

Low R&D spend at ~0.6-0.7% of GDP Hampers India's Manufacturing Growth



May 14, 2026 | Ratings

Synopsis

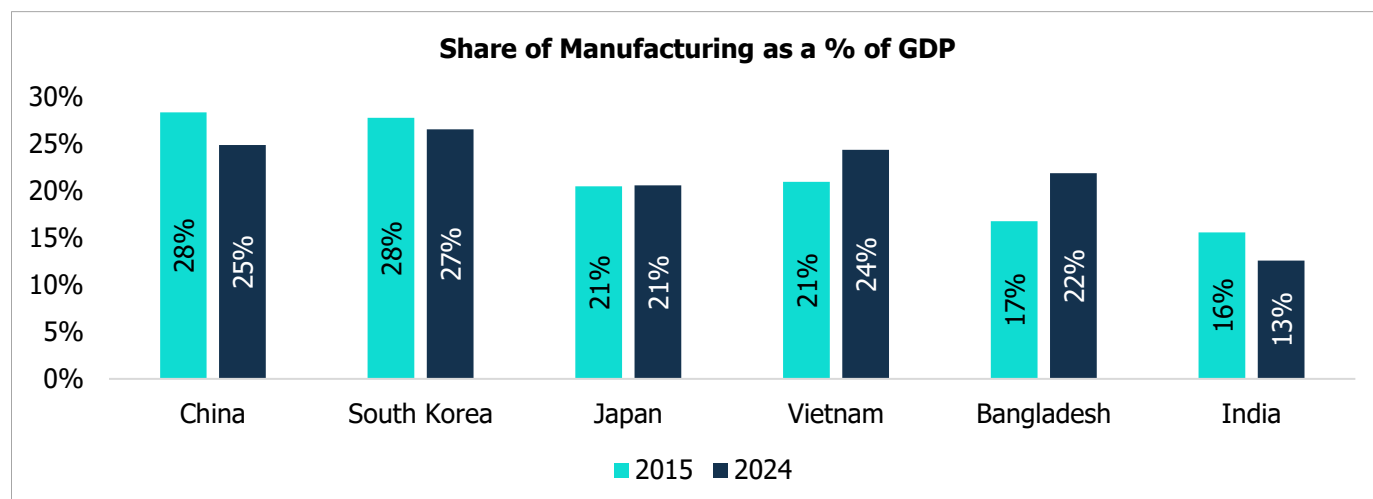
- India's manufacturing sector output expanded at a compounded annual growth rate (CAGR) of ~5% over last nine years ended CY24; however, its share in the gross domestic product (GDP) declined from ~16%¹ in 2015 to ~13%¹ in 2024, indicating structural challenges in scaling value-added production.
- Compared to Asian peers such as China, Japan, South Korea, and Vietnam, India's manufacturing growth remains constrained by lower R&D intensity, limited technology absorption, and weaker innovation ecosystems.
- India's R&D expenditure remains low at ~0.6–0.7% of GDP, significantly below global innovation leaders such as the United States (~3–3.5%), China (~2.5%), and South Korea (~4.0-5.0%).
- Low researcher density and weak industry–academia collaboration resulted in limited patent output (~4% global share), reflecting inefficiencies in innovation conversion.
- Structural constraints including low private-sector participation in R&D, risk aversion, talent outflow, and scale-first growth strategies have hindered the transition towards innovation-led manufacturing.
- While government initiatives such as production linked incentive (PLI) schemes and R&D funding programme provided a push to manufacturing scale, sustained competitiveness will require deeper integration of innovation and technology development.

India's Manufacturing Landscape: Growth with Limited Depth

Manufacturing has historically been the backbone of rapid economic transformation across developing economies. Despite being one of the world's fastest-growing major economies, India continues to lag its Asian peers in manufacturing-driven industrial expansion. India's manufacturing output increased from ~US\$328 billion in 2015 to ~US\$493 billion in 2024, however, its share in GDP declined from 16% to 13% in the same period. The service sector expanded rapidly in India while manufacturing growth remains relatively modest over the years.

