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THE STATE OF INDIA'S INDUSTRIAL SECTOR AND REFLECTIONS ON ITS FUTURE

Bhagwati Prakash Sharma*

Pacific University, Udaipur, Rajasthan, India.

Abstract

India's industrial sector stands at a decisive juncture, poised between rapid economic growth and the pressures of global competitiveness. Contributing significantly to employment generation, GDP expansion, export earnings, and technological advancement, manufacturing industries form a vital pillar of the national economy. During the financial year 2024–25, India's GDP growth rate is estimated at 6.4 per cent—one of the highest among major economies—while global growth remains between 2.4 and 4.6 per cent. Manufacturing output and exports have also expanded steadily; the country's gross industrial production, recorded a 9.7 per cent increase at constant prices over the previous financial year. Industrial employment has risen concurrently, with total jobs in 2024–25 estimated at 824.9 million. Despite these gains, India's share in global manufacturing remains modest at 2.9 per cent, indicating a vast scope for technological upgradation, policy reform, and enhanced participation in global value chains. This paper analyses the present status of India's industrial landscape, evaluates the challenges and external dependencies it faces, and envisions future strategies for sustainable, innovation-driven growth.

Keywords: Industrial development, Manufacturing sector, Global competitiveness, Economic growth, Employment generation, Technological advancement.

1. Introduction: Overview of the Indian Economy

Manufacturing industries—particularly those classified as engineering and medium-scale enterprises—occupy a crucial position in India's economic framework. They contribute substantially to national income, foreign-exchange earnings, employment creation, and the overall improvement of living standards. The current study seeks to examine the trajectory of India's manufacturing sector, its existing strengths and weaknesses, and its implications for future industrial policy (UNIDO, 2024; OECD, 2024).

India's overall economic growth rate in 2024–25 has been recorded at approximately 6.4 per cent, a figure that surpasses the global average. For comparison, China's projected growth stands at 4.6 per cent, the United States at 1.6 per cent, and the world average at 2.4 per cent. Such resilience demonstrates the underlying strength of domestic demand and policy support through production-linked incentive (PLI) schemes and infrastructural reforms (DPIIT, 2025).

At current prices, India's gross domestic product is valued at ₹ 324.11 lakh crore in 2024–25, compared with ₹ 295.36 lakh crore in 2023–24—an increase of 9.7 per cent in one year. At constant (2011–12) prices, the figure for 2024–25 stands at ₹ 184.88 lakh crore, up from ₹ 173.82 lakh crore in 2023–24. To place this in historical perspective, India's total gross domestic product in 1951–52 was merely ₹ 4.96 lakh crore (2011–12 base). Over the period from 1951–52 to 2024–25, the economy has thus expanded more than thirty-seven times, highlighting the remarkable structural transformation achieved since Independence (Ministry of Commerce & Industry, 2025).

Industrial employment has also witnessed consistent expansion. In 2024–25, total employment reached

*Corresponding author: Email:bpsharma131@yahoo.co.in

824.9 million persons, comprising 387.5 million in the service sector and 437.4 million in goods-producing industries. Between 2013–14 and 2024–25, overall employment increased by 77 per cent, with service-sector jobs rising by 254 per cent. Merchandise exports amounted to USD 94.26 billion in 2024–25 compared with USD 79.39 billion in 2023–24, reflecting the growing integration of India's industrial base with global markets (WTO, 2025; Ministry of Commerce & Industry, 2025).

Despite this progress, the pace of industrialisation remains uneven. Dependence on imported intermediate goods and limited high-technology capacity continue to constrain value addition and export diversification. Strengthening the ecosystem for manufacturing, research, and innovation is therefore essential for India to consolidate its position among the world's leading industrial economies (ADB, 2024; DPIIT, 2025).

2. India's Position in Global Manufacturing and Technological Competitiveness

2.1 Limited Share in World Manufacturing

Although India accounts for roughly 17.8 per cent of the world's population, its share in global manufacturing output is only about 2.9 per cent. This imbalance reflects the fact that a large portion of industrial production within India is carried out by multinational corporations operating primarily as assembly-line units, while high-technology components and design inputs are still largely imported. The resulting dependence on external technology increases India's foreign-exchange exposure and limits the creation of domestic intellectual property and skilled employment (ADB, 2024; World Bank, 2024).

