DAILY CURRENT AFFAIRS

11st FEBRUARY, 2025

INDIA AS A BRIDGE BETWEEN THE GLOBAL NORTH AND SOUTH

India as a bridge between the Global North and South

In his address in January 2025, in Bhubaneswar, Odisha, while addressing the 18th Pravasi Bharatiya Divas convention, the Prime Minister, Narendra Modi, said, 'Today's India not only firmly asserts its own point but also strongly amplifies the voice of the Global South'. Similarly, when India held the 3rd Voice of Global South Summit 2024, last August, Mr. Modi said that India aspires to lead the required reforms to take developing countries into a new, more inclusive structure of global governance.

What has influenced India's renewed enthusiasm to champion the cause of the developing world? And, how can the country influence change to become an effective global development partner?

Unlike the Non-Alignment Movement (NAM), India's motivation does not appear to be based on decolonisation or strong criticism of the West. Rather, as India attempts to increase its presence in the Global South, it is simultaneously deepening its relationships with traditional partners such as the United States and Europe. The high-level visit of Jake Sullivan, the former U.S. National Security Adviser, in January, reflects this. Mr. Modi's visit to Poland, in August 2024, also shows India's attempt to create new alliances.

The China factor argument

The cynical answer often circles back to India trying to counter China's growing global dominance. Trends of foreign direct investments in Africa indicate that India appears to be in a race with China, mainly focusing on countries which already have a significant Chinese presence. Further, industrialised countries are thought to be strategically partnering with India to contain China's rising international footprint. The Quad partnership, an on-going dialogue between Japan, India, Australia and the U.S., for a free and fair Indo-Pacific, is seen as one such attempt. However, the India-China competition does not give the full picture.

India is trying to create an individual identity as an emerging power in its own right to forward its own strategic trade, defence, and geopolitical interests. Global South countries are disillusioned with present economic paradigms, burdened with debt and conditionalities. They are not looking for another China or a new western institution. India can fill this gap while being a bridge between the Global North and Global South. To be successful, India needs to back up its rhetoric with the right strategies.

Pooja Ramamurthi

is an Associate Fellow at the Centre for Social and Economic Progress (CSEP), New Delhi

New Delhi's aspiration to be the 'voice' of the Global South can take shape if it also learns to listen

Steps that India must take

The first is for India to double-down on its call for an alternate paradigm of development cooperation that is not solely top-down, dictated by the Global North. India often lays emphasis on equal partnerships with other developing countries, trying to set itself apart from traditional powers. In practice, it signals otherwise by putting forward strategies with an India-first approach.

The newly announced 'Global Development Compact' aimed at facilitating growth in the Global South, was described as rooted in Indian experiences and strategies. India's development story as an emerging power and being the world's largest democracy makes it unique. However, it does not hold all the policy answers. It would merit India to not only assert itself as a provider of knowledge but also be open to learning from other Global South countries to address its domestic challenges. Countries are bound to be more receptive toward a country that views them as partners. Otherwise, India may also be perceived as a big brother imposing traditional donor and recipient relationships.

Second, New Delhi has laid stress on a more human-centric approach to tackle developmental challenges. This has been defined at international fora towards promoting behavioural change via Mission LiFE ('Lifestyle For Environment'), which encourages low consumption lifestyles. While important, the need is to rebrand human-centric development in order to focus on building human resource and capacity, especially to tackle future sustainability challenges. Skill India or schemes that mainstream women into entrepreneurship, will be attractive for countries in the Global South which are also seeking to grow their domestic industry. India's capacity building strategy has tended to revolve around the Indian Technical and Economic Cooperation (ITEC) programme, which implements sector-specific short-term activities. It would be more effective for longer term engagement to assist countries in creating their own institutional capacity to create a better workforce. India can leverage its experiences with micro, small and medium enterprises to foster exchanges. A focus on digital infrastructure, climate and energy solutions as well as water and food security are key areas for cooperation.

The goal ahead

Lastly, India has called for more inclusive global governance. The nation demonstrated this intent by championing the addition of the African Union into the G-20 (in 2023) during India's presidency. India should not be content with facilitating changes in established international institutions but also learn to build domestic capacity. As India aspires to become a stronger global development player, it must establish norms, standards and systems to work with partner countries. Initially, it is beneficial to use existing institutional channels of partners such as the United Nations or Germany and France that are more experienced in development cooperation. However, the long-term goal should be for India to create its own robust domestic systems for international cooperation. Trilateral partnerships and increased engagement with new partners need to be seen as a learning by doing process, where India imbibes its experiences to scale up India-led global initiatives.

India aspires to be the 'Voice' of the Global South, but it also must 'listen' to be a good leader. When India spearheaded NAM, the country showed the world that there is a new, third option for developing countries. India should not miss out on an opportunity to do the same thing now.

