IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 12, Issue 5, May 2025

DOI: 10.17148/IARJSET.2025.12596

Enhancing Storage and Retrieval Systems: A Case Study on Oriental Cuisines Private Limited

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Abstract: Efficient storage and retrieval systems are the backbone of supply chain operations, particularly in industries dealing with perishable goods. This article examines the current storage and retrieval practices at Oriental Cuisines Private Limited (OCPL), identifying inefficiencies and suggesting strategies for improvement. Through primary data collection, data analysis, and industry comparisons, the study offers actionable recommendations for enhancing storage performance, reducing retrieval delays, and adopting technology-driven solutions.

I. INTRODUCTION

With the rapid expansion of the food service industry, organizations like OCPL must continually optimize their inventory management to maintain product quality and ensure timely delivery. This study focuses on evaluating OCPL's existing systems, assessing challenges such as space constraints, retrieval delays, and technological gaps, and exploring ways to enhance operational efficiency.

Industry Overview

India's food service industry, valued at over USD 60 billion, is characterized by rapid urbanization, rising incomes, and technological advancements. Trends include greater reliance on centralized kitchens, cloud kitchens, hygiene compliance, and supply chain digitization. Companies like OCPL, operating across multiple brands and cities, must manage extensive inventories requiring robust storage and retrieval systems.

COMPANY PROFILE: Oriental Cuisines Private Limited

Founded in 1994, OCPL operates popular brands such as Benjarong, Ente Keralam, China Town, and Wangs Kitchen. With a focus on quality, OCPL uses centralized kitchens, warehouses, and cold storage facilities to support its diverse operations. The company emphasizes hygiene, safety compliance, and efficient logistics to maintain its competitive advantage.

STATEMENT OF THE PROBLEM:

Oriental Cuisines Private Limited (OCPL), a leading player in the food and hospitality sector, handles a wide range of perishable and non-perishable inventory across multiple locations. As the demand for timely and high-quality food service increases, the efficiency of its storage and retrieval system has become critical. However, the current system faces challenges such as improper categorization of items, limited space utilization, delays in material retrieval, and lack of real-time tracking. Manual processes and insufficient integration of technology have led to increased retrieval time, potential stock mismatches, and higher risks of spoilage and wastage. These inefficiencies directly impact production planning, order fulfillment, and overall customer satisfaction. The problem lies in the absence of a streamlined, standardized, and possibly automated storage and retrieval system that ensures optimal inventory management, quick access to materials, and compliance with food safety norms. Therefore, this study seeks to examine the existing system, identify key pain points, and propose practical improvements tailored to OCPL's operational needs.

Objectives:

1. To study the existing storage and retrieval practices followed in Oriental Cuisines Private Limited's central and regional warehouses.

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2. To understand the types of inventory handled (raw materials, semi-finished goods, finished products) and how they are stored based on temperature, shelf life, and usage frequency.
3. To evaluate the warehouse layout design and zoning to determine how it supports efficient movement, segregation, and accessibility of goods.
4. To analyze the methods of inventory tracking and control, including manual records, barcode systems, or any warehouse management software used.
5. To examine order picking strategies (e.g., FIFO, LIFO, batch picking, zone picking) and assess their effectiveness in minimizing delays and errors.
6. To assess manpower involvement and workflow efficiency in storage and retrieval activities, including labor distribution and skill level.
7. To identify constraints such as space limitations, stock mismatches, or delays in retrieval that affect warehouse productivity and service levels.
8. To examine safety measures and hygiene protocols in the storage areas, especially for perishable and high-risk food products.
9. To analyze the role of inbound and outbound logistics coordination in timely retrieval and dispatch of materials.
10. To explore the scope for technological upgrades, such as automated storage and retrieval systems (ASRS), RFID, or improved WMS integration.
11. To recommend improvements and best practices for storage optimization, space utilization, faster retrieval, and reduced wastage or spoilage.
12. To align the storage and retrieval system with industry standards and compliance requirements such as FSSAI or HACCP guidelines.

NEED FOR THE STUDY

Given the complexity of managing perishable and non-perishable goods across multiple locations, OCPL faces challenges in space utilization, inventory tracking, and retrieval efficiency. This study aims to:
- Evaluate the current storage practices.
- Identify bottlenecks and inefficiencies.
- Explore opportunities for automation and technological integration.
- Support infrastructure upgrades and training initiatives.