Table 1: Share of India in World Manufacturing (2024)

Country	Share in World Population	Share in World Manufacturing
China	17.20 %	31.6 %
United States	4.22 %	15.9 %
Japan	1.5 %	6.5 %
Germany	1.02 %	4.8 %
India	**17.78 %**	**2.9 %**

Source: UN Industrial Development Organization (UNIDO, 2024); World Bank Manufacturing Value Added Dataset.

2.2 Technological Competitiveness

India's relative position in high-technology exports remains considerably lower than that of leading industrial nations. The total value of India's high-tech exports in 2024 amounted to USD 35.2 billion, whereas China exceeded USD 769 billion and Germany USD 223 billion. The discrepancy illustrates India's continuing dependence on imported intermediate and capital goods (WTO, 2025; Ministry of Commerce & Industry, 2025).

Table 2: High-Technology Exports by Country (2024, in Million USD)

Rank	Country	High-Tech Exports (USD Million)
1	China	769 699.28
2	Germany	223 370.84
3	Hong Kong	194 079.88
4	United States	166 435.57
5	Vietnam	122 993.36
6	South Korea	98 537.96
7	France	95 753.98
8	Singapore	94 102.98
9	Netherlands	92 149.42
10	Mexico	85 898.58
11	**India**	**35 219.09**

Source: UN Comtrade Database (2024); World Trade Organization Statistics Portal.

India's high-technology export volume is thus only 4.5 per cent of China's and 15 per cent of Germany's, underscoring the need for deeper integration of research, design, and innovation in domestic industries. The creation of innovation clusters, stronger university–industry collaboration, and an expansion of production-linked incentive schemes targeted at electronics, semiconductors, and renewable-energy equipment are vital to bridge this gap (SIA, 2024).

3. India's Participation in Global Value Chains (GVCs)

3.1 Limited Integration in Global Production Networks

A defining feature of modern international trade is the dominance of global value chains (GVCs), in which over 70 per cent of world trade now occurs through cross-border networks of intermediate goods and components. In such production systems, value addition is distributed across countries according to their technological specialisation and cost advantages (UNCTAD, 2024; OECD, 2024).

Despite its large market size and demographic weight, India's participation in GVCs—especially in the electronics and high-technology manufacturing sectors—remains modest. The country contributes barely 1 per cent to the global electronics value chain, compared with China's 30 per cent share in exports and 17 per cent in imports. This limited involvement curtails India's potential to benefit from international technology transfers and high-value manufacturing opportunities (UNIDO, 2024; OECD, 2024).

Table 3: India's Participation in the Global Electronics Value Chain

Country	Exports (Billion USD)	Export (%)	Imports (Billion USD)	Imports (%)
China	886	30	512	17
United States	210	7	482	16
Taiwan	267	9	126	4
South Korea	189	6	124	4
Singapore	168	6	147.5	5
Germany	157	5	180	6
Vietnam	130	4	116	4
Malaysia	105	4	69	2
Japan	87	3	109	4
Mexico	82	3	118	4
Netherlands	62	2	75	3
India	**24**	**1**	**78**	**2**

Source: OECD Trade in Value Added (TiVA) Database, 2024.

India's limited presence in these production networks is largely attributable to its technological constraints, infrastructure bottlenecks, and a regulatory environment that has not yet fully aligned with global supply-chain standards. By comparison, East and South-East Asian economies—such as Vietnam, Malaysia, and Thailand—have successfully leveraged trade agreements and export-oriented industrial clusters to achieve far deeper integration (UNCTAD, 2024; OECD, 2024).

3.2 Policy Imperatives for Enhancing GVC Participation

For India to emerge as a significant node in global production, certain key policy directions are imperative:

3.2.1 Technology Upgradation and Skill Development: Encouraging domestic production of high-value components through research incentives, vocational training, and R&D subsidies.

3.2.2 Infrastructure Modernisation: Strengthening ports, logistics, and digital connectivity to reduce transaction costs.

