Innovation Ecosystem in Life Sciences: Global vs India

Curated by

FABA
FEDERATION OF ASIAN BIOTECH ASSOCIATIONS

Launched at Pune-Mumbai Life Science Innovation Cluster Meet, 23rd August 2025

in association with

D Y PATIL
INTERNATIONAL
UNIVERSITY
AKURDI PUNE

Contents

About the Authors:

Miss. Snikitha Siddavatam, Management Trainee, FABA

Linkedin:

https://www.linkedin.com/in/snikitha-siddavatam-88094421a/

Miss. Divya Telidevara, Manager, FABA

Linkedin: https://www.linkedin.com/in/divyatelidevara/

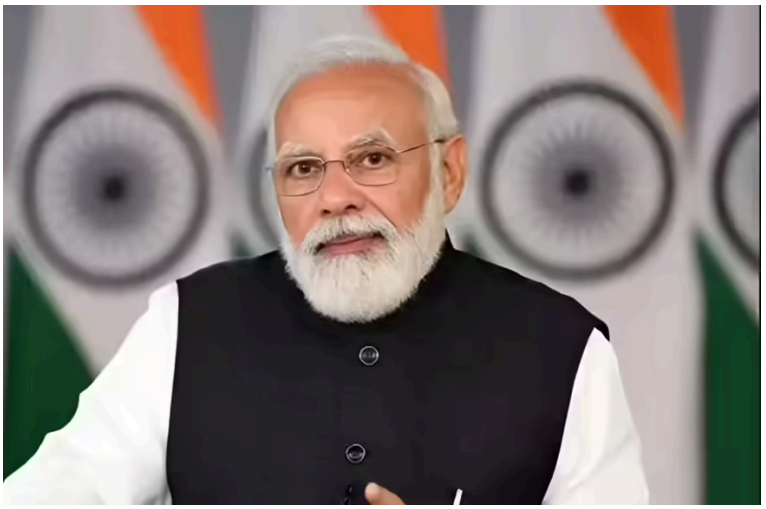
Dr Jagadeesh Gandla, Chief Operating Officer, FABA

Linkedin: https://www.linkedin.com/in/jgandla/

Preface

The global pharmaceutical and biopharmaceutical industries stand at the forefront of scientific and technological progress, increasingly recognized as strategic sectors vital to the health, economic stability, and innovation capacity of nations. Over the past two decades, the convergence of biotechnology, artificial intelligence, genomics, and precision medicine has revolutionized the discovery, development, and delivery of therapies. As healthcare systems evolve to meet the complex challenges of aging populations, emerging diseases, and personalized care, the innovation ecosystem surrounding pharma and biopharma plays a pivotal role in shaping the future of global health.

On similar lines, in a recent speech (16th August 2025), India's honourable Prime Minister Narendra Modi has called for a renewed focus on **research and development** within India's pharmaceutical sector. He urged scientists and industry leaders to move beyond producing generic medicines and to innovate by developing and patenting new drugs. He asked the Indian Pharma industry to move:



Honourable Prime Minister Narendra Modi

- **From "Pharmacy of the World to Innovator":** While acknowledging India's crucial role in supplying affordable generic drugs and vaccines globally, PM Modi emphasized the need for

the country to become a leader in pharmaceutical innovation. He encouraged the development of new, patented medicines to address global health challenges.

- **Focus on Affordability and Efficacy:** The Prime Minister stressed the importance of creating the "cheapest and most effective medicines." He highlighted the goal of developing treatments with minimal side effects that can be relied upon during health crises.
- **Addressing Lifestyle Diseases:** PM Modi also touched upon the growing problem of obesity, warning that it is a significant health concern.

To address the above points, this report, titled “Global vs Indian Innovation Ecosystem in Pharma & Biopharma Sectors,” seeks to provide a comprehensive, comparative analysis of India’s positioning within the global biopharmaceutical landscape. With a focus on research infrastructure, academic contributions, industry dynamics, funding ecosystems, regulatory environments, and talent development, this document maps the trajectories of leading biopharma hubs, particularly those in the United States and Europe. It contrasts them with the emerging innovation frameworks in India.

Globally, regions such as Boston-Cambridge in Massachusetts, the San Francisco Bay Area, Basel in Switzerland, and Cambridge in the United Kingdom have become renowned for their contributions to pharmaceutical innovation. These hubs are not only home to some of the world's most prestigious universities and research institutions but also to high concentrations of biotech startups, venture capital activity, and multinational pharmaceutical giants. Their ecosystems are characterized by well-oiled pipelines that transfer academic research into commercial applications, driven by robust intellectual property regimes, dedicated technology transfer offices, and a culture that rewards entrepreneurship and interdisciplinary collaboration.

Academic institutions in these hubs are not isolated islands of knowledge; rather, they function as central engines of their regional innovation ecosystems. With strong support from government research funding, philanthropic endowments, and industry partnerships, they fuel a continuous cycle of discovery, innovation, and commercialization. They have also institutionalized mechanisms that

support spinouts, such as incubators, translational research centers, and biotech accelerators. These models have provided the blueprint for innovation-driven development in the life sciences, making them valuable case studies for countries like India aspiring to replicate similar success.

