



DEVELOPING THE MANUFACTURING SECTOR IN INDIA: PROBLEMS AND SOLUTIONS

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Abstract The manufacturing sector is crucial for India's economic growth, providing significant employment opportunities and contributing to the GDP. Despite its potential, the sector faces several challenges, including high business costs, skill gaps, limited access to financing, unstable infrastructure, and intense global competition. This research aims to identify the primary obstacles hindering the growth of India's manufacturing sector and proposes viable solutions. Key issues include complex regulations, inadequate infrastructure, and a mismatch between skills and industry needs. Solutions involve streamlining regulations, investing in infrastructure and skill development, enhancing financial access, and adopting advanced technologies like Industry 4.0. By analyzing successful strategies from other nations, particularly China's manufacturing boom, the study provides insights into policy reforms, investment in infrastructure, and the promotion of innovation. The findings emphasize the importance of public-private partnerships, continuous learning, and robust monitoring mechanisms to foster a competitive manufacturing environment. Future research should focus on the long-term impact of policy changes and the integration of new technologies in the manufacturing sector.

Keywords– Indian manufacturing sector, industrial policy, skill development, infrastructure improvement, technological advancement, global competition

I. INTRODUCTION

The manufacturing sector is a cornerstone of India's economy, playing a pivotal role in fostering growth and development. This sector is instrumental in generating employment and contributing significantly to the Gross Domestic Product (GDP). By absorbing a considerable portion of the workforce, the manufacturing sector reduces dependency on agriculture and promotes economic diversification through stable and skilled job opportunities. Furthermore, manufacturing adds substantial value to raw materials, reflecting the country's industrial strength and export capabilities.

Currently, India's manufacturing sector exhibits a dual nature with notable strengths and significant weaknesses. On the positive side, India benefits from an abundant and youthful workforce, a diverse industrial base, and an expanding domestic market. These factors provide a solid foundation for demand and potential growth. However, the sector also faces critical challenges, including high business costs due to complex regulations and inadequate infrastructure, a significant skills gap, limited access to financing, and fierce global competition. These obstacles hinder the sector's efficiency and growth potential.

This research aims to identify the primary obstacles impeding the growth of India's manufacturing sector and propose viable solutions. By analyzing the current state of the sector and drawing comparisons with successful international strategies, particularly China's manufacturing boom, this study provides insights into policy reforms, investment in infrastructure, and the promotion of innovation. The findings highlight the importance of public-private partnerships, continuous learning, and robust monitoring mechanisms to cultivate a competitive manufacturing environment. Future research should explore the long-term impacts of policy changes and the integration of new technologies within the sector.

The current state of manufacturing in India presents a mixed picture:

Strengths:

- **Abundant and young workforce:** India possesses a vibrant demographic dividend with a growing pool of potential workers.
- **Diverse industrial base:** The manufacturing sector encompasses a wide array of industries ranging from textiles and pharmaceuticals to automobiles and steel.
- **Expanding domestic market:** India benefits from a large and continuously growing domestic market, providing a solid foundation for demand.

Weaknesses:

- High business costs: Complex regulations and infrastructure deficiencies inflate production costs, making it challenging for businesses to operate efficiently.
- Skill gap: There exists a disparity between available skills and industry requirements, leading to reduced productivity.
- Limited access to financing: Challenges in obtaining credit hinder investments in technology and expansion, constraining growth opportunities.
- Unstable infrastructure: Inconsistencies in power supply and logistical bottlenecks result in operational inefficiencies.
- Global competition: Intense competition from low-cost producers exerts pressure on profit margins, posing a significant challenge.

Research Objective:

The primary goal of this research is to identify the key obstacles hindering the growth of India's manufacturing sector. By conducting a thorough analysis of these challenges, the research aims to propose potential solutions that can foster a more robust and competitive manufacturing environment, thereby driving India's economic advancement.

II. Literature review:

Gupta, P., Hasan, R., & Kumar, U. (2008). What Constrains Indian Manufacturing: The article delves into the trajectory of India's manufacturing sector over the last two decades, observing that despite significant reforms, anticipated growth and employment enhancements have not materialized as expected.

Key observations reveal a divergence in post-reform performance among various industries, particularly those reliant on infrastructure, external funding, and labor-intensive operations, which have not fully reaped the benefits of the reforms.

This analysis underscores the pivotal role of infrastructure and financial sector advancements in catalyzing manufacturing expansion, emphasizing the urgency of addressing the obstacles faced by labor-intensive industries.

