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Freedom to Innovate

The pursuit of innovation has been a defining feature of *Homo sapiens*. From the earliest days when nomadic hunter-gatherers began crafting stone tools, harnessing fire, and forming settled agrarian societies, humanity has continuously shaped the world through creativity. Agricultural revolutions led to the development of advanced irrigation systems, crop rotation methods, and selective domestication practices, which

significantly boosted productivity and later laid the foundation for urbanisation and trade. Moreover, successive industrial and technological revolutions introduced machines, steam power, and mass production, eventually giving rise to the digital age, service economies, automation, and the frontiers of artificial intelligence and space exploration. Across this vast horizon of human advancement, various societies have made unique contributions to the unfolding story.



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INNOVATE. INCUBATE. IMPACT

In 2024, DST expanded its innovation under NIDHI Program:

- 17 Inclusive Tech Incubators**
- 10 Entrepreneur-in-Residence Centres**
- 11 cutting-edge projects in precision manufacturing**



What's next in 2025?

- 12 new incubators (5 for women)**
- 2 Agri-Waste-to-Wealth CoEs**
- 10 new PRAYAS Centres**

Among them, India reflects its tradition of innovation deeply embedded in its civilisational ethos. Scholars like Pingala, Brahmagupta, Aryabhata, and Bhaskara revolutionised the fields of mathematics, geometry, and astronomy. The centres of learning, such as Nalanda, Vikramashila, Valabhi, Pushpagiri, etc., served as vibrant hubs of interdisciplinary education, drawing students and thinkers from across Asia and nurturing knowledge systems in architecture, metallurgy, medicine, Ayurveda, linguistics, etc. This spirit of knowledge creation and innovation is still enduring in India, despite centuries of foreign invasions, colonial domination, and global disruption, which speaks volumes about the resilience and depth of its intellectual and cultural foundation.

Freedom to Innovate and Constitutional Ethos

In its relentless march to realise the *Viksit Bharat* by 2047, India is navigating a profound metamorphosis not only in its economy and institutions but also in the very meaning of freedom. In the 21st century, the definition of freedom is not limited to political sovereignty or the absence of colonial rule, but it also involves one's capacity to create, to solve, and to participate meaningfully in shaping the world around them. Among the most contingent frontiers of this new idea is the 'freedom to innovate', which can be defined as the opportunity, ability, and right of citizens to build

solutions to solve problems, imagine alternatives, and convert indigenous wisdom into '*glocal*' (global + local) relevance. This form of freedom finds expression in our Atal Tinkering Labs, startups, incubation centres, farm fields practising sustainable agriculture, etc.

Lately, India has been proactively decentralising the ecosystem of innovation, extending from metro cities to rural hinterlands and from startup unicorns to self-help groups, resulting in development as substantive freedom. If innovation leads people to act and bring change, then the freedom to innovate becomes a natural extension of constitutional mandates, i.e., the right to equality (Article 14), the right to life and dignity (Article 21), the right to education (Article 21A), and the duty to develop scientific temper and reform (Article 51A).

Broadening the Horizon of Innovation

Over the past decades, the government has institutionalised a plethora of initiatives reinforcing the commitment to becoming a leading innovation-led economy:

- **Strategic Policy Framework and Budgetary Push for an Innovation-First Republic**

The government has made a decisive policy shift toward promoting an innovation-driven economy, which has again reflected strongly in the recent Union Budget 2025–26. The most significant development is the allocation of Rs 20,000 crore specifically for fostering R&D (Research and Development) in strategic and emerging technologies, including artificial intelligence, quantum computing, biotechnology, semiconductors, and clean energy. This is not just a generic science budget but a clear government intervention aimed at enabling freedom to experiment, freedom to fail, and freedom to commercialise. This fund complements the Rs 10,000 crore deep-tech Fund of Funds (FoF) recently added to the corpus under the Small Industries Development Bank of India (SIDBI). Deep-tech startups require longer gestation periods and face higher risks; therefore, the government is stepping in as an early-stage backer, which shows a deep intent to democratise innovation finance. Moreover, 10,000 new PM Research Fellowships have been announced, with monthly stipends between Rs 70,000–Rs 80,000, aiming to attract the brightest minds of the country to immerse themselves in science and engineering R&D. These measures signal a clear resolve of the government that innovation is not a privilege but a national imperative.