In contrast, China and South Korea have sustained manufacturing share of ~25–27% of their respective GDPs while Vietnam and Bangladesh have expanded manufacturing intensity as a percentage of their GDP in this period through export-led strategies. In case of Vietnam and Bangladesh, this expansion has been driven primarily by low-cost labour, scale efficiencies and preferential foreign trade agreements (FTAs) that enhance export competitiveness, rather than by innovation-led capabilities.

¹ Classification of manufacturing as per the World Bank



Source: World Bank; Compiled by CareEdge Ratings

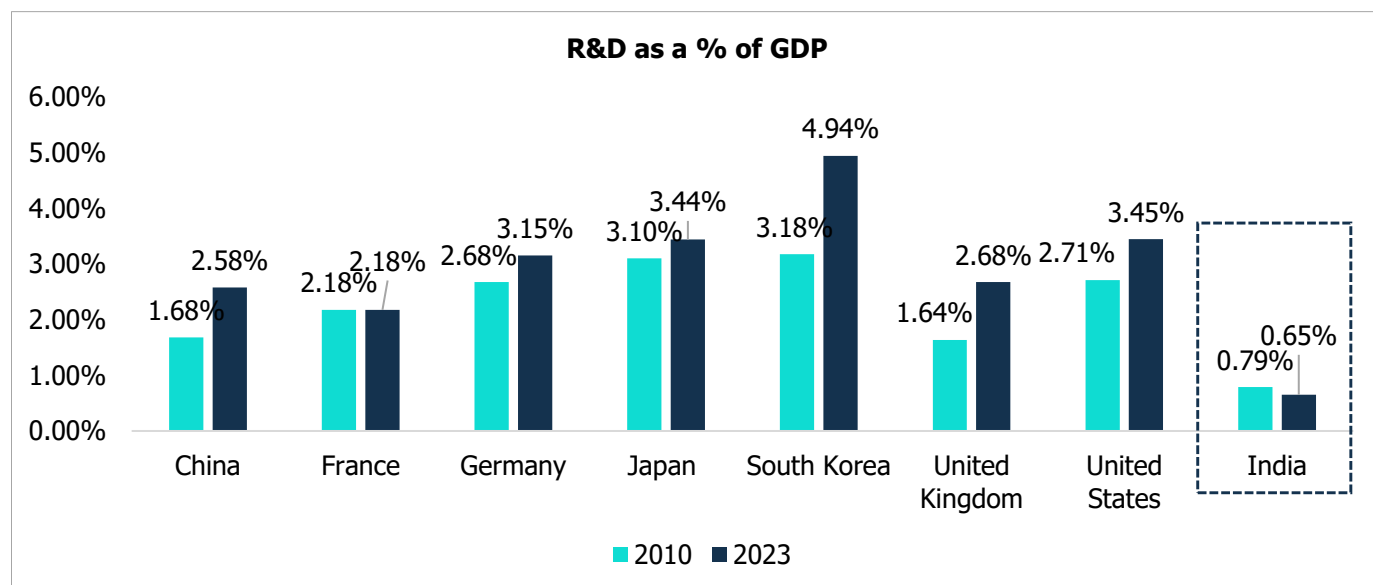
R&D spending among listed Indian companies is concentrated in a few sectors, primarily automobiles, pharmaceuticals, chemicals, and metals, while the broader industrial base remains under-invested. Innovation that emerges from this spending tends to be incremental rather than path-breaking, with Indian firms generally following global developments instead of leading them. As a result, the country has yet to secure a meaningful first-mover advantage in novel discoveries. For example, top innovator pharma companies on an average spend ~20% of its revenue on R&D, which remained at ~6% for top Indian pharma companies.

