Science & Technology: Epitome of India-Russia Cooperation

by

Sanjeev Kumar Varshney[1] and Rajiv Kumar[2], [1]Adviser & Head, [2]Senior Scientist, International Cooperation Divison, Department of Science & Technology, Government of India, New Delhi

Science & Technology has been the epitome of the bilateral India-Russia (and India-Soviet) partnership, apart from political and military partnerships. Roots of the collaborative programme are deep and it has penetrated in many scientific groups in universities or academic institutes, industries, scientific/ basic science laboratories. The joint endeavours have led to generation of knowledge, products, and facilities through hundreds of joint projects. Both countries have been making concerted efforts to strengthen, expand and deepen cooperation in this important sector of bilateral relations. Formulation and implementation of fundamental scientific ideas in order to create new technologies, new types of equipment and materials required of the economic development of both countries has been the main focus of the programme, both in strategic as well as civil science sectors.

Right since Soviet days, when Soviet laboratories were not open to many countries, except COMECON countries, scientists from India and China were having access to these scientific and production institutes in Soviet Union. This, in turn, led to establishment of several technical institutes, both companies and academic institutes in India. It included establishment of Bhilai Steel Plant, Indian Institute of Technology Bombay (popularly known as IIT Bombay), International Advanced Research Centre for Powder Metallurgy & New Materials (ARC-I), Hyderabad etc. besides several critical support to India in strategic sectors including nuclear, outer space and defence research. After the initial chaos, following breakdown of Soviet Union and emergence of Russia as a sovereign nation, India-Russia bilateral scientific cooperation soon picked up and are currently in full swing, both in civilian and strategic sectors, in basic and applied sciences, encouraging not only knowledge generation, but also encouraging entrepreneurships, innovation, and supporting techno-commercial research. This article restricts itself to scientific cooperation in non-strategic sectors.

Presently, both countries have adopted multi-stakeholder bases and scientific cooperation is facilitated through many agencies. While from the Indian side, Department of Science & Technology (DST), Ministry of Earth Sciences (MOES), Council of Scientific & Industrial Research (CSIR), Department of Biotechnology (DBT), Ministry of Electronics & Information Technologies (MEITY), Indian Council of Medical Research (ICMR), Indian Council of Agricultural Research (ICAR) and Indian National Science Academy (INSA) are the primary agencies in civilian science & technology cooperation. On the Russian side, their Ministry of Science and Higher Education (MSHE), Russian Foundation for Basic Research (RFBR), Russian Science Foundation (RSF), Skolkovo Foundation (SF), Russian Academy of Sciences (RAS), Russian Federal Foundation for Small Innovative Enterprises (FASIE) and Russian Ministry of Economy Development (MED) are involved in inculcating this partnership.

In addition, there is a possibility to increase the science funding agencies on both sides to facilitate new cooperation. The program is steered through India Russia Working Group on Science & Technology which reports to the India Russia Inter Governmental Commission.

In addition to bilateral cooperation, both countries are supporting each other actively in several multilateral platforms, including BRICS (Brazil, Russia, India, China and South Africa), Shanghai Cooperation Organization (SCO), G-20, etc. through which cooperation activities based on mutual interest is supported.

Basic Science Cooperation

Both countries have been supporting joint R&D in Basic Sciences. Around 150 joint projects are presently under implementation in Mathematics & Computations, Physics & Astrophysics, Chemistry, Earth Science, Biological & Medical Sciences, Engineering Sciences and Information & Communication Technologies. These cooperation has resulted in knowledge generation as well as development of institutes of excellence in identified thematic areas.

Collaboration between Indian and Russian scientists on development of India's first indigenous oral polio vaccine, which has benefited millions of people is an excellent example of joint cooperation. Support and training from Russia has been a key factor in the success of the vaccine production facility of Bharat Immunologicals and Biologicals Corporation Ltd at Bulandshahr in Uttar Pradesh. This resulted in the development of oral polio vaccine by several companies. This eventually led to launch of Pulse Polio program and thankfully India is now, one of polio free countries.

