Global Innovation Index 2025

For Prelims: World Intellectual Property Organization, Global Innovation Index, Intellectual Property, Fund of Funds for Startups, National Semiconductor Mission, IndiaAI Mission, Atal Tinkering Labs.

For Mains: Performance of India in Global Innovation Index 2025, challenges associated with India's innovation ecosystem and ways to address them.

Source: ET

Why in News?

India has climbed to the **38th position** among **139 economies** in the **World Intellectual Property Organization's (WIPO) Global Innovation Index (GII) 2025**, improving from **48th place** in **2020**.

Global Innovation Index

- The **Global Innovation Index (GII)**, introduced in **2007**, was developed to provide **comprehensive metrics and methodologies** for assessing the wide spectrum of **innovations across economies**.
- Published annually by the **World Intellectual Property Organization (WIPO)**, the GII has become a **key benchmark** for evaluating an economy's **innovation ecosystem**.
- Recognized by the **UN General Assembly** as an **authoritative reference** for shaping **Science, Technology, and Innovation (STI) policies**.

What are the Key Highlights of the GII 2025?

- **India Related Findings:** India rose from **81st (2015) to 38th (2025)**, ranking **1st** among lower-middle-income economies and in **Central & Southern Asia**.
    - Its strengths are **Knowledge & Technology Outputs (22)** and **Market Sophistication (38)**; weaknesses lie in **Business Sophistication (64)**, **Infrastructure (61)**, and **Institutions (58)**.
- **Top-Ranked Economies:** The **top five** most innovative economies are **Switzerland (1st), Sweden (2nd), USA (3rd), South Korea (4th), and Singapore (5th)**. **China** ranked in the **top 10** for the first time, securing the **10th position**.
- **Top Innovation Clusters:** The world's top **innovation clusters** are **Shenzhen–Hong Kong–Guangzhou (1st)** in China and Hong Kong, and **Tokyo–Yokohama (2nd)** in Japan.
- **Positive Socioeconomic Impact: Labor productivity** rose **2.5%** in 2024, **global life expectancy** reached **73 years**, and **extreme poverty** fell to **817 million**, under half of 2004 levels.

- **Rapid Technological Advancement:** In 2024, **technology advanced** with notable gains in **supercomputing efficiency** and **battery prices**. However, **adoption slowed**, progress in **wind power** and **genome sequencing** lagged, and **novel drug development** regressed.

What is the Current Status of India's Innovation Landscape?

- **Funding Mechanism:** As per the latest available R&D statistics, India invested **0.65% of GDP** in R&D, compared to **China (2.43%)**, **Brazil (1.15%)**, and **South Korea (2.5%)**.
- **Patent Filings:** India now ranks **6th globally** in terms of **patent applications**. Meanwhile, India's **patent-to-GDP ratio**—a measure of the economic impact of patent activity—grew significantly, from **144 in 2013 to 381 in 2023**.
- **Strategic Policy Support:** Programs like **Startup India**, **Make in India**, and **Production Linked Initiative (PLI) scheme** offer foundational support.
    - The **Fund of Funds for Startups (FFS)** has a **Rs 10,000 crore corpus**, and the new **one lakh crore Research, Development, and Innovation (RDI) scheme** seeks to boost **private sector R&D**.
    - The **Startup India Hub** links more than **1,140 incubators and accelerators**. In **2023**, the **Startup India Seed Fund Scheme** provided **Rs 945 crore** for **seed funding**.
- **DeepTech Push:** Significant investments focus on strategic sectors, with the **National Semiconductor Mission** backed by **Rs 76,000 crore**, alongside the **IndiaAI Mission** and **PLI for quantum technologies** to enhance **self-reliance.**
- **Rise of Unicorns & Cleantech:** India has over **100 unicorns**, the **3rd-largest ecosystem globally**. The **private sector** leads in **Cleantech**, with startups like **Ather Energy** and **Ola Electric**.
- **Geographical Diversification:** Initiatives like **Atal Tinkering Labs (ATLs)** are decentralizing innovation, with over **45% of DPIIT-recognized startups** emerging from **tier-2 and tier-3 cities**.