Significantly, this research contributes to understanding the intricacies of economic reform and its differential impact across sectors, underscoring the necessity for targeted interventions to unleash the manufacturing potential within India.

Singh, M.P., Meena, R., & Panwar, A. (2016). A survey on the adoption of lean practices in Indian manufacturing sector: The article delves into the implementation of lean manufacturing practices in India, with a primary focus on minimizing waste and optimizing efficiency by eliminating non-value-added activities.

Among the various lean tools discussed, 5S emerges as the most widely utilized in Indian industries, underscoring the significance of organized workplaces in enhancing operational procedures.

Value Stream Mapping (VSM) stands out as a fundamental lean practice, involving the comprehensive depiction of material and information flows necessary for product delivery. Its objective is to achieve seamless production by identifying and eradicating waste, shortening process cycle times, and implementing process enhancements. VSM facilitates a clear visualization of workflow across all processes, highlighting areas of waste and fostering a shared understanding of post-improvement operations.

Total Productive Maintenance (TPM) represents a comprehensive approach to equipment maintenance, aiming for flawless production by eliminating breakdowns, small stops, defects, and ensuring a safe working environment. TPM emphasizes proactive and preventive maintenance, blurring the lines between production and maintenance responsibilities, empowering operators to contribute to equipment upkeep. The traditional TPM framework integrates 5S as its foundation and includes eight additional pillars like autonomous maintenance and planned maintenance activities. TPM fosters collective engagement in small group improvement initiatives to enhance equipment efficiency and reduce waste.

The article examines lean manufacturing as a methodology aimed at minimizing waste and maximizing value-added tasks, highlighting its slow adoption in India and the hurdles faced by Indian industries in embracing lean principles.

A survey conducted within Indian manufacturing sectors aimed to gauge the current state of lean initiatives, intending to offer guidance on tool selection and practice prioritization to address potential inefficiencies.

The research underscores the multifaceted nature of lean implementation in India, emphasizing a thorough exploration of its status and the uncertainties surrounding its applicability within Indian manufacturing contexts.

Various lean tools and techniques, including 5S, value stream mapping, and total productive maintenance are outlined in the article, along with discussions on their integration into Indian industries.

Eid, R. (2009). Factors affecting the success of world class manufacturing implementation in less developed countries: The case of Egypt.

Purpose

The study aims to identify the key determinants that influence the successful implementation of world-class manufacturing (WCM) in less developed countries, with a specific focus on Egypt.

Methodology

A self-administered questionnaire was distributed to 200 manufacturing firms in Egypt, and the responses from 96 firms were analyzed.

Findings

The research identifies seven critical factors that are essential for the successful implementation of WCM in Egypt. These factors are categorized into strategic and tactical groups, both of which have a significant impact on the WCM implementation process.

Implications

The study provides valuable insights for professionals involved in WCM projects, highlighting the importance of understanding these critical success factors to ensure effective implementation and enhance competitiveness in the global market.

Research Methodology:

The methodology involved gathering data via a self-administered questionnaire dispersed among 200 Egyptian manufacturing firms, with 96 responses being utilized for analysis. Respondents were tasked with rating the significance of various factors contributing to WCM implementation success and their presence within their respective firms.

Critical Factors for WCM Success:

The study identifies seven pivotal factors essential for WCM success, categorized into strategic and tactical domains, which were validated through empirical examination of the surveyed companies.

Implications for Practice:

The findings furnish professionals spearheading WCM implementation with valuable insights, offering guidance on project management and strategies for addressing workforce attitudes toward WCM adoption.

The article stresses the importance of comprehending both the strategic and tactical elements influencing the successful integration of WCM techniques, particularly crucial for Egyptian manufacturers seeking to compete on a global scale. Moreover, it advocates for further empirical scrutiny to refine these factors and delve deeper into their interconnectedness. This research contributes significantly to the literature by demonstrating the specific influence of these factors on WCM implementation success within the context of a less-developed country.

Theoretical frameworks that can be used to analyze problems and solutions.

1. Industrial Policy Frameworks:

Export-Oriented Industrialization (EOI): This approach prioritizes boosting exports to drive industrial growth. Examine how governmental policies can facilitate exports through trade agreements, infrastructure development, and export financing initiatives.

Import Substitution Industrialization (ISI): This strategy aims at nurturing domestic industries to replace imported goods. Evaluate its efficacy within the Indian context, considering its potential inefficiencies and limitations.

