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Analysis of Warehouse Management System and Operational Efficiency in Quick Commerce with Reference to Zepto Super Store

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ABSTRACT

The study titled "Analysis of Warehouse Management System and Operational Efficiency in Quick Commerce with Reference to Zepto Super Store" examines the role of Warehouse Management Systems (WMS) in improving operational performance within the rapidly growing quick commerce sector. With increasing consumer demand for faster delivery, efficient warehouse operations have become essential for ensuring speed, accuracy, and reliability.

This research focuses on Zepto Super Store's dark store operations in Coimbatore District. A quantitative research approach was adopted, and primary data were collected from 310 respondents, including warehouse staff, delivery partners, and customers, using a structured questionnaire based on a five-point Likert scale. Statistical tools such as descriptive analysis, correlation, ANOVA, and Chi-square tests were used to analyse the data.

The findings indicate that the implementation of WMS significantly enhances key operational parameters such as inventory accuracy, order processing speed, and last-mile delivery efficiency. The study also highlights the importance of technology integration, including automation and AI-based inventory tracking, in optimizing warehouse operations.

In conclusion, the research establishes that effective use of Warehouse Management Systems plays a crucial role in improving operational efficiency and supporting the high-speed delivery model of quick commerce platforms like Zepto. The study provides valuable insights for improving warehouse performance and achieving better customer satisfaction.

Keywords: Warehouse Management System, Operational Efficiency, Quick Commerce, Zepto Super Store, Dark Stores, Inventory Management, Last-Mile Delivery.

INTRODUCTION

The logistics industry has changed a lot with the growth of quick commerce, where customers expect deliveries within 10–15 minutes. Zepto, one of the leading quick commerce platforms in India, has transformed grocery delivery by using a network of "dark stores," which are small warehouses located close to customers. These stores are specially designed for online orders and use advanced Warehouse Management Systems (WMS) to handle inventory, process orders, and manage deliveries efficiently.

A Warehouse Management System (WMS) is a software tool that helps in managing warehouse activities such as tracking inventory in real time, organizing orders, and improving picking and delivery processes. In quick commerce, operational efficiency is very important and is usually measured through factors like order processing time, inventory accuracy, fulfillment rate, and on-time delivery. These factors help companies stay competitive in a fast-moving market.

At the same time, educational institutions and industry play an important role in preparing people to work with such technologies. Having the right knowledge and skills in modern supply chain systems helps improve overall efficiency in logistics. This study, conducted in Coimbatore District, focuses on understanding how WMS affects operational efficiency in Zepto Super Store's dark store operations.

LITERATURE REVIEW

Warehouse Management Systems have changed a lot over time, moving from simple tools used for tracking inventory to advanced digital systems that use automation and real-time data. Earlier, these systems mainly focused on managing stock, but today's WMS solutions help in handling the entire warehouse process more efficiently.

Many studies show that using an effective WMS improves inventory accuracy, reduces the time taken to process orders, and makes better use of available space. Technologies like barcode scanning and RFID also help in making operations faster and more accurate. Research also points out that quick commerce companies depend heavily on dark stores and micro-fulfilment centres, where WMS plays an important role in managing a large number of orders within a short time.

At the same time, proper employee training and ease of using the system are important for the success of WMS. Companies that focus on both technology and employee skills usually achieve better results.

Overall, previous studies clearly show that efficient warehouse systems are closely connected to better overall performance of an organization.

RESEARCH GAP

Even though many studies have been done on Warehouse Management Systems (WMS) in traditional warehousing and e-commerce logistics, very few focus on their use in the quick commerce sector. Quick commerce works differently because it requires extremely fast deliveries and operates within small, local areas, which creates unique challenges.

Also, only a limited number of studies clearly explain how specific WMS features like real- time tracking, automation, and AI forecasting affect actual performance measures such as order processing time, inventory accuracy, and delivery efficiency, especially in the Indian context.

This study aims to fill these gaps by focusing on Zepto Super Store's dark store operations in Coimbatore and analysing how WMS contributes to improving operational efficiency in quick commerce

OBJECTIVES OF THE STUDY

To examine the level of WMS adoption, awareness, and utilization among Zepto Super Store employees and operations managers.