The views expressed are personal

Key Points of the article

- **India's Vision for the Global South**
  - PM Narendra Modi at **18th Pravasi Bharatiya Divas (2025, Bhubaneswar)**:
    - "Today's India not only firmly asserts its own point but also strongly amplifies the voice of the Global South."
  - **3rd Voice of Global South Summit (2024)**:
    - India aspires to lead global governance reforms for developing nations.
  - **Key Questions:**
    - Why is India championing the cause of the Global South?
    - How can India influence global change effectively?

India's Approach: Beyond NonAlignment

- Unlike the **Non-Aligned Movement (NAM)**, India's approach is not based on decolonization or anti-West sentiment.
- **India is expanding ties with both:**
  - **Global South** – Strengthening partnerships with developing nations.
  - **Traditional Allies** – Deepening relationships with the U.S. and Europe.
- **Examples:**
  - Jake Sullivan's **high-level visit (January 2025)** reflects strong U.S.-India ties.
  - PM Modi's **Poland visit (August 2024)** shows new alliance-building efforts.

The China Factor – A Partial Answer

- India and China are seen as competitors in the Global South:
  - Both invest heavily in **Africa** (strategic influence race).
  - Industrialized nations view India as a counterweight to China.
- **Quad Alliance (India, U.S., Japan, Australia)** aims for a free and open Indo-Pacific.
- **Beyond Competition:**
  - India seeks to create its **own identity** as a global power.
  - Developing countries are disillusioned with Western models and China's debt-driven approach.
  - India aims to be a **bridge between the Global North and South**.

Key Steps for India to Lead

A. **Redefining Development Cooperation**
  - India promotes **equal partnerships** rather than top-down approaches.
  - **Global Development Compact**:
    - Rooted in **Indian experiences** but must incorporate learnings from other nations.
    - India should not just **share knowledge** but also **learn** from Global South partners.
  - Risk: India may be perceived as a **big brother**, replicating donorrecipient dynamics.

B. Human-Centric Approach

- India promotes **Mission LiFE (Lifestyle For Environment)** for sustainable living.
- However, a broader human-centric approach is needed:
  - **Skill Development:**
    - *Skill India* can help Global South nations strengthen their workforce.
    - **Women entrepreneurship programs** can drive economic empowerment.
  - **Capacity Building:**
    - Move beyond short-term ITEC (Indian Technical and Economic Cooperation) programs.
    - Help countries build **institutional capacity** for long-term impact.
  - **Priority Areas for Collaboration:**
    - Digital infrastructure
    - Climate and energy solutions
    - Water and food security

The Road Ahead – Strengthening Global Governance

- India has **championed inclusivity** in global institutions:
  - Key achievement: African Union's entry into the **G-20 (2023, India's presidency)**.
- **Long-term strategy:**
  - Build **domestic institutions** for international cooperation.
  - Use **existing global networks** (UN, Germany, France) to refine India's approach.
  - Strengthen **trilateral partnerships** to scale India-led global initiatives.

India's Leadership – A Balancing Act

- India aspires to be the **Voice of the Global South**.
- However, leadership is not just about speaking—India must also **listen**.
- Historic parallel:
  - During NAM, India offered a **third option** to developing countries.
  - Today, India must **seize the opportunity** to shape a new, inclusive global order.

MODI ARRIVES IN FRANCE FOR AI SUMMIT, TALKS WITH MACRON

Modi arrives in France for AI summit, talks with Macron

Kallol Bhattacherjee
NEW DELHI

Prime Minister Narendra Modi arrived in France on a three-day visit during which he will co-chair an AI Action Summit with French President Emmanuel Macron and hold bilateral talks with him.

Representing the Global South in the Paris AI Action Summit, broadening consular and diplomatic ties, and nuclear research are some of the items on the agenda of Mr. Modi's visit to France, an official statement said on Monday.

The official statement issued ahead of his departure for the two-nation tour covering France and the U.S. informed that he will be co-chairing the AI Action Summit, which will be held in Paris on Tuesday and Wednesday.

Warm welcome: Prime Minister Narendra Modi with members of the Indian diaspora in France on Monday. PTI

The AI summit is the third in a series of global initiatives on artificial intelligence after the AI Safety meet in the U.K. in 2023 and South Korea in 2024. The summit in Paris will focus on innovation, public interest, future of work and issues in AI governance. India is expected to represent the voice of the Global South on AI-related issues.

Economic cooperation

The bilateral component of the visit will begin after the AI summit and will include interaction with the India-France CEOs Forum where Mr. Modi and Mr. Macron will lay down respective visions of economic cooperation. On Tuesday evening, Mr. Macron will host a dinner in honour of Mr. Modi.

During the visit, the two sides will review the progress on the 2047 Horizon Road map for India-France strategic partnership. A new Indian consulate at Marseille will also be opened. Mr. Modi will visit the International Thermonuclear Experimental Reactor (ITER) project which is a major international project on energy generation and nuclear research.

