

PARLIAMENT QUESTION: PUBLIC-FUNDED RESEARCH AND DEVELOPMENT INSTITUTIONS

Posted On: 11 FEB 2026 5:02PM by PIB Delhi

The Government maintains data on the number of technologies developed and transferred to industry by major public-funded research institutions. The details for the last 5 years are given in Annexure 1.

The Office of the Principal Scientific Advisor (PSA) to the Government of India had undertaken two studies to assess the performance of centrally funded Research & Development organisations (in non-strategic sectors), where IP and technology transfer were among several metrics. A report titled "Evaluation of the Innovation Excellence Indicators: Report on Public Funded Research & Development (R&D) Organizations (Round 1) and (Round 2)" was released in 2022 and 2025, respectively. The Confederation of Indian Industry (CII) and the Centre for Technology, Innovation and Economic Research (CTIER) served as knowledge partners for this work. NITI Aayog Working Paper No. WPS (NITI Aayog)/11/2025, titled "Public R&D Institutes in India: Opportunities for Multisectoral and Systemic Integration," provided a diagnostic analysis of over 1,800 public R&D institutes, identifying gaps in technology commercialization. Factors influencing research-to-market transition include weak Institutional-Industry-Government linkages, the absence of Technology Transfer Offices in institutions, and lack of incentives for scientists and researchers to pursue translational research. The Government has initiated several structural, financial, and policy reforms to address these factors which are given below: -

- The Anusandhan National Research Foundation (ANRF) under DST has strengthened Industry-Academia linkages through various programs. One key mechanism to bridge the gap between academic research and market-ready products is structured support across Technology Readiness Levels (TRLs). Under the new framework, ANRF supports research from basic and early-stage development, i. e., up to TRL-4, while the RDI scheme, launched with an outlay of ₹1 lakh crore, funds projects from TRL-4 and above to advance prototypes, scale up and commercialisation. This coordinated approach ensures a smooth transition from laboratory research to commercially deployable technologies, strengthening Institutional-Industry-Government linkages. BIRAC under DBT also addresses the gap between academia and industry by providing specialized support through targeted schemes like Biotechnology Ignition Grant (BIG) and BioNEST (Bio- Incubators Nurturing Entrepreneurship for Scaling Technologies).
- Several measures have been taken to establish and strengthen Technology Transfer Offices (TTOs) to bridge the gap between academia, R&D labs and industry. The National IPR Policy (2016) emphasised creating TTOs in universities and R&D institutions to facilitate the commercialization of intellectual property. Techex.in, i-TTO, C-CAMP, and others under the BIRAC-RTTO Network manage intellectual property, foster industry partnerships, and facilitate R&D commercialization from academia and labs to industry. IN-Space enables the transfer of ISRO developed space technologies to Indian industries. The National Research Development Corporation (NRDC) promote technology transfer and commercialisation from R&D institutions and supports TTOs via seed funding, patenting assistance, technology validation, and licensing, often acting as an

intermediary to commercialize innovations. NRDC's efforts have facilitated over 5000 technology transfer agreements, helping turn academic research into commercial success. Major technical institutions like IITs, NITs, and CSIR laboratories have also established TTOs or Intellectual Property Management Cells (IPMC) to handle licensing and commercialization.

- The government offers various incentives to promote translational research, including direct grants, specialized fellowships, infrastructure support, and regulatory assistance. BIRAC provides up to ₹50 lakhs for early-stage startups and individual scientists to reach the Proof-of-Concept stage. Under the ANRF Translational Research and Innovation (ATRI) initiative, ANRF will establish ATRI Centres to support advancing technologies from TRL 4 to TRL 7, thereby strengthening the innovation pipeline from lab to market. Previously, SERB (now ANRF) provided grants under schemes like SERB-TETRA (for proposals with potential and promise for translation at TRL 5 or beyond). The CSIR Technology Awards (CTA) encourage multidisciplinary in-house efforts and external collaboration for technology development, transfer, and commercialization.

Each organisation maintains its own institutional repository or list of technologies, including those ready for deployment as well as those under development.

- Council of Scientific and Industrial Research (CSIR) Technology Showcase Portal lists various ready-for-deployment or mature technologies available for transfer to industries, start-ups, entrepreneurs, and other stakeholders. The portal includes technologies categorized by sector and lab, success stories, and patent portfolios.
- All the BRIC (Biotechnology Research and Innovation Council) institutions under the Department of Biotechnology maintain their own institutional repositories, listing technologies that are ready for deployment as well as those under development.
- The India Science, Technology and Innovation (ISTI) Portal, developed by the Department of Science and Technology (DST), acts as a one-stop shop, collating information on research, technology, and innovation- including technologies ready for deployment and transfer from various central scientific departments. The autonomous institutions of DST also maintain a database of technologies that are ready for deployment.
- The Indian Council of Agricultural Research (ICAR) manages the ICAR Technology Repository for agricultural technologies, covering areas such as Crop Science, Horticultural Science, Agricultural Engineering, Animal Science, Natural Resource Management, Fisheries Science, etc.
- The Defence Research and Development Organisation (DRDO) maintains a portfolio of technologies developed in its 50+ laboratories, which are transferred to private sector companies for production.

