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Automating LCL Shipment Booking and Enhancing Customer Experience with AI - A Study on Process Efficiency and Digital Transformation in Logistics

S. Saronika[1], Dr. Jayasree Krishnan[2*]

[1]MBA (Shipping & Logistics Management), School of Management Studies, Vels Institute of Science, Technology & Advanced Studies, Chennai-117.

[2]Director, School of Management Studies &Commerce, Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai-117. Orchid Id 0000-0002-4167-0444

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ABSTRACT

Recent changes in the global economy and the increase in digital technology, plus the customer's demand for better service and communication from the logistics provider, have driven rapid changes in the logistics industry. In this context, there is a growing reliance on Less than Container Load (LCL) consolidation services as they provide an economical way for multiple customers to share a shipping container. However, operational inefficiencies such as delays in booking, lack of communication, reliance on manual coordination of operations and difficulty with documentation still negatively impact service quality and customer satisfaction.

The purpose of this research project was to determine the role of Automation (via Artificial Intelligence [AI]) in improving the efficiency of booking shipments for customers and ultimately improving the customer experience. The research involved an analysis of the various operational issues faced by logistics providers related to internal coordination and communication practices in the management of the consolidation-based logistics service process. The study involved administering a structured questionnaire to 50 respondents and using various statistical analysis methods such as percentage calculations, One-Way ANOVA, Independent samples t-tests and Chi-Square tests to evaluate the responses for the research purpose.

Manual processes and the time it takes to coordinate work are the main causes for inefficiency in operations. Employees surveyed indicated they are generally aware of and accept the use of AI-based systems, such as automated booking and documentation management. The results show AI-driven process automation can increase operational efficiencies, reduce the time it takes to book shipments, increase the accuracy of communications, and increase customer satisfaction for logistics operations.

Keywords: Artificial Intelligence, LCL Consolidation, Logistics Automation, Shipment Booking, Customer Experience, Process Efficiency, Digital Transformation.

INTRODUCTION

Logistics companies are the backbone of global trade as they facilitate the flow of goods from manufacturer to market across various countries. The expectation of globalization and an increase in export-import activity, and a rise in small and medium-sized businesses have significantly increased demands for logistics services that can meet the requirements of companies providing a flexible and efficient means of shipping products. Of the many logistics services available, Less than Container Load (LCL) consolidation has become an important shipping model where multiple customers share the space in a container based on similarities in their destination and shipping schedule.

Using an LCL consolidation service creates cost-effective transportation solutions for customers that do not have enough product volume to fill an entire container. Although the LCL consolidation model provides shipping

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options to customers, it also adds additional complexity to the operational processes as multiple shipments, customers, and departments must all be coordinated at the same time. If one customer's shipment is delayed, it can cause other customers in the same consolidated container to experience delays as well. In the current business environment, customers expect faster booking confirmation, real-time updates, transparency, and efficient communication. However, many logistics operations continue to depend heavily on manual coordination, repeated follow-ups, and fragmented communication systems. These issues reduce operational efficiency and negatively influence customer satisfaction.

The rise of artificial intelligence (AI) and automated technologies has created several ways for logistics companies to make their processes more efficient. With AI, companies can automate and eliminate repetitive tasks, improve their booking workflows, create efficiency in internal operations and communicate with others in a faster manner by using technologies such as automated booking systems, digital workflow platforms, predictive analytics and AI-powered customer service.

This research project will explore the operational difficulties surrounding LCL consolidation services and the use of AI-based automation to improve shipment booking processes and enhance customer satisfaction.

REVIEW OF LITERATURE

Research conducted in the past has emphasized many aspects that lead to efficient logistics operations including freight consolidation, process efficiency, and the use of technology.

According to Campbell, J. F., the concept of freight consolidation allows for lower transportation costs by improving route efficacy and allowing economies of scale to be achieved through a planned freight consolidation process. Ha, K. H. explored how freight consolidation positively affects logistics service performance through improving coordination efficiency and delivery urgency related to how well logistics firms coordinate with their freight consolidators. Pezeshki, S. studied the role of freight consolidation in global transportation networks and noted how operational coordination and service quality increase when an environment that has structured workflows and integrated logistics systems is present. Khanh, G. H. N. assessed the role of customer satisfaction in using LCL cargo services. The study's findings concluded that communications quality, operational reliability, service process efficiency, and customer satisfaction were all related. Tan, P. J.'s research also identified the importance of digital coordination and equitable cross-functional management in collaborative logistics environments.

Key findings in the literature indicate that while consolidation greatly improves transportation efficiencies, many logistics firms continue to have operational problems related to communication lags, manual workflows, and fragmented operations for coordinating supplier and client processes. There has been limited research specifically related to AI-based consolidated freight automation specifically for booking efficiency and customer communications.

Objectives of the Study

Primary Objective

- To study the role of AI-based automation in improving LCL shipment booking efficiency and customer experience.

Secondary Objectives

- To identify the major causes of delays in shipment booking confirmation.
- To examine the impact of internal coordination challenges on operational efficiency.
- To evaluate employee awareness and readiness toward AI-based systems.
- To identify operational areas requiring automation and digital improvement.

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- To analyse employee perceptions regarding automation in logistics operations.