"I will also pay tribute to the Indian soldiers who laid down their lives during World War I and II at the Mazargues War Cemetery," Mr. Modi said in a statement. The cemetery is maintained by the Commonwealth War Graves Commission which looks after similar graves across Europe where Indian soldiers sacrificed themselves during the two World Wars.

Following the visit to France, Mr. Modi is scheduled to take off for the United States.

"In Washington DC, I look forward to meeting President Donald Trump, This visit will further cement India-USA friendship and boost ties in diverse sectors. I warmly recall working with President Trump during his first term and I am sure our talks will build on the ground covered then," Mr. Modi said in a post on X.

(With PTI inputs)

Key Points from the article

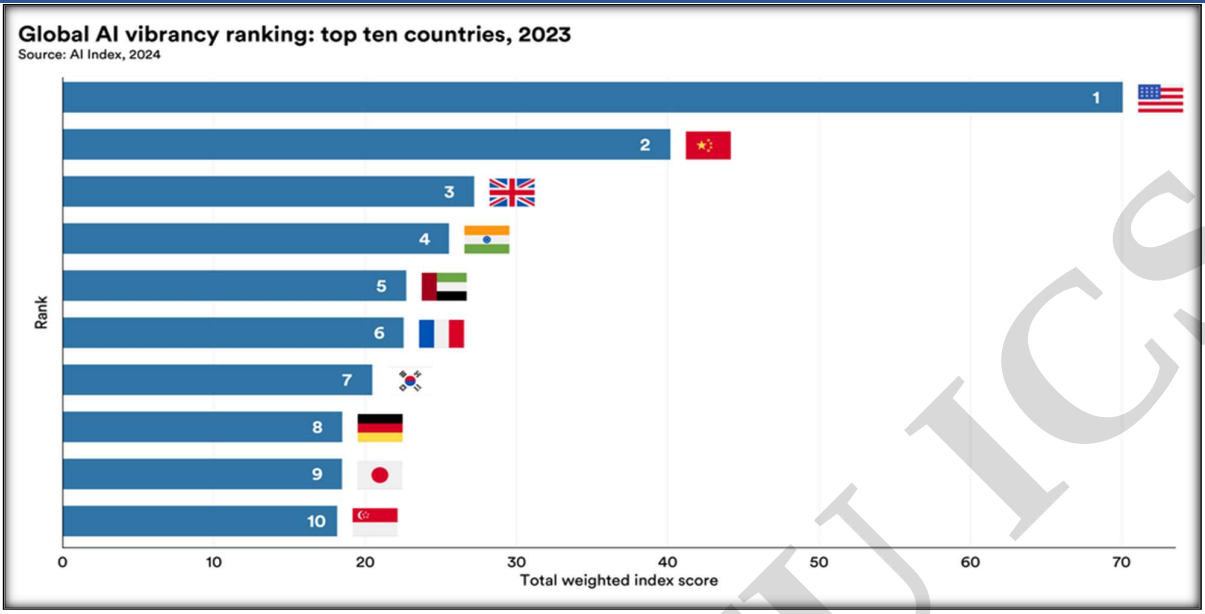
AI Action Summit – Paris 2025

- **Date:** February 10-11, 2025
- **Location:** Paris, France
- **India's Role:** Co-chairing the summit with France

Key Highlights:

- Third AI Summit after:
  - **UK (2023):** Focused on AI safety → Led to the UK AI Safety Institute (AISI).
  - **South Korea (2024):** Expanded discussions on multilateral AI cooperation.
  - **Discussion Topics:**
    - AI safety
    - Innovation
    - Governance
    - Future of work

GLOBAL AI VIBRANCY RANKING: TOP 10 Countries



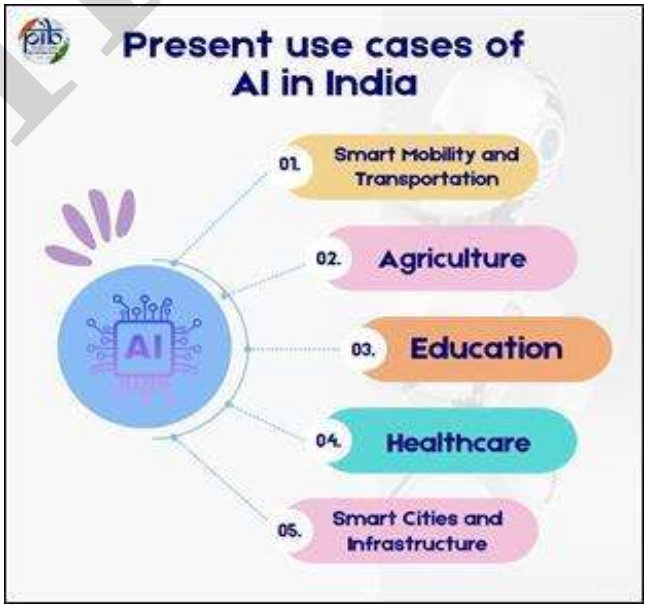
India's Global AI Engagement

Key AI Initiatives & Participation

- Participated in UK and South Korea AI Summits.
- Launched **India's AI Safety Institute** to promote responsible AI.
- Advocated for AI for the **Global South** in multilateral forums.
- Under **India's G20 Presidency (2023):**

Promoted a **"pro-innovation regulatory approach"** balancing AI growth & safety.