Several institutional mechanisms, including specialised schemes and programmes have been formulated by respective departments to facilitate coordination between public research institutions, investors, and industry for technology commercialisation. The details of significant initiatives are given below: -

- Dedicated Business Development Groups (BDGs) operate at the Council of Scientific and Industrial Research (CSIR) at both the Laboratory and Headquarters levels. They liaise with academia and industry to facilitate collaborative research in areas of mutual interest and complementary expertise, including adoption and access to technologies and products developed by CSIR. To support technology outreach to MSMEs, CSIR has partnered with Laghu Udyog Bharati (LUB). CSIR also supports startups through incubation centres at some of its laboratories, offering scientific assistance for R&D, prototyping facilities, use of R&D equipment for analytical measurements, mentoring, advisory and consulting services, IP support, and capacity building.

- The BRIC-BIRAC Entrepreneur-in-Residence (EIR) Programme is a strategic initiative launched by the Department of Biotechnology to foster, coordinate, and accelerate biotechnology innovation. It aims to bridge the lab-to-market gap by facilitating collaboration between research institutions, academia, industry, and investors, enabling high-risk, advanced biological research to become scalable, commercialized solutions. The EIR Programme empowers young innovators to convert advanced biological research into viable commercial solutions by providing funding and stipends, incubation and mentorship, skill development, and industry integration.
- The Technical Research Centres (TRCs) established at five autonomous institutions under the Department of Science and Technology (DST) support technology commercialization by offering techno-legal-commercial and financial assistance to bridge the gap between scientific discovery and industrial application. These centres act as intermediaries that streamline the involvement of multiple stakeholders, including industry and academia, to translate research into products of societal and industrial value. The TRCs adopt various strategies to coordinate between researchers, investors, and industry, such as building a strong ecosystem by enhancing the Technology Readiness Levels (TRL) of background R&D and intellectual properties, making them more appealing for industrial adoption, while also supporting the business community in transforming inventions into viable services.
- The NIDHI (National Initiative for Developing and Harnessing Innovations) programme, implemented by DST, facilitates coordination among research institutions, investors, and industry through a structured, multi-component ecosystem designed to transform lab research into commercialized products. By focusing on 'start-to-scale' support, NIDHI connects innovators with industry for validation and with investors for funding, bridging gaps in technology commercialisation.

The public-funded research institutions under the Ministry as well as other government organisations are already developing several low-cost indigenous technologies focusing on socially relevant technologies in areas like drinking water, sanitation, energy, healthcare, organic farming etc. Public funded R&D institutions in India, primarily led by the CSIR, DBT, DST, ICAR, ICMR etc, have initiated specific schemes and programs aligning research with national priorities to ensure innovations move from laboratories to real-world applications. The details of few significant, socially relevant technologies in areas like drinking water, sanitation, energy, healthcare, and organic farming developed by public-funded R&D institutions under the Ministry are given in Annexure 2.

Annexure 1

1. Council of Scientific and Industrial Research (CSIR)

<i>Sl. No</i>	<i>Year</i>	<i>Technologies Developed</i>	<i>Technology Transferred</i>
1.	2025	74	181
2.	2024	45	293
3.	2023	51	152
4.	2022	85	162
5.	2021	192	214

Total	447	1002
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2. Department of Biotechnology (DBT)

<i>Sl. No</i>	<i>Year</i>	<i>Technologies Developed</i>	<i>Technology Transferred</i>
1.	2025	24	12
2.	2024	71	6
3.	2023	25	0
4.	2022	38	7
5.	2021	63	19
Total		221	44

3. Department of Science and Technology (DST)

<i>Sl. No</i>	<i>Year</i>	<i>Technologies Developed</i>	<i>Technology Transferred</i>
1.	2025	63	19
2.	2024	62	12
3.	2023	60	5
4.	2022	72	19
5.	2021	71	22
Total		328	77

4. Indian Council of Agricultural Research (ICAR)

<i>Sl. No</i>	<i>Year</i>	<i>Technologies Developed</i>	<i>Technology Transferred</i>
1.	2025	475	475
2.	2024	412	412
3.	2023	381	381

4.	2022	379	379
5.	2021	349	349
Total		1996	1996

Annexure 2

Key, socially relevant technologies developed by public-funded R&D institutions under the Ministry of Science and Technology.

