Category: National

India’s R&D Growth: Increased Investment & Innovation Reforms

India stands as the world's second largest manufacturing nation of Science Technology Engineering and Mathematics graduates after China. **India holds the 39th position on the Global Innovation Index 2024 while China stands at 11th rank because India dedicates limited funding to Research and Development.** To strengthen India’s R&D ecosystem, reforms such as increased funding, industry-academia partnerships, and efficient project management are needed.

Features of R&D system in India

- **R&D Funding Status:**
  - The R&D funding rate in India for 2022 equaled 0.65% of the national GDP but China distributed 2.43% and Brazil allocated 1.15%.
- **Need to Prioritize R&D:**
  - The national economic growth depends heavily on R&D because it helps India earn global competitiveness and upgrades its position from lower-middle-income classification to enhance productivity levels.
  - Modernization efforts in pharmaceuticals along with chemicals and automotive industries are necessary to face opponents from developed countries as well as emerging economies.
  - Deep-tech companies that develop quantum computing systems along with biotechnology and robotics and nanotechnology need major R&D funding.
  - The increase in labor costs requires manufacturing companies to develop automated assembly systems that incorporate AI and digital technologies for better productivity and export potential and higher added value.
- **Global R&D Scenario:**
  - South Korea underwent a fundamental transformation after doubling its R&D funding from 0.4% to 2.5% of GDP during two decades which enabled the nation to develop into a modern society and its corporate sector made an 800-fold increase in research spending by 2005.
  - The Chinese government increased their research and development investments from 0.6% of GDP in the late 1990s to 2.4% in the current period which corresponds to their greatest economic growth period.

Challenges in India’s R&D Ecosystem

- The expenditure for R&D research in India stands much lower than comparable levels in developed economies such as the United States and Japan at 3.46% and 3.30% respectively and Israel and South Korea at 5.56% and 4.93% respectively.
- The main source of R&D funding during 2020-2021 came from government institutions since they provided 63.6% of the total while private sector support reached only 36.4%.
- Indian research institutions and industries perform operations independently from each other which diminishes innovation possibilities and interdisciplinary collaborations.
- The successful link between Stanford University and Silicon Valley development highlights a missing pattern in Indian industry-academia connections.

Lack of Diversification:

- The research and development (R&D) priorities in India primarily concentrate on defense and scientific space applications while completely disregarding industrial production science.
- Example: Prioritization of missile technology (Agni, BrahMos) over semiconductor advancements.
- The majority of Indian companies choose to bring in foreign technology solutions although startup companies primarily work on IT and e-commerce solutions instead of pursuing deep-tech innovation.
- The research outputs from DRDO, ISRO and BARC become incapable of appearing as commercialized products because of bureaucratic procedures.

India's Initiatives Related to R&D

- Vigyan Dhara Scheme
- Rashtriya Vigyan Puraskar (RVP)
- Science, Technology, and Innovation Policy 2020
- VAIBHAV Fellowship
- Reforms to Strengthen India's R&D Ecosystem

Increased R&D Investment:

- India needs to increase research and development spending during the forthcoming decade by obtaining essential financial support from the private sector.
- The Anusandhan National Research Foundation (ANRF) must serve as a mechanism for stimulating private sector and philanthropic donations toward research programs.
- The government should speed up the process of distributing the Rs 1 lakh crore innovation fund released in the Union Budget 2025–26 over the next 3–5 years to enhance deep-tech research and development.

Efficient Project Management:

- The ANRF should use the US Defense Advanced Research Projects Agency (DARPA) model to establish an efficient program management system combined with transparent funding along with a CEO-led operational structure.

Encouraging Risk-Taking:

- Research at its initial stage nearly always includes open-ended exploratory work that produces long-term outcomes rather than instant findings.
- The government should track project development initiatives but maintain flexibility to accept reasonable risks.

Conclusion

India's economic future hinges on robust R&D investment, industry-academia collaboration, and policy reforms. India will achieve global science and technology leadership position by dedicating increased financial support to research alongside university innovation development and open-minded risk management. The country's position as a significant force in the world innovation market will be permanently secured through this economic expansion combined with technological independence.