

## Science, Technology and Innovation Policy

Recently, the Prime Minister Manmohan Singh declared that India will unveil a new Science, Technology and Innovation (STI) Policy later this year<sup>1</sup>. After independence, drawing inspiration from a legacy of Article 51A(h) of the Constitution of India, which asks the citizens of India to pursue scientific temper as a fundamental duty, the Science Policy Resolution was historic confirmation of India's tryst with destiny in relation to 'scientific modernity'. While we understand the Policy being a definite course of action adopted for the sake of expediency, facility, let us take a look at what kind of definite course of action was recommended by subsequent policies in independent India.

The Science Policy Resolution, 1958 recognized the historic need to concentrate on the effective combination of three factors: technology, raw materials and capital. From the perspectives of a nation, it realized the pragmatic feature of the contemporary world being the intense cultivation of science on a large scale, and its application to meet a country's requirements. This Resolution was a declaration of moving India in the direction of industrialization based on scientific approach and method. Thus the Resolution also paved the way to foster, promote and sustain, by all appropriate means, the cultivation of science and scientific research in all its aspects – pure, applied and educational by proving academic freedom.

In continuation of the Science Policy Resolution, 1958, the Government of India declared the Technology Policy Statement in 1984. It inherited the idea from the founding fathers of Constitution that in Independent India, our challenge is to achieve economic and social freedom based on political and constitutional rights already conferred in 'Free India'. The chief concern of the Statement of 1984 recognized the needs to attain technological self-reliance, a swift and tangible improvement in the conditions of the weakest sections of the population and the speedy development of backward regions. This Policy Statement was influenced by the belief that those were capital-scarce times and optimal utilization of human resources was the need of the hour in the context of the need to develop different technologies indigenously

and further promote acquisition of technology through import and its subsequent absorption, adaptation and upgradation; ensuring competitiveness at international levels in all necessary areas.

At that time, India was making incremental progress towards ensuring the basic needs of the citizens. The Indian Patents Law of 1970 which supported generic inventions and the achievements of Green Revolution were supportive towards access to food and access to medicine. The debates about technological gaps and national competitiveness within European Union (pre-formation), the United States and Japan started to accelerate due to the debates raised by institutes and international agencies like OECD, UNESCO, National Science Foundation, RAND Corporation, Harvard Business School and UNCTAD. The perception about S&T Policy also started to change in India.

The Technology Policy Statement came up with more specific goals like linking investment in S&T to that of:

- Generation of employment.
- Identifying the obsolescence of technology and thus work towards upgradation.
- Developing export potential technology which can be internationally competitive.
- Improving production speedily through greater efficiency and fuller utilization of existing capabilities, and enhancing the quality and reliability of performance and output.
- R&D in the energy sector will aim at improving the efficiency of its production, distribution and utilization, as well as improvement of efficiency in processes and equipment.
- Emphasis on indigenous technology development, technology acquisition and technology transfer.
- S&T Policy affirmed that 'Equally, India also assimilated scientific ideas and techniques from elsewhere, with open-mindedness and a rational attitude characteristic of a scientific ethos.'

The problem with these recommendations was that they were not comprehensively thought over along with other equally significant policies which need

to be in harmony if we have to realize at least one aspect of competitiveness, prosperity and human development. These other equally significant or crucial policies were taxation policies which can give incentive for doing R&D, import and export policies, status of science in primary and secondary education, linkages of higher education policy to that of research ecosystems and emphasis on commercial aspect of the 'D' in R&D.

The S&T Policy of 2003 was perhaps the first effort to declare any government's thinking in terms of 'Official Policy'. Major realization of S&T Policy, 2003 was that 'Science is becoming increasingly inter- and multi-disciplinary, and calls for multi-institutional and, in several cases, multi-country participation'. Through the S&T Policy, for the first time the Government of India discussed 'Promotion of innovation' by promising creation of a comprehensive national system of innovation. It also laid serious importance to 'Public Awareness of Science and Technology'.

The National Knowledge Commission (NKC) in its final recommendations documented many useful strategies and activities aimed at improving knowledge infrastructure, improving higher education and quality of research and promotion of entrepreneurship<sup>2</sup>. NKC also shaped the vigorous debates regarding access to technical and professional education, creating multilingual content, creating translation facilities, rejuvenation of libraries, setting up of NKC, Health Information Network, Open Education Portals, etc.

