

Investigating the Factors Affecting Supply Chain Efficiency in India's Manufacturing Sector

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ABSTRACT

The manufacturing sector in India is striving to improve supply chain efficiency by streamlining processes such as procurement, production, logistics, and inventory management in order to reduce costs, waste, and speed, employing strategies such as digitalization, artificial intelligence, just-in-time manufacturing, and collaboration to increase competitiveness and satisfy rising domestic and international demand. Despite the fact that challenges in infrastructure and disruptions continue to exist, there is a growing trend toward the development of resilient and agile networks. The purpose of this study is to suggest a number of factors that influence the supply chain performance of manufacturing companies in India. A thorough assessment of empirical research publications on supply chain management (SCM) and performance measurement methodologies served as the basis for the summary of the factors. This study is a component of a broader investigation on activities relating to SC. To find research gaps in the context of supply chain performance evaluation and to suggest future research topics, a critical analysis is conducted. Additionally, a conceptual model is suggested. A critical analysis of a few chosen publications gave rise to the hypothesis that some factors may have a major impact on SC performance. It is evident how several metrics, extracted from the literature research, impact SC's performance and, ultimately, its ability to compete. In the context of Indian manufacturing companies, single research examines a number of elements, including supplier-buyer relationships, the external supply chain, environmental thoughts, human metrics, information exchange, and performance assessment techniques. The items were reduced as a consequence of empirical testing, which were based on pilot research with a sample size of 100. Based on the results, the businesses may improve their present practices and plans by concentrating on the factors that have a substantial impact on SCM performance. To generalize the findings, other studies may be conducted utilizing data from different supply chains in other Indian sectors and businesses.

INTRODUCTION

In India, the manufacturing sector is seeing significant growth, but in the majority of industrialized nations, it is shrinking. In accordance with research that was published on the manufacturing sector on a worldwide scale, the number of employees at firms in the West has been steadily declining over the course of the last few decades. This has led to an improvement in the efficiency of production, and lean manufacturing techniques are virtually universally implemented. The primary focus of emerging markets is mass production, and they compete primarily on the basis of price. The Asian nations of China, India, and Korea are ranked first, second, and third, respectively, in the Global Competitiveness Index. According to the findings of the survey, a significant number of manufacturing executives—49 percent of those internationally and 54 percent of those in the United States—acknowledge that their organizations do not currently have visibility of their supply chain beyond tier-1 suppliers.

A survey that is conducted annually with the participation of 300 individuals from around the world is meant to investigate trends in global supply chains. In this survey, respondents are asked to provide answers that are relevant to areas of critical concern. These areas include the following: the process of designing the future configuration of supply chain networks in the context of increased globalization and outsourcing, maintaining product quality and safety while managing numerous internal and external channel partners across the globe, and setting new priorities on the company's agenda to ensure supply chain flexibility and to shape the requirements for high-performance supply

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chains [3]. The purpose of the study is to collect important information on the methods by which industry leaders were expanding their supply chain operations in order to get a competitive edge in the current demanding business climate. A number of different approaches that businesses utilize in order to handle their supply chains on a worldwide scale are uncovered by the survey. There have been a few significant trends seen that are propelling the creation of new and inventive supply chain designs and configurations in sectors across the board. The trends that have been identified are as follows: the increasing rate at which globalization is taking place, which has led to significant structural transformations for supply chain organizations throughout the world, and the emergence of novel difficulties in effectively managing supply chain performance and the agenda of the company in various industries. Additionally, there is a convergence of the company's agenda across different industries and geographical areas with regard to enhancing supply chain flexibility and performance.

The maturity of a company's supply chain is a significant factor in determining its performance and overall profitability. In the local marketplaces, the manufacturing sectors of India are seeing competition from two sources: international corporations and imported goods. The recently introduced parameters of competition consist of the following: a reduction in cost, an increase in the quality of products, an expansion of the variety of items that are available, and a further improvement in the quality of services. All of these improvements are expected to be achieved simultaneously (Dangayach and Deshmukh, 2003). As it is common knowledge, a large number of companies have not been successful in maximizing the potential of their supply chain due to the fact that they have not been able to develop the performance measures and metrics that are necessary to achieve the complete integration of their supply chain. As a result, this has prevented them from maximizing their effectiveness and efficiency.

