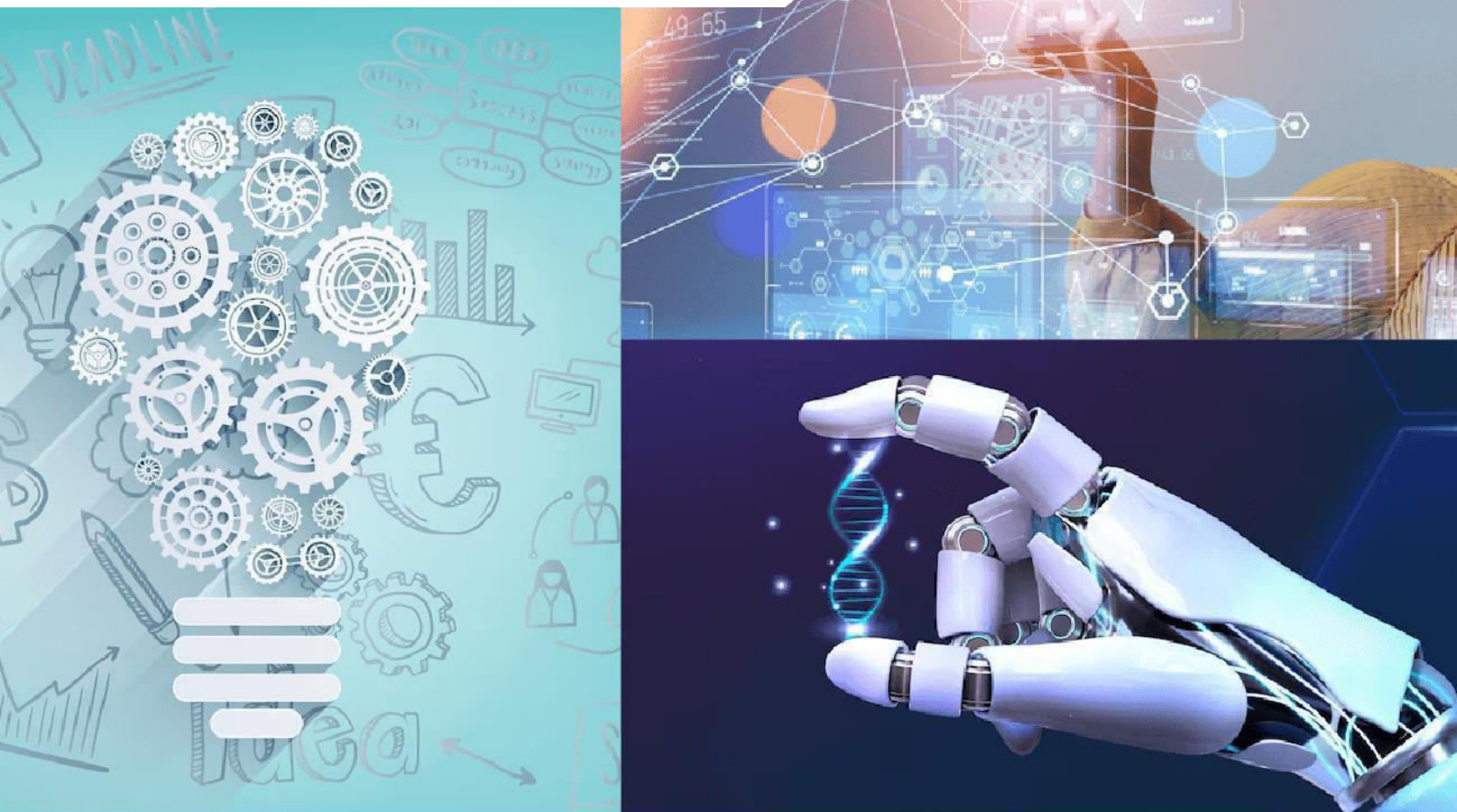




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A Study on Warehouse Operations in Sricity, Tada, Andhra Pradesh

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ABSTRACT: This study examines warehouse operations, focusing on efficiency, workforce coordination, and employee perceptions. Analyzing primary data from 102 employees using Chi-square and correlation techniques, findings reveal high satisfaction with safety and teamwork. Results show a significant link between training and efficiency, and communication and error reduction. Recommendations include regular skill development, improved feedback systems, and stronger supervisory involvement to enhance productivity and maintain an inclusive work environment.