In contrast, India’s pharmaceutical sector has traditionally focused on volume-led growth, becoming the world's third-largest producer of medicines by volume and a critical supplier of affordable generics to both developing and developed nations. However, while India's manufacturing strength and regulatory compliance capacity are well acknowledged, its innovation ecosystem is still maturing. Challenges such as underinvestment in R&D, limited early-stage venture capital for biotech, underdeveloped technology transfer mechanisms, and a shortage of interdisciplinary talent have historically constrained the emergence of a robust innovation pipeline.

That said, there is growing momentum for change. The Indian government has launched several initiatives, including the Biotechnology Industry Research Assistance Council (BIRAC), the National Biopharma Mission, and the Production Linked Incentive (PLI) Scheme, to incentivize innovation, support startups, and build capacity in biopharmaceutical research. Institutions such as the Indian Institute of Science (IISc), the Indian Institutes of Technology (IITs), and National Institutes of Pharmaceutical Education and Research (NIPERs) are increasingly engaging in cutting-edge biosciences research and collaborative ventures with industry. Incubators and innovation hubs like C-CAMP, IKP Knowledge Park, and FITT are enabling biotech startups to access lab space, mentorship, and early funding.

The purpose of this report is not only to highlight the gaps that exist in India's current ecosystem but also to identify areas of opportunity and models of excellence that can be adapted from global success stories. By benchmarking India’s progress against international best practices and drawing insights from high-performing ecosystems, this document aims to inform policy, guide institutional strategy, and inspire collective action among stakeholders across academia, industry, and government.

This report is by the Federation of Asian Biotech Associations (FABA), a non-profit organization and key platform uniting academia, industry, and policy leaders beyond Asia to advance biotechnology innovation. FABA's commitment to fostering regional collaboration and nurturing talent has positioned it as a vital stakeholder in shaping Asia's biopharma narrative. Through its various programs, conferences, and advisory roles, FABA has consistently advocated for policies and partnerships that strengthen the research-to-market pipeline, encourage global knowledge exchange, and empower emerging biotech ecosystems such as India. The insights offered in this report are aligned with FABA's broader mission of catalyzing innovation and promoting Asia as a global biotechnology hub.

With its unique demographic advantages, rapidly expanding talent pool, and growing digital health infrastructure, India is well-positioned to leapfrog into the next phase of pharmaceutical innovation. However, realizing this vision will require sustained investment, structural reforms, and the fostering of a culture that values risk-taking, collaboration, and scientific inquiry. Through this report, we aim to contribute to that journey by presenting an evidence-based narrative that combines rigorous analysis with actionable insights.

This report, hopefully, serves as a useful resource for decision-makers, researchers, entrepreneurs, investors, and students alike, sparking dialogue, encouraging innovation, and ultimately contributing to a more dynamic, inclusive, and globally competitive biopharmaceutical innovation ecosystem in India.

Prof. Reddanna Pallu,

Executive President, FABA

Linkedin: https://www.linkedin.com/in/reddanna-pallu-76762b18/

Global Innovation Hubs

Global innovation hubs are regions or cities that have emerged as leading centers of research, entrepreneurship, and technology-driven economic development. These ecosystems bring together academia, industry, government, and investors to foster the growth of groundbreaking ideas and technologies.

United States

Boston-Cambridge (Massachusetts):

This region is widely regarded as the global capital of biotechnology. The presence of prestigious institutions such as Harvard University, the Massachusetts Institute of Technology (MIT), and the Broad Institute has created a thriving ecosystem where basic research seamlessly transitions into clinical applications. The area is home to more than 1,000 biotech companies and startups, bolstered by proximity to teaching hospitals and a robust investor community. Facilities like LabCentral provide co-working lab spaces for early-stage companies, while events like the BIO International Convention further connect innovators with global stakeholders.

San Francisco Bay Area (California):

With institutions like Stanford University, the University of California, Berkeley, and UCSF, this region combines academic strength with entrepreneurial energy. It is the birthplace of Genentech, one of the pioneers of modern biotechnology, and continues to be a magnet for venture capital funding. The Bay Area benefits from its culture of innovation, with strong connections between tech and life sciences, enabling the development of digital therapeutics, bioinformatics, and synthetic biology applications. The region's incubators, accelerators, and strong legal/IP infrastructure support sustained innovation.

San Diego (California):

San Diego has emerged as a leader in biomedical sciences, particularly in areas such as regenerative medicine, oncology, and genomics. UC San Diego, Scripps Research, and the Sanford Burnham Prebys Medical Discovery Institute contribute significantly to academic research output. The city also hosts the JLABS innovation hub and the BIOCOM association, which represents over 1,000 life science companies. San Diego's proximity to the Mexican border also supports cost-effective clinical research and cross-border collaborations.

