2001) made it possible to obtain results and create competencies necessary for moving to the implementation of new priorities of S&T development of the Russian Federation that address grand challenges[2].

III. R&D Management (modern, «digital», competitive).

Following up on the document the Strategy, in 2017 the Russian government approved the Action Plan for the Implementation of the Scientific and Technological Development Strategy of the Russian Federation in 2017-2019 (hereinafter – the Action Plan). The Action Plan, in particular, provides for the development and approval of the state program «Scientific-technological development of the Russian Federation», which includes a programme of fundamental research and integrated S&T programmes in priority areas defined by the Strategy. The programme will be financed at the expense of other government programmes, development institutions and funds of support of scientific, scientific-technical and innovation activities. Also, it may be said that the Action Plan includes measures for creating opportunities for the successful realization of creative potential of young people in science and innovation, including international technical and scientific cooperation.

The Action Plan consists of 43 actions intended to[3]:

- Form an up-to-date management system & improve investment attractiveness;
- Establish an effective communication system, increase the perceptivity of the society and the economy to innovations, provide conditions for the development of science-driven business;
- Provide conditions for R&D in line with the best Russian and worldwide practices and the recent principles of work organization;

- Create conditions to identify talented youth and enable them to build successful career and develop intellectual potential of the country;
- Establish the model of international S&T cooperation and integration that will help to protect the identity of the Russian science and enhance its effectiveness through mutually beneficial collaboration.

To the key elements of the Strategy also refer the implementation of the National Technological Initiative, the Strategy of "naukograds" (science cities) and development of the Concept of International Science and Technology Cooperation", which is aimed at promotion of the international S&T cooperation and integration into global S&T community.

Russian-Indian R&D collaboration

Legal framework

The Intergovernmental Russian-Indian Agreement on Science and Technical Cooperation, 1994, establishes a legal basis for the development of bilateral cooperation between Russia and India.

The Working Group on Science and Technology (hereinafter – the WG on S&T) functioning under the Intergovernmental Commission on Trade, Economic, Scientific, Technological and Cultural Cooperation, the Integrated Long-Term Programme and the Basic Science Cooperation Programme are the three main institutional mechanisms for bilateral Science and Technology cooperation, while the Science Academies of the two countries promote inter-academy exchanges.

Moreover, there are Memorandums and Agreements on S&T cooperation between the Indian organisations and Russian science foundations (Russian Foundation for Basic research, Russian Science Foundation); universities are being promoted to encourage the growth of bilateral interaction in the field of S&T.

Two Programmes of Cooperation concluded in October 2013 were active mechanisms for cooperation as well. The first was the Programme of Cooperation in the fields of science, technology and innovation between the Department of Science and Technology (DST), Government of the Republic of India, and the Ministry of Education and Science of the Russian Federation (MON) for the period 2014 – 2017. Priority areas of cooperation, set in the Agreement, were environmental sciences; energy (including alternative sources of energy), efficiency and security; information & communication technology; nanotechnology and materials & engineering sciences. The second one was the Programme of cooperation between the Department of Biotechnology of the Ministry of Science and Technology (DBT), Government of the Republic of India, and Ministry of Education and Science of the Russian Federation for the period 2014 – 2017, within life sciences and biotechnology.

Both Programmes supported joint Russian-Indian R&D projects through the mechanism of a joint call for proposals.

Joint working platforms

The general coordination of S&T relations at the interstate level is carried out by the WG on S&T functioning under the Intergovernmental Commission on Trade, Economic, Scientific, Technological and Cultural Cooperation. Last meeting of the WG was held on February 26, 2018, in the Ministry of Science and Higher Education of the Russian Federation.

BRICS STI WGs. Within the BRICS, India oversees such areas as geospatial technologies and their applications for development: the development of information and communication technologies (ICT) and decision-making systems (SPM) based on geospatial technology for managing risks associated with natural disasters and climate change, and for appropriate flexible development planning to ensure a sustainable habitat. Together with Russia, India is responsible for cooperation in the field of materials science and nanotechnology, as well as in the field of photonics. Both India and Russia supports and actively participate in the implementation of BRICS STI Framework Programme aims to support joint research projects in priority areas. The initiative is aimed to facilitate cooperation among researchers and institutions in the framework of consortia that should consist of partners from at least three BRICS countries.

Funding

Support of fundamental research in the Russian Federation is carried out within the framework of the Program of Fundamental Scientific Research in the Russian Federation for the long-term period (2013-2020) and the Program of Fundamental Scientific Research of the State Academies of Sciences for 2013-2020. Russian Foundation for Basic research (RFBR, regularly announces bilateral joint calls, BRICS STI Framework Programme funding organization and Call Secretariat) and Russian Science Foundation (RNF, the second call for Russian-Indian proposals in all research fields, except social sciences and humanities was announced on June 1, 2018) make a significant contribution to the basic research funding. A number of separate initiatives are implemented in order to support research infrastructure, including mega-science projects: Government Decree No. 220 on measures to attract leading scientists to Russian higher education institutions.

The activity of the Russian Foundation for Assistance to Small Innovative Enterprises in Science and Technology (FASIE) is intended to support innovations via funding R&D projects aiming at solving societal problems and creating highly knowledge-intensive products, with focus on small innovative companies.

