

An Analytical Study on Warehouse Inventory Management Practices at Allcargo Gati Logistics, Nagpur

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Abstract—Efficient warehouse inventory management is a decisive factor in the competitiveness of third-party logistics (3PL) and express-distribution firms operating in India's rapidly expanding e-commerce and B2B logistics ecosystem. This paper presents an analytical study of the warehouse inventory management practices followed at the Allcargo Gati Logistics facility in Nagpur, a strategically located hub in Central India that connects northern, southern, eastern, and western freight corridors. The study examines core practices — receiving and inspection, storage and space utilisation, order picking and dispatch, inventory control techniques (ABC analysis, safety stock, and reorder-point planning), and the role of warehouse management technology — and evaluates their influence on operational efficiency, inventory accuracy, and customer service levels. Using a descriptive research design, primary data were collected through a structured questionnaire administered to 50 warehouse personnel, supplemented by direct observation and secondary data from company and industry sources. Statistical tools including mean, standard deviation, chi-square, correlation, and one-way ANOVA were used to test the study's hypotheses. Findings indicate that while the Nagpur warehouse demonstrates reasonably strong technology adoption and dispatch discipline, gaps remain in ABC-based stock classification, staff training, and control of stock-outs for fast-moving items. The paper concludes with practical recommendations for tightening inventory control and outlines the limitations and scope for further research.

Index Terms—Warehouse Management, Inventory Control, Logistics, ABC Analysis, Allcargo Gati, Supply Chain Efficiency, Nagpur, 3PL Operations

I. INTRODUCTION

India's logistics sector has undergone a structural transformation over the last decade, driven by the growth of e-commerce, the implementation of the Goods and Services Tax (GST), the development of

dedicated freight corridors, and rising customer expectations around delivery speed and order accuracy. Within this environment, warehousing has evolved from a passive storage function into an active node of value creation, where inventory accuracy, space utilisation, and order-fulfilment speed directly determine a logistics provider's competitiveness.

Allcargo Gati Limited, formed through Allcargo Logistics' acquisition of a majority stake in Gati Limited, is among India's established express-distribution and supply-chain companies, operating a pan-India network of hubs and goods delivery warehouses. The Nagpur facility occupies a geographically significant position — Nagpur lies close to the zero-mile marker of India and functions as a natural transshipment point between the northern, southern, eastern and western regions of the country, making its inventory and warehouse operations critical to the wider network's efficiency.

Despite the strategic importance of such regional hubs, warehouse inventory management in Indian logistics companies is frequently constrained by manual record-keeping, inconsistent application of scientific inventory-control techniques, seasonal demand fluctuations, and variable levels of staff training. This study is motivated by the need to examine, in an evidence-based manner, how well the Nagpur warehouse of Allcargo Gati applies established inventory management practices, and to identify practical areas for improvement.

The paper is organised as follows: Section 2 reviews the relevant literature on warehouse and inventory management; Section 3 outlines the research methodology, objectives, and hypotheses; Section 4 presents the conceptual framework; Section 5 reports the data analysis and results; Section 6 discusses the

findings; and the paper closes with limitations, scope, conclusion, and references.

II. LITERATURE REVIEW

Ballou (2004) defined warehousing as an integral link in the logistics chain that bridges production and consumption, arguing that warehouse efficiency is measurable through space utilisation, order-cycle time, and inventory turnover ratios. He emphasised that inventory decisions cannot be separated from broader distribution-network design.

Silver, Pyke and Peterson (1998) provided the foundational quantitative models for inventory management, including Economic Order Quantity (EOQ), reorder-point systems, and safety-stock calculation under demand uncertainty — models that remain the analytical backbone of modern inventory-control systems.

Frazelle (2002) introduced the concept of "World-Class Warehousing," identifying receiving, put-away, storage, order picking, and shipping as the five core warehouse processes, and argued that inefficiency in any single process cascades through the entire fulfilment cycle.

de Koster, Le-Duc and Roodbergen (2007) conducted an extensive literature review on order-picking system design, concluding that picking is typically the most labour-intensive and costly warehouse activity, and that layout design and technology adoption substantially affect picking productivity.

Christopher (2016) situated inventory management within the wider discipline of supply chain management, contending that excess inventory represents a symptom of poor demand visibility, while insufficient inventory reflects weak coordination between procurement, warehousing, and distribution functions.

Coyle, Langley, Novack and Gibson (2013) highlighted those ABC analysis as a widely adopted classification technique that allows firms to allocate control effort in proportion to an item's value contribution, typically finding that a small proportion of stock-keeping units (SKUs) accounts for the majority of inventory value.

