GOVERNMENT OF INDIA

MINISTRY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF SCIENCE AND TECHNOLOGY

RAJYA SABHA

STARRED QUESTION NO. 130

ANSWERED ON 31.07.2025

PROMOTING INDIGENOUS SCIENTIFIC INNOVATION AND STARTUPS

*130 SHRI BABUBHAI JESANGBHAI DESAI:

Will the Minister of SCIENCE AND TECHNOLOGY be pleased to state:

(a) the major R&D initiatives undertaken by Government to boost indigenous scientific innovation in 2024-25;

(b) whether Government is supporting deep-tech and science-based startups under any flagship scheme;

(c) the role of Council of Scientific & Industrial Research (CSIR), Department of Science & Technology (DST) and Department of Biotechnology (DBT) in addressing national challenges like climate change and health-technology; and

(d) the measures taken to retain Indian scientists and prevent brain drain?

ANSWER

MINISTER OF STATE (INDEPENDENT CHARGE) FOR THE
MINISTRY OF SCIENCE AND TECHNOLOGY & EARTH SCIENCES
(DR. JITENDRA SINGH)

(a) to (d): A statement is laid on the Table of the House.

STATEMENT AS REFERRED IN REPLY TO PARTS (a) TO (d) OF THE RAJYA SABHA STARRED QUESTION NO. 130 FOR REPLY ON 31.07.2025 REGARDING "PROMOTING INDIGENOUS SCIENTIFIC INNOVATION AND STARTUPS"

(a) The major R&D initiatives taken by the government in 2024-25 to promote indigenous scientific innovation, are as given below:

- The Government of India is actively implementing a range of schemes to incentivize indigenous scientific innovation, research and development. Flagship initiatives such as the National Supercomputing Mission, and the India Semiconductor Mission laid down the early groundwork for a robust innovation and R&D ecosystem in the country. Building on this foundation, newer programs like the National Quantum Mission, the India AI Mission, and the National Green Hydrogen Mission reflect the government's strategic intent to lead in next-generation technologies.
- In 2024–25, the Government operationalised the Anusandhan National Research Foundation (ANRF) under the Department of Science and Technology with a mandate to enhance participation from the private sector and promote interdisciplinary research aligned with national priorities. ANRF has launched several programs like EV-Mission, Partnerships for Accelerated Innovation and Research (PAIR), Prime Minister Early Career Research Grant (PMECRG), JC Bose Grant etc. to boost indigenous scientific innovation.
- Further, the government has approved the Research Development and Innovation (RDI) Scheme to incentivize private sector participation in research and development. The RDI scheme has a total outlay of ₹1 lakh crore over 6 years, with ₹20,000 crore allocated for FY 2025–26. Several technology sectors of strategic importance have been identified under the RDI scheme such as energy security, climate action, deep-tech, quantum technologies, artificial intelligence, biotechnology, digital agriculture, digital economy, etc. The nature of financing under this scheme includes long-term loans (at low or no interest), equity financing, and contributions to the Deep-Tech Fund of Funds.
- 'Vigyan Dhara' scheme of the Department of Science and Technology has been operationalised to strengthen the Science, Technology, and Innovation (STI) ecosystem in the country, and to enhance the S&T infrastructure by fostering well-equipped R&D labs in academic institutions and promote research in critical sectors.
- The government has approved the 'Biotechnology Research Innovation and Entrepreneurship Development (Bio-RIDE)' scheme of the Department of Biotechnology with new components namely Biomanufacturing and Biofoundry. Bio-RIDE scheme is designed to foster innovation, promote bio-entrepreneurship, and

strengthen India's position as a global leader in biomanufacturing and biotechnology. Moreover, 'Biotechnology for Economy, Environment and Employment (BioE3) Policy has been rolled out for fostering high performance biomanufacturing.

- The National Quantum Mission (NQM) is another major strategic initiative aiming to seed and nurture a vibrant & innovative ecosystem and position India among the global leaders in quantum technologies. During 2024–25, the Mission has established four Thematic Hubs (T-Hubs) in the field of quantum computing, quantum communication, quantum sensing, and quantum materials & devices.
- Under the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS), DST has launched BharatGen initiative for IoT & IoE, focusing on Large Language Modelling (LLM)/ Generative AI for developing advanced Gen-AI models tailored to India's linguistic, cultural, and socioeconomic diversity.
- In order to empower various sections of society through its Aroma Mission and Floriculture Mission, Council of Scientific and Industrial Research (CSIR) is fueling the growth of agri-based industry and rural employment. Additionally, CSIR has established a world-class Innovation Complex (CSIR-IC) at Mumbai to bridge the translational gaps (*lab to regulator and to the market*) of the technologies and products.

(b) Yes, sir. The government is supporting deep-tech and science-based startups under different schemes and programs, details of which are as given below:

- Under the National Quantum Mission, the Department of Science and Technology actively supports startups working in the domain of quantum technologies, specifically quantum computing, quantum communication, quantum sensing, and quantum materials & devices.
- Under the National Mission on Interdisciplinary Cyber Physical Systems (NM-ICPS), the Technology Innovation Hubs (TIHs) support innovation and entrepreneurship by providing funding and resources to startups in cutting-edge domains such as Artificial Intelligence (AI) & Machine Learning (ML), Robotics, Internet of Things (IoT), Cybersecurity, FinTech etc.
- Through the National Initiative for Developing and Harnessing Innovations (NIDHI) program, the Department of Science and Technology has established a nationwide ecosystem to support startups. Various programs under NIDHI provide end-to-end support such as scientific infrastructure, mentoring, funding and market access to startups. Also, DST has also launched a programme namely 'Electric Vehicle Solutions led by Startups (EVolutionS)' to support innovative startups working in EV domain for translating their proof of concepts and prototypes into commercially viable products.

