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A STUDY ON SUPPLY CHAIN MANAGEMENT ON COSTING OF MANUFACTURING INDUSTRIES

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ABSTRACT

Since the liberalization reforms of the 1990s, India's economy has undergone substantial changes that have accelerated industrial expansion and increased competitiveness. The significance of Supply Chain Management (SCM) in augmenting organizational performance and competitiveness has been emphasized by this progression. This research explores the complex aspects of supply chain management (SCM) in the context of India's rapidly expanding manufacturing sector, which has shown significant growth rates in recent years.

The paper follows the development of SCM conceptually and historically, noting significant turning points including the emergence of globalization and scientific breakthroughs. It clarifies the fundamental ideas and purposes of supply chain management (SCM), highlighting the crucial part it plays in combining various business processes, making the most use of available resources, and encouraging cooperation among supply chain networks. Additionally, the research delves into how SCM paradigms are changing in response to shifting market conditions and technological advancements... It looks at the strategic imperatives that drive SCM methods, such as operational agility, demand management, and customer centricity. The revolutionary influence of Information Technology (IT) integration on the competitive advantage and effectiveness of supply chain management is given particular attention. Furthermore, considering India's distinct economic and logistical environment, the study provides insights into the opportunities and problems inherent in SCM within the Indian setting. It highlights the crucial role that supply chain management (SCM) plays in promoting efficiency, cost containment, and market responsiveness by analyzing significant trends and projections in India's logistics sector.

Introduction

India is among the economies with the fastest growth. In the fiscal year 2015, India's manufacturing sector grew at a rate of 7.1%, and in the most recent quarter, it grew at a robust 8.4%. 3.3% in 2013 and 4.4% in 2014. This indicates a consistent growth in India's manufacturing industry. Supply chain management is seeing growth along with the industry's demand.
The Indian economy has seen significant changes since the 1990s, with the industrial sector expanding quickly following the 1991 Reforms in the Economic Policy (LPG) carried out by the then-prime minister, Mr. P. V. Narasimha Rao. The competition and difficulties in delivering goods and services at the best possible price at the appropriate location and time have intensified because of this development. Thus, the organisations began focusing on optimising the entire manufacturing process. They discovered that it was advantageous to focus on the supply chain process in addition to the production process since they believed it to be the most crucial for maintaining market competitiveness.
Over the past few years, supply chain has been increasingly important in improving the performance of the company. Researchers must focus on finding new approaches to suit customer wants in the highly competitive world of today. Today's business environment is more global and competitive than it was in the past since new product advancements and enhancements happen frequently, and short product life cycles are preferred. Not only that, but customers of days are highly knowledgeable, well-informed, and equipped with cutting-edge technology due to the explosion of information technology. This situation requires the organisations to become more innovative and fiercely competitive to position themselves for a prompt response. For this reason, they ought to applaud modifications made between the first and last steps. When reacting to consumer and market demands, they must to be adaptable.

Supply Chain Management

Research is evident that Supply Chain Management plays a vital role for an organization to gain and maintain the competitive advantage. It even improves the overall organizational performance by enhancing the quality in products and services, delivers and responses. So, the organizations have to realize the importance of SCM and its practices to stay in the competition.
According to Global Supply Chain Forum (GSCF), "Supply Chain Management is the integration of key business processes from end user through original suppliers that provide products; services and information that add value for the customers and other stakeholders.
Supply chain management is management of supply chain activities to maximize customer value and to achieve competitive advantage, which requires continuous effort by the supply chain firms to develop and run supply chain in an effective and efficient manner possible. Supply chain activities like product development, sourcing, production and logistics, and information systems are needed to coordinate the activities. Supply Chain in the organization is linked though physical and information flows. Physical flow means the transportation, movement and storage of goods and materials and are visible activities in the supply chain. Information flow coordinates the long-term plans and controls the day-to-day flow of goods and material up and down the supply chain.
According to Oxford English Dictionary logistics is the branch of military science relating to procuring, maintaining and transporting material, personnel and facilities. It is further defined as "the detailed coordination of a complex operation involving many people, facilities, or supplies", Normally logistics is seen as a branch of engineering that creates "people systems" rather than "machine systems".
The Council of Logistics Management defined logistics as is, "having the right thing, at the right place, and at the right time". The other definition for Logistics is the process of planning, implementing, and controlling the flow of goods and services effectively and efficiently from the point of origin to the point of consumption.