3.2.3 Trade Facilitation and Standards Harmonisation: Aligning domestic certification norms with international standards to enable seamless export participation.

4. Strategic Trade Agreements: Negotiating bilateral and multilateral trade pacts that secure preferential access for Indian manufactured goods.

Together, these initiatives can help India capture a higher share of global manufacturing value addition and integrate more effectively into international production networks.

4. Semiconductor Fabrication Capacity and India's Emerging Role

4.1 Global Context

In the contemporary industrial landscape, semiconductors serve as the cornerstone of almost every advanced technology — from communication systems, computers, and medical equipment to automobiles, energy systems, and defence infrastructure. Consequently, semiconductor fabrication capacity has become a critical determinant of technological sovereignty and economic competitiveness (SIA, 2024).

At present, global semiconductor fabrication is heavily concentrated in a handful of East Asian economies, notably Taiwan, South Korea, and China, which collectively account for nearly three-quarters of total world capacity. According to the Semiconductor Industry Association (SIA, 2024), Taiwan alone commands around 60 per cent of global chip manufacturing, primarily through TSMC, while South Korea and China share approximately 18 per cent and 16 per cent, respectively (WIPO, 2024).

Although India has made remarkable progress in chip design and embedded systems, it has historically lacked front-end fabrication (fab) facilities — the most capital-intensive and technology-driven component of the semiconductor value chain. However, policy initiatives launched under the India Semiconductor Mission (ISM) and the Production-Linked Incentive (PLI) schemes for electronic manufacturing have started to alter this scenario (UNIDO, 2024; OECD, 2024).

4.2 India's Emerging Prospects

In 2025, India is expected to commence its first large-scale semiconductor wafer fabrication operations under joint ventures involving leading global firms. The projects in Gujarat (Dholera) and Assam are anticipated to mark a turning point in India's high-technology manufacturing capacity. These initiatives aim not only to reduce dependence on imports from East Asia but also to position India as a potential alternative manufacturing hub in the context of global supply-chain diversification.

The government's "Make in India – Chip Manufacturing Ecosystem" and Digital India programmes, coupled with a 50 per cent capital subsidy on approved projects, are expected to attract significant foreign direct investment (FDI) and generate high-skilled employment in design, testing, and packaging segments. Moreover, the establishment of research partnerships between industry and technical institutions (e.g., IITs, IISc) is enhancing domestic design capabilities and nurturing a new generation of semiconductor engineers (UNCTAD, 2024; RBI, 2024).

Nevertheless, India still faces several challenges: high infrastructure costs, limited water and power availability at fab-grade standards, and the need for consistent policy support. Overcoming these bottlenecks will be essential to ensuring the sustainability and global competitiveness of India's semiconductor ambitions (SIA, 2024).

5. Artificial Intelligence Patents and India's Innovation Potential

5.1 Expanding the Frontier of Digital Innovation

Artificial Intelligence (AI) represents one of the most transformative technological forces of the 21st century, reshaping sectors as diverse as agriculture, education, healthcare, law, and public administration. The ability of nations to innovate, secure patents, and commercialise AI-based technologies increasingly defines their global competitiveness and future growth trajectories.

In recent years, India has witnessed a rapid surge in AI-related research and innovation activity. The number of AI patent applications filed by Indian entities has grown exponentially, reflecting a growing awareness of AI's strategic and commercial significance. Yet, despite this progress, India's share in global AI patents remains relatively small, indicating substantial room for capacity enhancement (WIPO, 2024).

5.2 Comparative Analysis of AI Patent Ownership (2024)

As of 2024, India ranked among the top fifteen countries in AI patent filings but continues to trail far behind global leaders such as China and the United States. China dominates the field with 12,945 AI patents, followed by the United States with 8,609, while India accounts for a modest share with only a few hundred patents filed annually.

Table 4: AI Patents by Country (2024)

Rank	Country	Total AI Patents (2024)
1	China	12,945
2	United States	8,609
3	South Korea	1,537
4	Japan	1,537
5	Germany	784
6	United Kingdom	369
7	Netherlands	249
8	Sweden	243
9	Finland	180
10	Taiwan	156

Source: World Intellectual Property Organization (WIPO, 2024); OECD AI Policy Observatory.