KEYWORDS: Warehouse Operations, Logistics Management, Employee Perception, Operational Efficiency, Workplace Safety.

I. INTRODUCTION

Warehouse operations encompass systematic storage, handling, and distribution of goods, driven by modern technology and efficient management. The facility follows structured procurement, optimal inventory control using FIFO, strategic layouts, and safe material handling. Emphasizing order accuracy, route planning, real-time tracking, safety protocols, and quality control, these integrated policies and procedures ensure streamlined workflows, minimized wastage, reduced operational costs, and enhanced customer satisfaction.

Statement of the Problem

Efficient warehouse operations are crucial for supply chain success, yet organizations frequently face challenges like order delays, poor inventory control, and inefficient layouts. Managing large volumes while ensuring accuracy often leads to inaccuracies, manual bottlenecks, and higher costs. This study evaluates current facility practices, identifies operational gaps, and suggests actionable improvements to boost productivity, minimize expenses, and enhance overall performance.

Objectives of the Study

The objectives of this study are

1. To study the warehouse operations Sricity, Tada, Andhra Pradesh
2. To evaluate the inventory management system followed in the warehouses.
3. To analyze the efficiency of order picking and dispatch processes.
4. To examine the material handling methods used in the warehouse.
5. To assess the overall efficiency of warehouse operations.

Scope of the Study

1. Examines core warehouse activities, including receiving, storage, inventory control, and dispatch.
2. Evaluates inventory accuracy, layout efficiency, material handling, and technological impacts on performance.
3. Identifying operational challenges, the research provides actionable insights to boost productivity, minimize losses, optimize cost control, and enhance overall supply chain management.

Limitations of Study

1. This study remains limited to specific warehouse operations, restricting broader logistics industry generalizations.
2. Time constraints and restricted confidential information heavily influenced employee responses and data accuracy.
3. The research focuses narrowly on inventory management, order processing, and material handling procedures.

II. REVIEW OF LITERATURE

In a study by **Gupta and Mehta**, (2025), titled “Performance Evaluation of Warehouse Operations in E-Commerce Logistics”, published in International Journal of Logistics Systems (Vol. 22, Issue 2), it was concluded that faster order fulfillment, efficient picking systems and real-time tracking are key factors influencing warehouse performance in e-commerce logistics.

In another study by **Reddy and Naidu**, (2025), titled “Efficiency of Inventory Control Techniques in Third Party Logistics Warehouses”, published in Asian Journal of Logistics (Vol. 12, Issue 1), it was concluded that scientific inventory control methods like ABC analysis and EOQ enhance stock management and reduce carrying costs in 3PL warehouses.

Sharma et.al., (2024) in their study titled “Role of Warehouse Management Systems in Modern Logistics Operations”, published in Journal of Supply Chain Management (Vol. 18, Issue 3), it was concluded that effective implementation of WMS improves real-time tracking, order processing speed and coordination between different warehouse functions.

Yet another study by **Ali and Khan**, (2024), titled “Safety and Risk Management Practices in Warehouse Operations”, published in Journal of Safety Management (Vol. 14, Issue 3), concluded that proper safety measures, training programs and risk management strategies reduce workplace accidents and improve employee productivity in warehouses.

Industry Profile

The premier logistics and supply chain management companies located in Sricity, operates as a subsidiary of a global logistics powerhouse. Major companies headquartered in Chennai with over 3,500 employees, it delivers comprehensive solutions including freight forwarding, warehousing, and contract logistics. Backed by solid financial performance and a strong reputation for reliability, it serves diverse sectors from automotive to pharmaceuticals.