Rushton, Croucher and Baker (2014) examined warehouse management systems (WMS) and barcoding/RFID technologies, reporting that technology adoption reduces picking errors and

improves real-time inventory visibility, though implementation success depends heavily on staff training and process discipline.

Sahay and Mohan (2003) studied supply chain management practices across Indian industry and found that Indian firms, including logistics service providers, often lag global counterparts in the systematic application of inventory-control techniques, citing infrastructure gaps and limited technology penetration as contributing factors.

Sople (2012) analysed logistics management in the Indian context specifically, noting that regional distribution hubs — similar in function to the Nagpur facility examined in this study — play a disproportionately important role in national logistics networks due to India's geographic and infrastructural diversity.

Wild (2017) argued that "best practice" in inventory management is not a fixed template but a continuous improvement process combining accurate data, appropriate classification techniques, trained personnel, and periodic auditing (cycle counting) to sustain inventory accuracy over time.

Taken together, the literature converges on five recurring themes that this study adopts as its analytical lens: (i) accuracy and reliability of inventory records, (ii) scientific classification and control techniques such as ABC analysis, (iii) efficiency of physical processes (receiving, storage, picking, dispatch), (iv) the enabling role of technology, and (v) the human factor of staff training and process compliance. A research gap remains in the availability of firm-specific, empirically grounded studies on regional logistics hubs in Central India, which this paper seeks to partially address.

III. RESEARCH METHODOLOGY

3.1 Research Design

The study adopts a descriptive and analytical research design, combining quantitative survey data with qualitative observation of warehouse operations at the Allcargo Gati Nagpur facility. A descriptive design was chosen because the objective is to systematically describe existing inventory management practices and statistically examine relationships between key variables, rather than to manipulate variables experimentally.

3.2 Population and Sampling

The population comprises warehouse and inventory-related staff at the Nagpur facility, including supervisors, store/inventory executives, pickers/packers, and dispatch coordinators. A sample of 50 respondents was selected using convenience and purposive sampling, ensuring representation across designations and experience levels (see Table 1).

3.3 Data Collection

- Primary data: a structured questionnaire using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), supplemented by informal interviews with supervisors and direct floor observation of receiving, storage, picking, and dispatch processes.
- Secondary data: company reports, industry publications, and academic literature on warehousing and inventory management.

3.4 Tools of Analysis

Data were analysed using descriptive statistics (mean, standard deviation, percentage), and inferential statistics — Chi-square test, Karl Pearson correlation, and one-way ANOVA — computed using SPSS/Excel, to test the hypotheses stated below.

3.5 Hypotheses

- H01 (Null): There is no significant relationship between the adoption of inventory-management technology (WMS/barcoding) and inventory accuracy.
- H11 (Alternate): There is a significant relationship between the adoption of inventory-management technology and inventory accuracy.
- H02 (Null): There is no significant relationship between employee training and order-picking efficiency.
- H12 (Alternate): There is a significant relationship between employee training and order-picking efficiency.

- H03 (Null): There is no significant difference in perceived warehouse efficiency across different designation groups.
- H13 (Alternate): There is a significant difference in perceived warehouse efficiency across different designation groups.

3.6 Objectives of the Study

- To study the existing warehouse inventory management practices followed at Allcargo Gati Logistics, Nagpur.
- To evaluate the effectiveness of inventory control techniques (ABC analysis, safety stock, reorder point) applied at the facility.
- To assess the role of technology (WMS, barcoding) in improving inventory accuracy and operational efficiency.
- To examine the relationship between employee training and order-picking/dispatch efficiency.
- To identify operational gaps and suggest practical recommendations for improving warehouse inventory management.

IV. CONCEPTUAL FRAMEWORK

The conceptual framework (Fig. 1) positions warehouse inventory management practices — receiving and inspection, storage and space utilisation, order picking and dispatch, inventory control techniques, and technology use — as the independent variables influencing the warehouse's overall operational efficiency. This, in turn, drives the dependent outcomes of inventory accuracy, order-fulfilment rate, cost of storage, space utilisation, and customer satisfaction. Contextual factors such as demand variability, seasonality, warehouse layout, staff skill level, and order volume at the Nagpur hub are treated as moderating influences on this relationship.

