



## 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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