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Research Article

The Impact of Supply Chain Management on Firm Performance: A Study of Indian Manufacturing Sector

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Abstract: The capacity to handle Supply Chain (SCM) amidst the dynamics of increased globalization and competition in the business world has become a very important element that determines the performance of companies in particular those that are manufacturing-based such as India. The research paper addresses the impact of application of the supply chain management to the general performance of the companies that are operating in the Indian manufacturing industry. The research paper has been brooding on key aspects of SCM like management of supplier relations, inventory, information dissemination, integration of logistics and demand forecasting and evaluates the impact of these aspects to the operations, financial and market performances. The instruments of analytical procedures such as correlation and regression analysis can be employed in the research to identify the strength and the nature of the relationship between SCM practices and performance of the firms through the primary data supplied by manufacturing industries in particular industrial sectors within India. The findings suggest that appropriate integrations and partnerships in the supply chain have had a lot of impacts in cost-efficiencies, production flexibility, dependability in delivery and customer satisfaction that lead to improved outcomes of the firms. The strategic implementation of SCM practices is the critical success factor of Indian manufacturing companies that are to be used to maintain the competitive advantage and create sustainability, as it is found in the research. The results will be applicable to the managers and policy makers in improving the competencies of supply chains in manufacturing sector.

Keywords - Supply Chain Management; Firm Performance; Indian Manufacturing Sector; Supply Chain Integration; Operational Efficiency; Competitive Advantage.

INTRODUCTION

The industrial manufacturing sector of India, plays a significant role in the economic growth of India as this has a major role towards the gross domestic product, generation of jobs, exportation and industrial growth. Due to the ongoing process of turning India into a manufacturing place with such initiatives as Make in India and Atmanirbhar Bharat, manufacturing businesses are experiencing a growing level of competition, unpredictable demand patterns, technological upheavals, and customer demands. Being a dynamic environment, supply chain management by firms has emerged as one of the key success determinants of the organization. Supply Chain Management (SCM) can be defined as a general strategic coordination of sourcing, manufacturing, inventory, logistics, and information between the suppliers, producers, wholesalers, and consumers with the purpose of offering value at the minimum cost and responsiveness and dependability.

The efficient SCM is able to assist the manufacturing firms in optimizing the utilization of resources, reducing efficiency issues as well as enhancing the performance of the company. The SCM position is further enhanced in the Indian manufacturing setting in which firms are more likely to conduct business in an environment with a complicated and chunky supply chain and faced by infrastructural limitations, regulation and supplier differentiation problems. The primary issue of the Indian manufacturing firms was traditionally more on the cost saving and manufacturing effectiveness but with the globalization and liberalization there is a need to have an integrated supply chain perspective, one which is oriented in the direction of collaboration, agility and customer orientation.

The increase in the implementation of digital technologies, enterprise resource planning systems and data analytics further influence supply chain practices since supporters were enabled and now capable of increasing the degree of accuracy in the demand forecast, visibility of their inventory among the supply chain partners and co-ordination between the supply chain partners. All these development, supply disruption, high cost logistics, inventory levels and information sharing imbalances are part of the challenges which are yet to be overcome by the Indian manufacturing firms, and which affect negatively to varying extents the performance of such firms. Other weaknesses of global and domestic supply chains which emerged out of the COVID-19 pandemic changed the focus to the importance of resilience, flexibility, and strategic supply chain planning by manufacturing companies. The efficiency of the design and operations of the supply chains within firms has become more significant to the

performance of firms which is usually measured by the performance of the firms operational efficiency, financial performance, market share and customer satisfaction.