Supply chain is the key focusing competitive advantage for any business, and it has become an important competitive advantage for organization's business. Studies on the management of supply chain emphasize maximizing the overall value of the firm by better utilizing and developing the resources across the whole firm. Supply chain adds the activities and connects the organizations suppliers and its customers. The main purpose of supply chain is receiving input from firm's suppliers, add value and deliver to customers.

A supply chain includes all the parties involved, directly or indirectly, in addressing a customer request. It includes manufacturer, suppliers, transporters, warehouses, retailers and even customers themselves. Every organization's supply chain includes all functions involved in receiving and filling a customer request like new product development, marketing, operation, distribution, finance, customer service and other function that related to serving customer request. Effective supply chain management is required to build the competitive advantage in the product and the services of the firm. "The performance of supply chain was influenced by managing and integrating key element of information into their supply chain". To achieve effective supply chain integration, theirms need to implement information that with the use of technology a firm can manage the flow and impact of many supply chain dimensions like quality, cost, flexibility, delivery, and profit. The information technology will have a direct influence on the importance of supply chain effectiveness. They even stated that the development and long-term utilization of information technology will lead to better firm performance in terms of return on investment (ROI, return on equity (ROI) and market share. The supply chain coordination and integration are facilitated by using integrated information technology, which directly impacts a financial performance of the firms. to achieve a competitive advantage and better performance, supply chain management strategy needs support of the business strategy.

- **Customer Relationship Management** - Provides the structure for developing and maintaining relationships with customers.

- **Customer Service Management** – introduces the firm to the customer, acts as a single source of customer information, and the key point of contact for administering the product service agreements.

- **Demand Management** –It balances the customers' requirements with supply chain capabilities. Concentrates in increasing supply chain flexibility by reducing the demand variability.

- **Order Fulfilment** – includes defining the customer requirements, design a network, and enabling the firm to meet customer request by minimizing the total delivered cost.

Objectives of SCPM

- Facilitates the enhancement of the efficiency and effectiveness of SCM.
- SCPM models and frameworks will support the management in measuring business performance, analyses and improve operational efficiency through better decision-making processes.
- Engages the organization's performance measurement system for bringing change in the organisation.
- It facilitates a better understanding among the SC members.
- It contributes to decision making in SCM, particularly in re-designing business goals and strategies, and re-engineering processes.

Emerging trends in supply chain management

The global supply chain is continually evolving to keep up with the current era's frenetic technical breakthroughs. Though it might be challenging for supply chain managers and business leaders to keep up with these developments, it is critical to do so in order to preserve supply chain resilience and boost your company's performance.

Supply Chain Management (SCM) spans a wide variety of tasks and necessitates meticulous attention to detail. As a result, most enterprise resource planning software includes SCM-specific modules and functionalities. Managers may use the software to improve supply chains, keep them operating as smoothly as possible, and avoid disruptions that harm customer service.

1- Artificial Intelligence (AI) & Automation

In several industries, the usage of artificial intelligence (AI) and automation is increasing. Automation, which has existed for decades, uses technology to reduce human inputs and is basically a machine completing a series of activities. There are several methods to apply AI and automation into your organization's workflow, ranging from improving your manufacturing line to powering digital twin technologies and everything in between.

2- Digital Supply Chain Twins

With social distancing and remote labor, digital has surpassed manual since it gives real-time data from across the supply chain as well as exact analytics. This helped to avoid several interruptions. They reconstruct a full supply chain and its procedures in a digital environment that is easily accessible.

Real-time data from IoT devices provides complete insight into everything, from consumer orders to specific commodities moving through the supply chain. It can detect production delays and their implications, as well as alert you to machinery that needs to be repaired.

They provide substantial benefits to sectors outside of supply chain management as well but need a significant financial and equipment commitment.

3- Circular supply chains

Sustainability has become one of the most crucial factors for the success of supply chain management businesses. Previously, linear supply chains caused waste by discarding unused components after producing a product.

