*Page 1774 - 1782* **DOI:** *https://doij.org/10.10000/IJLMH.119261*

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# The Impact of Integrated Logistics on Supply Chain Performance

GIRIJA V.[1] AND DR. K.R. SOWMYA[2]

## ABSTRACT

*This study examines this paper on how the integration of logistics systems is said to be one of the significant determinants in improving the efficiency of supply chain. Lee and Whang (2005) postulated that sharing information among all the levels across supply chains improves decision-making as well as visibility. Stock and Boyer, on the other hand, identify its part in operational efficiency, such as better inventory management and reduced lead times. Waller and Fawcett indicate the revolutionary role of digital technologies, including predictive analytics and big data, in building a more responsive, data-driven approach to logistics. Yildirim et al. demonstrate that integration leads to greater responsiveness and flexibility, critical for volatile demand industries. Therefore, alignment of logistics integration aligns stakeholders' strategic aims with an aim to optimize the flow of goods and services, as Christopher specifies. Coyle et al. (2016) focuses more on the adoption of advanced technologies such as IoT and real-time data analytics to enhance efficiency while Klaus et al. (2017) highlighted some technologies such as RFID and AI-driven platforms for quicker decision-making and resource optimization.*

***Keywords**: Integrated Logistics, Supply Chain Performance, Efficiency, Cost Optimization, Coordination, Inventory Management, Transportation, Customer Satisfaction, Lead Time.*

## I. INTRODUCTION

Integrated logistics has emerged as an imperative in the quest to optimize the performance of the supply chain; it is the cornerstone upon which firms are built for smooth running and efficient supply chain efficiency. Understood broadly, integrated logistics represents the harmonized coordination of logistics functions, including transportation, warehousing, inventory management, and order fulfillment, in a single system so that goods and information may flow smoothly. Due to increased technological innovation and market globalization and the growing expectations of customers, the complexity of global supply chains has come to be seen as necessary in integrating.

[1] Author is a student at Department of Management Studies,. Vel Tech Rangarajan Dr. Sagunthala R&D, Institute of Science and Technology, Avadi, Chennai, India.
[2] Author is a Professor at Department of Management Studies,. Vel Tech Rangarajan Dr. Sagunthala R&D, Institute of Science and Technology, Avadi, Chennai, India.

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The integration of logistics functions results in lower costs, improved service levels, and increased responsiveness to changes in markets. Companies can control inventories and reduce variability in lead times while avoiding reactivity through efficient coordination in transportation, procurement, production, and distribution by aligning the processes. Better communication between supply chain partners results in improved integration as the decision regarding the need to respond to changes in demand or disruptions in the supply chain would be quicker.

Supply chain continuously changes and requires faster decisions within today's speedy business scenario; therefore, logistics integration may be one aspect that can help organizations balance their supply chain to serve the value-added propositions, optimizing its resource, better accurate forecasting, and provide great value-added service to a customer. Therefore, the effect of integrated logistics on supply chain performance is beyond just optimizing business operations as its result also comprises enhancing customer satisfaction while minimizing the risk of the supply chain while achieving the maximum return through profit for businesses. The article focuses on how integrated logistics systems determine supply chain performance-from key components to challenges to strategic benefits-providing insight into ways in which firms may exploit integration as a way to improve their competitive position within an increasingly complex and interrelated market landscape.

### (A) Objectives of the study

- To Assess the extent to which integrated logistics supports cost management as well as efficiency in the supply chain.
- To evaluate the extent to which combined logistics improve service quality and customer satisfaction.
- It will lay a good foundation for understanding how technologies such as IoT and data analytics enhance the overall process of logistics.
- To understand how the activity of integrated logistics assists in supporting sustainability as well as the use of several transportation modes to improve the functions of a supply chain.

### (B) Review of literature

**Lee and Whang (2005)** note that integrated logistics enable the sharing of information by all participants in the supply chain to facilitate better decisions and visibility. "Incorporation of logistics processes has been argued to be dependent on the achievement of increased agility and

responsiveness within the supply chain.".

**According to Stock and Boyer (2009),** logistics integration has an upper-level impact on the efficiency of operation: it allows for better inventory management, less lead time, and therefore lower operational expenses and general performance of the supply chain. Flexibility to react almost instantly to fluctuations in demand and better utility of the resources deployed is named often among the advantages of logistics integration.

**Waller and Fawcett** argue that logistics has changed the game, based on digital technologies that have transformed it from static to fluid as well as data-driven processes. For example, predictive analytics and big data in general will allow firms to better understand and forecast demand, track inventory in real-time, and identify inefficiencies in their logistics network.