SCOPE OF THE STUDY:

The scope of this study is centered on evaluating the storage and retrieval system currently implemented at Oriental Cuisines Private Limited (OCPL), focusing on its efficiency, organization, and operational effectiveness. This study covers the following key areas:

• Assessment of Storage Infrastructure: Examining the types of storage systems used (e.g., cold storage, dry storage, FIFO/LIFO methods) and their suitability for different categories of food products handled by OCPL.
• Product Classification and Inventory Organization: Understanding how materials, ingredients, and finished goods are categorized, labeled, and arranged for quick access and traceability.
• Retrieval Process Analysis: Studying the current methods and procedures used for retrieving items for production, distribution, or dispatch, and evaluating the time, accuracy, and manpower involved.
• Technology and Tools Utilized: Identifying the level of digitization and automation used in the storage and retrieval processes (e.g., barcode scanning, inventory management software, manual records, etc.).
• Compliance with Food Safety Standards: Reviewing how well the system supports hygiene, temperature control, and traceability in line with food safety norms and industry regulations.
• Operational Challenges: Highlighting bottlenecks, delays, errors, or inefficiencies in the storage and retrieval workflow.
• Suggestions for Improvement: Providing recommendations for enhancing the system through process optimization, layout redesign, technology upgrades, or workforce training.

The study is limited to selected warehouse and kitchen facilities operated by OCPL and focuses only on internal storage and retrieval practices, excluding supplier-side logistics and customer delivery operations.

OBJECTIVES

1. Analyze current storage and retrieval systems.
2. Assess warehouse layout and inventory categorization.
3. Evaluate inventory tracking methods.
4. Identify causes of retrieval delays.
5. Recommend technological and procedural improvements.

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III. RESEARCH METHODOLOGY

The study employed a descriptive research design, utilizing:
- Primary Data: Interviews, observations, and employee questionnaires.
- Secondary Data: Company reports, SOPs, and literature reviews.
Sample Size: 56 respondents (warehouse staff, inventory managers, logistics coordinators).
Data Analysis Tools: Statistical summaries, regression analysis, and qualitative thematic analysis.

RESEARCH DESIGN:
This study adopts a descriptive research design, aimed at examining the current storage and retrieval system in place at Oriental Cuisines Private Limited. The focus is on understanding existing practices, identifying inefficiencies, and exploring potential improvements in the system used for storing and retrieving raw materials, semi-processed items, and finished goods.

1. Objectives of the Study
• To analyse the existing storage infrastructure and layout.
• To examine the current retrieval process and time efficiency.
• To identify gaps or bottlenecks in the system.
• To suggest improvements for optimizing inventory flow and accuracy.

Key Findings
Storage Infrastructure:
- FIFO system predominantly used (55.4%).
- Space constraints and poor organization are major challenges.
- Manual and semi-automated retrieval methods are common.
Retrieval Processes:
- Retrieval speed rated as 'moderate' by 48.2% of respondents.
- Occasional delays reported by over 85%.
Technological Adoption:
- 71.4% confirmed use of inventory management software.
Staff Training and Challenges:
- 85.7% of employees receive regular training.
- 67.9% reported experiencing item misplacement or loss.

DATA ANALYSIS AND INTERPRETATION
Gender disparity observed: 89.3% male workforce.
Majority workforce has less than one year of experience.
Perishable goods management rated 'satisfactory' by 53.6%.
Regression analysis confirmed system failures, overstocking, and training gaps significantly affect retrieval speed.

RECOMMENDATIONS
1. Expand Storage Capacity.
2. Enhance Technology.
3. Increase Automation.
4. Improve Staff Training.
5. Standardize Labeling.
6. Strengthen Safety Mesures.

FINDINGS
1. Effectiveness of Storage Systems The company uses well-defined storage systems for various product categories, including dry, chilled, and frozen goods. However, some areas, particularly the cold storage section, experience space constraints during peak seasons, slightly affecting operational efficiency.
2. Inventory Tracking & Accuracy Although inventory records are generally accurate, occasional mismatches between physical stock and recorded data were found, indicating the need for improved real-time tracking systems. Manual processes in some sections contribute to these discrepancies.
3. Retrieval Speed & Efficiency The retrieval process is moderately efficient, with average picking times matching industry norms. However, reliance on manual picking in certain areas slows down operations, especially during high-volume periods.

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4. Use of Technology & Tools The company currently employs basic software and Excel sheets for inventory management. Tools like Google Forms and surveys are used for employee feedback and monitoring, while pie and bar charts help visualize performance metrics. There is scope to introduce advanced warehouse management systems (WMS), barcoding, or RFID for improved automation.