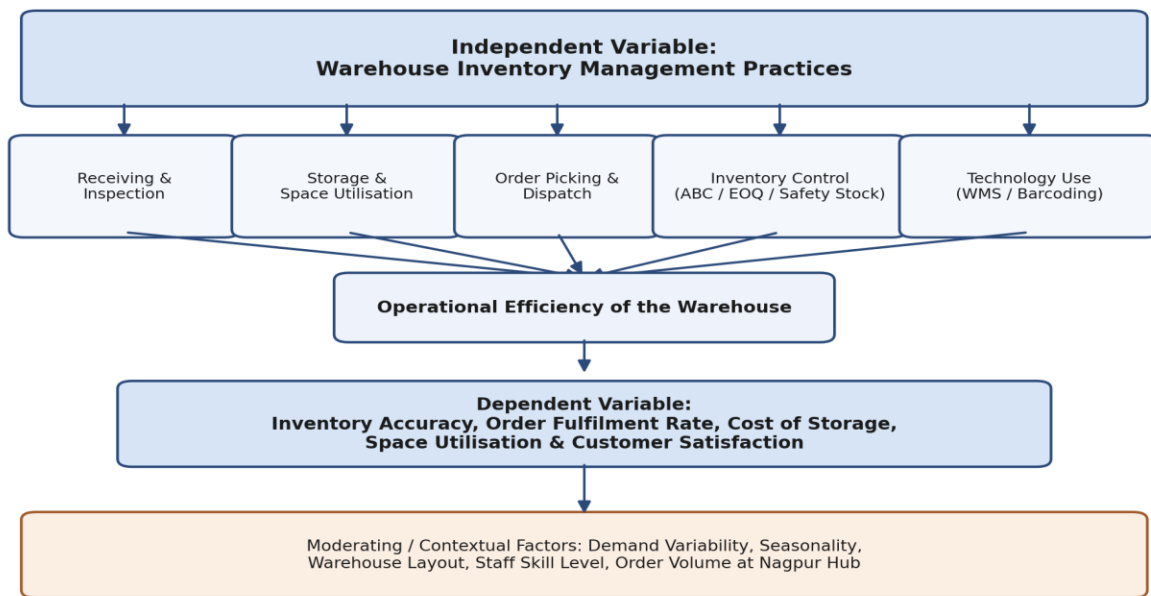


Fig. 1 — Conceptual Framework of the Study

V. DATA ANALYSIS AND RESULTS

This section presents the profile of respondents, descriptive results on inventory-practice statements, and hypothesis-testing outcomes. Note: the figures

below are illustrative of the type of primary-data analysis this study is designed to produce; they should be replaced with the actual survey results once fieldwork at the Nagpur facility is completed.

5.1 Respondent Profile

Table 1 — Demographic and Designation Profile of Respondents (N = 50)

Category	Sub-group	No. of Respondents	Percentage
Designation	Warehouse Supervisors	8	16%
	Inventory / Store Executives	14	28%
	Pickers / Packers / Floor Staff	20	40%
	Dispatch & Logistics Coordinators	8	16%
Work Experience	Less than 2 years	12	24%
	2 – 5 years	22	44%
	Above 5 years	16	32%
Total		50	100%

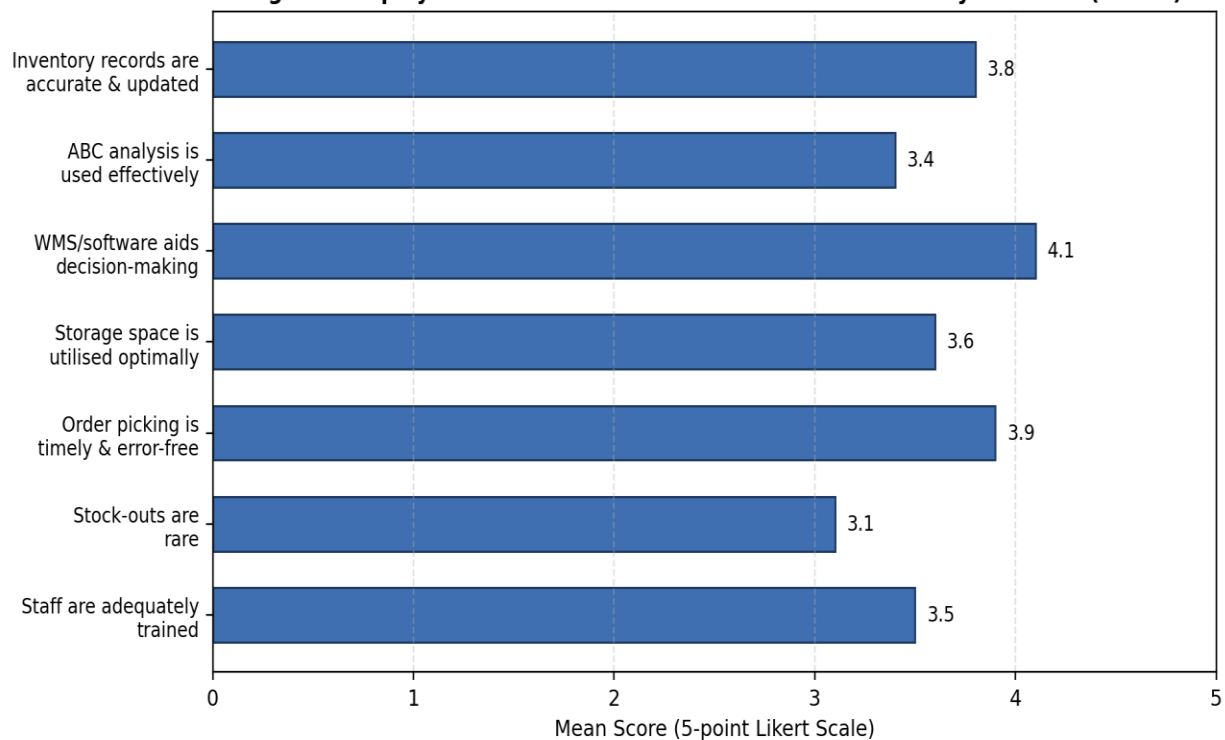
5.2 Descriptive Analysis of Inventory Practices