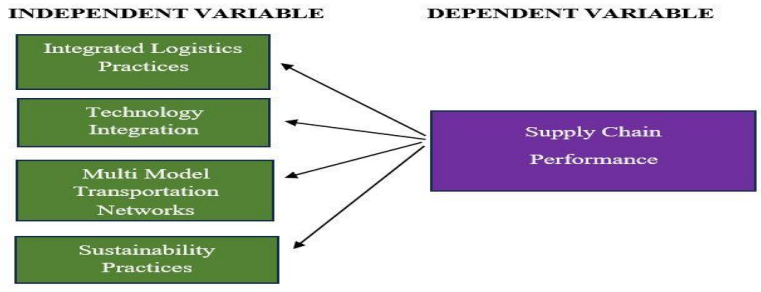
**According to Yildirim et al. (2014),** integrated logistics systems enable firms to improve their response and flexibility. Such high-volatility industries with vague demand patterns require responsiveness and flexibility. Companies with better responses to disruptions have enhanced overall performance within their supply chains.

**Christopher** further identifies that logistics integration stands at the center of supply chain performance improvement due to the following reasons: it brings together the different strategic objectives of the different stakeholders in order to eliminate redundancies as well as permit the efficient flow of goods and services.

**Coyle et al., 2016** believe that integrated logistics is meant to optimize the processes above for improving the efficiency of supplies chains, cost savings and service levels. This can generally be achieved through the embracement of advanced technologies like real-time data analytics, IoT, and automation.

**According to Klaus et al. (2017),** advanced technologies in cloud computing, RFID, and AI-driven logistics platforms are enablers for integrating logistics functions with each other. Free flow of real-time data among suppliers, manufacturers, and distributors enables quick decision making, fewer cases of stockouts, and optimal resource consumption.

### (C) Research Model



**Null Hypothesis ($H_0$):**

There is no significant relationship between the mode of transportation, Routing and scheduling of transportation, the number of locations of distribution centres, inventory policies towards supply chain performance.

**Alternative Hypothesis ($H_1$):**

There is significant relationship between the mode of transportation, Routing and scheduling of transportation, the number of location of distribution centres, inventory policies towards supply chain performance.

**(D) Statement of the problem**

- Many companies are still utilizing fragmented logistics systems wherein parts, such as transportation, warehousing, and inventory management, operate in multiple company- run systems across a given supply chain. This approach tends to be inefficient and laborious.
- Lack of effective communication and coordination among the various stakeholders in the supply chain leads to backlogs, mistakes in inventory management, poor reaction to market demands, and will consequently affect the performance of the business at large.
- Without integrated logistics, the organization suffers from higher operational costs, especially increased transportation costs, stockouts, overstocking, and higher fees paid at storage facilities, which blur supply chain efficiency and profitability.
- Poor visibility in an entire supply chain network inhibits effective decision-making, predicting, and risk management with negative impacts on overall performance within organizations.
- Companies with broken logistics systems fail to make fast transitions along shifting customer demands, market requirements, and chain disruptions, having less flexibility and responsiveness.
- Poor integration of the chain restricts resiliency and hinders businesses in mitigating risks and further decreases the impact of interruptions like natural disasters or similar transportation incidents.
- Poor customer experience is a direct outcome of many inefficiencies in logistics. In many instances, delays and stockouts adversely affect customer satisfaction,

 [ISSN 2581-5369]

loyalty, and competitiveness.

- An integrated approach to logistics cannot help prevent an organization from achieving easier measures for delivery time and achieving cost-efficiency and inventory turnover.

### (E) Research Methodology

The survey focuses on the dimensions that are key in the performance of supply chains to evaluate the implications of logistics integration. These include efficiency, cost reduction, service quality, flexibility, technology integration, and sustainability. A total of 100 participants will be considered, which guarantees. Participants will evaluate how such practices would contribute to cost reduction, including inventory management and transportation costs. This is an online and in-person one-to-one interview study. The research will determine how transportation and distribution can be designed to perform on the supply chain. The aspect of service quality will then be examined from the improvements realized in terms of speed and delivery accuracy, reliability, while flexibility will be measured from how well logistics systems adapt in case of demand fluctuations and disruption. The role of technology including but not limited to IoT, real-time tracking, and big data analytics in enablers of integration and improvement in performance will be examined. Finally, the sustainability aspect of an integrated logistics system will be examined with reference to adopting best practices in terms of greener ways and barriers they face. The findings of this study point towards exploring the understanding of how integrated logistics affects the effectiveness of the supply chain and, by extension, the broader business operations in which it operates.