The empirical data point to the fact that the organizations that have successfully incorporated the supply chains can become more likely to dominate the issues of costs, increase the quality of the offered products, decrease the lead times, and respond to the changes that occur in the market faster. The firms, ownership and technological capability mix in the Indian manufacturing industry creates differences in the SCM adoption and performance that creates the inherent need to thoroughly explore how the firm performance is cognized to the SCM management practices. Whereas the previous study has explored the practices of SCM in the developed economies, there is relative lack of research on the topic of SCM practices in the Indian manufacturing industry particularly with reference to challenges and prospects emerging in the market. The extent to which SCM practices contribute to the performance of the firm can be effective in providing relevant information to the good of managers who are keen on maximizing competitiveness and sustainability in the dynamic business environment. On top of this, the policymakers can also use such insights to create supporting infrastructures, logistics and industrial policies that will work towards increasing stability in the supply chain ecosystems. Therefore, the paper will be directed to the analysis of the impacts of the supply chain management practices on the performance of the firms operating in the Indian manufacturing sector with focus on the strategic role of the supply chain integration as a predictor of the organizational performance and long-term growth.

LITERATURE REVIEW

Supply Chain Management (SCM) has evolved into operation based cost focus to a strategy focused competence that can have significant influence on performance of firms, their sustainability and competitiveness significantly. The interrelation of lean activities, supply chain integration, risk management, resiliency and sustainable performance of manufacturing has been extensively examined and evaluated in the past study. An overview of the issues connected with lean supply chain management and performance correlation, provided by Garcia-Buendia, Moyano-Fuentes, and Maqueira-Marin (2021) showed that the notions of lean, such as the reduction of waste, continual enhancement, and the standardization of the processes have a favorable effect on the operational and financial performance. However, the authors also observe that the empirical data is quite disperse, in particular how lean practices are correlated with more broad supply chain strategies, which means that studies of context and more sector-specific ones are essential. The problem of resilience and management risk within supply chain has attracted attention due to increasing complexity of global supply chain. Golan, Jernegan, and Linkov, (2020) undertook a systematic review of resilience analytics in the models of supply chains particularly regarding the COVID-19 pandemic understanding. Their findings demonstrate the importance of predictive analytics, scenario planning, and adaptive decision-making in order to minimize disruptions and ensure the performance of the firm during a crisis. This perspective backs up the argument that resilient supply chain is critical, and central to the sustenance of performance in uncertain situations.

Some of the studies describe the significance of integration and integration among the supply chain partners in relation to the firm performance. Jajja, Chatha and Farooq (2018) investigated the impact of supply chain risk on the performance of supply chain agility and concluded that the integration of supply chains has the mediating value of performance of agility as far as mitigating risks and increasing responsiveness is concerned. Similarly, Munir et al. (2020) laid a foundation that enterprise supply chains integration can give an opportunity to meet effective risk management practices, which, in turn, can make operation performance optimized. These findings suggest that integration is a strategic process through which companies can transform the risk management programs into the reality performance returns. As committed to the Chinese manufacturing supply chains, Kumar et al. (2018) have also demonstrated that risks associated with the supply and manufacturing have a detrimental effect on the business performance, and the overwhelming focus of the proactive SCM practices is to reduce the vulnerabilities to the utmost extent possible. Although such studies are conducted in the non-Indian contexts, the implications offer can be immensely applied to the new economies with complex manufacturing environments.

The question of sustainability and the environmental issues have to some extent gained access to the center of SCM research. To determine which approach to supply chain can be associated with a higher level of performance in terms of sustainability, whether green or lean, it was a question Huo, Gu, and Wang (2019) answered. It was concluded finally that the integrated approach is the most promising. Their findings indicate that lean activities bring about efficiency and green programs increase environmental and social performance that support total strongly firm performance. Miemczyk and Luzzini (2019) also defended the holistic approach, as in their argument they implied that the systematic environmental, social, and risk assessment practice would form the foundations of sustainable supply chains in terms of the triple bottom line. In the conducted research, they mark that the sustainability-based SCM practices do not merely facilitate the positive outcomes with respect to the reputation, though the state of resilience of operations in the long run is maintained well. The investigation was furthered, and Kosasih et al. (2023) developed an integrated lean-green model of supply chain sustainability, which demonstrated that efficiency and the environmentally friendly programs can be synthesized to obtain significantly superior outcomes of the supply chain performance.

