



India's Innovation Surge: Climbing the Global Ladder

This editorial is based on “[Building the ecosystem for product innovation](#)” which was published in Hindustan Times on 10/10/2024. The article brings into picture India's impressive rise in innovation, highlighting key drivers like government initiatives, digital adoption, and a thriving startup ecosystem. However, it also addresses critical challenges, particularly the gap between patent generation and commercialization, and the need for stronger academia-industry collaboration to sustain this momentum globally.

For Prelims: [India's innovation landscape](#), [Global Innovation Index](#), [Anusandhan National Research Fund](#), [Digital India](#), [Startup India](#), [National Education Policy 2020](#), [Economic Survey 2023-24](#), [Prime Minister's Science, Technology, and Innovation Advisory Council](#), [Fund of Funds for Startups](#).

For Mains: Key Growth Drivers of India's Innovation Ecosystem, Key Issues Hindering the Growth of Innovation Ecosystem in India.

[India's innovation landscape](#) has been on a remarkable upward trajectory, as evidenced by its climb from **81st to 40th position in the [Global Innovation Index](#) between 2015 and 2022**. This progress is fueled by increased investment in research and development, a flourishing startup culture, and the widespread adoption of digital technologies. Government initiatives like Digital India, Startup India, and the recently announced [Anusandhan National Research Fund](#) with a budget of **₹1 lakh crore** are laying a robust foundation for innovation. Key sectors such as **information technology, [biotechnology](#), and [renewable energy](#)** are spearheading this transformation, positioning India as a potential global leader in innovation.

However, significant challenges persist that hinder India's full innovation potential. Despite a surge in patent registrations, with over **one lakh patents granted in 2023**, **the journey from patent publication to commercialization remains arduous**. This results in many innovations failing to make a tangible market impact. Addressing these challenges, particularly by **bridging the gap between research institutions and industry**, and fostering closer ties between academia and the private sector, will be crucial for India to fully harness its innovation capabilities and compete on the global stage.

What are the Key Growth Drivers of India's Innovation Ecosystem?

- **Government Initiatives and Policy Support:** The Indian government's proactive approach has been a significant driver for innovation.
 - Flagship programs like '[Digital India](#)' and '[Startup India](#)' have created a conducive environment for tech innovation and entrepreneurship.
 - The recent announcement of the **Anusandhan National Research Fund, with a substantial budget of ₹1 lakh crore**, demonstrates the government's commitment to fostering research and innovation.

- This fund aims to support basic research, prototype development, and encourage private sector participation in commercial research.
- **Thriving Startup Ecosystem:** India's startup ecosystem has become a powerhouse of innovation, attracting global attention and investments.
 - The number of technology startups in India surged from **around 2,000 in 2014 to approximately 31,000 in 2023**.
 - Indian tech startups raised **USD 4.1 billion** in H1 2024, **4% higher than H2 2023**, remaining fourth-highest funded country globally.
 - As of 3rd October 2023, India is home to **111 unicorns** with a total valuation of **USD 349.67 billion**.
 - Sectors like **fintech, edtech, and healthtech** are at the forefront, with companies like **CRED and PharmEasy** revolutionizing their respective industries.
 - The success of these startups is not only driving innovation but also **creating a ripple effect**, inspiring more entrepreneurs and attracting talent to the innovation sector.
- **Academia-Industry Collaboration:** While still evolving, the collaboration between academia and industry is emerging as a crucial driver of innovation.
 - The establishment of **research parks at IITs** and the setting up of industry-sponsored labs are bridging the gap between academic research and commercial application.
 - With 240 startups valued at Rs 10,500 crore incubated over 8 years, **IIT Madras is India's hi-tech haven**.
 - The government's push for industry-relevant curricula through the **National Education Policy 2020** is expected to further strengthen this collaboration.
- **Geographical Diversification of Innovation Hubs:** While Bangalore remains India's Silicon Valley, there's a notable rise of innovation clusters across tier-2 and tier-3 cities.
 - Cities like **Indore, Jaipur, and Kochi** are emerging as new hotspots for startups and R&D centers.
 - The **Kerala Startup Mission**, for instance, has nurtured over **4,000 startups** since its inception.
 - **Economic Survey 2023-24** stated that over 45% of the start-ups emerged out of Tier 2 and Tier 3 cities.
 - This geographical diversification is democratizing innovation, tapping into diverse talent pools, and addressing region-specific challenges.
- **Frugal Innovation and Reverse Innovation:** India's unique market conditions are fostering a culture of frugal innovation, creating high-quality, low-cost solutions that are increasingly finding global applications.
 - This '**Jugaad**' innovation approach is now being systematized and scaled. For instance, **Bengaluru-based Biocon's 'ALZUMAb' for Covid-19 treatment**, developed at a fraction of the cost of similar drugs, exemplifies this trend.
 - The success of such innovations is attracting global attention, with multinational companies like GE and Siemens setting up R&D centers in India to develop products for global markets.