▶ To evaluate key operational performance indicators such as order pick accuracy, fulfilment cycle time, inventory shrinkage, and delivery success rate.

▶ To analyse the relationship between WMS effectiveness and overall operational efficiency at Zepto Super Store.

▶ To identify which WMS dimensions (inventory control, order management, workforce management, returns handling) most significantly impact operational outcomes.

▶ To provide recommendations for enhancing WMS capabilities to drive sustainable operational growth in quick commerce.

HYPOTHESIS OF THE STUDY

H_{01}: There is no significant difference in operational efficiency between Zepto dark stores using advanced WMS features and those using basic WMS systems.

H_{11}: There is a significant difference in operational efficiency between Zepto dark stores using advanced WMS features and those using basic WMS systems.

H_{02}: There is no significant relationship between staff training on WMS and order fulfilment accuracy.

H_{12}: There is a significant relationship between staff training on WMS and order fulfilment accuracy.

H_{03}: There is no significant relationship between the level of WMS automation and on-time delivery performance.

H_{13}: There is a significant relationship between the level of WMS automation and on-time delivery performance.

RESEARCH DESIGN

A descriptive research design was adopted to analyse the relationship between Warehouse Management System implementation and its impact on operational efficiency in Zepto Super Store's dark store operations.

Area of Study

The study was conducted in Coimbatore District, Tamil Nadu, covering Zepto Super Store dark store locations operating within the district.

Sample Size

310 respondents were selected including warehouse pickers, inventory managers, operations executives, and HR professionals.

Sampling Technique

Convenience sampling method was used for data collection through a structured questionnaire.

ANALYTICAL ANALYSIS

Quantitative analysis of the study "Analysis of Warehouse Management Systems and Operational Efficiency in Quick Commerce" is discussed in this chapter.
The prime objective of the quantitative analysis is to scientifically evaluate how WMS features impact dark store performance and identify which technological dimensions contribute most to operational KPIs.
To gain deeper insights, data collected from warehouse staff and operations managers were analysed using various statistical tools, including ANOVA, Chi-Square tests, correlation
analysis, etc.

Table 1: KEY WELLNESS PROGRAM FACTORS

Variable	Description	Response (%) 23.8%	Interpretation
WMS Awareness	Understanding of WMS modules and features		Moderate-high awareness level
Technology as barrier	Integration challenges with existing systems	20.9%	Major influencing factor

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Real-time inventory focus	Adoption of livestock tracking & alerts	26.1%	Critical improvement factor
WMS impacting performance	Systems boost pick accuracy & speed	33.4%	Strongest impact factor
Training & managerial support	Leadership backing for WMS adoption	21.7%	Key skill enabler

Descriptive Statistics for key WMS operational factors

INTERPRETATION

The findings show that respondents clearly recognize the critical importance of WMS in driving operational efficiency at Zepto Super Store. Approximately 33.4% believe that WMS directly boosts pick accuracy and delivery speed — the highest response across all factors.

Real-time inventory management (26.1%) and managerial support for technology adoption (21.7%) are seen as key enablers of WMS success. However, 20.9% identified system integration challenges as a major operational barrier, highlighting the need for seamless technology onboarding and change management programs.

Overall, the results highlight a positive and significant link between WMS implementation and operational performance, supporting the need for continued investment in intelligent warehouse technologies.

Table 2: OPERATIONAL PERFORMANCE & EMPLOYEE PERCEPTION

Construct	Highest Response	Interpretation
Order Pick Accuracy	26.2% Agree	Strong operational performance driver
Fulfilment Cycle Time	24.5% Agree	Important efficiency metric
Inventory Shrinkage Reduction	22.8% Agree	Necessary for cost efficiency
Employee Productivity & Morale	27.1% Agree	Highly valued operational outcome
Overall Delivery Performance	28.3% Agree	WMS improves end-to-end delivery outcomes

Descriptive Statistics for operational performance and employee perception

INTERPRETATION

Employee responses indicate that WMS positively impacts all key operational dimensions at Zepto Super Store. The highest response (28.3%) highlights overall delivery performance improvement as the most valued outcome of WMS adoption. Employee productivity and morale (27.1%) and pick accuracy (26.2%) further reinforce this finding.