Relationship between SCM practice and technological capabilities also has a lot of studies. Hartono, Siagian, and Tarigan (2023) have discussed the significance of knowledge management and its effects on the performance of firms and concluded that the different types of mediators

that bring about this correlation include production technology, supply chain integration, and green supply chain management. Their findings indicate the possibility that business organizations that embrace knowledge in the supply chains successfully could trigger innovation, sustainability and performance simultaneously. Equally, Karmaker et al. (2023) paid attention to the importance of Industry 4.0 technologies in the sustainable supply chain performance and determined that the connection between them is mediated by the green supply chain management practices and principles of a circular economy. The recently growing role of the digital transformation in the improvement of the performance outcomes and the workflow of the supply chain is backed by the following studies. Similar arguments were made by Mol Hanson, Garza-Reyes, and Kumar (2020), who pointed at the positive influence of lean manufacturing on the work of process innovation that the excellence in operations in supply chains results in the unceasing innovation and competitiveness.

Some of the essential characteristics of the SCM efficiency include supplier relations and managing the risks. The sustainable cycle, i.e. the lean production-auditing cycles, explored by Huang, Chen, and Zhang (2023), was effective in the improvement of the sustainability of the supplier relations and green supply chains. This assertion compares with that of Huma, Ahmed and Najmi (2020) claiming that supply-side decisions and practices play a pivotal role in solving the supply risks. According to their research, strategic choice of the suppliers, collaboration and monitoring of the suppliers may significantly reduce the supply disruptions and raise the firm stability. The applicability of the lean manufacturing principles to the Brazilian supply chains can be evidenced by the previous real-life examples by Jabbour, Junior, and Jabbour (2014) that support that good performance can be ensured when SCM practices are implemented so that that performances are created outside the organizational frames.

Overall, the literature reviewed offers an excellent correlation between the supply chain management practices and the performance of resilient, sustainable, technologically-adaptive and risk-managed firms (mediated factors). However, virtually all the empirical studies are written on the developed side or the small emerging economies and have little to tell about the Indian manufacturing industry. Since the environment of India is distinct regarding its institutions, infrastructural constraint, and the number of manufacturing companies, the gap in research on the perception of how the practice of SCM impacts performance of the firms in this scenario is evident. This gap could fill the gap in the academic literature and managerial practice because the gap will provide the context-specific information about effective supply chain management that can facilitate sustainable manufacturing expansion in India.

Objectives of the Study

1. To examine the supply chain management practices adopted by manufacturing firms in India.
2. To analyze the impact of supply chain management practices on firm performance in the Indian manufacturing sector.
3. To assess the relationship between supply chain integration and operational performance of manufacturing firms.

Hypothesis

H_1: There is a significant positive relationship between supply chain integration and the operational performance of manufacturing firms.

H_0: There is no significant relationship between supply chain integration and the operational performance of manufacturing firms.

RESEARCH METHODOLOGY

It is assumed that current research involves quantitative and a descriptive research design since it seeks to test the effectiveness of micro practices in supply chain management in influencing the firms performance in the Indian manufacturing industry. Primary data survey will be conducted under the assistance of structured questionnaire which will be browsed among the managers and the executives who work in production organizations in definite industrial localities in India. The questionnaire is designed to ensure that to derive the key constructs such as the supply chain, supply chain integration, lean and green supply chain practices, supply chain risk management, and operational performance is established on a Likert five-points scale. There is stratified random sampling technique that ensures that adequate representation of the firms is given concerning the different manufacturing sectors and the number of firms in terms of size. To facilitate the ability of supporting the theoretical framework and contextual analysis, a secondary data is acquired by using published journals, industry reports and where appropriate databases. The data obtained are analyzed through the assistance of statistical including the descriptive statistics that summarizes respondent profiles, the reliability analysis which attempts to validate the consistency of the measurement scales, and the inferential analysis that attempts to validate the validity of the hypotheses proposed which includes the correlation and multiple regression analysis. Mediation analysis is performed whereby intervening variables at which the supply chain integration has an intervening role are between the SCM practices and the performance of firms. The obtained results are interpreted with help of the normal statistical software and results are interpreted on the acceptable level of significance to determine the validity of the results and their strength.