What are the Key Issues Hindering the Growth of Innovation Ecosystems in India?

- **Underutilization and Commercialization of Patents:** Despite a significant increase in patent filings, with **over 100,000 patents granted in 2023**, the commercialization of these patents remains a major challenge.
 - According to the Fraunhofer Institute report, India's IPR payments tripled from **USD 4.8 billion in 2014 to USD 14.3 billion in 2024**, while IPR receipts only doubled from USD 0.7 billion to USD 1.5 billion.
 - So while India recovered **14% in receipts** (compared to payments) in 2014, it could only manage to recover **11% in 2023**.
 - This indicates a substantial **gap between patent generation and monetization**.
 - The Patent Box regime, introduced in 2016 to offer tax incentives, has had limited impact, with **only a small fraction of companies utilizing this benefit**.
 - This underutilization **not only represents missed economic opportunities** but also indicates a disconnect between research outputs and market needs, hindering the translation of innovations into commercial products.

- **Inadequate R&D Spending:** India's R&D expenditure as a percentage of GDP stands at a mere **0.65%**, significantly lower than countries like **South Korea (4.8%)** and **China (2.4%)**.
 - This underinvestment is particularly acute in the private sector.
 - The **Private sector's contribution to R&D in India is at 36.4%** of the country's gross expenditure on R&D (GERD), whereas **China and the US have contributions of 77% and 75%, respectively.**, compared to **70-80% in developed economies**.
 - This lack of investment hampers the development of cutting-edge technologies and limits India's global competitiveness.
- **Weak Academia-Industry Linkages:** The collaboration between academic institutions and industry in India remains suboptimal, hindering the flow of knowledge and innovation.
 - This disconnect is evident in the **low number of industry-sponsored research projects in universities** and the limited commercial application of academic research.
 - The lack of **industry-relevant curricula** and limited faculty involvement in industrial projects further exacerbate this issue.
 - While initiatives like the [**Prime Minister's Science, Technology, and Innovation Advisory Council \(PM-STIAC\)**](#) aim to bridge this gap, tangible results are yet to be seen on a large scale.
- **Skill Gap and Talent Retention:** Despite having a large youth population, India faces a significant skill gap in emerging technologies.
 - As technology evolves and adoption increases multifold, the [**World Economic Forum predicts that 50% of all employees**](#) will need **reskilling by 2025** to stay relevant.
 - This skills mismatch is particularly acute in areas like **AI, data science, and IoT**. Additionally, brain drain continues to be a challenge.
 - While initiatives like Skill India and the New Education Policy 2020 aim to address these issues, their impact is yet to fully materialize.
 - The **skill gap not only hampers innovation but also affects India's ability to leverage its demographic dividend** effectively.
- **Limited Access to Risk Capital:** While India's startup ecosystem has seen significant growth, access to risk capital, especially for deep-tech and hardware startups, remains a challenge.
 - For instance, according to the report for the year **2023**, funding for Indian deeptech startups **decreased by 77%**.
 - The lack of domestic venture capital and limited participation of institutional investors in early-stage funding further compound this issue.
 - While government initiatives like the [**Fund of Funds for Startups**](#) have provided some support, the scale of funding available for **high-risk, high-impact innovations** remains inadequate compared to global innovation hubs.
- **Regulatory Hurdles and Ease of Doing Business:** Despite improvements in India's ease of doing business ranking, **regulatory complexities continue to hinder innovation, especially in emerging technology areas**.
 - For instance, the **drone industry faced significant hurdles until the liberalization of drone rules in 2021**.
 - Similarly, the cryptocurrency and blockchain sector operates in a **regulatory grey area**, hampering innovation in fintech.
 - The time and cost involved in regulatory compliance divert resources from core R&D activities.

What are the Measures can be Adopted to Enhance the Growth of Innovation Ecosystem in India?