Research Triangle Park (North Carolina):

This cluster includes leading institutions such as Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University. Research Triangle Park (RTP) is one of the largest research parks in the world, housing both large pharma companies and innovative CROs like IQVIA and Syneos Health. RTP benefits from a favorable business environment, strong academic research, and ample state support.

Europe

Basel (Switzerland):

As the headquarters for pharma giants like Roche and Novartis, Basel represents one of the most mature and innovation-centric pharma clusters in the world. The presence of world-class institutions such as ETH Zurich and the University of Basel ensures a steady flow of skilled researchers and academic-industry collaboration. Basel also offers regulatory predictability, strong IP protection, and seamless access to EU markets, making it highly attractive for global clinical trials and drug development.

Munich and Berlin (Germany):

Germany’s dual hubs provide unique innovation advantages. Munich is home to the Max Planck Institutes, the Technical University of Munich, and a well-developed network of biotech companies and accelerators. Berlin, on the other hand, is gaining recognition for its startup-friendly environment

and institutions like the Berlin Institute of Health. The government's support for biotech and Germany's global reputation for manufacturing excellence bolster these hubs further.

Cambridge and Oxford (United Kingdom):

These historic academic centers are now also major life science innovation hubs. With institutions such as the University of Cambridge and the University of Oxford, these cities have fostered numerous successful spinouts like Oxford Nanopore Technologies and contributed to global vaccine efforts (e.g., the Oxford–AstraZeneca COVID-19 vaccine). The UK's Catapult program, generous R&D tax credits, and access to the NHS for clinical validation further enhance these hubs' value.

Imperial College London, another cornerstone of the UK's research excellence, plays a pivotal role in advancing life science innovation. Known for its interdisciplinary approach and strong industry partnerships, Imperial has produced pioneering research in synthetic biology, genomics, and medical engineering. The college's White City Campus serves as a dedicated innovation district, housing biotech startups, corporate R&D teams, and incubators that benefit from proximity to cutting-edge laboratories and Imperial's expert faculty. Its focus on translating research into real-world applications, spanning drug discovery to advanced diagnostics, has made it a driving force in London's emergence as a global life sciences hub.

Leiden and Amsterdam (Netherlands):

The Netherlands offers a collaborative and open innovation ecosystem supported by institutions like the Leiden University Medical Center. It features startup-friendly regulation, government co-investment funds, and efficient clinical trial processes. Amsterdam, with its vibrant digital health community, complements Leiden's strengths, offering a balanced environment for both traditional and tech-driven biopharma ventures.

Indian Innovation Hubs

Hyderabad, Telangana:

Often referred to as the "Genome Valley of India," Hyderabad is a leading life sciences cluster, home to institutions such as the Centre for Cellular and Molecular Biology (CCMB), Indian Institute of Chemical Technology (IICT), Center for DNA Fingerprinting and Diagnostics (CDFD), National Institute of Animal Biotechnology (NIAB), National Institute of Nutrition (NIN), University of Hyderabad, Indian Institute of Technology (IITH), and Indian Institute of Information Technology (IIIT). The Genome Valley hosts over 200 life sciences companies, including Bharat Biotech, Biological E, and Indian Immunologicals. Hyderabad is also the Bulk Drug Capital with a strong presence of Pharma companies like Dr. Reddy's Laboratories, Aurobindo Pharma, Hetero Pharma, and Divis Laboratories. It is also supported by IKP Knowledge Park and BIRAC BioNEST incubators that drive translational research and biotech entrepreneurship.

Bengaluru, Karnataka:

Known as the biotech capital of India, Bengaluru hosts premier institutes like the Indian Institute of Science (IISc), National Centre for Biological Sciences (NCBS), and Institute for Stem Cell Science and Regenerative Medicine (inStem). It features a rich startup ecosystem supported by C-CAMP, which offers incubation, funding, and mentorship. Bengaluru has a strong presence of biotech companies led by Biocon, in addition to med-tech, bioinformatics, and diagnostics companies.

Mumbai-Pune Cluster:

Pune has emerged as a growing hub for clinical research, vaccines, and biomedical innovation. It is home to the Serum Institute of India, the world's largest vaccine manufacturer. Academic institutions like National Chemical Laboratory (NCL), National Center for Cell Science (NCCS), National Institute of Virology (NIV), Indian Institute of Scientific Education and Research (IISER), and Savitribai Phule Pune University work in tandem with biotech firms, supported by the MCCIA BioIncubator and Venture Center for early-stage innovation.

Mumbai serves as one of India's most prominent pharmaceutical and life sciences hubs, blending corporate strength with emerging biotech innovation. As the headquarters of Sun Pharmaceutical Industries, India's largest pharma company, Mumbai plays a central role in driving the country's generics and specialty medicines exports. The city hosts a dense cluster of pharmaceutical manufacturers, CROs, and formulation developers, supported by a strong financial services infrastructure and proximity to regulators like the Central Drugs Standard Control Organization (CDSCO). Mumbai is also home to academic institutions such as the Institute of Chemical Technology (ICT Mumbai), which has produced numerous industry leaders and continues to contribute to R&D in green chemistry, bioprocessing, and drug formulation. With its combination of legacy manufacturing expertise, global market access, and evolving research capacity, Mumbai is well-positioned to lead India's transition from generics to high-value pharmaceutical innovation.

