# MANUFACTURING SECTOR IN INDIA - ECONOMY

NEWS: Global manufacturing is shifting toward innovation-driven high-tech products, requiring India to boost R&D, skills, and supply chains to stay competitive.

## WHAT'S IN THE NEWS?

### Significance of the Manufacturing Sector in the Indian Economy

- Major Contributor to GDP: Manufacturing contributes ~17% to India's GDP.
- To transform India from a $3.7 trillion economy to a $30–35 trillion powerhouse by 2047, manufacturing must contribute at least 25% to our GDP.

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| ıstry 4.0 (Fourth Industrial Revolution) |
| ıstry 4.0 refers to the integration of digital technologies into ıufacturing processes to create smart, autonomous, and data-driven duction systems. |
| ɔmbines AI, robotics, IoT, cloud computing, cyber-physical systems, l big data analytics to enhance productivity, efficiency, and tomisation. |
| e Components |
| rnet of Things (IoT): Devices and machines communicating via the rnet. |
| ficial Intelligence (AI) and Machine Learning (ML): Automating decisions l predictive maintenance. |
| otics and Automation: Enhancing speed, safety, and precision in duction. |
| ud Computing and Edge Computing: Real-time data access and lysis. |
| ɔersecurity: Ensuring data protection in interconnected systems. |

- Engine of Employment Generation: Over 27 million people are directly or indirectly employed in manufacturing.India must create 78.5 lakh non-farm jobs annually till 2030 to absorb its rising workforce.

- Reskilling and ITI upgradation (₹60,000 crore project) are being used to bridge the industrial skill gap.
- Boosts Exports and Foreign Exchange Earnings: India's merchandise exports reached ₹52.35 lakh crore (~US$ 602.6 billion) in Apr–Dec 2024.
- Mobile phone exports alone doubled to ₹47,779 crore in FY24.
- Pharmaceutical exports account for 50% of the sector's ₹4.17 lakh crore turnover.
- Enhances Technological Capability and Innovation: Schemes like PLI and SAMARTH Udyog Bharat 4.0 encourage smart manufacturing and Industry 4.0 adoption.
- India now ranks 6th globally in patent filings (WIPO 2023), with applications mainly in electronics, mechanical, and communication tech.
- Attracts Foreign Direct Investment (FDI): ₹14.45 lakh crore (US$ 165.1 billion) in FDI into manufacturing in the past decade – a 69% increase.
- Major investments from Apple, Foxconn, Micron, Google (Pixel production in Tamil Nadu).
- Backbone of Infrastructure Development: Steel and cement consumption driven by large-scale public projects:
- Steel demand from infra and construction: ~68% of total consumption in FY24.
- Cement: India's annual production ~427 million tonnes; per capita consumption ~290 kg (vs global avg of 540 kg).
- Support to MSMEs and Inclusive Industrial Growth: Manufacturing sustains thousands of MSMEs and local units, especially in textiles, white goods, and automotive components.
- For instance, 43% of applicants in the PLI for white goods are MSMEs, showing inclusive industrial participation.

> at are Industrial Hubs?
>
> ustrial hubs are geographically concentrated zones where a cluster of nufacturing industries and supporting services operate in an grated manner.
>
> se hubs provide specialised infrastructure, logistics

nectivity, regulatory facilitation, and often sector-specific incentives to st industrial productivity, employment, and exports.

mples

nzhen (China) – *Electronics and Hardware Manufacturing*: Integrated special economic zones (SEZs) and close proximity to supply chains export ports. Base for firms like Huawei, DJI, and Foxconn.

e (Maharashtra) – *Automobile & Engineering*: Major hub automobiles, auto components, and machine tools.

ne to companies like Tata Motors, Bajaj Auto, Volkswagen, and nmins.