- Hosted **Global Partnership on Artificial Intelligence (GPAI) 2023**, emphasizing **equitable AI access**.



Top Indian State Govt. AI Initiatives

PIM

GUJARAT
Focus: Healthcare, agriculture, sustainable cities
Investment: INR 990 crore for Centres of Excellence
Partnership: IBM-led AI Cluster in GIFT City with AI Sandbox, literacy programs

MAHARASHTRA
Collaborations: Google MoU for agriculture, healthcare, education AI
Excellence Centres: National Institute tie-up for AI, IoT, Industry 4.0 training

TELANGANA
E-Governance: Partnership with Meta for generative AI
AI Hub: WTCA partnership for AI-focused World Trade Center in Hyderabad

KARNATAKA
Education: Shiksha Copilot for teachers
GCCs: Policy for 500 new centres, 3.5 lakh jobs by 2029
Support: AI/ML administration unit, INR 15,000-stipends for vocational training

ANDHRA PRADESH
Objective: Amaravati as an AI city
Initiatives: Google-backed "AI for AP" program (agriculture, healthcare, skills), upcoming MoU for sector-wide AI

KERALA
Vision: Global hub for generative AI
Highlights: AI Cluster, industrial park, ESG-aligned public-private partnerships, global incentives

TAMIL NADU
Mission: Tamil Nadu Artificial Intelligence Mission (TNAIM)
Focus: Governance, social/economic growth
Funding: INR 13.93 crore
Principle: "Social Good by Design"

Top Indian State Government AI INITIATIVES IN 2024

India's Focus Areas at the Paris Summit

➢ Expanding AI Resource Access

India should advocate for:

✅ **Fair access to AI tools**, including:

- **Computing power** (e.g., India's 18,600-GPU facility, 40% govt-funded).
- **Data storage & cloud computing** (e.g., Open-source AI models like DeepSeek).
- **Easier global AI tech transfer** with safety measures.

➢ Developing AI for Local Needs

🌱 **AI Solutions for the Global South**

✅ Early **disease detection** in healthcare.

✅ **Personalized education platforms** for diverse learning needs.

✅ **AI-driven agriculture** solutions.

✅ 📊 Creating an **AI use-case repository** to guide future projects.

➢ Addressing AI Risks for the Global South

⚠️ Key AI Concerns:

✅ **Real-world AI risk assessments** (based on the International Scientific Report on AI Safety).

✅ **Cultural bias risks** from AI models trained on Western data.

✅ **Propose an AI-harms repository** to shape global safety policies.

WHAT HAS THE BUDGET OFFERED SCIENTISTS?

What has the Budget offered scientists?

The Union Budget for 2025-26 provided an overall and possibly unprecedented thrust on research and innovation, especially in the private sector. The Budget's support for private sector research is expected to accelerate advancements in areas such as gene-editing, personalised medicine, and sustainable agriculture

FULL CONTEXT

T.V. Padma

What does India's 2025-2026 Union Budget spell for India's research ecosystem? The author asked seven scientists and science administrators. Their replies are presented below, edited for clarity.

Read the full version online here: bit.ly/scientistsbudget

Abhay Karandikar, Secretary, Department of Science & Technology: The Budget provides an overall and possibly unprecedented thrust on research and innovation by setting aside ₹20,000 crore for the Department of Science & Technology (DST), and towards research in the private sector, including corporates and startups. There is a focused attempt to bring together academia, the private sector, and startups to work on national missions.

The dedicated fund of ₹20,000 crore is part of the ₹1 lakh crore corpus fund announced in the Budget of July 2024 to boost private sector R&D, especially in the deeptech and sunrise sectors. The DST will be the nodal ministry driving this fund. This will be a major step towards creating strategic autonomy in some key technology sectors. The National Geospatial Mission has been allocated ₹100 crore for FY 2025-2026 to develop foundational geospatial infrastructure and data. The mission will help implement the National Geospatial Policy 2022, with the goal of expanding the access and use of geospatial data and making India a world leader in the geospatial sector.

The Finance Minister has announced several initiatives to boost science, and innovation in the country including the Nuclear Energy Mission, clean tech initiatives, Atal Tinkering Labs etc.

Rajesh Gokhale, Secretary, Department of Biotechnology (DBT): The Union Budget demonstrates a commitment to advancing India's biotechnology sector, which aligns closely with the DBT's objectives. The ₹3,446.64 crore allocation reflects a significant increase of 51.45% from the previous year's allocation.

Recently, the government also approved the 'Bio-RIDE' scheme to foster innovation, promote bio-entrepreneurship, and strengthen India's position as a global leader in biomanufacturing and biotechnology.