- **Creation of ANRF and Regulatory Ease**

A milestone institutional reform is the establishment of the Anusandhan National Research Foundation (ANRF), enacted through Parliament in 2023. This foundation replaces the earlier Science and Engineering Research Board (SERB) with a significantly wider mandate. In order to enable private-sector R&D, early-career scientists, and university-driven innovations, the ANRF aims to receive funds amounting to Rs 50,000 crores during 2023-28 in the form of the ANRF Fund, Innovation Fund, Science and Engineering Research Fund, and Special Purpose Fund. A budgetary provision of Rs 14,000 crore has already been made from the Central Government, and the remaining amount will be sourced from public sector enterprises, the private sector, philanthropist organisations, foundations, and international bodies. Furthermore, institutes have been given procurement autonomy for scientific equipment and consumables for research purposes up to a higher threshold, improving agility and reducing procedural delays. With these steps, the nation is moving towards a model of trust-based, inclusive innovation governance.

Most recently, in a transformative step to bolster India's research and innovation ecosystem, the Union Cabinet, chaired by the Prime Minister of India, on 01 July 2025, has approved the Research Development and Innovation (RDI) Scheme with a corpus of Rupees One lakh Crore. Recognising the critical role that the private sector plays in driving innovation and commercialising research, the RDI Scheme aims to provide long-term financing or refinancing with long tenors at low or nil

interest rates to spur private sector investment in RDI. The scheme has been designed to overcome the barriers in funding the private sector and seeks to provide growth & risk capital to sunrise and strategic sectors to facilitate innovation, promote adoption of technology, and enhance competitiveness. The ANRF will provide overarching strategic direction to the RDI Scheme.

- **Strengthening Grassroots Innovation**

In India, there is still a large population in the informal sector practising regional socio-technical and traditional knowledge systems, viz., local agricultural techniques, farmers' varieties, plant protection technologies, human and animal health technologies, local engineering solutions, textile technologies, etc. These innovations emerge from individuals and communities in the remote areas. The National Innovation Foundation-India (NIF), an autonomous institute under the Department of Science and Technology (DST), is relentlessly nurturing such grassroots technologies and innovations scouted from nearly 600 districts of the country and providing them a complete cycle of support through collaborations with industry, research institutions, NGOs, and governmental organisations at various levels. So far, NIF has filed over 1400 patents for grassroots and student innovators and facilitated over 120 technology transfers, with several innovators supported by NIF being conferred the prestigious *Padma Shri* Award. This is a manifestation of freedom from invisibility. It puts India in sharp contrast to various countries where innovation largely remains confined to corporate organisations, sophisticated labs, and elite universities.

In addition, *Unnat Bharat Abhiyan*, launched by the Ministry of Education, connects academic institutions with rural India to address developmental challenges through appropriate technologies and community engagement. Under this scheme, institutes are adopting a cluster of villages and undertaking needs assessments and designing contextual interventions.

- **Digital Public Infrastructure as Platforms of Innovation Freedom**

India's innovation strategy is not confined to funding and policy reforms alone. The government has built Digital Public Infrastructure (DPI) like Aadhaar, UPI, DigiLocker, and ONDC (Open Network for Digital Commerce), each acting as an enabler for new-gen entrepreneurs and tech developers. For instance, ONDC allows even small business owners to compete on a level playing field with large e-commerce platforms like

AI FOR BHARAT

Fostering Innovation for New India



Three AI Centres of Excellence, to be set up in top educational institutions



Indigenous foundational AI models being developed like **BharatGen, Sarvam-1, Chitralekha, and Hanuman's Everest 1.0**



Collaboration with industry leaders to build **an AI-driven workforce ecosystem**


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INDIA'S SCIENCE SECTOR

Booming like never before!

ANUSANDHAN NATIONAL RESEARCH FOUNDATION

EV Mission: 7 e-nodes working with 35 R&D institutions | 61 industry partners



PMECRG: Around 700 early-career researchers supported

PAIR: 7 Hubs | 45 Spokes for university research excellence

Inclusivity Research Grant: 239 ST/SC researchers supported

Amazon or Flipkart. As of 2025, ONDC has successfully onboarded over 7 lakh sellers and service providers, the majority of whom are MSMEs. The platform has also processed over 20.4 crore cumulative transactions by March 2025, showcasing the network's growing momentum. According to the 'State of India's Digital Economy Report 2024', India now ranks third in the world for digitalisation of the economy. By 2030, India's digital economy is projected to contribute nearly one-fifth of the country's overall economy, outpacing the growth of traditional sectors.

Recently, the government has also launched India Energy Stack (IES) as a visionary initiative aimed at creating a unified, secure, and interoperable digital infrastructure, like UPI, for India's energy sector. It will integrate renewable energy, enhancing DISCOM (power distribution company) efficiency and delivering transparent, reliable, and future-ready power services through a digital platform. For instance, a farmer using solar panels would be enabled to feed extra electricity produced back into the grid and receive payments directly into his bank account. At the same time, DISCOMs can track local power demand more accurately, prevent electricity theft, and send timely alerts to users about supply schedules or outages. This digital system aspires to make energy access more

reliable, transparent, and inclusive, especially for rural and small consumers, while also supporting India's clean energy and Net Zero goals.