Bhubaneshwar, Odisha:

Bhubaneswar, the capital of Odisha, is rapidly evolving into a life sciences and biotech innovation hub in Eastern India. Anchored by the Institute of Life Sciences (ILS), a DBT-autonomous research institute specializing in infectious diseases, cancer biology, and genomics, Bhubaneswar has become a focal point for translational science. The establishment of the Odisha Biotech Park in Andharua provides state-of-the-art wet labs, animal houses, and integrated infrastructure to support biotech R&D and startup incubation. In 2025, the Odisha state government approved a ₹1,113 crore, five-year "Development of Biotechnology" scheme, comprising 17 sub-programs focused on building R&D infrastructure, nurturing talent, and strengthening academia-industry linkages. Additionally, plans for a dedicated pharmaceutical manufacturing hub and the launch of the Odisha Pharmaceutical Development Cell (OPDC) indicate a strategic intent to attract private investment and streamline regulatory approvals. With biotech startups like Heredity Biosciences and a growing base of research-intensive institutions, Odisha is positioning itself as a promising biotech and pharmaceutical corridor in India's eastern region.

Bharat Biotech has established a state-of-the-art manufacturing facility in Bhubaneswar, Odisha, as part of its strategic expansion to enhance vaccine production capacity and bolster India's biopharmaceutical infrastructure. The facility is equipped with advanced technologies and automated systems designed to meet global regulatory standards, ensuring high-quality and scalable production of vaccines and other biologics. It plays a critical role in supporting the company's research, development, and manufacturing efforts, particularly in the areas of infectious diseases and public health emergencies. This initiative not only strengthens India's self-reliance in vaccine manufacturing but also contributes to regional economic growth by creating skilled employment opportunities and fostering biotech innovation in eastern India.

Ahmedabad and Gandhinagar, Gujarat:

This region is gaining recognition for biosimilar and pharmaceutical manufacturing, supported by institutions like the Gujarat Biotechnology Research Centre (GBRC) and the National Institute of Pharmaceutical Education and Research (NIPER-A). Zydus Cadila and Intas Pharmaceuticals are headquartered here, with several initiatives by the Gujarat Biotech Mission fostering innovation.

Delhi NCR:

The National Capital Region has clusters of innovation centered around institutions such as AIIMS, IIT Delhi, Regional Center for Biotechnology (RCB), Translational Health Science and Technology Institute (THSTI), and ICGEB. FITT (Foundation for Innovation and Technology Transfer) and regional BioNESTs promote startups and tech transfer. Gurugram and Noida are emerging med-tech and diagnostics hubs, with proximity to policymakers enabling regulatory advocacy.

Lucknow, Uttar Pradesh:

The Biotech Park in Lucknow, supported by the Department of Biotechnology (DBT), hosts startups in herbal drug discovery, agricultural biotechnology, and bio-pharma. Institutions such as the Central Drug Research Institute (CDRI) contribute significantly to pharmaceutical innovation in the region.

Key Gaps in the Indian Innovation Ecosystem

Despite notable progress, India still faces several structural and systemic gaps that must be addressed to build a globally competitive biopharma innovation ecosystem:

- **Low R&D Investment:** Indian pharmaceutical companies invest less than 0.5% of their revenues into research and development, significantly below the global benchmark of 15–20%.
- **Underdeveloped Technology Transfer Infrastructure:** Unlike global hubs with well-resourced and active tech transfer offices, Indian academic institutions often lack the mechanisms to commercialize research and protect intellectual property effectively.
- **Limited Early-Stage Venture Capital:** Most biotech startups in India rely on government grants. There is a shortage of risk-tolerant, domain-specific venture capital willing to fund early-stage high-risk biotech ventures.
- **Fragmented Academia-Industry Collaboration:** While improving, the collaboration between academia and industry is still limited in scale and frequency, leading to underutilization of academic research.
- **Regulatory Bottlenecks:** Approval timelines for clinical trials and innovations can be unpredictable and slow. Regulatory processes need to be more streamlined and aligned with international standards.
- **Skill Gaps:** There is a shortage of interdisciplinary talent equipped with both scientific and entrepreneurial skills. Areas such as regulatory science, IP management, and translational research require greater capacity building.
- **Infrastructure Gaps in Tier-2 and Tier-3 Cities:** Most innovation activity is concentrated in metros. Expanding incubators, biotech parks, and research infrastructure to emerging regions remains a challenge.