While India's numerical position remains relatively low, its innovation ecosystem is evolving rapidly. The emergence of AI research hubs in Bengaluru,

Hyderabad, and Pune, the National AI Mission, and partnerships between global technology companies and Indian start-ups are accelerating innovation. The focus on responsible AI, natural language processing for Indian languages, and AI-driven governance under initiatives such as *Digital India* and *IndiaAI* are strengthening the country's research base and ethical framework (WIPO, 2024).

5.3 Towards a Stronger AI Ecosystem

For India to enhance its global position in AI-driven industries, several strategic measures are essential:

5.3.1 Strengthening Intellectual Property Regimes: Streamlining the patent-approval process and promoting IP awareness among researchers.

5.3.2 Enhancing Research–Industry Collaboration: Linking academic research with industrial application through funding and mentorship frameworks.

5.3.3 Investing in Computing Infrastructure: Expanding access to AI supercomputing facilities and data-sharing platforms.

5.3.4 Promoting Ethical AI and Skill Development: Creating training ecosystems that align technical innovation with social responsibility and data privacy standards.

By implementing these measures, India can position itself not merely as a consumer but as a producer of AI technology, contributing meaningfully to the global innovation landscape.

6. India's Position among the World's Top Exporting Nations

6.1 India's Evolving Export Profile

India has gradually emerged as one of the world's leading trading economies, with exports spanning merchandise goods, services, and digital products. The country's total merchandise exports in 2025 are estimated at USD 773 billion, positioning it as the tenth-largest exporter globally. Although this represents significant progress compared with the early 2000s, India's share of global exports still trails behind industrial powerhouses such as China, the United States, and Germany (WTO, 2025; Ministry of Commerce & Industry, 2025).

Table 5: The World's Largest Exporting Countries, 2025

Rank	Country	Exports (USD)
1	China	3.51 trillion
2	United States	3.05 trillion
3	Germany	2.10 trillion
4	United Kingdom	1.07 trillion
5	France	1.05 trillion
6	Netherlands	949 billion
7	Japan	920 billion
8	Italy	793 billion
9	Singapore	778 billion
10	**India**	**773 billion**

Source: World Trade Organization (WTO, 2025); IMF Direction of Trade Statistics.

India's rise as a major exporting nation underscores its growing integration with the global economy. The country's export basket has diversified beyond traditional goods such as textiles and agricultural commodities to include engineering products, pharmaceuticals, and IT services. In recent years, the share of electronics, machinery, and chemicals has expanded rapidly, reflecting the impact of production-linked incentive (PLI) schemes and broader industrial reforms (ADB, 2024; DPIIT, 2025).

6.2 Export Competitiveness and Global Challenges

Despite these achievements, India faces several challenges in maintaining export momentum. Key among them are rising input costs, infrastructure bottlenecks, and dependence on imported components in high-technology sectors. Moreover, fluctuating

exchange rates and global trade tensions—particularly in relation to supply-chain reorientation post-pandemic—pose uncertainties for export planning (UNCTAD, 2024; OECD, 2024).

To enhance competitiveness, India must focus on:

6.2.1 Logistics Efficiency: Upgrading port, warehousing, and transport infrastructure to reduce turnaround times.

6.2.2 Quality and Standards: Aligning domestic manufacturing with international quality certifications.

6.2.3 Trade Diversification: Expanding exports to underpenetrated regions in Africa, Latin America, and Central Asia.

6.2.4 Digital Trade Enablement: Leveraging e-commerce platforms and blockchain-based trade facilitation mechanisms to ease customs processes.

Through these strategies, India can strengthen its position not only as a large-volume exporter but also as a reliable and technologically advanced trade partner in the global economy.

7. Post-Liberalisation Industrial Policies and Foreign Dependence

7.1 Evolution after Economic Reforms

The trajectory of India's industrial sector underwent a decisive transformation following the liberalisation policies introduced in 1991. Earlier, under the Industrial Policy Resolutions of 1948 and 1956, almost forty industries were reserved for the public sector, while the private sector functioned under stringent licensing and import controls. Although these policies helped build a diversified industrial base, they also constrained competition and innovation.