## Current Trends in Global Manufacturing

- Shift in Global Manufacturing Landscape: Over the last decade, high-income countries have lost significant manufacturing share.
- This has largely been captured by upper-middle-income countries, led by China.
- India is among the few lower-middle-income economies that improved its share despite not being a dominant player yet.
- Regional Realignment and Diversification: Global supply chains are undergoing realignment due to:
- Geopolitical tensions (e.g., US-China trade conflict)
- Pandemic-driven disruptions
- Push for “China + 1” strategies by companies shifting production to India, Vietnam, etc.
- Technological Advancement: Global manufacturing is increasingly innovation-driven, focusing on:
- Advanced R&D; Automation and robotics; Artificial Intelligence (AI); Green and climate-resilient technologies
- High-tech products dominate export baskets of advanced economies.
- Environmental and Regulatory Pressures: Global manufacturing is adapting to climate goals and emission reduction mandates.

- Shift toward renewable energy, circular economy, and green steel is accelerating.
- For instance, India's cement and steel industries are being nudged toward carbon-neutral production.
- Trade Protectionism: Rise in aggressive industrial and trade policies:
- Increased tariffs, localisation norms, and export bans.
- Impacting India's export demand and competitiveness in foreign markets.
- Global Slowdown and Demand Shift: Consumption is shifting from goods to services globally, particularly in developed markets.
- Manufacturing output rose by only 0.4% in Q3 2024, signaling weak global demand.
- Growth Opportunities for India: As per the IMF, manufacturing production is increasingly shifting towards emerging markets, especially India and China.
- India's share in global manufacturing: 2.8% vs China's 28.8% – indicating massive growth potential.

### Challenges in India's Manufacturing Sector

- Low Per Capita Value Addition and Productivity: India's per capita manufacturing value added is only $0.32K, compared to the global average of $2K.
- Reflects inefficiency and underperformance in output per individual.
- Weak Global Share and Competitiveness: India accounts for just 2.8% of global manufacturing output, far behind China's 28.8%.
- Despite demographic advantages, India remains a minor player globally.
- Skill Mismatch and Outdated Training Systems: Surveys highlight a skills deficit: ITI graduates lack readiness for AI, robotics, and digital tech industries.
- Many ITIs were accredited without meeting safety or infrastructure norms.
- Low R&D Investment and Innovation Capacity: India spends only 0.65% of GDP on R&D, while countries like the US spend over 2.5%.
- Manufacturing productivity is linked to innovation: $159K (US), $103K (Germany), $21K (China)—India trails behind.

- Infrastructure Bottlenecks and Logistics Costs: Despite policy support, logistics and infrastructure gaps increase production costs.
- Global supply chain disruptions and high logistics expenses hinder export competitiveness.
- Import Dependence in Key Sectors: High reliance on imported capital goods and petrochemical intermediates (e.g., 45% of petrochemical intermediates are imported).
- Reflects lack of technological depth in domestic manufacturing.
- Fragmented MSME Ecosystem and Limited Value Addition: MSMEs dominate but lack scale, modern technology, and access to credit.
- Example: Textile sector lags due to over-focus on cotton while the global market shifts to man-made fibres (MMF).

### Issues with Technical Education and Skills in India

- Skill Mismatch with Industry Needs: Existing technical education often fails to meet the requirements of modern industries, especially in AI, data analysis, robotics, and green technologies.
- Traditional ITI training is not aligned with smart economy demands.
- Poor Placement Outcomes: Only a small fraction of ITI graduates find employment in high-tech or digital sectors.
- This indicates both poor industry linkage and outdated curriculum design.
- Weak Infrastructure and Monitoring: Many private ITIs were granted accreditation without meeting safety and construction standards.
- Audits revealed gaps in oversight—institutes operating without basic labs or infrastructure.
- Overemphasis on Theoretical Learning: Engineering colleges prioritize academic grades, with limited focus on practical skills or innovation.
- Students often lack creative problem-solving and exposure to real-world applications.
- Limited R&D and Advanced Labs: Most technical institutions do not provide state-of-the-art tool rooms, testing labs, or product development facilities.

- This restricts students' ability to engage in innovation and industry-grade prototyping.
- Inadequate Focus on Core Engineering: Excessive attention on IT and AI has overshadowed foundational streams like mechanical, civil, electrical, and chemical engineering.
- National capacity in equipment and machine building remains weak due to neglect of core disciplines.
- Limited Role of Private Sector in Curriculum Design: Until recently, course design and training standards were government-driven with minimal industry collaboration.
- The new ITI upscaling project proposes 10% private sector funding and co-creation of training modules.

