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Impact of Supply Chain Disruptions on Logistics Service Performance

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Abstract - The study is on the supply chain disruptions in logistics and supply chain industry and their impact on logistics service performance. The research focuses on major disruptions such as transportation delays, supplier failures, labour shortages, inventory shortages, fuel price fluctuations, IT system failures and natural disasters, which affect delivery reliability, operational efficiency, cost, flexibility and customer satisfaction. Descriptive research design was used to collect both primary and secondary data. The primary data was collected from 140 respondents working in logistics and supply chain sectors through a structured questionnaire. The findings of the study reveal that transport delays, labour shortages and IT/system failures are the major disruptions experienced by logistics firms and transport disruptions varied significantly with employee designations. The study concludes that supply chain disruptions have a significant impact on logistics service performance. The study also highlights the importance of effective risk management, technology adoption, operational flexibility, and resilient supply chain strategies to improve logistics efficiency and organisational performance.

Keywords: Supply Chain Disruptions, Logistics Service Performance, Third Party Logistics, Logistics service quality, Service reliability.

Introduction

The logistics sector plays vital role in global movement of business. Invariably every sector is dependent on logistics services. Many of them are using third party logistics and others have their own facilities. The major problems faced by the business organisations are due to natural disasters, transportation delays, political instability, communication issues and others. These causes results in effective functioning of transportation, warehousing, inventory management and in distribution. The performance is mainly dependent on the speed, flexibility, reliability and cost effectiveness, and thereby customer satisfaction. Katsaliaki et al (2022) suggests on- time delivery, reduction of lead time, responsiveness of suppliers, reliability of transportation and satisfaction of the customers as indicators for performance measurement. Yalda and Mahour (2019) conducted a systematic literature review of logistics performance and found that service quality and resilience is more significant in most of the researches. This study aims at understanding the dominant factors becoming disruptions and the indicators determine overall performance. The research results will provide a clear understanding on the indicators and guideline for framing policies to face such disruptions.

Objectives of the Study

The primary objective of this study is to understand the impact of Supply chain disruptions on logistics service performance. The major disruptions will be identified for preparations against them. The relationship between various disruptions and logistics performance will be measured. Key indicators will be found in order to have more focus and effort on them. The Logistics service performance will be measured and their weakness based on the disruptions will be analysed for preparatory works.

Literature Review

Ivanov, D. (2025) found that disruptions increase lead time for delivery of products and decreases the reliability of the organisations. It was suggested to adopt modern technology and simulation models for handling real life problems. Chopra, S., and Sodhi, M. (2024) identified the risk in supply chains and adopted diversification and backup strategies reduce the impact of disruptions impact. Sheffi, Y. (2025) This research explains how flexible logistics systems handle disruptions effectively. It finds that companies with multiple transportation options perform better. Flexibility reduces service delays. The study highlights the importance of adaptive logistics strategies.

Singh, S. et. al.. (2020) examined the issues related to transportation and found that delays and blockage of route results in more delivery time and high cost. Flexibility in routing and scheduling is suggested for increasing efficiency. Ratapol. W et. Al., (2018) evaluated the measurements of logistics performance considered IC measurement which is used very less. Relationships plays a major role in making impact on the customers. Mohamed et al (2019) found that

there is a significant negative impact of disruptive events such as demand fluctuation, transportation delays, lack of infrastructure and supplier issues on the performance of logistics service performance. There is no impact of socio-political and ecological risk on performance.

Martha (2007) found that transportation disruption happens between tier1 supplier and warehouse. Traditional structure was found with inventory disruption. conducted an analysis on the integrated supply chain resilience integrated model and its impact on supply chain performance and also the impact of disruption. A.J Juan and Eldon (2022). Supply Chain flexibility affects supply chain performance among the various factors of Agile Supply Chain. It influences the velocity and visibility of supply chain. There is significant positive impact of Supply Chain visibility on velocity and robustness of supply chain. Parast and Subramaniam (2021) disruption in supply chain affects different dimensions of performance. The upstream side of the supply chain has a comparatively higher impact than the downstream.

Wang et al. (2024) claim that supply chain disruptions decreased shareholders' value during COVID-19. Diversified suppliers will facilitate customer satisfaction irrespective of the distractions. It was also found that manufacturing organisations suffer more than service organisations due to disruptions. Duong et a. (2024) Natural disruption impacts both supply and operational risks, whereas human risk impacts only operational risk.Kissi et al. (2011) In construction industry, there is a negative impact of demand-related disruption on business performance. Supply chain innovation has no significant relationship with logistics service performance.

Aharonovitz et al. (2018) signify that supplier selection is the strongest deciding factor in performance; interpersonal skills, culture of the organisation and communication are the major deciding factors rather than any other factor influencing organisational performance because of the nature of service sector. Azadegan et al (2020) reveal that the effect of flexible or procedural response reduces the orientation operational damage of disruptions. Tobin et al. (2012) Supply chain partner participation increases the perceived honesty and responsiveness which leads to better performance. Imran et al. (2024) analysed whether that the choice of leadership style plays pivotal role in smooth functioning but the results revealed that there is no significant impact.