The main tool for supporting applied research is the Federal target program on research and development for priority areas of the development of S&T complex of Russia 2014-2020 (hereinafter - FTP 2014-2020), managing by the Ministry of Science and Higher Education of the Russian Federation. After studying the it can be summed up that in order to get funding for the international applied research projects under the program there are some obligatory rules, such as:

- The requested amount of funding from the federal budget (subsidy) should be calculated for the duration of the work within the framework of the project, specified in the call conditions (from 1 year to 4 years);
- The requested amount of funding from the federal budget (subsidy) should be fully used by its recipient to recover its research costs;
- The project may provide for extrabudgetary co-financing by the industrial partner;
- The cost of foreign partner in the project should be at least 100% of the amount of the grant requested by the Russian participant for each year of the project (the rule of equal funding);
- Foreign partner's work package are covered at the expense of foreign partner funds (foreign funding agency) and must be expressed by the Russian partner in the national currency (ruble, RUB) at the official exchange rate of the Central Bank of the Russian Federation on the day the decision on the winners is taken (the Protocol is sighed by the respected funding agencies);
- The amount of funding requested from the federal budget for the project implementation should not exceed the limit of the subsidy, including within one financial year, indicated in the call announcement;
- If the requested amount of funding from the federal budget is reduced in relation to the limit of the subsidy, the reduction should be proportional to each fiscal year. The allowable deviation from this requirement should not exceed 5%.

Indian-Russian applied R&D projects implementation

- **Bilateral cooperation in applied research. Challenging issues**

Bilateral cooperation in applied research - statistics

Within the framework of FTP 2014-2020, 15 bilateral Russian-Indian projects have been supported since 2014. Among them, six projects were supported in 2017 within the Programme of Cooperation in the fields of science, technology and innovation between DST and MON for the period 2014 – 2017 (two were dissolved due to the lack of financing from the Indian side); four were supported in 2017 within the Programme of cooperation between DBT and MON for the period 2014 – 2017 (one was dissolved due to the lack of financing from the Indian side).

Table 1: Existing Russian-Indian Partnerships - Examples

S. No.	Funding Organizations	Russian side	Indian Side
1	MON, DST	Federal State Budget Educational Institution of Higher Education "Irkutsk State University"	Indian Institute of Technology Guwahati
2	MON, DST	Federal state autonomous educational institution of higher education "St. Petersburg Polytechnic University of Peter the Great"	Indian Institute of Technology Bombay
3	MON, DST	Federal state autonomous educational institution of higher education "Belgorod State National Research University"	Center for Nanoscience and Technology, Indian Institute of Science, Bangalore, India; Limited Liability Company Megalum
4	MON, DST	Federal State Budgetary Research Institute of Physics and Technology. A.F. Ioffe Russian Academy of Sciences	Indian Institute of Technology (Indian School of Mines), Dhanbad; Technological Institute Motilal Nehru, Neshnel
5	MON, DST	Federal State Budgetary Institute of Science Institute of Problems of Chemical Physics of the Russian Academy of Sciences	University of Sri Venkateshwara
6	MON, DST	Federal State Budgetary Institute of Science Institute of Synthetic Polymer Materials. N.S. Enikolopov of the Russian Academy of Sciences	University of Visva-Bharati, Indian Association for the Advancement of Science
7	MON, DST	Federal State Autonomous Educational Institution of Higher Education "National Research University" Moscow Institute of Electronic Technology	University of Utkal
8	MON, DST	Federal State Institution "Federal Research Center Fundamental Foundations of Biotechnology" of the Russian Academy of Sciences	Center for Advanced Scientific Research Jawaharlal Nehru
9	MON, DST	Federal State Budgetary Institution of Science Institute of Bioorganic Chemistry, Institute of the Russian Academy of Sciences	Tata Memorial Center ACTREC
10	MON, DBT	Federal State Budget Scientific Institution "VN Orekhovich Scientific Research Institute of Biomedical Chemistry	The Council of Scientific & Industrial Research (CSIR) – National Geophysical Research Institute

Source: Data collected from various sources, including Department of Science and Technology and Department of Biotechnology, Government of India

Challenging Issues

The long-term Russian-Indian collaboration in science and technology provided the basis for identifying some bottlenecks in this cooperation. The challenging issues that should be taken into consideration are the following:

- The volume of funding within the framework of supported applied projects should be provided under the terms of equal co-financing, in accordance with the terms and conditions of national regulations and the call documentation.

- In India, there is a two-stage procedure of supporting and funding joint projects, while in Russia the procedure is one-stage. It means that after the joint decision is taken on what projects to support and it is fixed in the Protocol signed by both Indian and Russian funding agencies, the Indian side submits the chosen projects for the second round of internal approval. During this second stage some conditions, such as amounts of budget requested for the projects or projects implementation period or others, can sometimes be changed on a unilateral basis. This can cause inconvenience in terms of whole projects' changing and additional agreements undertaking between the project partners, and therefore between the Russian partner and the Russian funding agency.
- Multilateral cooperation in applied research - statistics. BRICS STI Framework Programme

Within BRICS STI Framework Programme two coordinated multilateral calls have been launched since 2015, with the participation of all BRICS countries: Brazil, Russia, India, China and South Africa. From the Russian side two funding agencies take part: Russian Foundation for Basic Research (performs the functions of the Call Secretariat as well as supports fundamental research projects) and the Russian Ministry of Science and Higher Education (MON, supports applied research projects). In 2017 within the pilot BRICS coordinated call MON supported for funding seven projects, five of them with Indian participation. In 2018 the second BRICS coordinated call was launched, MON supported six projects, four of them with Indian participation

The table 1 provides several examples on the existing partnerships between Russian and Indian research organisations.

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Note: Most of the points in "Russian-Indian R&D cooperation", "Indian-Russian applied R&D projects implementation" are narratives derived from my professional experience.