### Policy Framework and Government Initiatives

- Make in India (2014): Launched to boost domestic manufacturing, attract foreign direct investment, and enhance India's position in global value chains.
- Encouraged growth in electronics, pharmaceuticals, and automobile sectors through sectoral support.
- Production-Linked Incentive (PLI) Scheme: Introduced across 14 sectors including electronics, pharmaceuticals, automobiles, and white goods.
- Aims to scale domestic manufacturing and reduce import dependence.
- National Manufacturing Policy (2011): Seeks to increase manufacturing share in GDP to 25% and create 100 million jobs.
- Promotes setting up of National Investment and Manufacturing Zones (NIMZs) and infrastructure development.
- National Manufacturing Mission (Budget 2025–26): Focused on building industrial clusters, green technology ecosystems, and strengthening MSMEs.
- Encourages use of clean tech, digital manufacturing tools, and local supply chains.
- SAMARTH Udyog Bharat 4.0 (2017): Promotes Smart Advanced Manufacturing through setting up of SAMARTH centres.

- Facilitates Industry 4.0 technologies (IoT, robotics, AI) in SMEs and capital goods sector.
- ITI Upscaling and Skilling Reform: ₹60,000 crore sanctioned to upgrade 1,000 Industrial Training Institutes (ITIs).
- 20 lakh youth to be skilled over five years.
- Includes private sector participation in designing courses and training faculty.
- Policy Support for Specific Industries: National Steel Policy and Steel Scrap Recycling Policy promote green and sustainable steel manufacturing.
- Textile PLI Scheme and support for technical textiles aim to improve global competitiveness and reduce import dependence.
- Research & Development Incentives: Government seeks to raise R&D spending from 0.65% to 2% of GDP.
- Encouragement through IPR simplification (Patent Rules 2024) and technology innovation portals.
- Capital Goods Competitiveness Scheme – Phase II: Focuses on technology acquisition, setting up Centres of Excellence, and engineering support infrastructure.
- Tackles dependence on imported machinery.

Way Forward for India's Manufacturing Sector

- Raise R&D Investment and Foster Innovation: Increase R&D expenditure from 0.65% to 2% of GDP to boost innovation and technological self-reliance.
  - Establish advanced labs, tool rooms, and design-testing centres in manufacturing clusters and technical institutes.
- Strengthen Technical Education and Practical Skills: Reform engineering and ITI curricula to focus on practical application, problem-solving, and industry interface.
- Allocate 50% weightage to practical training and develop assembly lines, tool rooms, and product development labs in technical institutions.
- Build Robust Core Engineering Capabilities: Reinforce foundational disciplines like mechanical, civil, electrical, chemical, and metallurgical engineering.

- Focus on domestic equipment and machinery production to reduce import dependency in capital goods.
- Promote MSMEs and Local Value Chains: Encourage formalisation, access to finance, and technology adoption among MSMEs.
- Support MSME participation in PLI schemes and component manufacturing, especially in textiles and electronics.
- Develop State-Specific Manufacturing Ecosystems: Establish plug-and-play industrial parks with design, testing, and certification facilities.
- Incentivize in-house prototype development and collaboration with academic R&D institutions.
- Reduce Infrastructure and Logistics Bottlenecks: Improve logistics efficiency under the National Logistics Policy.
- Strengthen supply chains, storage, power, and transportation infrastructure to lower manufacturing costs.
- Encourage Sustainable and Green Manufacturing: Promote green steel and cement production, scrap recycling, and energy-efficient processes.
- Align with global standards for climate-friendly manufacturing, supported by policies like the Steel Scrap Recycling Policy.

## Conclusion

India's manufacturing sector, a vital driver of GDP and employment, holds immense potential to reach a $1 trillion valuation by FY26 through enhanced R&D, skill development, and robust policy support. By addressing challenges like low productivity, skill mismatches, and infrastructure gaps while embracing innovation and sustainability, India can significantly boost its global manufacturing share and economic resilience.

Source: https://www.thehindu.com/opinion/op-ed/a-fundamental-reset-to-drive-manufacturing-growth/article69564785.ece