Cluster Development: This framework explores the potential benefits of promoting geographically concentrated clusters of interconnected businesses to enhance innovation and competitiveness. Assess how fostering manufacturing clusters in India could tackle challenges and create synergies.

2. Competitiveness Theory Frameworks:

Porter's Diamond: Michael Porter's Diamond Model identifies factors influencing a nation's competitive advantage in specific industries. Analyze how India can leverage its factor endowments such as skilled labor and infrastructure, and enhance strategy, rivalry, and supporting industries to bolster manufacturing competitiveness.

Global Value Chains (GVCs): This framework studies the dispersion of production processes across different countries. Investigate how India can strategically position itself within GVCs, potentially focusing on high-value activities or specializing in specific segments.

3. Technological Advancement Frameworks:

Industry 4.0: This framework underscores the integration of digital technologies like automation, AI, and Big Data into manufacturing. Evaluate how adopting Industry 4.0 can assist Indian manufacturers in addressing challenges related to productivity, efficiency, and innovation.

Sustainable Manufacturing: This approach prioritizes environmentally friendly and resource-efficient manufacturing practices. Explore how promoting sustainable practices can enhance competitiveness and address environmental concerns within the Indian manufacturing sector.

Problems in manufacturing sector

The Indian manufacturing sector, although brimming with potential, encounters significant hurdles that impede its progress. Let's explore these challenges in depth:

1. Elevated Business Costs:

Complex Regulatory Framework: India's regulatory landscape is often described as burdensome, necessitating multiple permits and approvals for establishing and operating manufacturing facilities. This intricacy results in both time and cost burdens for businesses.

Infrastructure Limitations: Inadequate infrastructure, including deficient roadways, unreliable power distribution, and inefficient logistics networks, amplifies transportation expenses and disrupts production schedules.

Taxation and Labor Expenses: Despite relatively lower wages compared to developed nations, intricate tax systems and inflexible labor laws inflate overall manufacturing costs.

2. Skill Shortage:

Competency Gap: The skill sets prevalent in the workforce often fall short of the demands of modern manufacturing, particularly in areas like automation, robotics, and digital technologies. This deficit impedes productivity and innovation.

Deficiency in Vocational Training: The educational framework in India prioritizes theoretical learning over practical skill development, resulting in a scarcity of adequately trained workers.

Emigration of Talent: Talented individuals frequently migrate to foreign nations in pursuit of better prospects, further depleting the pool of skilled labor within the manufacturing sector.

3. Limited Financial Access:

High Interest Rates: Small and medium-sized enterprises (SMEs), integral to Indian manufacturing, encounter obstacles in securing credit due to stringent loan prerequisites and exorbitant interest rates.

Collateral Requirements: Financial institutions often demand substantial collateral, which smaller manufacturers may lack, further constraining access to financing for expansions and investments.

Scarce Venture Capital: In comparison to developed economies, India possesses a smaller reservoir of readily available venture capital for investment in innovative manufacturing startups.

4. Unreliable Energy Supply and Logistical Challenges:

Power Interruptions: Frequent power disruptions disrupt production workflows and damage equipment, resulting in inefficiencies and heightened expenses.

Logistical Infrastructure: Obsolete transportation systems lead to delays, elevated transportation costs, and complications in reaching markets expediently.

Warehouse Limitations: Inadequate warehousing facilities contribute to storage issues, affecting production planning and timely product delivery.

5. Global Competitive Pressures, Particularly from Economies with Lower Costs:

Emerging Market Competition: Nations like Vietnam and Bangladesh, with lower labor expenses, allure multinational corporations and present a pricing and competitiveness challenge for Indian manufacturers.

Impact of Free Trade Agreements: Free trade agreements expose Indian manufacturers to heightened competition from foreign counterparts, particularly in sectors with narrower profit margins.

Innovation Constraints: The relatively stagnant innovation and product development landscape make it arduous for Indian manufacturers to compete with global entities offering technologically advanced products.

These represent the primary obstacles obstructing the advancement of India's manufacturing sector.

Potential Solutions and Strategies

Simplifying regulations and enhancing infrastructure:

Government actions: Simplify regulatory processes, diminish bureaucratic obstacles, and foster a more conducive business environment by promoting transparency and accountability.

Industry-led efforts: Collaborate with industry associations to advocate for policy reforms aimed at facilitating smoother business operations.

Company-level tactics: Enterprises should stay updated on regulatory adjustments and actively engage with policymakers to voice concerns and suggest improvements.