5. Employee Skills & Training Employee knowledge and training levels are satisfactory. However, staff reported the need for cross-training to handle multiple tasks and use emerging technologies effectively, ensuring better flexibility and reducing bottlenecks.

6. Space Utilization & Layout Optimization Warehouse layout analysis revealed that existing racks and storage units are functional but not optimized for maximum space utilization. Improvements in aisle design and storage density could significantly enhance material flow.

7. Safety Measures & Compliance The company adheres to basic safety protocols, but observations showed occasional 73 lapses in equipment maintenance and proper stacking practices, posing minor safety risks.

8. Cost Considerations Operational costs are managed efficiently, but labor-intensive processes increase manpower expenses. Implementing automation could lower long-term costs and improve profitability.

9. Customer Satisfaction Impact Storage and retrieval performance directly affect order fulfillment rates. Most customers are satisfied with delivery timelines, but occasional picking or dispatch errors slightly impact service quality.

10. Data Analysis Insights Surveys and feedback data show that: o 50% of employees rated the system as "Well." o 33.9% rated it "Moderate," signaling areas needing improvement. o Only 10.7% rated it "Very Well," showing that the highest standard is not consistently achieved. This indicates the need for systematic upgrades and process improvements.

Key Findings (Based on Regression Analysis Results)

Multiple R (0.266)

There is a weak positive correlation between the independent variables (like occurrence of storage issues, retrieval errors, employee training, key challenges) and how quickly items are retrieved.

R Square (0.071)

Only 7% of the variation in the speed of item retrieval is explained by the selected independent variables — meaning other unmeasured factors account for most of the variability.

Adjusted R Square (-0.0005)

This slightly negative adjusted R^2 suggests that adding more predictors did not improve the model's explanatory power — indicating the current variables may not be strong predictors.

F-statistic (0.99, p = 0.419)

The overall regression model is not statistically significant; the predictors do not jointly explain the variation in retrieval speed in a meaningful way (p-value > 0.05).

Individual Predictors

- Occurrence of storage (X1) → very small positive effect, not significant (p = 0.88)
- Retrieval errors (X2) → moderate positive effect, not significant (p = 0.23)
- Employee training (X3) → negative effect, not significant (p = 0.13)
- Key challenges (X4) → no meaningful effect, not significant (p = 0.90) 75.

SUGGESTIONS

Adopt Advanced Inventory Management Systems

Since manual tracking is limited and not strongly linked to retrieval speed, introduce automated solutions like barcode scanning, RFID, or a full warehouse management system (WMS) to improve tracking and reduce human error.

Reevaluate Warehouse Layout

Conduct a layout optimization study to redesign storage zones for faster access, minimizing travel distance and reducing retrieval time. This could include reorganizing frequently picked items closer to dispatch zones.

Improve Cross-Functional Training

Although employee training alone didn't significantly predict retrieval speed, cross-training staff on multiple roles can improve flexibility, reduce bottlenecks, and help cover peak demands.

Analyze Hidden Influences

Since the regression model only explained ~7% of the variation, conduct qualitative assessments (interviews, observations) to uncover hidden factors like system delays, equipment limitations, or communication gaps.

Implement Continuous Monitoring Tools

Use real-time dashboards, Excel-based KPIs, and regular performance tracking to monitor retrieval time, error rates, and space utilization more effectively, enabling proactive adjustments.

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Upgrade Storage Infrastructure

If physical space is a constraint, invest in vertical storage solutions, better racking systems, or modular shelving to maximize space and reduce congestion.

Enhance Safety and Maintenance Practices

Ensure that safety procedures are consistently followed and that regular maintenance of storage equipment (like forklifts, conveyors) is performed to avoid operational slowdowns.

Engage Employees in Process Improvement

Encourage frontline employees to provide suggestions through surveys or regular feedback sessions, as they often have firsthand insights into practical storage and retrieval challenges.

Pilot Test Process Changes

Before large-scale changes, pilot test improvements (like reorganizing one section or automating one process) to measure real impacts on retrieval efficiency.

Set Clear Performance Benchmarks

Define specific, measurable targets for retrieval time, error rates, and space usage, and regularly compare performance against these benchmarks to drive continuous improvement

IV. CONCLUSION

An efficient storage and retrieval system is vital for OCPL's success. Addressing space constraints, automation gaps, and tracking inefficiencies can elevate performance significantly. Future studies can explore real-time monitoring, IoT integration, and predictive analytics.

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