REVIEW OF LITERATURE

1. **Crucial Factors Determining Manufacturing Cost: R.L. Daugherty (2011)** The authors emphasize the benefits of information systems including supply chain visibility and manual process cost reduction that come with ERP, MRP, and CRM. Effective inventory and transportation management, together with supply chain management strategies, integration, and visibility, are critical factors in reducing manufacturing costs. The literature underscores the importance of supply chain integration for coordinated activities, enabling manufacturers to enhance competitiveness, achieve sustainable growth, and reduce costs associated with production and delivery. The study highlights how putting information technologies like CRM, MRP, and ERP in place improves supply chain visibility while cutting costs associated with manual processes. For firms to reduce production and delivery costs and promote competitiveness and sustainable growth, supply chain management methods and integration particularly in inventory and transportation are essential.

2. **Supply chain management practices in manufacturing sector, M. Duran, and J. Puigjaner (2011)** With increased rivalry and globalization, the industrial sector is looking to improve supply chain management in order to cut costs. The present literature study outlines crucial strategies that reduce manufacturing costs, including inventory management, demand management, and supplier selection. Costs can be effectively decreased by improving coordination through the integration of supply chain activities, especially in the areas of distribution, production, and procurement. Supply chain coordination lowers manufacturing, inventory, and transportation costs while increasing efficiency. Information technology, such as RFID and ERP systems, are essential for supply chain management in order to reduce costs and increase visibility related to human procedures.

3. **The impact of supply chain management practices on cost reduction in the manufacturing industry, : N. T.H. Khan and M.S. Rahman's (2014)** : For manufacturers, efficient supply chain management techniques are essential in the highly competitive global economy. To cut expenses associated with faulty or delayed deliveries, the authors emphasize the critical significance that procedures like supplier selection play. The reduction of extra inventory expenses is emphasized by inventory management, especially with just-in-time procedures. The authors emphasize demand management and contend that coordinating production with demand lowers overtime and expedited shipping costs while improving customer satisfaction. Information technology—which includes RFID and ERP systems—

becomes a vital instrument for supply chain management, helping to reduce costs and increase visibility.

Research Gap

The present body of research on supply chain management (SCM) in the manufacturing industry places a strong emphasis on the significance of effective supply chain management for lowering costs and improving operational efficacy. However, the body of research does not include enough in-depth case studies that investigate the procedures and tactics that manufacturers employ to maximise the efficiency of their supply chains and minimise their expenses. Even though there are several studies that cover SCM practises in the manufacturing business, these studies frequently lack an in-depth investigation of the practises that are implemented and their impact on the amount of money saved.

Objective of study

- To investigate the present SCM practises and strategies employed by a medium- sized automotive manufacturing company to control production costs.
- Examine the effect of SCM on the costing of the manufacturing industry, particularly the automotive industry.
- Determine the critical success factors and obstacles in implementing effective SCM practises in the manufacturing sector.
- To provide actionable advice to other manufacturing firms seeking to optimize their supply chains and reduce costs.

SCOPE OF THE STUDY

- The effects of supply chain management (also known as SCM) on the pricing in the manufacturing sector will be the primary focus of this study.

- The research will take the form of a case study, focusing on a manufacturing company of medium size operating in the automobile industry.

Research Methodology and Data Collection

a. *Data Collection Method*

i. **Primary data:** The primary data for this study will be collected through a questionnaire designed to gather information on SUPPLY CHAIN MANAGEMENT ON COSTING OF MANUFACTURING INDUSTRIES
ii. **Secondary data:** The secondary data for this study will be collected through a literature review of relevant academic articles, reports, and government publications.

iii. **Sample design:** The sample design for this study involves selecting individual representatives or employees from 100 manufacturing companies in Bangalore.
iv. **Population**: The population for this study consists of manufacturing companies located in Bangalore, India.
v. **Sample size:** The study will collect data from a sample size of 50 manufacturing companies in Bangalore.
vi. **Sampling unit:** The sampling unit for this study is individual representatives or employees from the selected manufacturing companies.
vii. **Sampling method**: The sampling method used for this study is snowball sampling, which involves selecting respondents based on referrals from other respondents.

b. *Tools for Data Collection*

The primary data will be collected using a questionnaire that will be administered through Google Forms.

c. *Data Analysis Plan*

The data collected through the questionnaire will be analyzed using pie charts to provide a graphical representation of the responses.

d. *Statistical tools for analysis*

No statistical tools will be used for data analysis as this study will not involve any statistical testing or inferential analysis. Instead, the data will be analyzed using descriptive statistics.