This indicates that R&D is not yet a strategic priority for corporate India, limiting the country's ability to transition from process-driven efficiency to innovation-led growth.

R&D Intensity: A Critical Differentiator

Global evidence suggests that high and sustained manufacturing success is rarely built on low costs alone. It is usually reinforced over time by technology absorption, process improvement, firm-level capability building, and rising R&D intensity. Economic success of economies like South Korea, Japan, and China validate this pattern. For developing countries such as India, even if manufacturing expands, sustained high-income growth becomes harder without stronger R&D focus as the economy struggles to move from "assembly-based growth" to "innovation-based growth".

In India, low R&D investment limits the development of advanced manufacturing, keeping the economy focused on low-to-mid-tech production and making it harder to compete with innovation-driven exporters including China, South Korea, and developed economies such as the United States, Germany, and Japan. For instance, China has leveraged sustained R&D investment to transition into high-technology sectors such as electric vehicles, advanced battery materials, drones, semiconductors, and telecommunications, while South Korea demonstrated strong corporate-led innovation through private firms that can underpin global export competitiveness.

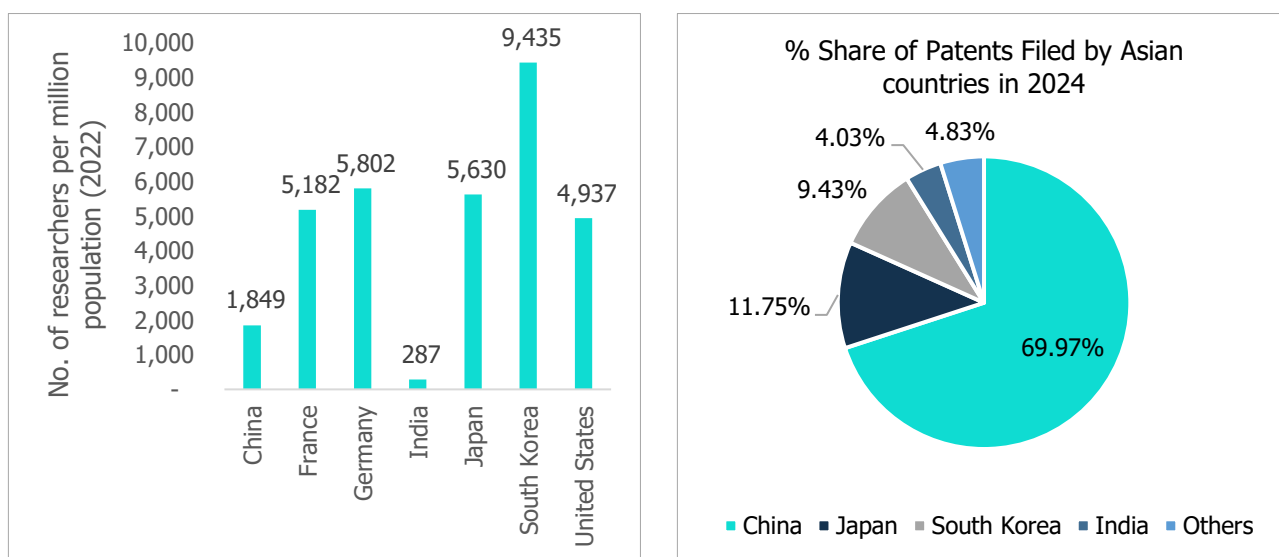


Source: World Bank; Compiled by CareEdge Ratings

India: Innovation Ecosystem Gaps

1. Low Researcher Density and Patent Output

India's researcher base per million population remains significantly lower than developed economies. This translates to limited innovation output, low patent share (~4% globally) and weak commercialisation of research. A shortage of advanced research roles and high-tech manufacturing opportunities drives skilled talent to seek better prospects abroad. This "brain drain" further weakens domestic innovation capacity and reduces availability of expertise needed to build value-driven manufacturing.