- **Strengthening Patent Commercialization:** To address the underutilization of patents, India should establish a **robust patent commercialization framework**.
 - This could involve creating a national patent marketplace, similar to **Denmark's IP Marketplace**, which has facilitated many technology transfers since its inception.
 - Implementing a system of innovation vouchers, like the **UK's Innovation Vouchers scheme**, could encourage SMEs to collaborate with research institutions for patent commercialization.
 - Additionally, expanding the scope of the **Patent Box regime to include a wider range of IP-derived income** and offering higher tax concessions for the first few years of

commercialization could incentivize patent utilization.

- **Boosting R&D Expenditure:** To elevate R&D spending, India should implement a multi-pronged approach.
 - Introducing a **weighted tax deduction of 200-250% for R&D expenditure** in priority sectors like **clean energy, biotechnology, and advanced manufacturing** could stimulate private sector investment.
 - Establishing sector-specific R&D funds, co-funded by the government and industry, **similar to Israel's MAGNET program** could drive collaborative research.
 - The government should aim to increase public R&D spending, with a clear roadmap for reaching the 2% target.
 - Implementing a **national R&D credit scheme**, modeled on the **US R&D Tax Credit**, could further incentivize corporate R&D spending.
- **Fostering Academia-Industry Collaboration:** To bridge the academia-industry gap, India should mandate that all centrally-funded educational institutions allocate a significant amount of their budget for industry-collaborative projects.
 - Implementing a national **"Professors of Practice" program**, bringing industry experts into academia, could enhance practical learning.
 - Establishing **Innovation and Entrepreneurship Development Centres (IEDCs)** in all higher education institutions, similar to the **Kerala Startup Mission's model which has set up over 300 IEDCs**, could foster an innovation culture.
 - Additionally, introducing a policy requiring **publicly-funded research** to have at least one industry partner could ensure research relevance and applicability.
- **Addressing the Skill Gap:** To tackle the skill gap, India should launch a separate **National Digital Skills Mission under Skill India**, aiming to upskill professionals in emerging technologies.
 - This could be modeled on **Singapore's SkillsFuture initiative**.
 - Implementing an **AI-driven national skills forecasting system**, similar to the **EU Skills Panorama**, could help align education with industry needs.
 - Establishing **Centers of Excellence** in emerging technologies across all states, in partnership with leading tech companies, could provide cutting-edge training.
 - To address brain drain, India could introduce a **"Reverse Brain Drain" scheme**, offering attractive packages to bring back talented researchers and innovators from abroad.
- **Enhancing Access to Risk Capital:** To improve access to risk capital, India should establish a **Deep Tech Fund of Funds**, to catalyze investment in frontier technologies.
 - Implementing a program similar to **Israel's Yozma initiative**, which transformed Israel's venture capital industry, could attract global VC firms to India.
 - Introducing a **"Startup Stock Exchange"** for easier public listing of innovative startups, could provide an alternative fundraising avenue.
 - Creating sector-specific innovation funds, **co-invested by the government and industry leaders**, could target strategic areas like quantum computing, advanced materials, and biotech.
- **Streamlining Regulatory Processes:** To address regulatory hurdles, India should implement a **"Regulatory Sandbox"** approach across all sectors.
 - Introducing a **"One Nation, One Permit" system for startups**, allowing them to operate across states with a single license, could ease compliance burdens.
 - Implementing an AI-powered regulatory compliance assistant for startups, could simplify the regulatory navigation process.
 - Additionally, mandating that all new regulations undergo an **"Innovation Impact Assessment"** to ensure they don't inadvertently hinder innovation could create a more supportive regulatory environment.

Conclusion

India's innovation landscape has made remarkable strides, driven by **proactive government initiatives**, a thriving startup ecosystem, and growing academia-industry collaborations. By addressing these issues through **targeted reforms, stronger partnerships, and enhanced skill development**, India can solidify its position as a global innovation leader. The path forward requires a holistic approach that aligns market needs with cutting-edge research and entrepreneurship.

Drishti Mains Question:

India has made significant strides in fostering an innovation-driven economy, yet several challenges hinder its full potential. Discuss the key drivers behind India's innovation growth and the critical roadblocks to translating research into commercial success.

UPSC Previous Year Question (PYQ)

Q. What does venture capital mean? (2014)

- (a)** A short-term capital provided to industries
- (b)** A long-term start-up capital provided to new entrepreneurs
- (c)** Funds provided to industries at times of incurring losses
- (d)** Funds provided for replacement and renovation of industries

Ans: (b)

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