Data Analysis and Interpretation
Hypothesis

1. HYPOTHESIS

Null Hypothesis (H0): Supply chain management practices do not significantly impact the costing of the manufacturing sector.
Alternative Hypothesis (H1): Supply chain management practices significantly impact the costing of the manufacturing sector.

2. Null Hypothesis (H0): There is no significant relationship between the strategies and technological solutions used by organizations and the optimization of supply chain management.

Alternative Hypothesis (H1): There is a significant relationship between the strategies and technological solutions used by organizations and the optimization of supply chain management.

3. Null Hypothesis (H0): Supply chain management practices do not significantly impact the costing of the manufacturing sector.

Alternative Hypothesis (H1): Supply chain management practices significantly impact the costing of the manufacturing sector.

Paired Samples Test

		Paired ... 95% Confidence Interval of the ... Upper	t	df	Sig. (2-tailed)
Pair 1	How important do you think supply chain management is in the costing of manufacturing sector - What are the challenges faced by organization in managing the supply chain	1.536	4.969	101	.000

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% ... Lower
Pair 1	How important do you think supply chain management is in the costing of manufacturing sector - What are the challenges faced by organization in managing the supply chain	Cohen's d	2.232	.492	.285
		Hedges' correction	2.240	.490	.284

Paired Samples Effect Sizes

			95% ... Upper
Pair 1	How important do you think supply chain management is in the costing of manufacturing sector - What are the challenges faced by organization in managing the supply chain	Cohen's d	.696
		Hedges' correction	.694

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

INTERPRETATION:

Accepting the hypothesis that supply chain management practices do not significantly impact the costing of the manufacturing sector requires a nuanced examination of various factors that may mitigate the direct influence of supply chain activities on manufacturing costs. While supply chain management undoubtedly plays a crucial role in optimizing operational efficiency and driving competitive advantage, several compelling reasons support the notion that its impact on costing may be less pronounced than commonly assumed.

One key consideration is the complexity and variability inherent in manufacturing cost structures. While supply chain management practices can influence certain cost components, such as procurement costs and logistics expenses, these represent only a fraction of the total cost structure for manufacturing organizations. Other factors, such as labor costs, overhead expenses, regulatory compliance, and market dynamics, may exert a more significant influence on overall costing, overshadowing the impact of supply chain activities.

Moreover, the efficacy of supply chain management practices in cost optimization may vary depending on the specific context and industry dynamics. While certain industries may benefit significantly from streamlined supply chain processes and just-in-time inventory management, others may face inherent constraints or structural barriers that limit the extent to which supply chain practices can drive cost reductions. For instance, industries characterized by long lead times, high customization requirements, or stringent quality standards may find it challenging to implement certain supply chain strategies without compromising other critical factors such as product quality or customer satisfaction.

In conclusion, while supply chain management practices undoubtedly play a critical role in driving operational efficiency and enhancing competitiveness in the manufacturing sector, several factors may mitigate their direct impact on costing. The complexity of manufacturing cost structures, industry-specific dynamics, globalization, technological advancements, external factors, and organizational heterogeneity all contribute to the nuanced relationship between supply chain management practices and costing. While supply chain optimization remains an essential strategic imperative for manufacturing organizations, the extent to which it influences costing may vary depending on a multitude of contextual factors.

2. Null Hypothesis (H0): There is no significant relationship between the strategies and technological solutions used by organizations and the optimization of supply chain management.

Alternative Hypothesis (H1): There is a significant relationship between the strategies and technological solutions used by organizations and the optimization of supply chain management.

Accepting the hypothesis that there is a significant relationship between the strategies and technological solutions used by organizations and the optimization of supply chain management involves recognizing the interplay between strategic decision-making and technological innovation in enhancing the efficiency and effectiveness of supply chain operations. Several compelling reasons support this assertion, highlighting the synergistic effects of strategic alignment and technological advancements on supply chain optimization.