The Budget's support for private sector research is expected to accelerate advancements in areas such as gene-editing, personalised medicine, and sustainable agriculture. The proposal for a light-touch regulatory framework based on principles and trust is a progressive step. Aligned with the government's 'BioE3 Policy' for fostering high-performance biomanufacturing, the National Manufacturing Mission (NMM) announced in the Budget aims to accelerate technology development and commercialisation.

The National Mission on High Yielding Seeds will focus on strengthening the research ecosystem and developing high-yielding, pest-resistant, and climate-resilient seeds. Similarly, some of DBT's initiatives contribute to self-reliance programmes, such as the mission on minor oil seeds. Another is a mission programme on "Characterisation of Genetic Resources", to sequence/re-sequence and characterise available germplasm resources of pulses.

ISTOCKPHOTO

N. Kalaiselvi, Director-General, Council of Scientific and Industrial Research (CSIR): The Budget reinforces science, technology, and innovation (STI) as key enablers of national progress, aligning with CSIR's vision of advancing self-reliance and global competitiveness. The Budget's focus on public-private partnerships, industry collaboration, and technology-driven entrepreneurship will accelerate innovation in manufacturing, healthcare, and sustainability.

For agriculture and rural prosperity, CSIR's Aroma and Floriculture Missions align with the Agri-Districts Initiative, promoting value-added farming and boosting farmer incomes. Similarly, CSIR's Millets Mission supports self-reliance in the farming of pulses and oilseeds, ensuring nutritional security and climate-resilient farming. The CSIR Cotton Mission aligns with the National Cotton Mission, strengthening India's position in global textile markets.

The Indigenous Manufacturing and Smart Packaging Missions find synergy with the NMM, driving innovation-led industrial growth. The Green Hydrogen Mission, spearheaded by CSIR, supports the clean energy transition.

For youth-skilling, CSIR's Jigyasa Programme complements Atal Tinkering Labs, fostering STEM education and research exposure. The Seaweed Mission and Learn & Earn Program empowers women entrepreneurs, supporting economic inclusion. Additionally, CSIR's Footwear for Healthcare and India Footwear Sizing Program align with the leather sector's initiatives. This Budget cements CSIR's pivotal role in nation-building and reinforces STI as the foundation for a self-reliant, inclusive, and globally competitive India.

K.S. Parthasarathy, former Secretary, Atomic Energy Regulatory Board: The Central government's ambitious programme to enhance the share of nuclear power to 100 GWe by 2047 and to invest heavily to support associated R&D is challenging to all stakeholders. Accepting private sector participation in the nuclear sector adds a new dimension to the programme. Success in the project to develop and install Small Modular Reactors (SMRs) is essential in India's energy transition. As per the International Atomic Energy Agency (IAEA), SMRs are nuclear reactors with a power generating capacity of 300 MWe equivalent or less.

The Atomic Energy Regulatory Board (AERB) has implemented measures to regulate the safety of VVER Russian reactors, pressurised heavy water reactors of 700 MWe etc, all of which include first of its kind technologies.

AERB's reports to the IAEA Convention of Nuclear Safety reveal how openly and transparently it has been fulfilling its mandate. AERB staff updates its knowledge and expertise in safety-related disciplines associated with new technologies. It has linkages with the U.S. Nuclear Regulatory Commission and the French regulatory agency among others, and exchanges its experience regularly.

C.P. Rajendran, National Institute of Advanced Studies, Bengaluru: The Budget infuses significant funding for science and technology and for the DBT, whereas the allocation for the Department of Scientific and Industrial Research is nominal.

The importance of curiosity-driven science doesn't seem to be a major priority. Much of the funding appears directed towards mission-mode programmes such as nuclear energy, AI, private sector initiatives, etc. The government also plans to amend the Nuclear Liability and Damage Act 2010 that makes operators liable for nuclear damage. This will have serious ramifications. Many experts have raised concerns about SMRs.

The Finance Minister also announced the expansion of the Small Industries Development Bank of India Fund for Startups with an additional ₹10,000 crore corpus to enhance the "deeptech ecosystem" in startups focused on AI, biotech, and space technology. India had over 3,600 deeptech startups in 2023. In that year, they raised $850 million, reflecting a 77% decrease from 2022 due to investors' lack of confidence regarding investment returns.

Curiosity-driven research is propelled by scientists' curiosity regarding specific research questions. What I observe is a growing corporatisation of science driven solely by immediate utility. Another critical issue is the rigid bureaucracy surrounding funding, which has created significant problems over the years.

Tapasya Srivastava, University of Delhi, South Campus: The Budget meets the increasing needs of health research and biomedical devices, given that the Economic Survey recognised the physical and mental harms of ultra-processed food leading to non-communicable diseases.

The percentage increase from the Revised Estimate of 2024-2025 to Budget Estimate of 2025-2026 for Central universities (4.3%) is about half of that given to IITs (8.4%), which is disappointing given the number of students and the overhauling with respect to the National Education Policy (NEP) that universities are going through. These changes require unprecedented support from the government, which is not evident looking at these numbers.