Asmahan et al (2024) suggest that collaboration with the customers improves the logistics performance of the organisations. An elaborate study is required on different dimensions such as supply chain management principles, technology involved, and customer service practices. Most of the research is based on any one of the disruptions and their impact on any one aspect of the performance indicators. This is lack of comprehensive research model with inclusion of major disruptions together and major indicators of performance indicators analysing their relationship and impact.

Methodology

A descriptive research study was conducted to have better understanding of different disruptions and their behaviour. Moreover, this study analyses multiple types of disruptions and hence a descriptive study is more suitable for this problem. A structured questionnaire was framed to collect data from the employees of different logistics firms in Tamilnadu. Standardised factor structure is adopted from existing research articles which are already tested and applied in various industries and across different nations. 140 data were collected and analysed using SPSS 23 version.

Conceptual Framework

Supply Chain Disruption and Logistics Service Performance are the two concepts considered for the study. Supply Chain Disruption was measured under five dimensions with 11 items: Transportation, demand, supplier, information and infrastructure. Logistics Service Performance was measured using a unidimensional scale having 6 items. The model proposed is the relationship between Supply Chain Disruption as an independent variable and Logistic Service Performance as Dependent variable. Correlation and Regression analysis were performed to find out the most influential disruptive factor on logistics service performance.

Analysis and Discussion

Demographic Profile

Table 1. Demographic Profile

Department	Logistics	Warehousing	Supply Chain Management	Procurement	Inventory Management	Operations
	31.4	37.1	9.3	17.1	2.1	2.9
Type of Firm	3PL	Transportation	Ware Housing	Parcel or Courier Service	E- Commerce Logistics	Integrated Supply Chain Service
	27.1	20.7	12.1	17.9	19.3	2.9
Nature of Industry	FMCG	Retail	Automotive	E-Commerce	Pharma	Others
	22.1	27.9	12.9	22.9	7.1	7
Type of Disruption	Supplier Delays	Transportation Delays	Labour Shortage	Inventory Shortages	Communication	Compliance and others
	10.7	19.3	17.1	8.6	15.0	19

Table 1 reveals that the study involved 140 respondents from the logistics and supply chain sector, with the majority being male employees and working as Supervisors, Executives, and

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Senior Executives in Warehousing and Logistics departments. Most respondents had 2–5 years of experience and were employed in 3PL firms, transportation companies, and e-commerce logistics firms. The respondents mainly served Retail, E-Commerce, and FMCG industries, with most located in North Tamil Nadu, indicating higher logistics and industrial activities in the region. Transportation, Labour shortage and compliance are the major disruptions.

Relationship between Supply Chain Disruption and Logistics Service Performance

Table No. 2 Relationship between factors of Supply chain Distractions and Logistics Performance

		SD	TD	DD	ISD	ID
LSP	Pearson Correlation	.275**	.355**	.449**	.469**	.398**
	Sig. (2-tailed)	.001	.000	.000	.000	.000
	N	140	140	140	140	140

Table 2 indicates that all dimensions of Supply Chain Disruptions have a positive and significant relationship with Logistics Service Performance. Among the factors, Inventory and Storage Disruption shows the highest correlation with Logistics Service Performance, followed by Demand Disruption, Infrastructure Disruption, Transportation Disruption, and Supplier Disruption. As all significance values are below 0.01, the null hypothesis is rejected, confirming that Supply Chain Disruptions have a significant positive relationship with Logistics Service Performance.

Impact of Supply chain Distractions on Logistics Performance

Table No. 3 Impact of Supply chain Distractions on Logistics Performance

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.629[a]	.395	.373	.410

a. Predictors: (Constant), ID, TD, SD, ISD, DD

Table 3 shows that Supply Chain Disruptions have a significant impact on Logistics Service Performance. The regression model is statistically significant and explains 39.5% of the variation in Logistics Service Performance. The results indicate that Supplier Disruption, Demand Disruption, Inventory and Storage Disruption, and Infrastructure Disruption have a significant positive impact on Logistics Service Performance, whereas Transportation Disruption does not show a significant impact. Among all the factors, Inventory and Storage Disruption has the highest influence on Logistics Service Performance.

Conclusion

The study examined the effect of supply chain disruptions on logistics service performance in the logistics industry. It found that the main problems facing logistics companies were transportation delays, labour shortages, inventory problems and IT failures. Most of the respondents were working in warehousing, transportation and 3PL companies serving Retail, E-Commerce and FMCG industries. The results also showed that digital technologies are still underused by many firms and that digital transformation is needed. Further analysis confirmed that disruptions in supply chain significantly affect logistics performance, with inventory and storage issues having the strongest impact. The study suggests that improved inventory management, enhanced supplier coordination, better infrastructure and advanced digital technologies can help organizations improve operational efficiency, maintain service continuity and boost customer satisfaction.

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