

# From aspirations to achievements: India's march towards a developed nation

Divya Vashisht and Ajay K. Sood

*India's aspiration to transform into a USD 5 trillion developed economy by 2047 under the vision of Viksit Bharat has catalysed nationwide strategic reforms. Science, Technology, and Innovation continue to be central to India's developmental path. The present article highlights the dimensions of innovation that, when integrated, can drive India's growth in achieving the goals of Viksit Bharat by evaluating the strengths of the country's science and technology ecosystem.*

**Keywords:** ANRF, RDI fund, technology sovereignty, Viksit Bharat

## Strategic vision and context

INDEPENDENT India has advanced its growth by expanding science and technology (S&T) across diverse domains, including atomic energy, agriculture, pharmaceuticals, and information technology services. These resilient technological capabilities have contributed to transforming India's socio-economic status. Not only this, but India has joined the ranks of leading scientific nations in the past decade.

The strengthening of India's S&T ecosystem is reflected in the steady rise in scientific publications, increased PhD output, and the country's emergence as the world's third-largest start-up ecosystem. In this context, the latest report from *Springer Nature* further substantiates and complements these positive trends<sup>1</sup>. With 19,000 articles among the top 10% most cited, India ranks as the third-largest contributor to global research. The report also indicates that national publications grew nearly sixfold over a decade (from 34,000 in 2010 to 195,000 in 2024), making India the second-fastest-growing nation in scientific production. Importantly, the share of India's scientists in global research has also increased, as indicated by a rise in co-authorship from 23% to 36%.

Formulated by the Government of India, the ambitious vision of 'Viksit Bharat 2047' is guiding this transformational growth. This multi-dimensional agenda is built on the aspirations of self-reliance, inclusive growth, and global leadership. To achieve this, clear objectives for holistic national development have been defined, which include eradicating poverty, providing access to education and affordable healthcare,

empowering the under-represented workforce, including women, strengthening farming systems, and creating world-class infrastructure<sup>2</sup>.

These aspirational goals have been articulated and reinforced through successive leadership calls by India's Prime Ministers: Lal Bahadur Shastri first gave the clarion call, 'Jai Jawan, Jai Kisan' in 1965, and decades later, Atal Bihari Vajpayee expanded the vision with 'Jai Vigyan' in 1998. More recently, Narendra Modi added 'Jai Anusandhan' in 2019, highlighting research and innovation as key drivers of India's prosperity.

Aligning scientific discoveries with societal needs and citizen-focused outcomes is essential for making S&T a pillar of national progress. In this light, the Emerging Science, Technology and Innovation Conclave (ESTIC) was conceived as India's first-of-its-kind flagship initiative. It was conceptualised and organised under the guidance of the Office of the Principal Scientific Advisor to the Government of India (O/o PSA), by 13 ministries and departments of the Government of India<sup>(i)</sup>. ESTIC has been structured as a strategic platform to bring discourse on eleven frontier technologies, including artificial intelligence (AI), quantum computing, semiconductors, biotechnology, and clean energy. These technological areas have been identified as shaping the nation's long-term developmental trajectory.

Under the chairmanship of the Principal Scientific Adviser to the Government of India, the panel discussion on 'Nurturing research and development (R&D) and the innovation ecosystem for Viksit Bharat 2047' brought together leading voices from academia, industry, foundations, and national institutions<sup>(ii)</sup>.

The authors are in the Office of Principal Scientific Advisor to the Government of India, Kartavya Bhawan-3, Janpath, New Delhi 110 001, India.

\* For correspondence. (e-mail: divyasbb@gmail.com)

<sup>(i)</sup> Department of Science and Technology, Department of Biotechnology, Council of Scientific and Industrial Research, Ministry of Earth Sciences, Indian Council of Agricultural Research, Indian Council of Medical Research, Ministry of Electronics and Information Technology, Department of Telecommunications, Ministry of Ayush, Department of Space, Department of Atomic Energy, Defence Research and Development Organization, Ministry of Education.

<sup>(ii)</sup> The panel comprised representatives from academia (Prof. Ashok Jhunjhunwala, IIT Madras; Prof Govindan Rangarajan, IISc Bengaluru; Lt. Gen. Madhuri Kanitkar, Maharashtra University of Health Sciences), industry (Shri Baba Kalyani, Bharat Forge; Dr Pawan Kumar Goenka, IN-SPACE), foundations (Dr Soumya Swaminathan, Principal Advisor to the National Tuberculosis Elimination Programme, Ministry of Health and Family Welfare, Government of India), and the national academy (Shri J. D. Patil, Indian National Academy of Engineering), convened under the chairmanship of Prof. Ajay K. Sood, Principal Scientific Adviser to the Government of India.