## II. DATA ANALYSIS AND INTERPRETATION

### (A) Anova

Metric Variable: Technology Integration and cost and operational efficiency of integrated logistics

Categorical Variable: Age groups

### (B) Hypothesis

**Null Hypothesis**: There is no significant difference between the age of the employees to the technology and cost and operational efficiency of the integrated logistics.

**Alternative Hypothesis**: There is significant difference between the age of the employees to the technology and cost and operational efficiency of the integrated logistics.

| | | Sum of Square | df | Mean Square | F | Sig |
|---|---|---|---|---|---|---|
| Cost Efficiency and operational Efficiency | Between Groups | 120.574 | 4 | 30.143 | 3.866 | .006 |
| | Within Groups | 818.744 | 105 | 7.798 | | |
| | Total | 939.318 | 109 | | | |
| Delivery Performance and Reliability | Between Groups | 75.792 | 4 | 18.948 | 2.321 | .062 |
| | Within Groups | 857.126 | 105 | 8.163 | | |
| | Total | 932.918 | 109 | | | |
| Flexibility and Responsive-ness | Between Groups | 56.186 | 4 | 8.671 | 1.620 | .175 |
| | Within Groups | 910.505 | 105 | 8.671 | | |
| | Total | 966.691 | 109 | | | |
| Technology Integration and Data Management | Between Groups | 119.311 | 4 | 29.828 | 3.641 | .004 |
| | Within Groups | 860.180 | 105 | 8.192 | | |
| | Total | 979.491 | 109 | | | |

**(C) Interpretation**

As the p value for Technology integration and Data management, (.004) is less than 0.05, null hypothesis is rejected and alternate hypothesis is accepted. Hence, there is a significant difference between technology integration and the age groups.

As the p value for cost and operational efficiency, delivery performance and reliability and flexibility and responsiveness is greater than 0.05, null hypothesis is accepted and alternate

hypothesis is rejected. Hence, there is no significant difference between the cost and operational efficiency, delivery performance and reliability and flexibility and responsiveness.

**Correlation**

Metric Variable: Technology Integration and cost and operational efficiency of integrated logistics

**Hypothesis**

**Null Hypothesis:** There is no relationship between the technology integration and cost and operational efficiency of the employees.

**Alternative Hypothesis**: There is relationship between the technology integration and cost and operational efficiency of the employees.

| | | **CEOE** | **DPR** | **FR** | **TIDM** |
|---|---|---|---|---|---|
| Cost Efficiency and operational Efficiency | Pearson Correlation Sig. (2-tailed)<br>N | 1<br><br>110 | .241<br>.011<br>110 | .490<br>.007<br>110 | .491<br>.002<br>110 |
| Delivery Performance and Reliability | Pearson Correlation Sig. (2-tailed)<br>N | .241<br>.011<br>110 | 1<br><br>110 | .305<br>.001<br>110 | .165<br>.085<br>110 |
| Flexibility and Responsiveness | Pearson Correlation Sig. (2-tailed)<br>N | .257<br>.007<br>110 | .305<br>.001<br>110 | 1<br><br>110 | .244<br>.010<br>110 |
| Technology | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Integration and Data management | Pearson Correlation Sig. (2-tailed) | .299 | .165 | .244 | 1 |
| | N | .002 | .085 | .010 | |
| | | 110 | 110 | 110 | 110 |

**Interpretation**

Here, the P value is less than 0.05. Therefore, we reject null hypothesis and accept alternative hypothesis. That is, there is a relationship between the technology integration and cost and efficiency of the employees. There is a positive relationship between the technology integration and cost and efficiency of the employees.

## III. CONCLUSION

The Integration of transportation and distribution within logistics networks plays a fundamental role in shaping the overall performance of supply chains,. It is relatively obvious that well-designed logistics networks with state-of-the-art transportation and distribution strategies have a significant impact on service quality, speed of delivery, reliability, and responsiveness toward changes in the market. While the application of advanced technologies such as IoT and big data analytics enhances network efficiency, its implementation also presents formidable challenges that need to be dealt with strategically. In terms of sustainability, its use increasingly becomes an integral part of logistics network design where more businesses switch to environmentally friendly operations that meet regulator demands and consumer expectations. Such elements can be well integrated to help logistics providers build much more resilient, efficient, and flexible supply chains that better respond to disruption events as well as changing customer needs. At bottom, it resonates with the greater imperative for transport and distribution organizations to constantly innovate and realign in order to stay ahead in the current dynamic market environment.

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