World Scenario

Connecting regional enterprises to international markets across Asia, Europe, and the Americas, these organizations utilizes advanced green logistics practices, automation, and solar-facilitated infrastructure to maintain strict global standards of operational efficiency and environmental sustainability.

National Scenario

Featuring a robust pan-India network near major ports and industrial gateways, these enterprises maintains stable credit ratings and advanced technological frameworks. Its integrated supply chain services support key industries through real-time tracking, inventory management, and structured workforce deployment.

State Scenario

Regional operations in Tamil Nadu are anchored by strategic warehousing hubs in Oragadam, Sricity, and Coimbatore. The business leverages favorable state policies, port connectivity, and infrastructure frameworks to drive efficiency in automotive, e-commerce, and cold-chain sectors.

Future Outlook

Long-term strategic plans focus on expanding into multimodal logistics parks, scaling artificial intelligence and automation, capitalizing on port developments, meeting rising e-commerce demands, and strengthening green logistics leadership.

Research Design & Approach

This study employs a descriptive research design to provide a detailed and accurate picture of warehouse characteristics and behaviors. The chosen research approach is the survey method, collecting information through targeted individual responses.

Sources of Data & Instrument

❖ **Primary Data:** Collected firsthand through a structured questionnaire, which served as the primary research instrument for original data acquisition.

❖ **Secondary Data:** Gathered from published and unpublished sources, including the internet, company websites, and organizational journals.

Sample Plan

- ❖ **Sample Unit:** Consists of warehouse employees located in Sricity, Tada.
- ❖ **Sample Size:** Comprises 102 respondents (\$n\$) out of a total population of 169 employees.
- ❖ **Sampling Procedure:** Convenience sampling was utilized, offering respondents an accessible path to selection while efficiently covering nearly the entire target employee population of 169.

Tools Used for Data Analysis

Percentage Analysis: Percentage analysis was used to analyze demographic characteristics and respondents' options regarding supply chain operations.

$$\text{Percentage} = \frac{\text{No.of Respondents in a Category}}{\text{Total No.of Respondents}} \times 100$$

Chi-Square Test: Chi-square determines whether variables are associated, including analytics usage, performance, awareness, decision-making, and departmental usage.

$$\chi^2 = \frac{\sum (O_i - E_i)^2}{E_i}$$

Correlation Analysis

Correlation analysis is a statistical tool used to measure the relationship between two variables. It is denoted by “r” and shows the strength and direction of the relationship. It helps to identify whether variables such as business analytics usage and organizational performance are related

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Data Analysis and Interpretation

Data analysis involves systematically organizing and examining data to answer research questions, often using visual tools like tables and charts. Data, collected through various methods, is meaningless until analyzed. Analysis identifies patterns and insights through techniques like classification and comparison. Interpretation gives meaning to findings, aligns them with research goals, and generates insights for informed decision-making and future studies.

Table: 1 Age wise Classification

Age	No. of Respondents	%
Below 20	10	10
21- 30	35	34
31- 40	35	35
41- 50	12	11
Above 50	10	10
Total	102	100

The table shows that 10% respondents belong to age below 20, 34% to 21 – 30, 35 % to 31 – 40, 11 % to 41 – 50 and 10 % belong to age above 50.

Table: 2 Years of Experience

Years of Experience	No. of Respondents	%
Below 1 year	35	34
1–2 years	20	19
3–5 years	30	29
6–10 years	12	11
Above 10 years	5	5
Total	102	100

The table shows that 34% respondents have less than 1-year experience, 19% have 1 – 2 years, 29% have 3- 5 years of experience, 11 % have 6 – 10 years and 5 % have experience more than 10 years.