- **Lack of Global Integration:** Indian innovators often lack access to global networks, partnerships, and clinical trial ecosystems, limiting their market reach and collaborative potential.
- **Lack of Proactive Government Policies in Embracing Emerging Technologies:** The Government of India has imposed restrictions on the adoption of genetically modified (GM) crops, thereby limiting access to the potential benefits of genetic engineering and genome editing for both farmers and consumers. Similarly, regulatory barriers, often influenced by governmental agencies and non-governmental organizations, are hindering the progress of pre-clinical and clinical trials necessary for innovative drug development. Consequently, pharmaceutical companies are compelled to conduct pre-clinical studies, particularly those involving primates, in foreign countries.

These gaps represent both challenges and opportunities. With targeted investment, policy reforms, and stakeholder alignment, India can close these gaps and position itself as a global leader in biopharmaceutical innovation.

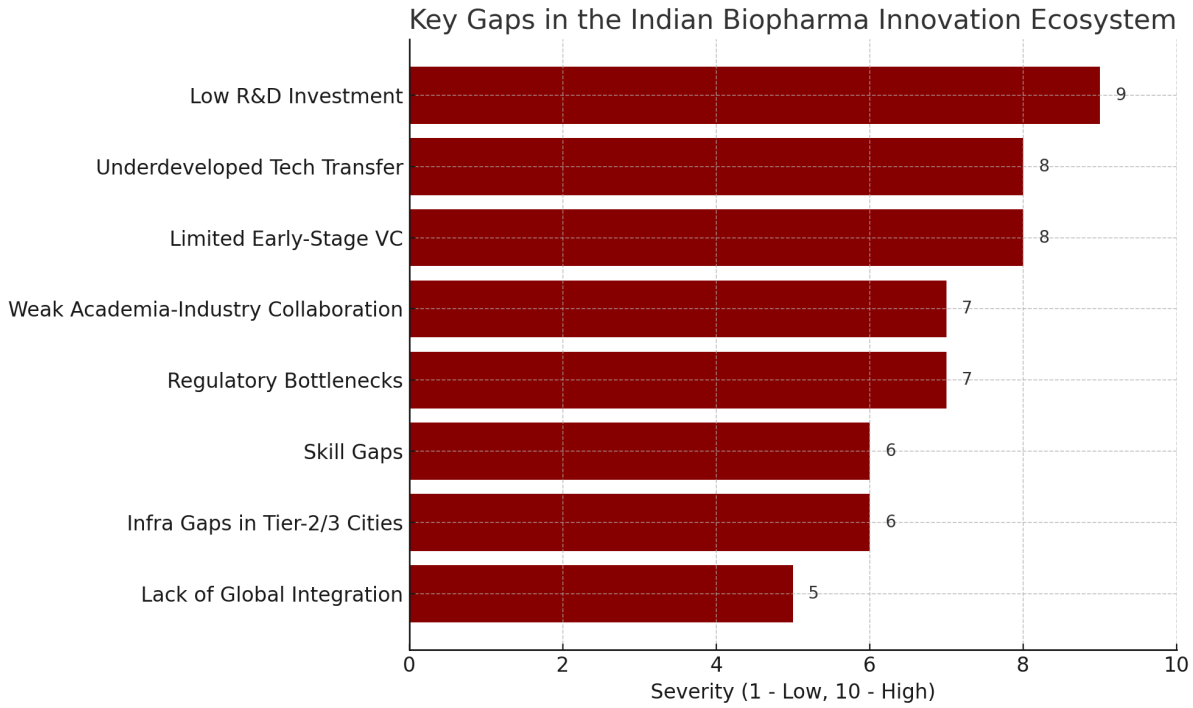


Figure 1

The above figure 1 visually represents the most pressing gaps in India's biopharma innovation landscape, assessed on a severity scale from 1 to 10. Topping the list are low R&D investment and limited access to early-stage venture capital, two foundational issues that inhibit risk-taking and long-term innovation. These are closely followed by underdeveloped technology transfer systems and weak academia-industry linkages, which hinder the commercialization of research. Regulatory bottlenecks, skill shortages, and infrastructure deficits in Tier-2 and Tier-3 cities further contribute to the innovation lag. Finally, India's limited integration with global research and clinical networks restricts the scalability and global relevance of its innovations. Addressing these areas through targeted reforms and cross-sector collaboration is essential to unlock India's full potential as a global biopharma innovator.

Global Innovation Index

The Global Innovation Index (GII), published annually by the World Intellectual Property Organization (WIPO), provides a comprehensive framework to assess the innovation performance of over 130 economies. It evaluates innovation across seven pillars divided into Input Sub-Index

(Institutions, Human Capital & Research, Infrastructure, Market Sophistication, and Business Sophistication) and Output Sub-Index (Knowledge & Technology Outputs and Creative Outputs). With over 80 indicators, the GII serves as a benchmarking tool for policymakers and stakeholders to design innovation-driven strategies.

In its 2024 edition, India ranked 39th globally out of 133 economies, making consistent progress over the past decade. It leads among lower-middle-income countries and tops the Central and Southern Asia region. Notably, India's Innovation Output rank (33rd) outpaces its Input rank (44th), indicating strong conversion of available resources into impactful innovation outcomes, a trend also reflected in India's growing biotech and health-tech sectors.