Investing in skill development programs:

Government interventions: Allocate resources towards vocational training, apprenticeships, and skill enhancement initiatives to bridge the gap between educational offerings and industry demands.

Industry-driven initiatives: Forge partnerships with educational institutions to design curriculum aligned with industry needs and promote continuous learning among employees.

Firm-specific strategies: Invest in employee training and development, fostering a culture of ongoing learning within the organization.

Facilitating access to credit and financial assistance:

Government actions: Enhance credit accessibility for manufacturers, particularly SMEs, by streamlining loan application procedures and making financing options more readily available.

Industry-led endeavors: Collaborate with financial institutions to craft tailored financial solutions catering to the needs of manufacturing entities.

Company-level approaches: Maintain robust financial records, explore alternative funding avenues, and cultivate strong relationships with banks and lenders.

Promoting innovation and technological advancements (Industry 4.0):

Government initiatives: Provide incentives for research and development activities through tax incentives, grants, and subsidies, fostering an environment conducive to innovation.

Industry-driven actions: Foster collaboration between academia, research bodies, and industry stakeholders, investing in advanced technologies to drive innovation.

Firm-specific strategies: Embrace automation, data analytics, and smart manufacturing practices, leveraging IoT solutions to enhance operational efficiency.

Focus on specific high-growth manufacturing sectors:

Government policies: Identify and support sectors with significant growth potential, tailoring policies and incentives to encourage development in areas such as electronics, pharmaceuticals, and renewable energy.

Industry-led initiatives: Establish industry clusters or hubs to facilitate knowledge sharing, resource pooling, and adoption of best practices.

Company-level tactics: Expand product offerings, explore opportunities in export markets, and remain agile to adapt to evolving consumer preferences.

Implementation and Challenges

Policy Inertia and Bureaucratic Hurdles: Reforms initiated by the government may encounter delays due to policy inertia, while bureaucratic procedures can impede the timely implementation of streamlined regulations and infrastructure enhancements.

Allocation of Funding and Resources: Substantial investments are necessary for skill development and technological upgrades, presenting a challenge in effectively allocating adequate funds and resources.

Coordination Among Stakeholders: Ensuring efficient collaboration among government entities, industries, and educational institutions requires overcoming operational silos and communication barriers.

Resistance to Change: Some segments within the manufacturing sector may resist adopting new technologies and processes, particularly among firms accustomed to traditional methods.

Quality of Education and Training: The alignment of educational programs with industry requirements is critical, yet the consistency and relevance of training initiatives may vary, posing a challenge.

Collaborative Strategies for Successful Implementation:

Public-Private Partnerships (PPPs): Encourage partnerships between the public and private sectors to capitalize on their respective strengths in infrastructure development, skill training, and technology adoption.

Policy Frameworks and Incentive Structures: The government can establish conducive policy frameworks and offer incentives to incentivize industry engagement in reforms and innovation.

Integrated Education Approach: Educational institutions should collaborate closely with industry experts to design curricula that meet current industry standards and anticipate future needs.

Adaptability and Lifelong Learning: Industries should cultivate a culture of adaptability and continuous learning to remain abreast of technological advancements and evolving market demands.

Monitoring and Evaluation: Implement robust monitoring and evaluation mechanisms to track initiative progress and make informed, data-driven decisions for ongoing enhancement.

III. Conclusion and Recommendations

Key Findings: The Indian manufacturing sector faces significant challenges including intricate regulations, high business costs, a shortage of skilled labor, limited access to financial resources, unreliable infrastructure, and stiff global competition, particularly from low-cost producers. Promising solutions entail streamlining regulations, enhancing infrastructure, investing in skill development, facilitating financial access, promoting innovation and technological advancements like Industry 4.0, and focusing on high-growth manufacturing sub-sectors.

Policy Recommendations:

Government actions should involve implementing policy reforms to simplify regulations, increasing infrastructure investment, fostering public-private partnerships for skill development, creating accessible financial schemes for SMEs, and supporting R&D and innovation through subsidies and tax incentives.

Industry players should prioritize continuous learning and upskilling, adopt advanced manufacturing technologies, explore niche markets and export opportunities, and collaborate with educational institutions to align training with industry demands.

We should also consider the economies which were successful in developing their manufacturing sector.