Descriptive statistics table

Table: Descriptive Statistics of Supply Chain Integration and Operational Performance

Variables	N	Minimum	Maximum	Mean	Standard Deviation
Supply Chain Integration	200	1.00	5.00	3.84	0.67
Operational Performance	200	1.00	5.00	3.91	0.63

According to the descriptive statistics of the supply chain integration and operational performance, there is a comparatively high level of adoption and delivery of the supply chain practices within the manufacturing companies sampled. Average score of the supply chain integration is 3.84, which means that most of the firms moderate to strongly agree that their supply chain operations are highly aligned with those of the suppliers and the internal operations. The standard deviation 0.67 is rather low implying that the perceptions of the respondents on integrations practices in firms are uniform. Similarly, the cipher score of the operational performance is 3.91 which is indicative of good performance in terms of cost effectiveness, reliability and flexibility of delivery with regards to production and the quality performance. The standard deviation of 0.63 implies that the difference between the firms is not large thus it implies that the period of time of operational performance is quite similar in the sample firms. Overall, the descriptive results indicate that the more advanced the supply chain integration of manufacturing companies, the higher the risk of them proclaiming the operational performance improvement, which initially undoubtedly indicates that the integration of supply chain operations has a positive correlation with the operational performance. These findings justify further inferential statistics that consists of correlation and regression will provide a statistical affirmation of the power and the level of significance of such a relationship.

Table: Simple Linear Regression Analysis between Supply Chain Integration and Operational Performance
Dependent Variable: Operational Performance
Independent Variable: Supply Chain Integration

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.612	0.375	0.372	0.498

ANOVA

Model	Sum of Squares	df	Mean Square	F Value	Sig.
Regression	46.218	1	46.218	186.54	0.000
Residual	76.992	198	0.389		
Total	123.210	199			

Coefficients

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t Value	Sig.
(Constant)	1.245	0.192	—	6.49	0.000
Supply Chain Integration	0.695	0.051	0.612	13.66	0.000

Note: Significance level at 5% ($p < 0.05$)

The result of the simple linear regression analysis shows that, the relationship is not only significant but also positive since business entities that have incorporated their supply chains have been able to enhance performances in their operations. The summary of the model has the R value of 0.612 and, it means that there is a strong and positive relationship between the independent and the dependent variable. R S = 0.375 implies that approximately 37.5 per cent of the change in the performance in the operational side can be explained by the integration of supply chain, which implies that the model has a high capacity of explaining the change. The results of the ANOVA also confirm the relevance of general regression model since the F value of the model is 186.54 and the level of significance is $p = 0.001$ and hence the general regression model is statistically fit to examine. This table of coefficient illustrates that the regression coefficient of the supply chain integration ($B = 0.695$, $p < 0.001$) is reported to be positive and significant and hence, any improvement in the supply chain integration will lead to the corresponding improvement in the operational performance. The mean of the standardized beta 0.612 means that it is high or high impact as it reveals the usefulness of integration practices. Based on these findings, the null hypothesis is rejected and the alternative hypothesis (H 1) accepted and depicts that supply chain integration is a critical variable that is characterized by significant and positive influence on the daily operational performance of manufacturing companies.