Source: World Bank and World Intellectual Property Organization; Compiled by CareEdge Ratings

China leverages its large population to have a much higher total number of researchers, driving ~70% of patents despite moderate per-capita intensity. Meanwhile, South Korea and Japan achieve strong innovation through high research density and efficiency. India's innovation performance can improve significantly by

expanding its research workforce and better utilising its large population to scale up R&D activity, while also improving conversion of research into patents.

2. Limited Private Sector Participation

In advanced economies, 60–80% of R&D is driven by private sector. While In India, Government accounts for over 60% of total R&D spending. Corporate reluctance stems from, long gestation periods, high capital risk and preference for imported technologies. Indian firms have traditionally prioritized predictable returns and capital efficiency. Many rely on licensing, or partnerships rather than developing in-house capabilities, reflecting a lower appetite for long-term, high-risk nature of innovation.

3. Structural Constraints

Government spending is largely directed toward, infrastructure, welfare programmes and defence. These limits sustained public investment in deep-tech and advanced manufacturing. Limited collaboration between startups, industry, and academic institutions restricts knowledge transfer, commercialisation of research, and the development of innovation ecosystems.

Way Forward: Transitioning to Innovation-Led Manufacturing

1. Strengthening Education and Industry-Academia Linkages

Improving India's manufacturing share requires significant investment in education especially science, technology, engineering and mathematics (STEM) and stronger integration between academic institutions and industry. While India's education spending as a share of GDP (~4-4.6%) is broadly comparable to many countries, its per capita expenditure remains alarmingly low (~₹6,000), resulting in limited learning outcomes and skill development, particularly in technical and vocational training.

India needs to expand industry-aligned and technology-focused courses in engineering and applied sciences while ensuring curricula aligned with long-term national priorities such as self-reliance in manufacturing, critical technologies, and strategic sectors such as defence, energy, AI, semi-conductors, pharmaceuticals among others. Strengthening collaboration between universities and industry, strengthening public private partnerships, and scaling world-class research institutions will help better align workforce skills with manufacturing needs and national development goals.

2. Enabling Private Sector R&D to build World-Class Innovation Ecosystems

Expanding tax incentives for R&D, improving access to risk capital, introducing performance linked funding models, and encouraging large business groups to invest in innovation and subsequently commercialise the same is critical for strengthening technological capability. Strong institutional support for startups and manufacturing firms is essential.

India must develop globally competitive industrial and innovation ecosystems which includes building high-quality industrial clusters, globally competitive compensation with modern infrastructure, improving ease of doing business, and ensuring regulatory accountability. While India's ease of doing business ranking improved significantly per World Bank Records, substantial structural reforms are still required to reach advanced-economy standards.

3. Building Integrated Industrial Ecosystems

Sustained manufacturing competitiveness requires India to move beyond isolated industrial projects and develop fully integrated ecosystems that bring together suppliers/ customers, skilled labour, infrastructure, and R&D capabilities within the same clusters. Countries such as China and South Korea achieved rapid industrial upgrading by building tightly connected manufacturing ecosystems that enabled continuous innovation and large-scale production efficiency.

For India, this implies creation of sector-specific hubs, such as semiconductor manufacturing corridors, biotechnology clusters, and advanced engineering zones designed to support end-to-end production and innovation within a single ecosystem. The long-term objective should be to strengthen domestic capability not just in assembling products, but also in designing and building the machinery and technologies that produce them, enabling true technological self-reliance and deeper integration into global value chains. Government of India started promoting the 'Innovate in India' initiative to an extent by promoting higher domestic value addition in sectors such as defence, space, electronics, and other strategic industries, fostering self-reliance and boosting indigenous innovation. While PLI brought much needed impetus to manufacturing it now needs to be sustained by innovation and R&D. Future industrial incentives should not only reward volume; but also, reward technological deepening R&D spending, which translates to innovative products. Shifting from PLI to higher incentive for "Innovative based Production" can enable deeper penetration into global markets.