The post-1991 reforms dismantled industrial licensing, opened most sectors to foreign direct investment (FDI), and promoted market competition. The outcome was a shift from a state-dominated economy to a liberalised, globally connected industrial structure. However, the period also witnessed a surge in foreign acquisitions, import dependence, and exposure to global supply shocks, especially in strategic sectors such as electronics, chemicals, and automobiles (UNCTAD, 2024; RBI, 2024).

7.2 Rising Import Dependence and Market Concentration

Since liberalisation, India's manufacturing value chains have become heavily reliant on imported components, particularly from China and East Asia. Table 6 in the original paper illustrated that foreign brands dominate 70–75 per cent of market share in categories such as cars, televisions, refrigerators, and consumer electronics. Domestic production, in many cases, is limited to assembly operations, with critical inputs and sub-components sourced from abroad (UNIDO, 2024; OECD, 2024).

This dependency has resulted in a widening trade imbalance—notably with China—despite India's substantial export growth in other regions.

Table 6: India–China Trade Imbalance (FY 2024–25)

Metric	Value
Total Bilateral Trade	~USD 118 billion
Indian Imports from China	~USD 109 billion
Indian Exports to China	~USD 9.8 billion
Trade Deficit	**~USD 99.2 billion**

Source: Ministry of Commerce & Industry, Government of India (2025).

Over the past decade, India's trade deficit with China has consistently remained above USD 80 billion, underscoring the extent of import dependence across strategic sectors such as electronics, solar panels, pharmaceuticals (APIs), and industrial machinery.

7.3 Sectoral Composition of Imports

Table 7: Largest categories of imports from China include

Product Group	Import Value (USD Billion)
Electrical & Electronic Equipment	44.15
Machinery & Boilers	21.70
Organic Chemicals	13.27
Plastics	5.93
Optical and Medical Instruments	2.68

Source: UN Comtrade (2024) data.

Within these categories, five critical products account for a major share of India's technology imports

Table 8: India's Five Major Technology Imports

HS Code	Product Label	Imports from China (USD Million, 2024)
847130	Portable data-processing machines	4 709.7
851779	Parts of telephone sets	6 894.0
854143	Photovoltaic cells	2 246.1
850760	Lithium-ion batteries	2 120.9
854231	Electronic integrated circuits	4 565.6

Source: UN Comtrade (2024) data

These figures demonstrate how core technologies—semiconductors, photovoltaic cells, and lithium-ion batteries—remain import-dependent, creating vulnerabilities for sectors like renewable energy, electronics, and electric mobility.

7.4 Structural Causes of Dependence

India's persistent trade imbalance and import dependence arise from several inter-linked structural issues:

7.4.1 Limited Domestic R&D: Insufficient investment in applied research and low patenting intensity have inhibited technological self-reliance.

7.4.2 Fragmented Supply Chains: A large share of industrial inputs continues to be imported due to inadequate domestic component manufacturing.

7.4.3 Scale Inefficiencies: High cost of capital, logistics bottlenecks, and limited economies of scale reduce price competitiveness.

7.4.4 Policy Inertia: Frequent procedural delays and regulatory uncertainty discourage long-term investment in complex manufacturing.

Addressing these constraints is essential to realising the goals of *Atmanirbhar Bharat* (Self-Reliant India) and reducing vulnerabilities to external shocks.

7.5 Strategic Measures for Industrial Development

To strengthen domestic manufacturing and reduce import dependence, the paper proposes a multi-pronged strategy:

7.5.1 Anti-dumping Measures: Implement targeted tariffs and quality control to curb unfair pricing, particularly from solar, electronics, and chemical imports.

7.5.2 Outbound Acquisitions: Encourage Indian enterprises to acquire high-technology firms abroad through Outbound Direct Investment (ODI), replicating China's cross-border mergers model.

7.5.3 Industrial Consortia: Develop industry-research consortia similar to those in the United States and Japan to foster cooperative R&D under public-private partnership frameworks.

7.5.4 Domestic Brand Promotion: Promote "Made-in-India" brands through targeted marketing and incentives rather than excessive reliance on foreign assemblers.