<i>Sl. No</i>	<i>Sector</i>	<i>Details of Technologies Developed</i>
1.	Drinking Water	- ONEER™, an electronic device to eliminates harmful microbes from water without adding chemicals has been developed by CSIR-IITR/NEERI. - Ceramic membrane-based technology (CSIR-CGCRI) and Electrocoagulation/Flotation (ECF) technology (CSIR-NEERI) were developed and deployed for removing excessive iron, fluoride, and arsenic from groundwater - Thin-film composite reverse osmosis (RO) and nanofiltration (NF) membranes, developed by CSIR-CSMCRI/IICT are widely deployed for producing potable water from brackish water. - The R&D institutions funded by DST had developed several low-cost water purification technologies like Laterite-based Arsenic Removal Filters, AMRIT (Arsenic & Metal Removal by Indian Technology), JalKalp Water Filter – a gravity-based filter that removes biological impurities, bacteria, and heavy metals without needing electricity etc.
2.	Sanitation	- CSIR-CLRI had developed a Waterless Chrome Tanning Technology that eliminates water use in the tanning process and significantly reduces environmental pollution from tanneries. - CSIR-IICT had developed Anaerobic Gas Lift Reactor (AGR) for treating biodegradable organic waste to produce biogas and bio-manure, useful for local waste management. - DBT-ICT Centre for Energy biosciences had developed a technology demonstration project designed to convert 1 ton/day of Municipal Solid Waste (MSW) into energy through an integrated, multi-technology approach.

3.	Energy	- CSIR-CMERI developed Solar Tree, a compact, space-saving, and high-efficiency solar energy-harvesting structure for lighting in rural spaces. - Improved Soft Coke & Fuel Technology has been developed by CSIR-CIMFR for manufacturing cleaner-burning soft coke to reduce indoor pollution. - CSIR-NCL/NPL developed of 3 KWe and 5KW High-Temperature Polymer Electrolyte Membrane Fuel Cells (HT-PEMFC).
4.	Healthcare	- DST's SCTIMST had developed an array of biomedical devices like Cardiovascular Devices (Heart Valves, Cardiac Occluders, Vascular Stents and Devices, Paracorporeal Left Ventricular Assist Device (pLVAD), Centrifugal Blood Pumps, Annuloplasty Rings, Implantable Cardioverter Defibrillators), Blood Management and Extracorporeal Devices (Electromagnetic Blood Flow Meters, Automatic Contrast Injectors, Disposable blood bags, Membrane Oxygenators, Cardiotomy Reservoirs), Neurological and Rehabilitation Devices (Hydrocephalus Shunts, Deep Brain Stimulator Systems, Intracranial and Subdural Electrodes, Spinal Cord Stimulators) Biomaterials and Dental Products (Hydroxyapatite-based Bioceramic Porous Granules, Calcium Phosphate Bone Cement, Bioactive Calcium Sulfate Cement, Hydroxyapatite Nanogel for root canals and Dental Composites), Diagnostic Kits and Other Devices (Multiplex RT-PCR Kit for SARS-CoV-2 detection and Chitra RNA Isolation Kit). - BGR-34 (Blood Glucose Regulator) for managing Type-2 diabetes was developed by CSIR-NBRI & CIMAP. - A portable, battery-operated, low-cost diagnostic device for rapid detection of TB, malaria, dengue, H1N1, and COVID-19 has been developed by CSIR-IGIB. - Cost-effective, generic drugs like Risorine (anti-TB) and generic, bio-equivalent versions of expensive drugs were developed by CSIR-IICT. - The affiliated institutions of DBT including BIRAC had developed several affordable diagnostic and therapeutic tools.

5.	Organic Farming	- Seaweed-based Fertilizer (<i>Kappaphycus alvarezii</i>) was developed by CSIR-CSMCRI) which increases crop yield (13-36%) and reduces chemical fertilizer usage by 25%. - CSIR-IHBT had developed several technologies for Cultivation of high-value aromatic plants (e.g., lavender, lemongrass, Hing (<i>Asafoetida</i>) and Saffron) to boost farmer income and reduce import reliance. - The Biotech KISAN (Krishi Innovation Science Application Network) program connects science with farmers, focusing on enhancing productivity and sustainability. - DBT funded institutions had developed a variety of microbial agents to improve soil health, enhance crop yields, and reduce dependence on chemical fertilizers. - Drought, pest, and disease-resistant seeds (e.g., in amaranth and safflower), technologies for waste-to-fertilizer, particularly for small-landholding farmers and modern spectroscopic techniques for quick soil nutrient analysis were developed and deployed by DBT.
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This information was given by Union Minister of State (Independent Charge) for Science & Technology and Earth Sciences, and Minister of State in the Prime Minister's Office, Personnel, Public Grievances and Pensions, Atomic Energy and Space, Dr. Jitendra Singh, in a written reply in the Lok Sabha on Wednesday.

AK/FK

(Release ID: 2226472) Visitor Counter : 114

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