India performs particularly well in areas such as ICT services exports, venture capital received, and intangible asset creation. It also features four science & technology clusters, Bengaluru, Delhi, Mumbai, and Chennai, among the world's top 100 innovation clusters. These clusters benefit from dense networks of academic institutions, startups, and multinational companies engaged in R&D across pharmaceuticals, biotechnology, and medical devices.

Despite these strengths, India faces challenges in innovation infrastructure, institutional frameworks, and business sophistication, areas where it ranks significantly lower. Limited R&D expenditure, complex regulatory frameworks, and fragmented academia-industry linkages continue to hinder ecosystem maturation. These gaps are particularly relevant to the pharma and biopharma sectors, where the cost of innovation is high and timelines are long.

The GII insights are particularly valuable for shaping India's innovation trajectory in pharmaceuticals and life sciences. While output indicators are promising, sustained progress will require focused investment in research infrastructure, enhanced IP frameworks, more efficient regulatory systems, and stronger collaboration between public and private stakeholders. Addressing these foundational

elements can position India as not just a manufacturing leader but also a global innovation powerhouse in healthcare and biotechnology.

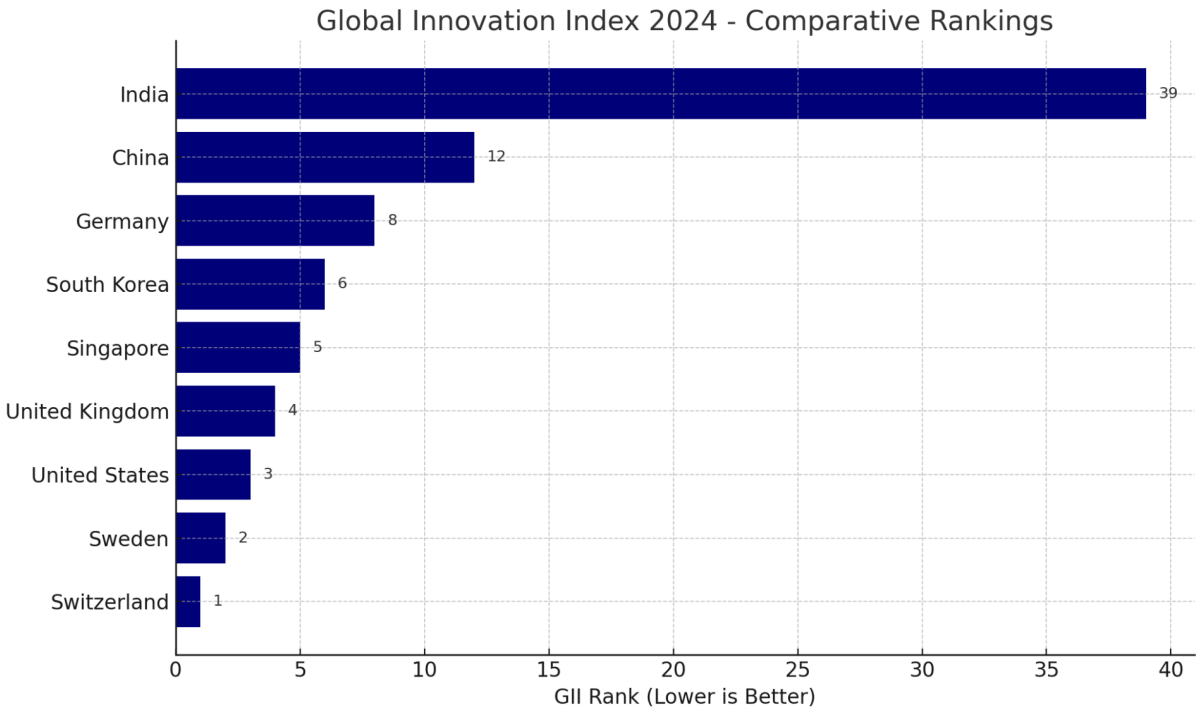


Figure 2: Global Innovation Index 2024 – Comparative Rankings

This chart illustrates the Global Innovation Index rankings for selected innovation-driven economies. India, ranked 39th globally, leads among lower-middle-income countries but still trails behind established innovation hubs such as Switzerland, Sweden, the United States, and China. The comparison highlights India's progress and the potential for further improvement in innovation inputs such as R&D investment, institutional capacity, and infrastructure.

AI in Drug Discovery

India is beginning to explore the transformative potential of Artificial Intelligence in drug discovery, with several startups and research labs applying machine learning to accelerate molecular screening, target identification, and drug repurposing. Companies like Qure.ai, Elucidata, and Insilico Medicine (operating in India) are leveraging bioinformatics and AI to reduce the time and cost associated with

early-stage R&D. Additionally, academic institutions such as the Indian Institute of Science (IISc) and Indian Institutes of Technology (IITs) are developing AI models for predictive toxicology and pharmacogenomics. However, to scale AI adoption across the pharmaceutical pipeline, India will need enhanced access to clean biomedical datasets, interdisciplinary talent, and incentives for AI-biotech collaboration.