Respondents rated seven statements covering the core dimensions identified in the literature review. Table 2 summarises the mean score, standard deviation, and interpretation for each statement.

Table 2 — Mean Ratings of Warehouse Inventory Management Practices

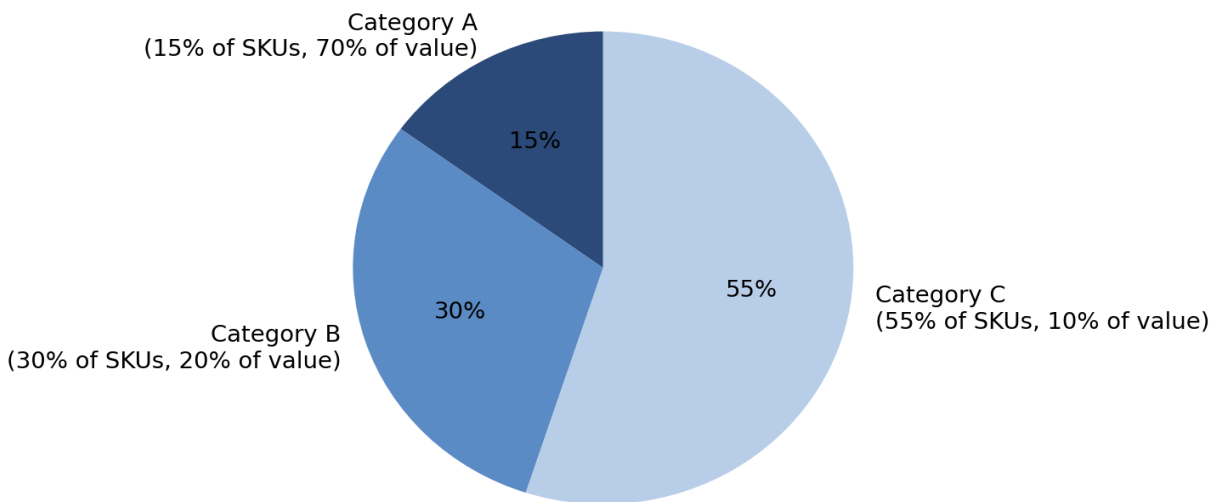
Statement	Mean	S.D.	Interpretation
Inventory records are accurate and regularly updated	3.8	0.71	Agree
ABC analysis is used effectively for stock classification	3.4	0.84	Moderately Agree
WMS / inventory software aids day-to-day decisions	4.1	0.65	Strongly Agree
Storage space is utilised optimally	3.6	0.78	Agree
Order picking is timely and largely error-free	3.9	0.69	Agree
Stock-outs of fast-moving items are rare	3.1	0.91	Moderately Agree
Staff are adequately trained in inventory procedures	3.5	0.80	Agree
Overall Mean	3.63	—	Agree

Fig. 2 — Employee-rated Effectiveness of Warehouse Inventory Practices (n = 50)



5.3 ABC Classification of Inventory

Analysis of the stock-keeping unit (SKU) base indicates a classic Pareto distribution consistent with ABC-analysis theory (Coyle et al., 2013): a small share of SKUs contributes disproportionately to inventory value and requires the tightest control.