Joint collaboration in Materials science has led to establishment of International Advanced Centre for Powder Metallurgy and New Materials (ARCI) set up at Hyderabad. This was the first Centre of Excellence established through the Indo-Russian cooperation 35 years ago. ARCI has grown from strength to strength and is now recognized as a premiere institute for development and transfer of materials related technologies. There are enormous examples of such collaborating efforts like development of streak cameras; high power lasers and their application, growth of BGO crystals with unprecedented perfection. Many programmes pertaining to photochemistry, laser spectroscopy and cluster dynamics etc. have been successfully completed under the Indo-Russian joint collaboration. Other completed projects include medical applications of lasers, such as, treatment of drug-resistant TB using phototherapy based on UV light, bio-stimulation and tissue modification, use of laser-based fluorescence technique for cancer diagnostic applications etc.

High Performance Computing was one of the major thrust areas for collaboration. A significant project under its purview pertains to the collaboration between the Centre for Development of Advanced Computing (C-DAC) and the Institute for Computer Aided Design (ICAD) of the Russian Academy of Science in the area of High Performance Computing (HPC). This has led to establishment of Russia-Indian Centre for Advanced Computing in Moscow.

A Remotely Operated Unmanned Submersible (ROSUB) was jointly development by National Institute of Ocean Technology (NIOT), Chennai and Experimental Design Bureau of Oceanological Engineering (EDBOE), Russian Academy of Sciences (RAS), Moscow. Joint development of the unmanned submersible for deep sea operation consists of an electric work class. Remotely Operated Vehicle (ROV) equipped with two manipulators and having an additional pay load capability of 150 kg for mounting scientific and mission oriented subsystems and can go up to the depth of 6000 m. Joints projects were successfully pursued in the areas of Computational Fluid Dynamics, Modelling Monsoon Circulation, Transition and Turbulence Control; and Fatigue & Fracture Mechanics. With joint efforts of National Institute of Ocean Technology (NIOT), Chennai and Sevmorgeo, St Petersberg in-situ soil tester was developed. Joint studies were undertaken by Indian and Russian team in Lake Baikal for exploration of gas hydrate. With joint efforts during winter expedition in Lake Baikal gas hydrates from three cores were recovered in Malenki mud volcanic region.

There are tremendous potential for joint collaboration in frontier areas of Ocean Science & Technology such as Design and development of Manned Scientific Submersible; Gas Hydrate Exploration & energy Harvesting; machines and technologies for Deep Sea Mining etc.

Similarly Polar Science could be another area of interest for joint collaboration where scientific research as well as logistics in Antarctica. Every year Russian Scientists do visit Indian stations and also Indian scientists do visit Russian stations in Antarctica. Russian Ice breaker vessel helped Indian charted vessel in Antarctica and India helped logistical help in providing Pistenbulley services to Russia for carrying containers from shelf to Russian station (near Maitri). Last year, first time in Antarctic history, India hosted International Conference on Antarctic Research (ICAR) in Bharati, Antarctica, wherein Russian scientists from Progress Station have participated. Also, scientists of both National Centre for Polar and Ocean Research (NCPOR), Goa and Arctic and Antarctic Research Institute (AARI) St. Petersburg are continued to meet and discuss possible collaborations between the two countries, in various international meetings held elsewhere.

The Astrophysics area has played an important role in bilateral collaboration in basic science because it was considered important and essential for the growth and development of technology and hence for the benefit of society and human being. The projects undertaken covered a wide range of areas from Gamma Ray to Radio astronomy on the observational side to high-energy physics and Cosmology on the theoretical side. This has further widened cooperation as the projects in the areas of ground based optical and space based astronomy are the latest one.

A preliminary design of Light Transport Aircraft Project (LTA) SARAS-DUET is also a major outcome of joint collaboration.