Digital Health Platforms

India's healthcare landscape is undergoing a digital transformation, positioning it as a fertile ground for digital health platform innovation. With the rollout of the Ayushman Bharat Digital Mission (ABDM), the country is building an integrated digital health infrastructure to support electronic health records (EHR), telemedicine, and mobile diagnostics. Startups like Practo, 1mg, and HealthPlix are redefining access and delivery models through scalable SaaS tools and AI-powered platforms. These innovations are particularly impactful in rural and underserved areas where traditional healthcare access is limited. Continued public-private collaboration, data governance standards, and health tech sandbox environments will be essential to ensure quality, privacy, and interoperability in this growing ecosystem.

Gene and Cell Therapies

Although still in its infancy, India's engagement with gene and cell therapies is growing steadily through public and private sector initiatives. Institutions like the Institute for Stem Cell Science and Regenerative Medicine (inStem), Centre for Stem Cell Research (CSCR), AIIMS, and CSIR labs have begun exploratory work in CRISPR, CAR-T cell therapy, and regenerative medicine. The Drug Controller General of India (DCGI) has issued initial regulatory frameworks for advanced therapy medicinal products (ATMPs), a promising sign for future commercialization. However, challenges persist in clinical trial readiness, GMP-grade cell processing infrastructure, and trained regulatory scientists. With targeted investment and global collaborations, India can build domestic capacity and emerge as a cost-effective hub for gene and cell therapies in Asia.

The Way Forward

India's biopharmaceutical sector can shift from a generics-dominated model to a globally recognized, innovation-driven ecosystem. Achieving this transformation requires a **multi-pronged strategy** that integrates research investment, supportive policies, and ecosystem development.

1. **Boost R&D Investment**
    - Increase targeted public and private funding for high-potential areas such as novel biologics, next-generation vaccines, and digital therapeutics.
    - Create dedicated grant programs for translational research to move promising discoveries from the lab to clinical trials.
2. **Strengthen Technology Transfer Mechanisms**
    - Establish **Technology Transfer Offices (TTOs)** in universities and research institutes to manage intellectual property, facilitate licensing, and support spin-off creation.
    - Provide training for TTO staff in IP management, commercialization strategies, and industry outreach.

3. Integrating Basic Sciences into Clinical Medicine

- Integrating basic sciences with clinical settings in medical education aims to bridge the gap between theoretical knowledge and practical application, leading to a more holistic and effective approach to patient care.

This can be achieved by establishing Medical Colleges and Hospitals in Universities, IITs, IISERs, and National Institutes. Also, All India Institutes of Medical Sciences (AIIMS) should be strengthened with Basic Scientists, on par with clinicians.

3. **Enhance Academia–Industry Collaboration**
    - Introduce **shared IP ownership models** that balance incentives for both academia and industry partners.
    - Implement **grant-matching schemes** where government funding matches industry contributions for joint research projects.
4. **Develop Innovation Infrastructure**
    - Expand biotech incubators, accelerator programs, and shared R&D facilities equipped for biopharmaceutical development.
    - Support regulatory science initiatives to streamline clinical trial approvals while maintaining safety and efficacy standards.

By integrating these elements, India can position itself as a hub for biopharmaceutical innovation, attracting global partnerships, fostering domestic breakthroughs, and ultimately delivering cutting-edge healthcare solutions to both local and international markets.

Purpose of the Report

This report provides a comparative analysis of the **global vs. Indian innovation ecosystem** in the pharmaceutical and biopharmaceutical sectors. It benchmarks India's progress against leading global hubs such as Boston–Cambridge, Basel, and Cambridge–Oxford, highlighting India's strengths, structural gaps, and emerging opportunities. The document also outlines strategies for strengthening India's ecosystem through targeted investment, improved policy frameworks, and enhanced academia–industry collaboration.

Key Findings

1. **India's Strong Manufacturing Base, Weak R&D Investment**

    - India is the world's third-largest producer of medicines by volume, but domestic R&D spending is <0.5% of revenues compared to the global benchmark of 15–20%.
2. **Global Hubs Show Clear Models for Success**
    - Hubs like Boston, Basel, and Cambridge thrive due to strong academic–industry linkages, venture capital, and effective technology transfer mechanisms — areas where India lags.
3. **Emerging Innovation Potential in Indian Clusters**
    - Cities like Hyderabad, Bengaluru, and Mumbai–Pune are building strong research and startup ecosystems, with institutions like IISc, CCMB, and NCL driving translational science.
4. **Key Gaps Restrict Global Competitiveness**
    - Limited early-stage venture capital, fragmented academia–industry partnerships, regulatory bottlenecks, and a lack of skilled interdisciplinary talent slow India's innovation pipeline.