- The Department of Biotechnology through Biotechnology Industry Research Assistance Council (BIRAC) is supporting startups through schemes such as Biotechnology Ignition Grant (BIG); PACE scheme, Fund of funds-AcE initiative, etc.
- Moreover, Defense Innovation Organisation (DIO) through Innovations for Defence Excellence (iDEX) program fosters innovation & technology development in Defence & Aerospace by engaging Start-ups and MSMEs.

(c) The Department of Science & Technology (DST), Council of Scientific & Industrial Research (CSIR), and Department of Biotechnology (DBT) play a major role in addressing national challenges like climate change and health-technology. Major initiatives are given below:

- The Department of Science and Technology has been implementing two national missions, namely, National Mission for Sustaining the Himalayan Ecosystem (NMSHE) and National Mission on Strategic Knowledge for Climate Change (NMSKCC), under the National Action Plan on Climate Change (NAPCC) to build S&T Capacity for developing a strategic knowledge system in different areas of climate change and for sustenance of Himalayan ecosystem. The R&D programmes are being supported across the country in different themes and sectors to study the effect of climate change on Himalayan Glaciers, biodiversity, climate modelling, coastal vulnerabilities, etc.
- Sree Chitra Tirunal Institute of Medical Sciences and Technology (SCTIMST), under DST has emerged as a center of excellence in both healthcare as well as research and development of new devices, instruments and medical procedures at cost-effective rates. It has been actively contributing to biomedical technology development and its translation. As an outcome, products such as AG Chitra Tuberculosis Diagnostic Kit, GelMA UVS Bioink for 3D Bioprinting, Titanium nitride (TiN) coated coronary stent, Automatic contrast injector, etc; have been developed and launched in the market.
- Additionally, under 'Pradhan Mantri Swasthya Suraksha Yojana' (PMSSY) a super specialty Neurosurgery and Cardiovascular Surgery state-of-the-art hospital facility at Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST) has been dedicated to the nation.
- The Department of Science and Technology (DST), through the Therapeutic Chemicals program is pursuing self-reliance in the health care sector. DST has taken an initiative on Anti-Microbial Resistance (AMR) for the development of chemical molecules naturally or synthetically for combating AMR.

- CSIR plays a pivotal role in addressing national challenges by developing innovative technologies and science-led interventions across diverse sectors. The significant initiatives undertaken/ technology developed by CSIR in critical areas of climate change include Climate-Resilient Buildings (CRB), Carbon Capture, Utilization & Storage (CCUS) mission implemented by CSIR, development of Net-Zero indigenous technologies for green hydrogen production and utilization; and development of climate resilient elite rice varieties.
- Significant technologies developed in health domain through CSIR initiatives include micro PCR device for detection of infectious diseases, indigenous dental implant system, BiPAP – non-invasive ventilator for COVID-19, handheld IoT-enabled colposcope, non-invasive blood test for early breast cancer detection, enhanced CRISPR-Cas9 system for precision genome editing, SARS-CoV-2 vaccine, etc.
- Under the National Biopharma Mission (NBM), India's technological and product development capabilities in bio-pharmaceuticals (vaccines and biosimilars), medical devices and diagnostics are being supported. DBT is implementing the Ind-CEPI (India-centric CEPI) Mission, for strengthening the capabilities for vaccine development for emerging infectious diseases. Under the Biodesign program of DBT, biodesign capacity building and indigenous med-tech innovations are being supported.

(d) The Government has created an ecosystem of scientific research and innovation including startups which has enabled researchers to stay and work in India leveraging the opportunities created. Various fellowships under the INSPIRE program of DST provides opportunities to researchers and faculties at different stages of their career to undertake high level of research at various premium institutes within the country. Moreover, the Ramanujan Fellowship of ANRF; Ramalingaswami Re-entry Fellowship Programme and MK Bhan-Young Researcher Fellowship of DBT attract brilliant Indian researchers from abroad to return to India and perform high quality research. The VAIBHAV fellowship of DST provides a platform for overseas scientists including Non-Resident Indians to undertake collaborative research in Indian institutions and universities.

Currently, there are various resources, and generous funding opportunities available for graduates/ researchers within the country to translate their research into startups. As a result, there are 1.7 lakhs startups in the country providing home-grown solutions to various critical problems.

Furthermore, through ANRF, increased funding is available for research through various schemes like Core Research Grant (CRG), Prime Minister's Early Career Research Grant (PMECRG) etc. Additionally, the ANRF-National Post Doctoral Fellowship (N-PDF) is

aimed to identify motivated young researchers and provide them support for doing research in frontier areas of science and engineering, thereby retaining the PhD talent within India for furthering the high-end research.

DST is partnering in creation and shared use of international advanced facilities like CERN (Geneva); ELLETRA (Italy); Sp-Ring-8 (Japan) etc. This facilitates access of advanced facilities to our researchers and their participation in mega-science and consortia projects.

The Ministry of Science and Technology is actively cooperating with 40 countries across the globe along with the UN and other International S&T Organizations. The main aim of these collaborations is to connect Indian research with global efforts particularly in the frontier areas of S&T and in areas addressing global challenges. This provides opportunities for Joint R&D projects, project-based mobility exchanges, fellowships, access to advanced facilities etc.

All these initiatives contribute towards a more vibrant R&D ecosystem, thereby motivating the researchers to stay back in the country, and perform quality research.

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