7.5.5 Localised Research and Innovation: Increase funding for pre-competitive research, prototype development, and incubation centres in collaboration with universities.

7.5.6 Labour Productivity and Technology Adoption: Facilitate automation and robotics training programmes to raise productivity while preserving employment quality.

7.5.7 Coordinated Manufacturing Policy: Establish an integrated industrial policy aligning fiscal, trade, and innovation measures to ensure coherence across ministries.

Collectively, these initiatives can reposition India from being a market for imported goods to a centre of advanced manufacturing and innovation.

8. Future Industrial Strategy and Regional Industrial Development

8.1 Towards an Integrated Industrial Vision

India's industrial landscape has achieved notable expansion since liberalisation, yet its full potential remains unrealised due to structural bottlenecks, technological gaps, and uneven regional development. A long-term National Industrial Strategy must therefore emphasise innovation, sustainability, and balanced regional growth. Such a strategy should integrate fiscal incentives, trade facilitation, skill

formation, and infrastructural development into a coherent framework that encourages both domestic and foreign investors (ADB, 2024; DPIIT, 2025).

The following policy directions are particularly vital for India's future industrial transformation:

8.1.1 Research and Innovation-driven Manufacturing: Continuous support for indigenous R&D and intellectual property generation should be prioritised.

8.1.2 Employment-centred Industrialisation: The creation of high-quality jobs in manufacturing must accompany automation and digitalisation.

8.1.3 Regional Industrial Clusters: Development of specialised industrial zones across states, reducing over-concentration in a few metropolitan regions.

8.1.4 Industrial–Academic Collaboration: Strengthening partnerships between universities, technical institutes, and industries to promote applied research.

8.1.5 Infrastructure Modernisation: Accelerating the development of logistics parks, industrial corridors, and green energy systems.

8.1.6 Investment Promotion: Simplifying regulatory procedures and ensuring stability in taxation and policy frameworks to attract sustained investment.

8.2 Industrial Corridors and Regional Development

The Government of India's initiatives such as the Delhi–Mumbai Industrial Corridor (DMIC), Chennai–Bengaluru Industrial Corridor, and Amritsar–Kolkata Industrial Corridor are transforming the spatial pattern of industrialisation. These projects are designed to link major economic centres with efficient logistics, power supply, and digital infrastructure. The establishment of National Industrial Corridors aims to create regionally distributed growth centres that can reduce inter-state disparities in industrial capacity. The emergence of industrial clusters in automobiles (Tamil Nadu and Maharashtra), pharmaceuticals (Hyderabad and Gujarat), textiles (Gujarat and Tamil Nadu), and fertilisers (Eastern India) highlights the potential for sector-specific hubs integrated into global value chains (ADB, 2024; DPIIT, 2025).

8.3 Innovation, Digitisation, and Green Manufacturing

The next phase of India's industrialisation must be sustainable, digitally empowered, and innovation-led. Adoption of Industry 4.0 technologies—including AI, IoT, robotics, and additive manufacturing—can substantially improve productivity while reducing environmental footprints. Policies should promote circular economy principles, energy efficiency, and renewable-based manufacturing systems to align with global climate commitments (UNIDO, 2024; OECD, 2024). Digitalisation of industrial operations through smart supply chains, e-commerce integration, and data analytics can further enhance competitiveness and transparency. Skill development in emerging technologies, combined with institutional reforms, will ensure that India's industrial sector remains adaptive and future-ready.

9. Conclusion

India's industrial sector today stands at a defining moment. Over the past seven decades, it has evolved from a protected, state-driven structure into a globally connected manufacturing economy. The challenge now lies in consolidating this transformation by fostering technological self-reliance, sustainable production, and equitable regional growth. By nurturing domestic innovation ecosystems, deepening its integration into global value chains, and maintaining fiscal and policy stability, India can advance towards its vision of becoming a five-trillion-dollar economy supported by a robust, diversified industrial base. The future of Indian industry thus depends on balancing global competitiveness with national self-reliance — ensuring that industrial growth translates into inclusive prosperity and long-term economic resilience.

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