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A study on impact of technology adoption on operation efficiency in cargo logistics with the special reference to Indian live cargo Karipur

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Abstract
This study examines the impact of technology adoption on operational efficiency in cargo logistics, with special reference to Indian Live Cargo, Karipur. The research focuses on how digital tools, automation, and real-time tracking systems enhance productivity, reduce delays, and improve accuracy in cargo handling. Data were collected from logistics professionals and operational staff to assess the extent of technological integration. The findings reveal that advanced technology significantly improves coordination, reduces manual errors, and optimizes resource utilization. The study highlights the role of innovation in achieving competitiveness and service excellence. It concludes that continuous technological upgradation is essential for sustainable logistics operations.

Keywords: Technology adoption, cargo logistics operations, operational efficiency

Introduction
In today's fast-paced global economy, logistics has emerged as a critical backbone for trade, commerce, and industrial growth. The cargo logistics sector, in particular, plays a pivotal role in ensuring that goods move seamlessly across domestic and international markets. Efficient cargo operations are no longer merely a competitive advantage; they have become a necessity for businesses aiming to meet customer expectations, maintain supply chain integrity, and reduce operational costs. With increasing globalization, heightened customer demands, and rapid technological advancements, cargo logistics companies are compelled to innovate and modernize their operations continuously.

Technology adoption has become one of the most influential factors in enhancing operational efficiency in the logistics sector. From automated tracking systems and digital documentation to warehouse management solutions, real-time GPS tracking, and advanced data analytics, technological interventions are transforming traditional cargo processes into highly efficient, reliable, and customer-centric operations. These innovations not only minimize human error and reduce manual workload but also enable faster decision-making, optimize resource allocation, and ensure transparency across the supply chain. Indian Live Cargo Karipur, a leading player in the cargo logistics industry in Kerala, provides a compelling case to examine the impact of technology adoption on operational efficiency.

Objectives of the study
1. To examine the extent of technology adoption in cargo logistics operations at Indian Live Cargo Karipur.
2. To assess the impact of technological tools on operational efficiency, including delivery speed and accuracy.
3. To identify the challenges faced in implementing technology in cargo handling and management.

Review of literature
Moyano-Londoño (2025) presents a comprehensive scientometric analysis of Logistics 4.0, exploring how emerging technologies, including the Internet of Things (IoT), Artificial Intelligence (AI), and blockchain, are revolutionizing supply chain management. The study emphasizes that real-time data visibility and predictive analytics provided by these

technologies significantly enhance operational decision-making and process automation. By leveraging these tools, logistics firms can optimize route planning, reduce lead times, and improve service reliability, ultimately leading to substantial cost savings. Additionally, the adoption of these technologies fosters greater customer satisfaction through faster and more accurate order fulfillment. The study also highlights the potential for continuous operational improvements, as digital technologies allow for dynamic monitoring and adaptive management of supply chain activities. Moyano-Londoño's work underscores the strategic importance of embracing Logistics 4.0 technologies to maintain competitiveness in increasingly complex global markets.

Krishnan *et al*. (2025) investigate the role of technological innovation in driving productivity and operational performance in logistics. Their research identifies automation, AI, and data analytics as pivotal technologies that streamline operational workflows and reduce human error. The study shows that logistics firms integrating these technologies can accelerate order processing, enhance inventory management, and achieve higher accuracy in shipment tracking. Furthermore, the adoption of digital tools allows companies to respond swiftly to market fluctuations and customer demands, enhancing service reliability and efficiency. By facilitating real-time decision-making and predictive planning, these technologies reduce operational bottlenecks and optimize resource utilization. The research concludes that embracing digital transformation is not merely a technological upgrade but a strategic imperative for logistics organizations aiming to thrive in the digital economy.

Research Methodology

The research methodology provides a structured approach to examine the impact of technology adoption on operational efficiency in cargo logistics, focusing on Indian Live Cargo, Karipur. It outlines the research design, population, sampling, data collection methods, analysis techniques, and ethical considerations.

Method of data collection

The study utilized both primary and secondary data to provide a comprehensive understanding of technology adoption and operational efficiency:

- **Primary Data Collection:** Data were collected directly from employees through a structured questionnaire.
- **Secondary Data Collection:** Secondary data were obtained from company reports, operational manuals, industry studies, and prior research to provide context and support analysis. These sources helped identify trends in technology adoption, operational benchmarks, and best practices in cargo logistics.