Actionable Messages

- **Boost R&D Investment**: Prioritize funding for biologics, vaccines, AI-driven drug discovery, and digital therapeutics.
- **Strengthen Technology Transfer**: Establish and professionalize TTOs at leading universities and research institutes.
- **Enhance Academia–Industry Collaboration**: Create grant-matching schemes and shared IP models to accelerate joint innovation.
- **Expand Innovation Infrastructure**: Scale incubators, biotech parks, and shared R&D facilities beyond metro cities.
- **Streamline Regulatory Processes**: Align approval timelines with international standards to accelerate clinical trials and innovation adoption.

By addressing these gaps with targeted reforms and cross-sector collaboration, **India can move from being a global generics leader to becoming a true biopharma innovation hub**, aligned with FABA's mission of promoting Asia as a biotechnology powerhouse.

FABA's Efforts in Promoting an Innovation Ecosystem in India

The Federation of Asian Biotech Associations (FABA) has been instrumental in building and strengthening the innovation ecosystem in the country's life sciences sector. By bringing together stakeholders from academia, industry, government, and the investment community, FABA catalyzes knowledge exchange and collaborative problem-solving. Its flagship events, such as the BioAsia conference, create a platform where innovators can showcase technologies, explore partnerships, and access global best practices. These initiatives not only raise the profile of local research but also attract international collaborations that expand market opportunities for Indian biotech enterprises.

FABA's programs go beyond networking, with a strong focus on capacity building and talent development. Through workshops, training sessions, and mentorship initiatives, it equips researchers, entrepreneurs, and students with the skills needed to translate scientific discoveries into viable products and services. By connecting innovators with regulatory experts, venture capitalists, and business strategists, FABA helps bridge the critical gap between laboratory research and commercial deployment. This hands-on approach has enabled many start-ups and research teams to navigate challenges related to funding, IP protection, and market access.

In addition, FABA actively advocates for policy reforms and supports a conducive R&D environment. It engages with government agencies to shape policies that encourage investment in biotechnology, streamline approval processes, and promote public–private partnerships. Its role in fostering cross-border cooperation with other Asian nations has helped integrate the Indian biotech ecosystem into broader regional and global networks. By sustaining these multi-pronged efforts, FABA has

significantly contributed to positioning the country as a competitive hub for life sciences innovation and entrepreneurship.

More details about FABA can be found at https://biofaba.org.in/

About D. Y. Patil International University (DYPIU), Akurdi

D. Y. Patil International University (DYPIU), located in Akurdi, Pune, is a prominent institution known for its strong focus on innovation, research, and industry collaboration. It provides a modern, interdisciplinary learning environment designed to foster creativity and prepare students for the challenges of the global workforce. With state-of-the-art infrastructure and a commitment to practical, hands-on education, DYPIU stands as a vibrant hub for higher learning and professional development in the region.

More details about DYPIU can be found at https://www.dypiu.ac.in/

References

"How Immune Cell and Gene Therapies Are Transforming Treatment in India." Biospectrumindia.com, 2023, www.biospectrumindia.com/views/17/26302/how-immune-cell-and-gene-therapies-are-transforming-treatment-in-india.html. Accessed 27 Jul. 2025.

Adam, Jules. "Genome Valley, Hyderabad: A Global Biopharma Scale-up Hub." Labiotech.eu, Labiotech UG, 18 July 2025, www.labiotech.eu/in-depth/genome-valley-india/. Accessed 27 Jul. 2025.

Johny, Alenjith K. "Startup Registrations Cross 1.8 Lakh Mark, as 22,000 New Entities Join in 2025." *Economictimes.com*, Economic Times, 25 July 2025, m.economictimes.com/tech/startups/startup-registrations-cross-1-8-lakh-mark-as-22000-new-entities-join-in-2025/amp_articleshow/122909872.cms. Accessed 27 Jul. 2025.

Dandekar, Vikas. "Homegrown Cell, Gene Therapy Pioneer ImmunoACT Turns Profitable in First Year of Ops." The Economic Times, Economic Times, 27 July 2025, economictimes.indiatimes.com/industry/healthcare/biotech/healthcare/cheaper-cancer-care-therapy-earns-big-bucks-for-pharma-company/articleshow/122939629.cms. Accessed 28 Jul. 2025.

Gautam Kumra. "Dilip Shanghvi on the Focus and Philosophy behind Sun Pharma's Success." McKinsey & Company, 21 July 2025, www.mckinsey.com/featured-insights/future-of-asia/dilip-shanghvi-on-the-focus-and-philosophy-behind-sun-pharmas-success. Accessed 1 Aug. 2025.

Kirtika Suneja. "India's Rank One Notch up on Global Innovation Index 2024." The Economic Times, Economic Times, 26 Sept. 2024, economictimes.indiatimes.com/news/india/indias-rank-one-notch-up-on-global-innovation-index-2024/articleshow/113710894.cms. Accessed 1 Aug. 2025.

https://www.wipo.int/edocs/gii-ranking/2024/in.pdf

Innovation Ecosystem in Life Sciences: Global vs India