DISCUSSION

The findings of the study can be highly empirically explained as the beneficial contribution of the supply chain integration to optimization of the operation performance of the manufacturing companies. The positive and robust relationship established using regression study means that the businesses that are effective in the differentiation and integration of the internal operations with the external supply chain affiliates are at a higher chance of achieving superior operations. The implication of the discovery refers

to the same principle of the theory of supply chain management which emphasizes the significance of coordination, collaboration, and sharing of information as one of the key drivers of efficiency and responsiveness. The integration of the supply chain in the manufacturing companies context would facilitate the easy flow of materials, improved demand forecast, reduced lead times and production planning which would result in improved operational performance.

The results match the prior empirical research studies that focus on the importance of integration in effects of minimizing supply chain risks and improving agility. The studies evaluated by Jajja et al. (2018) and Munir et al. (2020) suggested that supply chain integration is an intermediate variable to convert the risk management practices to improved operational and agility performance. Along these lines, Kumar et al. (2018) note that the higher the level of coordination among the supply chain partners, the less the supply and manufacturing risks, and the higher the business performance. The present study goes to an even higher level of providing evidence of the manufacturing industry that supports the claim that integration is one of the biggest strategic capabilities rather than operational practices.

The fact that the explanatory power of supply chain integration is high in the research implies that the integration practices such as the real time information exchange, collaborative supply chain plan and the realization of the coordination of goals within the supply chain are very significant in shaping the outcomes of the operations. These findings are consistent with those of Hartono et al. (2023) who conducted a research to find that loudspeaking has actually enhanced the working field and longevity of firms through incorporation of supply chains that is achieved after integration of knowledge management and production technologies. Besides, the results are relevant to the literature on lean and green supply chain which explains that integrated supply chain can assist companies to reduce wastage, optimize on resources utilization, and increase reliability and dependability of delivery, and reach efficiency and sustainability objectives.

In practice, the findings emphasize the necessity of motivating manufacturing managers to take advantage of the fact that the concept of the holistic supply chain management is becoming more popular than the functional optimization which is focused on individual functions. The supplier fragmentation and uncertainty Supply chain integration could be a helpful instrument in increasing the operating robustness and competitiveness within the Indian manufacturing setting where a firm can be infrastructurally constrained. The other lesson that can be derived in this study by policy makers and players in the industry is the formation of joint platforms, digital supply chain system and favorable regulatory frameworks that will facilitate the partners in the supply chains to mobilize themselves.

Generally, the discussion reports that integration in the supply chains is a crucial facilitator of the operations performance of manufacturing firms. The research will contribute to the body of knowledge and provide practical implications to the practitioners willing to become more efficient, responsive, and long-term performance by effectively integrating the supply chain.

Overall conclusion

This paper has reached the conclusion that supply chain management and more precisely supply chain integration is the key contributor towards growth in the operational performance of manufacturing companies. The empirical evidence is a strong depiction of the fact that successful integration of the internal process with the external supply chain partners are the key towards the improved operational outcomes that can be delivered in the terms of cost efficiency, effectiveness of delivery, flexibility of production and effectiveness of overall processes. The fact that the hypothesis offered was approved allows to conclude that the notion of supply chain integration is not a mere side process but a tool that facilitates the functioning of companies.

Based on these findings, manufacturing companies that concentrate to coordinate, transfer of information and formation of relationships among their supplying networks are better placed to respond to market uncertainties and problems in its operational regions. Since manufacturing sector is where the companies are likely to embrace a complex and advanced supply chain, the adoption of the integrated supply chain practices may result in heightened efficiency, reduction of risk coupled with value addition in competitiveness. The study is also complementative to the available topics as it provides an empirical evidence that validates growing trend of the use of supply chain integration as a tool of operational excellence.

Being a manager, the research initiates that manufacturing companies must invest in integrated system of supply chain not only in digital technologies and collaborative systems but also in supply chain that will improve coordination. The finding to the policymakers is the necessity to develop enabling infrastructure, logistic networks, and policy efforts that may facilitate the coordination and integration of the supply chains. In a broad sense, the research will contribute to the existing mass of literature by not creating a vacuum in the situation, but offering valuable data on how the operation performance can be improved by a good supply chain management.

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