What are the Barriers to India's Innovation Ecosystem?

- **Inadequate Financial Investment:** India's **gross expenditure on R&D (GERD)** remains **~0.7% of GDP**, far below leading innovative nations like the United **States (3.5%)**, **South Korea (4.9%)**, and **Israel (5.6%)**, highlighting a critical **funding gap**.
- **Dominance of Public Sector in R&D Funding:** India's **innovation ecosystem** is largely **publicly funded**, with the **private sector contributing only 36.4%** (2020–21), unlike advanced economies where **industry leads R&D investment**.
    - Additionally, a **disconnect between academic research and industry needs** limits **interdisciplinary collaboration** and **commercialization of research**.
- **Skewed Focus Towards Strategic Sectors:** Historical R&D focus on **defense** and **space technology** (e.g., **Agni missile systems, space missions**) has led to under-investment in **industrial R&D** for **emerging areas** like **semiconductors, advanced materials, pharmaceuticals**.
- **Risk-Averse Industrial Culture:** Industries prefer **importing proven technologies** over **high-risk, long-gestation indigenous R&D**; startups focus on **business model innovations** in **IT services and e-commerce** rather than **foundational deep-tech research**.
- **Bureaucratic Hurdles:** Despite achievements by **DRDO**, **ISRO**, **BARC** **laboratories**, **technology transfer** to the market is impeded by **procedural delays, intellectual property challenges**, and lack of **streamlined processes.**

What Reforms are Needed to Strengthen India's Innovation Ecosystem?

- **Boost R&D Investment:** India should **boost R&D spending** over the next decade, increase **private and philanthropic contributions**, and fully deploy the **Rs 1 lakh crore innovation fund (Union Budget 2025–26)** within 3–5 years to accelerate **deep-tech research**.
- **Promote University-Led Research: Higher Education Institutions (HEIs)** can

drive **upstream research** to expand knowledge frontiers and **help industry commercialize mature technologies**.

- **Establish Public-Private Innovation Hubs:** India should establish **sector-specific innovation hubs** in **AI, semiconductors, and clean energy**, linking **government, academia, and industry**, and providing **shared resources** like **testing facilities, prototype labs, and venture funds.**
- **Facilitate Cross-Sector Collaboration: Sector-specific industry councils can guide policy, pinpoint funding gaps, and channel resources to critical innovation sectors. For instance, a CleanTech Council could prioritize solar, EVs, and energy efficiency.**
- Regional Innovation Clusters: Regional innovation clusters in non-metro areas can leverage local government and private resources to foster entrepreneurship and innovation, supporting rural agri-tech and social enterprises with funding, mentorship, and infrastructure.

Conclusion

India's **innovation ecosystem** has advanced significantly, reaching **38th in GII 2025** and topping **lower-middle-income economies**. While strategic policies have driven this rise, challenges remain in **R&D funding, industry-academia collaboration**, and **private sector investment**. Sustaining growth will require increasing **GERD**, promoting **deep-tech**, and building **synergistic ecosystems** to evolve from a **startup hub** into a **global innovation leader**.

Drishti Mains Question:

Q. Critically evaluate the barriers in India's innovation ecosystem and suggest reforms to enhance deep-tech research and commercialization.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims

Q. Which of the following statements is/are correct regarding National Innovation Foundation-India (NIF)? (2015)

1. NIF is an autonomous body of the Department of Science and Technology under the Central Government.
2. NIF is an initiative to strengthen the highly advanced scientific research in India's premier scientific institutions in collaboration with highly advanced foreign scientific institutions.Select the correct answer using the code given below:

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans: (a)

Mains

Q. Scientific research in Indian universities is declining, because a career in science is not as attractive as are business professions, engineering or administration, and the universities are becoming consumer-oriented. Critically comment. (2014)

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