In the recent past, a large number of businesses have come to the realization of the significant impact that supply chain management can have on their everyday operations. However, there are a number of businesses that lack the necessary understanding to create the efficient performance measurements and metrics that are required in order to build a supply chain management system that is completely integrated. The reason for this is because they lack access to a balanced approach and a clear distribution between the measurements at strategic, tactical, and operational levels (Bhagwat & Sharma, 2007). Furthermore, there is no way to enhance something that cannot be quantified. Despite the fact that supply chain management is a highly relevant topic in the present day, there is still no appropriate instrument that can be used to assess the effectiveness of the supply chain in any manufacturing business. In contrast to measurements of productivity or quality, which can be objectively quantified and stated as a unit or ratio, measurements of the supply chain are more akin to qualitative statements. According to Chen and Paulraj (2004), determining the performance of supply chains (SCP) can be of assistance in achieving a greater knowledge of supply chains as well as enhancing the overall performance of supply chains.

SUPPLY CHAIN AND THE MANAGEMENT OF THE SUPPLY CHAIN

According to Christopher (1992), a supply chain is a network of businesses that collaborate to carry out a range of processes and activities with the goal of creating value in the form of products and services for end customers. A supply chain is a network of organizations that are interconnected through upstream and downstream connections. This network is involved in the many processes and activities that result in the production of value in the form of products and services, which are ultimately delivered to the final customer (Christopher, 1998). Supply chain (SC) is defined as "the network of facilities and activities that performs the functions of product development, procurement of material from suppliers, the movement of materials between facilities, the manufacturing of products, the distribution of finished goods to customers, and after-market support for sustainment.

The efficiency of India's manufacturing supply chain is contingent upon a variety of factors, including infrastructure (roads, ports), technology adoption (digitization), supplier collaboration, inventory management, and government policies. The challenges that the supply chain faces include logistical bottlenecks, fragmented networks, and demand volatility, all of which have an impact on performance. To overcome these challenges, integrated solutions are required in order to reduce costs, improve speed, and increase customer satisfaction. Robust planning, information sharing, solid supplier connections, efficient warehousing, and the use of digital tools like as artificial intelligence (AI) and the Internet of Things (IoT) for real-time visibility and improved decision-making are all critical factors that contribute to improvement.

FACTORS AFFECTING EFFICIENCY

- **External Supply Chain (ESC):** A unifying characteristic across all world-class enterprises in India, regardless of whether they operate in textiles, automobiles, or pharmaceuticals, is the developed and maintained supply chain network. The current supply chains have been reinforced via enhanced

collaboration. Collaboration with external partners is now essential. Strategic partners across the global supply chain cooperate to determine shared company objectives and action plans. Currently, thought has evolved beyond basic supply chains to intricate networks of firms collaborating to generate competitive advantage and value, referred to as value networks. As a result, networks are evolving to intersect organizational boundaries, transitioning from inter-organizational to trans-organizational networks. The distinctions between "traditional" and "networked" organizations are extensively examined in the literature (Gunasekaran et al., 2005). An effective logistics network may diminish overall supply chain expenses, including production and procurement costs, inventory management costs, facility expenditures (fixed costs), labor costs, and transportation costs.