Conceptual Framework

The study's conceptual framework centers on how operational efficiency plays a role in binding internal coordination, communication practices and artificial intelligence (AI) automated fulfillment functions for logistics fulfilment activities. The process of consolidating LCL (Less than Container Load) shipments requires multiple operational fulfilment processes, including booking confirmation, documentation, communicating with customers as well as out the shipment transaction. Any delays or inadequacies experienced throughout the fulfilment processes can have an effect on overall service quality and ultimately affect customer satisfaction.

The framework provides the assumption that any of these operational challenges (e.g., manual processes, gaps in communication, and delays in coordination) will negatively impact the overall booking efficiency and customer experience. AI based automation will serve as the independent variable that will improve workflow efficiencies, decrease manual input from employees, enable higher levels of accuracy in communication and create a more reliable service delivery. Enhancing the level of coordination through automated processes are projected to improve the logistics service providers (LSP) operational performance level and will create greater levels of customer satisfaction.

Research Gap

Current literature emphasizes efficiency of transportation, economics of freight consolidation, and customer satisfaction with logistics services. There is very little research exploring operational inefficiencies found within the processes related to the consolidation of LCL freight. Furthermore, there is little research looking at how automating processes using AI will improve shipment booking, internal coordination, and customer communication in logistics operations that utilize consolidation as an operational means.

Existing literature also primarily focuses on the optimization of transportation costs and supply chain efficiency as areas of concern while limiting their focus on operational workflow challenges for organizations such as manually following up with customers, delays in communication and poor process standardization. Because of these previously identified gaps, this study intends to provide an analysis of operational coordination issues and automation readiness for LCL logistics services.

RESEARCH METHODOLOGY

To gain insight into the current operational state of logistics services and their employees' viewpoints on robotic automation within those organizations, the researchers utilized a descriptive research design. A descriptive study design was chosen for this type of study because it focuses on the analysis of current operations, communication methods and coordination difficulties without any manipulation of variables. The study required both primary and secondary data. The study collected primary data through a structured questionnaire that was distributed to employees of logistics-related departments such as operations, customer service, sales, documentation and IT. The researchers used several different data sources for their secondary data collection including research journals, logistic reports, books and online academic resources related to the supply chain management and automation. The research sample consisted of 50 respondents. Statistical analysis of the collected data was conducted utilizing One-Way ANOVA, Independent Samples t-test and Chi-Square tests.

Data Analysis and Interpretation

Statistical Analysis

One-Way ANOVA

Source	SS	df	MS	F	Sig.
Between Groups	7.330	3	2.443	1.302	0.286

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Source	SS	df	MS	F	Sig.
Within Groups	82.586	46	1.795		
Total	89.917	49			

The ANOVA results show that there is no significant difference in coordination challenges across departments.

Independent Samples t-Test

Condition	t	df	Sig.
Equal Variances Assumed	0.635	48	0.530
Equal Variances Not Assumed	0.635	48	0.530

The results indicate that there is no significant difference between male and female employees regarding comfort with AI tools.

Chi-Square Test

Test	Value	df	Asymp. Sig.
Pearson Chi-Square	7.825	12	0.799
Likelihood Ratio	9.284	12	0.679
Linear-by-Linear Association	0.011	1	0.916

The results indicate that there is no significant association between years of experience and perceptions regarding automation improving booking efficiency.

Findings of the Study

Logistics' workforce consists mostly of younger and inexperienced workers and coordinating work between departments can be one of the largest challenges in booking shipments. The use of manual workflows and requiring numerous follow-ups contributes substantively to delays in the shipment booking process. Communication deficiencies may also negatively impact customer satisfaction and the efficiency of operations. Employees have demonstrated an understanding of AI-based systems related to logistics. The booking by AI and doc functions have been identified as the most appropriate for automation. Employees are generally in support of implementing AI-based systems in logistics. Employees' perceptions of automation and operational challenges are relatively similar across demographic groups.

Suggestions

Implementing AI technology in the booking process will allow for automation of confirming reservations as well as eliminating the need for manual coordination. Centralizing the workflow process into a single system will greatly enhance communication among departments. Automated notifications sent to customers about their shipments in as close to real time as possible will allow for greater visibility of their orders through the shipping process. Integrating documentation into a digital workflow will help to eliminate delays and errors caused by paper processes. Employees need to be trained on how to utilize AI based systems in order to become more adaptable to change. Logistics companies should take a phased approach to automating their processes to ensure a smooth transition to an automated system.

CONCLUSION

This research reveals the increasing significance of automated processes utilizing AI in relation to operational efficiency improvements for LCL consolidation services. Specifically, survey results indicated that staff

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members encounter three main barriers to efficiently obtain bookings and deliver superior client experiences, namely manual coordination, communication delays, and fragmented processes.

Furthermore, employees overall have positive perceptions regarding automating processes within their organization, and are cognizant of how important digital transformation is to achieve operational excellence in logistics operations. Employees believe that AI-associated systems will be beneficial as they will help eliminate manual efforts, provide better inter-departmental coordination, facilitate better communication, and ultimately enhance service quality.

In conclusion, automation using AI technologies can be viewed as a strategic opportunity for logistics organizations wishing to improve operational performance and ultimately enhance their customer experience. Successful implementation of automation systems needs to be combined with adequate employee training and defined workflows to enhance the long-term operational competitiveness for companies in the Logistics industry.

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