Indian Council of Medical Research (ICMR) and Russian Foundation for Basic Research (RFBR) are also supporting joint research in specific areas of health research such as oncology, bioinformatics and bio-imaging, neurosciences, new generation vaccine research and research in HIV/AIDS.

Under the Inter-Academy agreement between Indian National Science Academy (INSA) and Russian Academy of Sciences (RAS) signed in 2001, both Academies supports visit of scientists to each others' countries.

Applied Research

With the aim to support Applied Research Department of Science & Technology (DST) & Department of Biotechnology (DBT) on Indian side and Russian Ministry of Scince & Higher Education, have supported over 15 joint R&D projects in the areas such as Environmental Sciences, Energy (including renewable), Nanoscience & Technology, Information & Communication Technologies and Biotechnology.

A new corporate level collaboration linkage through setting up of Technology Promotion Councils (TPC) with Skolkovo Foundation as the lead from Russia and CSIR as the lead from India is already under finalization. This could be an effective mechanisms for promoting two way transfer of technologies. This new initiative can leverage joint intellectual and financial resources to develop technologies that would provide the solutions for tomorrow.

Promotion of entrepreneurship, innovation and techno-commercial R&D

India has one of the largest startup ecosystems in the world, the number of unicorns is testimony to the tremendous talent the country possesses. S&T-led innovation and entrepreneurship are priorities of both countries. Efforts are being made by the two Governments to support joint development of technologies and innovations to facilitate formation of ventures, acceleration programs, grant support for innovations, localization of innovative industries of the two countries based on innovative clusters and technology parks of two countries. To facilitate implementation of such activities, Department of Science & Technology, Govt. of India and Ministry of Economic Development of the Russian Federation has recently signed a MoU for cooperation in the field of Innovation. Under this MoU Indo-Russian Bridge for Innovation program, aimed at organizing and conducting start-up forum on an annual basis, as well as the business missions of medium-sized high-tech companies will be supported.

With the aim to connect Indian and Russian Science & Technology (S&T) led SMEs and Start-ups for joint R&D for technology development and for cross-country technology adaptation, the Department of Science and Technology, Govt. of India and the Foundation for Assistance to Small Innovative Enterprises (FASIE) of the Russian Federation have launched the India-Russia Joint Technology Assessment and Accelerated Commercialization Programme.

Multilateral Cooperation

India and Russia are active contributors to BRICS program. In addition of supporting joint R&D projects (with at least one partner from one more BRICS member

country), there are active engagements of youngsters towards Science & Technology Conclaves and Innovation prizes in addition to Basic science cooperation. In last BRICS call, focus has been on combating the current pandemic, Covid-19. Joint projects are being supported on developing new therapeutics (including vaccine), studying virology, applications of high computing and artificial intelligence against the COVID. India takes over BRICS presidency from 1st January 2021.

In addition to BRICS, two countries are actively supporting research engagements in SCO framework which includes all Central Asian countries within a broad circle around Russia, China and India. Young researchers are also provided special opportunities for interaction in addition to joint research projects. India takes over SCO Presidency in November 2020.

G-20 is Group of 20 developed nations. Both India and Russia are members of this platform which acts as policy think tank. India will join Troika (President, Past President and Future President) in December 2020 and will be President of G-20 forum from December 2021 and will contribute significantly to the development of programs under this platform.

Way forward

There are opportunities and challenges for India and Russia in the 21st century to become global knowledge economy. During the next two decades, Scientific Ministries and Agencies of both countries can strategically leverage collaborative advantage by building chosen alliances and partnerships that can have perceptible yields, such as R&D outputs through joint alliances which can contribute directly to national R&D priorities and outcomes; Accelerating institutional and human capacity building through joint exposure and linkages; Enable new paradigms for sustainable; Evolve modalities and mechanisms for seamlessly connecting Indian and Russian research with global efforts particularly in the frontier areas of S&T and in areas addressing global challenges; Absorbing experience of existing global research facilities in fine-tuning and/or coupling with upcoming or existing research facilities; etc.

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