It would have been more meaningful if the Prime Minister's Research Fellowship became an interim research fellowship of a reasonable amount that replaces the abysmally low ₹8,000 non-NET UGC. The PMRF is competitive and, therefore, ends up mostly in labs with sufficient funding.

The AI bandwagon is something that all governments seem to want to rush into. The allocation has come into the Centre of Excellence in AI education and one hopes the Centre sets benchmarks for adoption in a way that truly benefits Indian society, beyond buzzwords.

With a significant number of youth struggling with mental health issues, overall health decline, reduced attention span and consumerism, the unprecedented advantage of a steady government to implement value-based learning and life skills in school education to bring about generational change appears to have been lost.

Soumitro Banerjee, IISER, Kolkata: The scientific community of India is dismayed to see the low financial allocation to sectors crucial for scientific development. The NEP-2020, adopted by the same government, recommended the expenditure on education be 6% of the GDP, which requires at least 10% of the Union Budget to be spent on education.

But since 2020, there has been no attempt to meet this target. This year the allocation is only 2.54%. This implies that through NEP-2020, the government is trying to change the structure and content of education without improving its quality. The direction of change is clear from the five-fold increased outlay for 'Indian Knowledge Systems'.

Basic science research has taken a backseat as the funding for IISc and the IISERs has been reduced. The UGC, which funds all universities, saw a drastic reduction in its budget last year (from ₹5,360 crore to ₹2,500 crore). Despite some increase this year (33% BE to BE), it is far below the pre-2024 figure.

T.V. Padma is a science journalist.

THE GIST

- The dedicated fund of ₹20,000 crore is part of the ₹1 lakh crore corpus fund announced in the Budget of July 2024 to boost private sector R&D, especially in the deeptech and sunrise sectors.
- The importance of curiosity-driven science doesn't seem to be a major priority. Much of the funding appears directed towards mission-mode programmes such as nuclear energy, AI, private sector initiatives, etc.
- Basic science research has taken a backseat as the funding for IISc and the IISERs has been reduced.

Key Highlights: Union Budget 2025-26 for Science & Innovation

1. **Unprecedented Boost to R&D and Private Sector Innovation**
   - ₹20,000 crore allocated to the **Department of Science & Technology (DST)**, supporting academia, startups, and private sector collaboration.
   - **₹1 lakh crore corpus fund** for deeptech and sunrise sectors, enhancing strategic autonomy in key technologies.
   - **₹100 crore for the National Geospatial Mission** to strengthen geospatial infrastructure under the National Geospatial Policy 2022.
2. **Major Push for Biotechnology & Agriculture Research**
   - **51.45% increase** in the Department of Biotechnology's (DBT) budget, reaching ₹3,446.64 crore.
   - Launch of **'Bio-RIDE' scheme** to boost biomanufacturing and bio-entrepreneurship.
   - **National Mission on High Yielding Seeds** to develop climate-resilient and pest-resistant crops.
   - Research focus on **gene-editing, personalized medicine, and sustainable agriculture**.
3. **Strengthening Scientific & Industrial Research**
   - **CSIR's innovation-driven initiatives:**
     - **Aroma & Floriculture Missions** for value-added farming.
     - **Millets & Cotton Missions** for selfreliant agriculture.
     - **Smart Packaging & Indigenous Manufacturing Missions** for industrial growth.
     - **Green Hydrogen Mission** supporting clean energy transition.
   - **Youth-skilling initiatives** through Atal Tinkering Labs and CSIR's Jigyasa Program.
4. **Nuclear Energy Expansion & Private Sector Involvement**
   - Plan to **increase nuclear power share to 100 GWe by 2047** with private sector participation.
   - **Small Modular Reactors (SMRs)** introduced as part of India's clean energy transition.
   - **Amendment to Nuclear Liability and Damage Act 2010** proposed, raising concerns over safety and liability.
5. **AI, DeepTech, and Startup Ecosystem Strengthening**
   - **₹10,000 crore for SIDBI Fund for Startups**, focusing on AI, biotech, and space technology.
   - **Centre of Excellence in AI Education** launched to guide AI adoption in India.

Concerns Over Basic Science & Higher Education Funding

- **Reduced funding for IISc and IISERs**, impacting basic science research.
- **UGC funding cut in 2024 (₹5,360 crore to ₹2,500 crore);** some increase this year but still below pre-2024 levels.
- **Higher budget growth for IITs (8.4%) than Central Universities (4.3%)**, raising concerns about equity in education funding.
- **Lack of focus on curiosity-driven research** in favor of mission-mode, application-based projects.

Criticism & Challenges

- **Scientific community dismayed by low funding for fundamental research.**
- NEP-2020 recommended **6% of GDP for education, but actual allocation remains only 2.54%.**
- **Shift towards corporatization of science,** with focus on immediate utility rather than long-term discovery.