- **Elements of the Environment (EOTE):** The impacts of globalization, technology, and the increasing necessity for environmental responsibility and sustainability are compelling enterprises and individuals to modify their work practices. In the research that was conducted by the Ministry of Corporate Affairs in collaboration with the industry association known as the Confederation of Indian Industry (CII), it was discovered that the private sector plays a significant role in fostering inclusive growth through their involvement in Corporate Social Responsibility (CSR). The overwhelming majority of large Indian firms have a corporate social responsibility (CSR) initiative.
- **Metrics for Humans (HM):** When defining and putting into practice the important PMs and metrics, behavioral concerns have a significant impact. Choosing the appropriate PMs and metrics also heavily depends on cultural and political considerations. Organizations share a great deal of trust, dedication, and cooperation. Additionally, top management support and organizational capabilities are necessary for an efficient SCM (Mello and Stank, 2005). The efficiency of supply chain management (SCM) is said to be greatly impacted by the human factor (Tony and Kelvin, 2007). It is also a crucial component in accomplishing operational and strategic goals and supply chain modifications (Hoek, Chatham, and Wilding, 2002).
- **Information Sharing (IS):** The exchange of information is referred to as "information sharing" (IS). the term "information sharing" refers to the ability of business partners to monitor the status of orders and goods as they go through the various phases or processes in the supply chain. This is made possible by their ability to access private data. The components that constitute the sharing of information include the consistent collecting, processing, storage, display, retrieval, and broadcasting of demand and forecast data, inventory status and location, order status, cost-related data, and performance status.
- **Methods for Evaluating Supply Performance (SPA):** The majority of firms employ financial and non-financial performance measurement methodologies; however, they do not present them within a balanced framework. The fundamental inquiry is to the appropriateness of financial and non-financial performance metrics for assessing the efficacy of a supply chain system. For instance, strategic-level project managers mostly rely on financial figures. Project managers at the tactical level can be assessed utilizing both financial and non-financial metrics. The assessment of operational level performance mostly relies on non-financial metrics. Some organizations focus on financial performance metrics, while others emphasize operational metrics.
- **Infrastructure & Logistics:** The time and expense of transportation are increased by factors such as the low quality of roads, congested ports, and restricted rail networks, particularly when it comes to the last leg of delivery.
- **Technology & Digitization:** While the use of information technology, automation, and data analytics (artificial intelligence and the Internet of Things) improves the accuracy of forecasting, inventory management, and transparency, the application of these technologies in micro, small, and medium-sized enterprises (MSMEs) continues to be a significant obstacle.
- **Supplier Relationship Management:** Lead times and production schedules are directly affected by the strength of collaboration, the exchange of information, and the reliability of suppliers.
- **Inventory Management:** It is essential to optimize inventory levels in order to prevent stockouts, which occur when demand is not satisfied, or overstocking, which results in waste. Both of these situations are detrimental to cost management.

- **Demand Forecasting & Planning:** The avoidance of inefficiencies may be accomplished by the use of precise forecasting, which allows for the alignment of production with consumer demand.
- **Government Policies & Regulations:** Supportive policies and stable environments are conducive to investment in modern supply chain management (SCM) since they eliminate uncertainty.

MAJOR CHALLENGES IN INDIA

1. **Fragmented Network:** A mix of large corporations and numerous small players (MSMEs) with varying capabilities.
2. **Logistical Bottlenecks:** Inefficient transportation and warehousing infrastructure.
3. **Information Asymmetry:** Lack of real-time data sharing across the chain.
4. **Cost Pressures:** High logistics costs and competitive pricing.

STRATEGIES FOR IMPROVEMENT

- **Digital Transformation:** Implement SCM software, IoT sensors, and AI for predictive analytics.
- **Integrated Logistics:** Develop multi-modal transport and modern warehousing.
- **Strategic Partnerships:** Foster collaboration and trust with suppliers and customers.
- **Focus on the 7 Rs:** Ensure the Right product, quantity, condition, place, time, customer, and price.
- **Risk Management:** Build resilience against operational, financial, and geopolitical risks.

CONCLUSION

The phrase "supply chain management" allows for a supply chain to be understood from a variety of perspectives, depending on the relationship between the client and the provider. There is no one, definitive method for establishing a plan of action that leads to an assessment of supply chain performance at its best possible level. The technique that has been provided gives logistical networks an inventive tool that they may use to create a balanced performance measurement for the whole supply chain. The suggested model establishes a correlational link among supplier-buyer relationships, external supply chains, environmental variables, information exchange, performance assessment methodologies, and supply chain management performance. The authors want to address the deficiency of study in supply chain management about the importance of crucial success determinants in Indian manufacturing enterprises. The next study based on the suggested model aims to examine the essential success variables that enhance SCM performance to bolster the competitive edge of Indian manufacturing businesses.

The primary problem that managers face is the development of appropriate performance metrics and measurements in order to make well-informed decisions that will ultimately lead to an enhanced level of competitiveness at the organizational level. The topic at hand is whether it is possible to utilize traditional metrics for performance evaluation, and if so, which of these metrics should be given importance when evaluating performance in a new business context. Furthermore, it is the intention to emphasize the rationale that justifies the choice of suitable metrics that will provide managers with the relevant information at the appropriate moment in order to make decisions that will improve the competitiveness of the business. However, this research only considers a restricted number of manufacturing companies that are based in India. It is possible to extend it to other organizations in the future.

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