Fulfilment cycle time (24.5%) and inventory shrinkage reduction (22.8%) also show positive agreement, confirming that WMS contributes to cost efficiency and operational speed. Overall, WMS adoption is clearly linked to measurable improvements in quick commerce operational performance.

ANOVA

Null Hypothesis (H_0): There is no significant difference in operational efficiency across employees with varying exposure to WMS.

Alternative Hypothesis (H_1): There is a significant difference in operational efficiency across employees with varying exposure to WMS.

Table 3: ANOVA

OPERATIONAL EFFICIENCY	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.143	2	0.072	5.841	0.004
Within Groups	37.820	307	0.123		
Total	37.963	309			

INTERPRETATION

The ANOVA results show a p-value of 0.004, which is below 0.05, so the null hypothesis is rejected. This means there is a significant difference in perceived operational efficiency based on levels of WMS exposure among employees.

Employees working in Zepto Super Store dark stores with well-established and fully implemented WMS report significantly better operational outcomes compared to those in stores with limited or inconsistent WMS usage. This difference may be attributed to factors like system quality, training adequacy, managerial support for technology adoption, and the maturity of operational processes.

Overall, the results confirm that WMS exposure and depth of implementation play a critical role in improving operational efficiency in quick commerce dark store operations.

CHI-SQUARE TEST

Null Hypothesis (H_0): There is no significant relationship between WMS implementation and operational efficiency at Zepto Super Store.

Alternative Hypothesis (H_1): There is a significant relationship between WMS implementation and operational efficiency at Zepto Super Store.

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Table 4: CHI-SQUARE TEST

Test	Value	df	Significance
Pearson Chi-Square	54.610	2	0.000
Continuity Correction	52.940	2	0.000
Likelihood Ratio	55.380	2	0.000
Linear-by-Linear Association	53.720	1	0.000
N of Valid Cases	310		

INTERPRETATION

The Chi-Square test shows a p-value of 0.000, which is significantly below 0.05, so the null hypothesis is rejected. This indicates a strong and statistically significant relationship between WMS implementation and operational efficiency at Zepto Super Store.

Employees in dark stores with structured and fully functional WMS report higher order pick accuracy, faster fulfilment cycle times, and lower inventory discrepancies. The finding validates that WMS is not merely a support tool but a core driver of operational excellence in the quick commerce model.

Overall, the results confirm that WMS implementation plays a key and measurable role in improving operational performance outcomes across Zepto Super Store's dark store network.

CORRELATION ANALYSIS

Null Hypothesis (H_0): There is no significant relationship between WMS implementation and operational efficiency.

Alternative Hypothesis (H_1): There is a significant relationship between WMS implementation and operational efficiency.

Table 5: Correlation Analysis

Variables	WMS Implementation	Operational Efficiency
WMS Implementation	1	0.491
Operational Efficiency	0.491	1
Sig. (2-tailed)	0.000	
N	310	310

INTERPRETATION

The analysis indicates a moderate positive relationship between WMS implementation and operational efficiency at Zepto Super Store, and the result is statistically significant. This confirms that stronger adoption of WMS contributes to improved operational performance.

It suggests that capabilities such as real-time inventory tracking and optimized picking processes enhance efficiency. However, WMS is not the only influencing factor, as elements like workforce training, store layout, delivery optimization, and managerial support also impact performance.

Therefore, to achieve optimal results, WMS implementation should be supported by effective operational practices and continuous improvement initiatives.

CONCLUSION

This study shows that Warehouse Management Systems (WMS) play a key role in improving operational efficiency at Zepto Super Store. When WMS is effectively implemented—with features like real-time inventory tracking, automated order processing, and better workforce coordination—it leads to clear improvements such as higher picking accuracy, faster operations, and better delivery performance.

The findings also suggest that WMS should be seen as a strategic priority, not just a support function. A well-integrated approach that combines inventory control, order management, and employee training, along with strong management support, can help maintain a competitive advantage in quick commerce.

Although the study has some limitations, it still offers useful insights. Overall, adopting advanced WMS along with continuous improvement practices can help build a more efficient, reliable, and scalable system for long-term growth.

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