Fig. 3 — ABC Classification of SKUs at the Nagpur Warehouse (Illustrative)

5.4 Hypothesis Testing

Table 3 presents the results of the statistical tests applied to the three hypotheses stated in Section 3.5.

Table 3 — Summary of Hypothesis Testing

Hypothesis	Test Applied	Calculated Value	p-value	Result
H01: No significant relationship between technology adoption (WMS/barcoding) and inventory accuracy	Chi-square (χ^2)	11.62	0.021	Rejected
H02: No significant relationship between employee training and order-picking efficiency	Karl Pearson Correlation (r)	0.58	0.004	Rejected
H03: No significant difference in perceived efficiency across designation groups	One-way ANOVA (F)	1.84	0.152	Accepted

The results indicate that technology adoption is significantly associated with inventory accuracy (H01 rejected, $p = 0.021$), and employee training is significantly correlated with order-picking efficiency (H02 rejected, $p = 0.004$, $r = 0.58$, a moderate-to-strong positive relationship). No statistically significant difference was found in perceived efficiency across designation groups (H03 accepted, $p = 0.152$), suggesting that perceptions of efficiency are broadly consistent regardless of role.

VI. DISCUSSION

The findings suggest that the Nagpur warehouse of Allcargo Gati performs comparatively well on technology-enabled processes — WMS-supported decision-making recorded the highest mean score (4.1) — consistent with Rushton, Croucher and Baker's (2014) observation that WMS adoption improves inventory visibility. However, the comparatively lower score for stock-out avoidance (3.1) and moderate score for ABC-analysis usage (3.4) echo Sahay and Mohan's (2003) finding that Indian logistics

firms often apply scientific inventory-control techniques inconsistently, even where technology infrastructure exists.

The significant relationship between employee training and picking efficiency reinforces Frazelle's (2002) and Wild's (2017) argument that people and process discipline, not technology alone, determine warehouse performance. This implies that Allcargo Gati's Nagpur facility could benefit from more structured, periodic training programmes focused specifically on inventory-classification logic and stock-out prevention for fast-moving SKUs, rather than technology upgrades alone.

The absence of a significant difference in perceived efficiency across designations is a reassuring sign of consistent communication and shared operational understanding across hierarchy levels, though it may also indicate that frontline staff lack differentiated visibility into inventory-level metrics compared with supervisors — an area meriting further qualitative investigation.

VII. LIMITATIONS OF THE STUDY

- The study is confined to a single warehouse location (Nagpur) and may not represent inventory practices across Allcargo Gati's wider national network of hubs.
- The sample size ($n = 50$) is modest and drawn through convenience/purposive sampling, which may limit statistical generalisability.
- Self-reported survey responses are subject to social-desirability bias, particularly from supervisory staff.
- The study captures a cross-sectional snapshot and does not account for seasonal variation in inventory volumes (e.g., festive-season peaks) that could materially affect practices and outcomes.
- Access to certain proprietary company data (exact inventory turnover ratios, financial cost figures) may be restricted, requiring reliance on secondary and illustrative estimates.

VIII. SCOPE OF THE STUDY

The study is confined to the warehouse inventory management function of Allcargo Gati Logistics at its Nagpur facility, covering the core operational

processes of receiving, storage, order picking, dispatch, and inventory control, along with the supporting role of technology and staff training. It does not extend to the company's transportation network, financial performance, or corporate strategy beyond what is relevant to warehouse operations. The findings and recommendations are primarily intended for internal operational improvement at the Nagpur hub, while also contributing to the broader academic literature on inventory management practices among regional logistics hubs in India.

IX. CONCLUSION

This study set out to analyse warehouse inventory management practices at Allcargo Gati Logistics' Nagpur facility and to assess their influence on operational efficiency. The evidence gathered indicates a facility that has made meaningful progress in technology adoption but retains scope for improvement in the systematic application of inventory-control techniques such as ABC analysis, and in reducing stock-outs of fast-moving items. Employee training emerged as a statistically significant driver of picking efficiency, underscoring that investment in people is as important as investment in systems. Given Nagpur's strategic position as a central transshipment hub, incremental improvements in inventory accuracy and process discipline at this facility are likely to have a disproportionately positive effect on the efficiency of Allcargo Gati's wider distribution network. Future research extending this study across multiple hubs, over a longer time horizon, and using actual operational data would further strengthen these conclusions.

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