Conclusion

"India's manufacturing sector is at a critical inflection point. While recent policy initiatives strengthened production capabilities, long-term competitiveness will depend on the ability to transition to innovation-driven manufacturing, leading to greater value-addition. With R&D spending currently at ~0.6–0.7% of GDP, India remains significantly behind global peers. India should target to increase its R&D spend to ~2% by 2035 in-line with its Asian peers, to enhance the share of manufacturing in GDP, which will require, greater private-sector participation, stronger innovation ecosystems and improved research-to-commercialisation pipelines", says Ranjan Sharma, Senior Director, CareEdge Ratings.

"India's manufacturing growth has been largely volume-driven so far; but sustaining global competitiveness will require a decisive shift towards innovation and R&D-led industrialisation. Strengthening private-sector participation and improving research commercialisation will be critical to unlocking higher value addition", says Krunal Modi, Director, CareEdge Ratings.

Contact

Ranjan Sharma	Senior Director	ranjan.sharma@careedge.in	+91 - 22 - 6754 3453
Krunal Modi	Director	krunal.modi@careedge.in	+91 - 79 - 4026 5614
Akshay Morbiya	Assistant Director	Akshay.morbiya@careedge.in	+91 - 79 - 4026 5619
Dhruv Shah	Assistant Director	dhruv.shah@careedge.in	+91 - 79 - 4026 5607
Vanshika Jain	Lead Analyst	vanshika.jain@careedge.in	+91 - 79 - 4026 5637
Mradul Mishra	Media Relations	mradul.mishra@careedge.in	+91 - 22 - 6754 3596

CARE Ratings Limited

Corporate Office: 4th Floor, Godrej Coliseum, Somaiya Hospital Road, Off Eastern Express Highway, Sion (East), Mumbai - 400 022
Phone : +91 - 22 - 6754 3456 | CIN: L67190MH1993PLC071691

Connect:



Locations: Ahmedabad | Andheri-Mumbai | Bengaluru | Chennai | Coimbatore | Hyderabad | Kolkata | Noida | Pune

About Us:

CareEdge is a knowledge-based analytical group offering services in Credit Ratings, Analytics, Consulting and Sustainability. Established in 1993, the parent company CARE Ratings Ltd (CareEdge Ratings) is India's second-largest rating agency, with a credible track record of rating companies across diverse sectors and holding leadership positions in high-growth sectors such as BFSI and Infra. The wholly-owned subsidiaries of CareEdge Ratings are (I) CARE Analytics & Advisory Private Ltd., (II) CARE ESG Ratings Ltd., and (III) CareEdge Global IFSC Ltd. CareEdge Ratings' other international subsidiary entities include CARE Ratings (Africa) Private Ltd. in Mauritius, CARE Ratings South Africa (Pty) Ltd., and CARE Ratings Nepal Ltd. For more information: www.careedge.in.

Disclaimer:

This report is prepared by CARE Ratings Limited (CareEdge Ratings). CareEdge Ratings has taken utmost care to ensure accuracy and objectivity while developing this report based on information available in public domain. However, neither the accuracy nor completeness of information contained in this report is guaranteed. CareEdge Ratings is not responsible for any errors or omissions in analysis / inferences / views or for results obtained from the use of information contained in this report and especially states that CareEdge Ratings has no financial liability whatsoever to the user of this report.

Privacy Policy applies. For Privacy Policy please refer to https://www.careratings.com/privacy_policy

© 2026, CARE Ratings Limited. All Rights Reserved.

This content is being published for the purpose of dissemination of information required as per applicable law and regulations and CARE Ratings Limited holds exclusive copyright over the same. Any reproduction, retransmission, modification, derivative works or use or reference to the contents, in whole, in part or in any form, is prohibited except with prior express written consent from CARE Ratings Limited.