China's Manufacturing Boom: A Case Study

China's journey to becoming a global manufacturing giant is an inspiring tale, offering valuable insights for developing countries. Here, we explore the key factors behind this transformation:

Policy and Reform (Post-1978):

- Transition from a Centrally Planned Economy:** After 1978, China moved away from a centrally planned economy towards a market-oriented system. This shift unleashed entrepreneurial energy and allowed businesses to adapt to market demands.
- Creation of Special Economic Zones (SEZs):** SEZs served as experimental grounds for market reforms and foreign investment. These zones offered tax incentives, streamlined regulations, and modern infrastructure, attracting foreign companies with advanced technology and expertise.
- Promotion of Foreign Direct Investment (FDI):** China actively welcomed FDI, enabling foreign companies to establish factories and joint ventures. This influx of capital facilitated technology transfer and integration into global markets.

Labor and Infrastructure:

- Abundant, Cost-Effective Workforce:** China had a large pool of low-cost labor, making it an attractive destination for companies seeking economical production.
- Significant Infrastructure Development:** The government invested heavily in developing infrastructure, such as transportation networks, power grids, and communication systems, enhancing efficiency and facilitating the movement of goods domestically and for export.

Emphasis on Efficiency and Scale:

- Export-Focused Strategy:** China adopted an export-oriented approach, prioritizing the production of goods for international markets. This strategy emphasized efficiency and economies of scale to keep costs low and remain competitive.
- Formation of Industrial Clusters:** The development of industrial clusters encouraged collaboration and knowledge sharing among manufacturers, leading to further efficiency gains and innovation.

Challenges and Future Directions:

- Rising Costs:** In recent years, wages and other production costs in China have increased, reducing its competitive advantage in labor-intensive industries.
- Environmental Issues:** Rapid industrialization has resulted in significant environmental pollution. China now faces the challenge of balancing economic growth with environmental sustainability.
- Focus on Innovation:** To sustain its manufacturing leadership, China is shifting towards technological innovation and advancing up the value chain to produce high-tech products.

Lessons Learned:

China's experience provides valuable lessons for developing nations:

- Adopting Market-Oriented Reforms:** Transitioning to a market economy can unleash entrepreneurial potential and drive economic growth.
- Strategic Investments:** Investing in infrastructure and education is crucial for establishing a robust manufacturing base.
- Balancing Costs and Innovation:** Maintaining competitiveness requires focusing on both cost-efficiency and technological advancement.
- Pursuing Sustainable Growth:** Economic development must be pursued in a way that protects the environment for future generations.

Conclusion and Recommendations

This research underscores the significant challenges faced by India's manufacturing sector, including intricate regulations, high operational costs, skill shortages, limited financing access, unreliable infrastructure, and intense global competition. Tackling these issues is essential for the sector to maximize its potential and significantly contribute to India's economic growth.

Key Findings

- Regulatory Complexity:** Simplifying regulations can lower business costs and improve operational efficiency.
- Infrastructure Deficiencies:** Investing in infrastructure is crucial for supporting efficient manufacturing operations.
- Skill Gaps:** Addressing skill shortages through targeted education and industry partnerships is vital.
- Financial Access:** Enhancing access to finance, particularly for SMEs, can drive innovation and growth.
- Technological Advancements:** Embracing technologies like Industry 4.0 can enhance productivity and competitiveness.
- Global Competition:** Focusing on high-growth manufacturing sub-sectors and pursuing export opportunities can alleviate competitive pressures.

Policy Recommendations

1. **Regulatory Reforms:** Streamline regulations to reduce compliance costs and foster business activities.
2. **Infrastructure Investment:** Improve infrastructure to ensure reliable power, transportation, and communication systems.
3. **Skill Development:** Implement vocational training and continuous learning programs that meet industry needs.
4. **Financial Support:** Develop accessible financial schemes and incentives to support SMEs and stimulate innovation.
5. **Public-Private Partnerships (PPPs):** Utilize PPPs to enhance infrastructure, skill training, and technology adoption.
6. **Incentives for Innovation:** Offer tax incentives, grants, and subsidies to promote R&D and technological advancements.
7. **Focus on High-Growth Sectors:** Identify and support sectors with substantial growth potential through tailored policies and incentives.

Future Research Directions

Future research should examine the long-term impacts of these policy changes and the integration of new technologies within the manufacturing sector. Additionally, comparative studies with other developing countries could offer valuable insights into best practices and innovative strategies for sustainable growth in manufacturing.

Addressing these challenges and implementing the proposed solutions can enable India to develop a robust and competitive manufacturing environment, driving economic progress and establishing itself as a global manufacturing leader.

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