Firstly, strategic alignment between organizational goals and supply chain management objectives is essential for driving cohesive and coordinated efforts towards optimization. Organizations that develop clear and focused supply chain strategies tailored to their business objectives are better positioned to leverage technological solutions effectively. For example, if an organization's strategic goal is to reduce lead times and improve responsiveness to customer demand, it may invest in technologies such as advanced analytics, real-time monitoring systems, and demand forecasting tools to enhance supply chain visibility and agility.

Moreover, technological solutions serve as enablers for implementing and operationalizing strategic initiatives within the supply chain. By leveraging technologies such as cloud computing, big data analytics, and artificial intelligence, organizations can automate routine tasks, analyze vast amounts of data, and derive actionable insights to support decision-making. For instance, predictive analytics algorithms can help organizations anticipate demand fluctuations and optimize inventory levels, thereby reducing stockouts and excess inventory costs.

Find and Suggestion

The report underscores the cost implications of supply chain disruptions and the necessity for organisations to have a well-defined strategy to manage risks. One recommendation from the study is to have a comprehensive strategy for managing risks in the supply chain. To reduce the negative effects of disruptions in the supply chain, companies had to carefully assess the feasibility of creating mitigation plans, transfer strategies, and contingency plans.

Adopt technological solutions: The findings of the study indicate that technology plays a key role in the management of supply chains, and as a result, businesses ought to adopt technological solutions such as customer relationship management systems, transportation management systems, and warehouse management systems. However, organisations should also address the challenges associated with implementing technology, such as resistance to change, complexity, and integration with existing systems. These are all issues that need to be addressed.

Create collaboration with suppliers: The study emphasises how important it is to collaborate with suppliers in order to optimise the supply chain. In order to create collaboration, organisations should think about collaborative planning and forecasting, exchanging data and information, and continuous improvement activities. Maintain a healthy equilibrium between cost cutting and environmental responsibility: the findings of this study indicate that businesses must maintain a healthy equilibrium between cost cutting and environmental responsibility because both aspects are equally

significant. Both of these factors are important for organisations to consider as they work to manage their supply chains, and they should make every effort to strike a balance between them.

The study found that organisations routinely evaluate and change their supply chain management strategy, with quarterly and semi-annual reviews being the most popular types of reviews. This suggests that supply chain management strategies should be reviewed and revised on a regular basis. To be able to quickly adjust to changes in the supply chain, however, organisations should seriously examine the possibility of conducting more frequent reviews, particularly during times of uncertainty.

In summary, the study emphasises the significance of supply chain management in manufacturing businesses, and it offers insightful information regarding both the difficulties and the most effective solutions to these problems. The aforementioned recommendations should be seriously considered for implementation by companies in order to maximise the effectiveness of their supply chain management, save costs, promote sustainability, and enhance efficiencies.

Conclusion

In conclusion, the research on the effects of supply chain management on the costing of manufacturing sectors has shown how essential efficient supply chain management is to the success of a company. According to the findings of the study, the management of supply chains, the reduction of costs, and the pursuit of sustainability are critical areas that organisations should focus on in order to achieve success The results of the poll were analysed, and the findings revealed that organisations confront several issues when it comes to the management of their supply chain. These challenges include managing the logistics and transportation, assuring the quality of raw materials, and preventing supply chain interruptions. According to the findings of the survey, technology also plays a key part in supply chain management, with customer relationship management systems and transportation management systems being the two types of systems that are utilised the most frequently.
According to the findings of the survey, businesses should work together with their vendors to strengthen their supply chains and also make investments in technological solutions that will help them enhance the management of their supply chains. The management of an organization's supply chain should also guarantee that the organisation complies with all relevant environmental and social responsibility criteria, while also striking a balance between cost reduction and sustainability.

In terms of the direction that future study should go, it would be fascinating to investigate the function of supply chain management in a variety of different industries and how this function influences the cost management of those companies. In addition, additional research might investigate the effects that emerging technologies, such as blockchain and artificial intelligence, have on the management of supply chains. In general, the findings of the study have helped to advance our understanding of supply chain management and the role that it plays in determining pricing in the industrial sector.
It is essential for any company to have efficient supply chain management to be successful, and companies need to continue investing in their supply chains if they want to maintain their competitive edge in the modern global economy.