CROSS BLOOD TRANSFUSION PERFORMED ON A PATIENT WITH BOMBAY BLOOD

Cross-blood transplant performed on a patient with Bombay blood

His mother donated her kidney, though she did not have the Bombay blood group. And doctors in Chennai, who had performed cross-blood transplants for close to two decades, were willing to cross the Rubicon and pulled off what not long ago might have looked like a sheer miracle

Ramya Kannan

It was in his blood that the 30-year-old male should create history. Literally.

In mid-2024, the patient underwent a kidney transplant. Though he was relatively young for a transplant, that's not where he stands unique. He had the extremely rare Bombay blood group, which prevented him from receiving organs or even blood transfusions from anyone who didn't have the same blood group running through their veins.

But then that's exactly what he did: his mother donated her kidney, though she did not have the Bombay blood group. Doctors at MIOT International in Chennai, who had performed cross-blood transplants for close to two decades, were willing to cross the Rubicon into a sector with no precedence whatsoever: no one had attempted a cross-blood match on a Bombay group patient ever before.

A sheer miracle

In a recent paper published in the peer-reviewed journal *Kidney International Reports*, the team that worked on the transplant – Rajan Ravichandran, Yashwanth Raj T., and Kanakaraj Arumugam – chronicled for posterity how a team of doctors in Chennai pulled off what not long ago might have been put down as a sheer miracle. "It was impossible for Bombay blood group patients to receive blood or organs from another blood group, until it was not," senior nephrologist Dr. Ravichandran explained.

The story he believes begins nearly two decades ago, when he was trained in Japan to perform cross-blood transplants, referring to the transplantation performed when donors and recipients have different blood types. In 2010, he and his team at MIOT Hospitals used a kidney from a donor with B blood group on a recipient with O blood group, successfully. Using a special procedure called double filtration plasmapheresis (DFPP) developed by the Japanese, the team had the patient discharged in a week and back at his software job in three months' time.

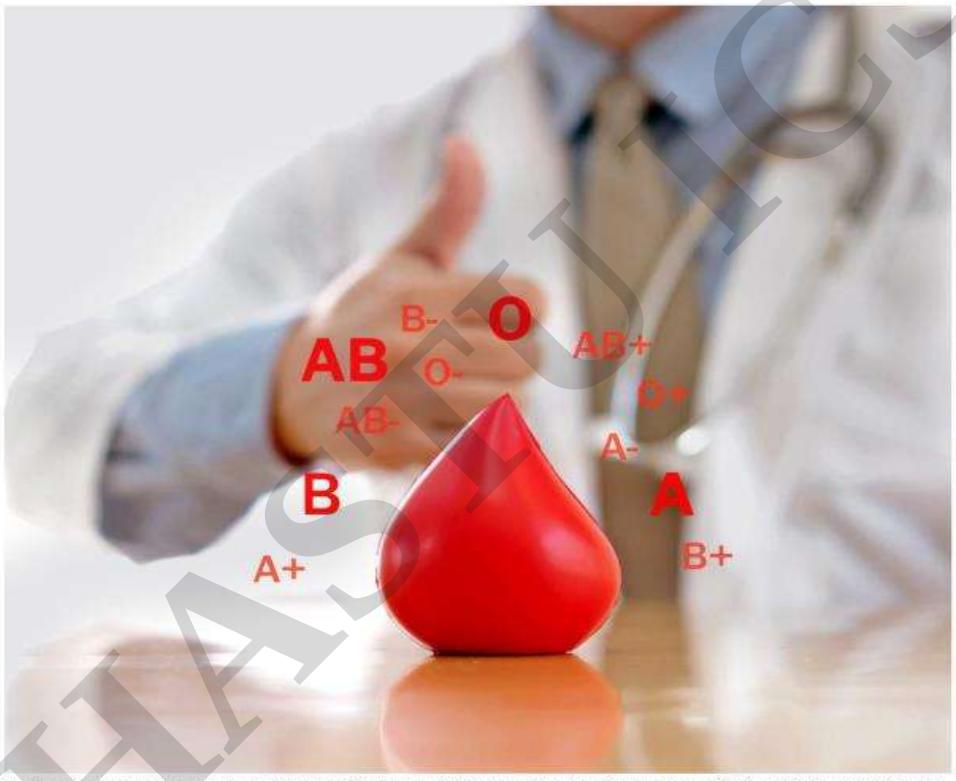
"The most essential requirement in transplantation is a blood group match – ideally, the patient's own blood group, or in the event it is not available, any group for which his blood does not carry antibodies," Dr. Ravichandran explained.

Antibodies are used by the body to detect and neutralise foreign bodies, while antigens are proteins or carbohydrates found on the surface of red blood cells, white blood cells, and platelets, and they determine blood type.