- **Sectoral Deepening of Innovation: Health, Agriculture, AI, and Quantum**

Sector-specific missions are further intensifying the innovation-led strategic advancements. In the healthcare sector, the shift towards a digital-first approach is being robustly institutionalised under the *Ayushman Bharat Digital Mission* (ABDM). Currently, over 70 crore *Ayushman Bharat Health Accounts* (ABHA) have been created, 3.49 lakh health facilities have registered on the Health Facility Registry (HFR), and 5.23 lakh healthcare professionals have registered on the Healthcare Professional Registry (HPR). This digital infrastructure is enabling interoperability across platforms, reducing redundancy, and enabling citizens to seamlessly access services such as telemedicine, e-pharmacies, and AI-supported diagnostics. Furthermore, the Pharmaceutical Research Incentive Program (PRIP), with a Rs 5,000 crore budget, aims to transform India into a global R&D hub in the pharmaceutical and MedTech sectors.

Moreover, the Department of Health Research and Indian Council of Medical Research (DHR-ICMR) 2024-29 Action Plan aims to catalyse India's healthcare ecosystem by promoting indigenous and affordable health technologies. It strives to provide solutions for resistant health problems, advance digital health solutions, ensure research-led translation into action, enhance technology-driven surveillance and accelerate the development of medical countermeasures leading to the elevation of India's global standing in medical research.

Simultaneously, the agricultural sector, which still employs around 42% of India's workforce and contributes around 18% to national GDP, is embracing Agriculture 4.0. The next-generation agriculture revolution is marked by the convergence of emerging technologies like drones, remote sensing, AI for pest detection, and IoT-based soil and water management. For instance, the *Drone Didi* and *Akashdoot* initiatives are promoting the widespread use of drones for various agricultural services. With targeted seed funding, mentorship, and access to market linkages, programmes such as Agri-India Hackathon, Attracting and Retaining Youth in Agriculture (ARYA), *Rashtriya Krishi Vikas Yojana* (RKVY-RAFTAAR), and Agri-Tech Innovation Hubs are nurturing numerous agri-startups

for AI-powered irrigation advisory tools, mobile labs for soil testing, and bio-input substitutes to chemical fertilisers.

In addition, Atal Incubation Centres (AICs) and Community Innovation Centres (CICs) are being promoted in Tier II and Tier III areas. Under the ATIs scheme, thousands of schools have been provided with 3D printers, robotics kits, and science equipment. These initiatives are operating as part of a broader, cohesive innovation framework envisioned under the National Mission on Interdisciplinary Cyber-Physical Systems (NM-ICPS) and the National Quantum Mission (NQM), which collectively aim to position India among the global leaders in deep tech. These missions not only ensure freedom to innovate in frontier technologies but also help build domestic capacity in sectors that are vital for national sovereignty and sustainability.

Measurable Global Impact

India's innovation ecosystem is also gaining global credibility. In the Global Innovation Index 2024, India achieved a 39th rank, making it the top innovator among prominent economies. In the WIPO (World Intellectual Property Organisation) World IP Filings Report 2023, India ranked 6th globally in patent filings, which puts India among the leading nations, including the United States, China, Japan, and South Korea, in terms of intellectual property activity. Additionally, India's position in the Network Readiness Index (NRI) improved from 89th in 2015 to 49th in 2024. These

signals reflect systemic maturity and policy alignment. With more than 1.57 lakh DPIIT-recognised startups, over 100 unicorns, and strong startup participation of up to 51% from Tier 2 and Tier 3 cities, India is the world's third-largest startup ecosystem. These successes are accompanied by stronger enforcement of patent laws and the removal of regulatory uncertainty.

Expanding the innovation architecture of India is not merely an outcome of policy design or institutional growth but the unfolding of a deeper national awakening, a resurgence of *Atmashakti* (inner strength) among ordinary citizens who are engaging in the pursuit of innovation with confidence and courage. This is reminiscent of the Gandhian 'oceanic circles' wherein innovation radiates—in self-reinforcing concentric ripples—from every laboratory, classroom, farm field, and tribal hamlet, and wherein individuals and communities are becoming the nucleus of creating energy and are empowered through trust, autonomy, and purpose. The government is enabling *Srijan* (creative expression) through *Jan Bhagidari* (people's participation), grassroots ingenuity, and community-driven solutions. This new expression of freedom reflects *Swaraj* of creativity, where rural-tribal grassroots innovators and scientists at ISRO are together contributing to the vision of *Viksit Bharat@2047* in their own unique ways. By facilitating opportunities for innovation across all layers of society, India is not just fostering innovation but also cultivating a civilisational shift toward *Aatmanirbharta*. □

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