Data analysis techniques

The data collected through the questionnaire was analyzed using SPSS (Statistical Package for the Social Sciences) to derive meaningful insights.

- Percentage Analysis was conducted to summarize respondents' demographic information and categorical responses, providing a clear picture of the distribution of opinions and practices regarding technology adoption.
- Correlation Analysis (Pearson correlation) was used to examine the strength and direction of the relationship between technology adoption and operational efficiency, identifying whether higher adoption levels are associated with improved performance.
- Regression Analysis (linear regression) was applied to assess the impact of customer satisfaction on technology adoption, determining the predictive power of customer satisfaction in enhancing technological integration.

These tools together provided a comprehensive understanding of the extent, impact, and benefits of technology adoption in cargo logistics operations.

Table 1: Percentage Analysis of Respondents by Age Group

Age Group	Frequency(f)	Percentage (%)
Below25	21	17.5
25-35	35	29.2
36-45	29	24.2
46-55	17	14.2
Above55	18	15.0
Total	120	100

Table 2: Percentage Analysis of Respondents' Agreement on Implementation Challenges

Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total
a) The cost of technology implementation is high	17	19	29	31	24	120
b) Lack of technical expertise limits effective adoption	15	21	27	33	24	120
c) Employees face difficulties adapting to new tools	19	23	31	29	18	120
d) Maintenance and upgrades cause workflow disruptions	21	25	27	31	16	120
e) There is insufficient management support for technology adoption	18	19	29	33	21	120

Interpretation

Most respondents agree that technology adoption faces significant challenges, particularly due to high costs, lack of technical expertise, and workflow disruptions. A combined majority of employees also report adaptation difficulties and perceive some management support as insufficient. Neutral responses indicate that experiences with challenges vary across staff. Overall, implementation hurdles exist but are not universally severe.

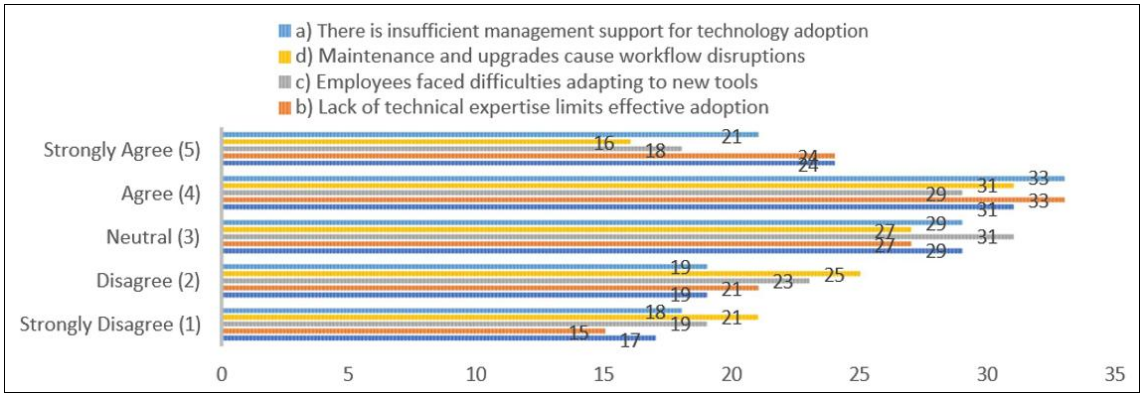

Fig 1: Percentage Analysis of Respondents' Agreement on Implementation Challenges

Conclusion

The study shows that technology adoption at Indian live cargo has improved operational efficiency, delivery speed, and accuracy. The use of digital tools, automation, and tracking systems has helped the company manage resources better and increase customer satisfaction.

However, some challenges still exist, such as limited employee training, system downtime, and resistance to change. High costs of technology implementation also affect the smooth functioning of operations. Addressing these issues through proper training and regular updates can make the system more reliable.

Overall, the findings suggest that continuous investment in technology and strong management support are essential for long-term growth. By encouraging innovation and adapting to new digital tools, Indian live cargo can achieve better performance and stay competitive in the logistics industry.

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