The Bombay blood group

The Bombay, a.k.a. HH, blood group is a rare blood group first discovered in Mumbai in 1952 by Y.M. Bhende. The key differences between the Bombay blood group and the common ABO blood groups lie in the presence (or absence) of the H antigen, which is the fundamental building block for the ABO blood group system.

In normal individuals, the H antigen serves as the base structure for building A and B antigens. In Bombay blood group individuals, the gene responsible for producing the H antigen is mutated or absent, so neither A nor B antigens can be formed.



The Bombay, a.k.a. HH, blood group is a rare blood group first discovered in Mumbai in 1952 by Y.M. Bhende. Representative image. GETTY IMAGES/ISTOCKPHOTO

Therefore, these people cannot receive blood transfusions from any ABO group, including type O, which has the H antigen. They can only receive blood from another Bombay blood group donor. Its prevalence is about 0.0004% (one in 4 million) of the total human population. While it drops to one in a million in the European population and one in 10,000 in Mumbai, the act of finding a donor is still daunting.

Clinical challenges

It was daunting for this index patient as well. The issue was not to find a donor for a kidney; his mother was eager to donate hers; the nub was that his body would reject it outright because they had differing blood groups. "We decided that it was time to use the principles of cross-blood matching that we use for the ABO type here as well. We assumed it was a similar situation and decided to use the Japanese technique of DFPP," Dr. Ravichandran said.

"Once you identify the Bombay blood group, you know he has anti-H antibodies. Firstly, we measure anti-A and anti-B antibodies in the blood as we do in the case of ABO cross-blood matches. Here, additionally, you have to measure the levels for anti-H antibodies too, and titrate the levels. The next step is to give a monoclonal antibody injection to the patient to deplete B cells that produce antibodies," he said.

As the authors detailed in the paper,

In normal individuals, the H antigen serves as the base structure for building A and B antigens. In Bombay blood group individuals, the gene responsible for producing the H antigen is mutated or absent, so neither A nor B antigens can be formed. Therefore they cannot receive transfusions from any ABO group

the clinical challenges in such a scenario, even among those with rich cross-blood transplant experience in ABO, include determining a safe anti-H antibody titre cut-off, sufficient enough to stop the body from rejecting the organ from the donor.

Notably, there is no precedence for this, so one had to, again, assume a safe level of antibody concentration. There is a high risk of hyper-acute rejection as anti-H antibodies are more potent than anti-A or anti-B antibodies.

"After determining the titre (levels) of antibodies, we started plasmapheresis, which again removes the antibodies in the blood, lowering the chances of rejection. This was combined with immunosuppressive IVIG [intravenous immunoglobulin] to further suppress antibodies, thereby preventing hyperacute rejection of the organ."

Every alternate day, the team measured the level of antibodies in the patient. "Normally for anti-A and anti-B, we consider a 1-in-16 concentration of antibody to be an ideal safe point to start transplant. It starts at 1-in-256, we then bring it down, lower the antibodies present. In anti-H there just is no cut off, so we made a few assumptions," he said.

A new hope

At what was assumed to be a safe, no-rejection antibody titre, the transplant surgery was performed. The team scoured the State for units of Bombay blood group units, just in case the patient might need it during transplant surgery, since cross-blood transfusion is not possible. However, he did not need it. The surgery was a breeze, and there were no complications during or after surgery, the team said.

While there is no published literature regarding accommodation of anti-H antibodies by the graft, as it had not been tested before, in this patient the doctors seemed to have achieved a no-rejection antibody titre status, and there was no rejection. The first two weeks, which are also crucial to decide if the organ will be rejected, also passed without incident, the doctors said.

Six months later, the patient is well and able to resume his pre-transplant activities, grateful at how the impossible became possible for him – and hopefully, for others in the Bombay blood group as well, if they are ever to require a transplant.

(ramya.kannan@thehindu.co.in)

Bombay Blood Group (HH Blood Group)

- Discovered in **Mumbai (Bombay) in 1952** by **Dr. Y.M. Bhende**.
- Also known as **HH Blood Group** or **Oh phenotype**.
- Extremely **rare** and unique in its composition.

Scientific Difference from ABO Blood Groups

- The **H antigen** is the base structure for the ABO system.
- In **normal individuals**, H antigen is converted into **A or B antigens** (depending on their blood type).
- People with the **Bombay blood group lack the H antigen** due to a **mutated or absent gene**.
- As a result, **they do not produce A, B, or even the H antigen**.

Why is it Rare?

- **Cannot receive blood from any other standard group**, including **O-negative**.
- Can **only receive blood from another Bombay blood group** individual.
- **Prevalence:**
  - **1 in 4 million globally** (0.0004%).
  - **1 in 1 million in Europe**.
  - **1 in 10,000 in Mumbai** (more common due to genetic clustering).

Challenges in Blood Transfusion & Organ Transplants

- Finding a **compatible donor is extremely difficult**.
- Requires **specialized blood banks** to store rare donations.
- Awareness and **rare donor registries** are crucial for life-saving transfusions.

— Keep Learning and Keep Revising! —