'The Draft National Innovation Act, 2008' aims to facilitate public, private or public-private partnership initiatives for building an innovation support system to encourage innovation, evolve a National Integrated Science and Technology Plan and codify and consolidate the law of confidentiality in aid of protecting confidential information, trade secrets and innovation. By virtue of implementation of this act, the Ministry of Science and Technology shall, in February of each year, present an Integrated Science and Technology Plan, which inter alia presents collated information and policy initiatives and measures directed at basic research, industry-academia partnerships, bilateral and multilateral coopera-

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tion in international science activities, establishment of globally competitive research facilities, etc.<sup>3</sup>.

Recently, the government of India also tabled in Parliament 'The Protection and Utilization of Public Funded Intellectual Property Bill, 2008'<sup>4</sup>. It seeks the transformation of public funded research as:

'The creation of new products and processes through technological innovation is essential for a country's economic growth. However, India lags behind due to a variety of reasons such as low level of commercialization, lack of funding from industry, and government control of the right to intellectual property developed in research institutions through public funds. This Bill seeks to boost research and development in public funded research institutes by permitting the sharing of the right to intellectual property with the institutes and scientists who created them.'

In the meantime, the Eleventh Five-Year Plan gave special significance to expansion of India's higher education system<sup>5</sup> and that of research institutions<sup>6</sup>. The Twelfth Five-Year Plan has also many recommendations directed at creating multidisciplinary research environment and attracting talent to science from within India and abroad as a special programme.

This legacy of creating an innovation-friendly environment continued in the form of the formation of the National Innovation Council and declaration of 2011–20 as a 'Decade of Innovations'. It lays emphasis on innovation drivers. These drivers are multidisciplinary, collaborative, disruptive, locally relevant, globally connected and competitive and speak the language of generational change versus incremental change, need versus demand.

The Government's initiative regarding the new STI Policy seems to be influenced by UNCTAD, which is urging all the nations since many years in its STI Policy Review<sup>7</sup>. It says:

'STI are essential ingredients in the industrialization, economic growth and sustainable development of nations in the context of the need to be competitive in the era of globalization, trade

liberalization and the emergence of knowledge-based industries. This new competitive environment has fuelled the growth of knowledge-intensive production by increasing scientific and technological interactions and the need for innovation. The active search for continuous improvements has created an urgent need to rely even more on scientific and technological innovation and to adjust policies and practices at both the enterprise and government levels. A stable political environment combined with sound macroeconomic policies creates the potential for improving national prosperity. However, prosperity depends on a nation's capabilities at the microeconomic level – the ability of firms, large and small, to produce goods and services productively and competitively.'

In the context of the new proposed STI Policy, let us understand some of the major functions of the Innovation System<sup>8</sup>:

- To supply incentives for institutes and companies to engage in innovative work.
- To supply resources.
- To guide the direction of search, i.e. influence the direction in which actors deploy their resources.
- To recognize the potential for growth of the innovation, which is necessary for it to attract resources and be brought to the market.
- To facilitate the exchange of information and knowledge.
- To stimulate/create markets.
- To reduce social uncertainty, i.e. uncertainty about how others will act and react.
- To counteract the resistance to change that may arise in society when an innovation is introduced or, in other words, to provide legitimacy for the innovation.

Apart from merely expressing the thinking of the Government, the occasion of the discussion about policy can be used to fix the priorities in a time-bound approach on the range of problems identified in a structured manner. The Japanese approach to regularly publish white papers based on specific deadlines and targets will be a beneficial guide in this regard<sup>9</sup>.

The different sets of indicators must be used to assess the situation of current STI system in India. The Department of Science and Technology has been using different indicators for a while, but most of them are on the input side and do not take into account the performance evaluation of scientific, technological and innovative activities in India<sup>10</sup>. Thus our discussion about STI policy should transfer from the input side towards process, output, outcome, impact and transformation of society and economy as a whole. Of course, no foresight analysis will be complete without realizing the complex social and economic situations of the Indian demography, which makes the planning for scientific society with a modern outlook a daunting task, if not impossible. Thus, while we have made an effort to understand the historic context in which the new STI policy is embedded, there is room for further discussion and debate.

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RAHUL S. MANE

*Centre for International Trade in Technology,  
Indian Institute of Foreign Trade,  
New Delhi 110 016, India  
e-mail: manraahul@gmail.com*