Table: 3 Department

Department	No. of Respondents	%
Inbound Logistics	28	27
Outbound Logistics	32	31
Inventory Management	24	24
Quality Control	18	18
Total	102	100

It is observed that 27 % of the respondents belong to Inbound logistics, 31 % belong to Outbound logistics, 24% belong to Inventory management, 18% belong to quality control department.

Table: 4 Documentation System Followed

Documentation System Followed	No. of Respondents	%
Fully digital	24	24
Manual	14	14
Hybrid (both)	32	31
Barcode	20	20
Cloud-based	12	11
Total	102	100

24% of respondents informed that warehouse operations are fully digital, 14 % are manual, 31% hybrid, 20% follow barcode, and 11% formed that documentation is cloud based.

Table: 5 Methods of Material Handling

Methods of Material Handling	No. of Respondents	%
Manual Handling	21	21
Forklift	27	26
Conveyor System	18	18
Automated System	16	16
Pallet trucks	20	19
Total	102	100

21% of respondents informed that materials are handled manually, 26 % by forklift, 18% by conveyor system, 16% by Automated system and 19% by pallet trucks.

Table: 6 Storage Systems

Storage Systems	No. of Respondents	%
Rack storage	29	28
Floor stacking	21	21
Bin system	19	19
Automated storage	14	14
Mixed storage	19	18
Total	102	100

28% of respondents informed that warehouses follow Rack storage, 21% informed Floor Stacking, 19% informed Bin system, 14% informed Automated storage and 18% informed Mixed storage.

Table: 7 Methods of Storage Retrieval Systems

Methods of Storage Retrieval Systems	No. of Respondents	%
FIFO (First in First Out)	33	32
LIFO (Last in First Out)	18	18
FEFO (First Expiry First Out)	16	16
JIT (Just-in-Time)	14	14
Mixed method	21	20
Total	102	100

32% of respondents informed that storage retrieval system follow FIFO, 18% informed LIFO, 16% informed FEFO, 14% informed Just – In – Time and 20% informed mixed method in storage retrieval systems.

Table: 8 Methods of Order Picking

Methods of Order Picking	No. of Respondents	%
Single order picking	24	24
Batch picking	28	27
Zone picking	21	21
Wave picking	16	16
Automated picking	13	12
Total	102	100

24% of respondents informed that warehouse follow Single Order Picking, 27% follow Batch Picking, 21% follow Zone Picking, 16% follow Wave Picking and 12% follow Automated Picking.

Table: 9 Use of Warehouse Management System (WMS)

Use of WMS	No. of Respondents	%
Fully implemented	36	36
Mostly used	32	31
Partially used	22	22
Rarely used	8	8
Not used	4	4
Total	102	100

Most respondents report active technology adoption, with 67% stating a Warehouse Management System is fully implemented or mostly used, reflecting strong digital integration across operational processes.

Table: 10 Use of Radio Frequency Identification Device (RFID)

Use of RFID	No. of Respondents	%
Always	34	33
Frequently	31	30
Sometimes	22	22
Rarely	10	10
Never	5	5
Total	102	100

Most respondents report high frequency of RFID adoption, with 63% indicating its use always or frequently, demonstrating strong reliance on tracking technologies for streamlined warehouse management.

Table: 11 Respondents Opinion about Order Picking in Warehouses

Order picking in Warehouses	Very High		High		Moderate		Low		Very Low	
	Res *	%	Res *	%	Res *	%	Res *	%	Res *	%
Accuracy in Order Picking	34	33	37	36	21	21	7	7	3	3
Order Processing Time	42	41	30	29	22	22	8	8	0	0
Order Picking Satisfaction	39	38	35	34	25	25	3	3	0	0

Most respondents report high to very high satisfaction, accuracy, and efficiency in order picking. Specifically, over 65% rate order processing time and picking satisfaction positively, reflecting strong operational performance.

Table: 12. Respondents opinion about Speed of Warehouse Operations

Speed of Warehouse Operations	Very Fast		Fast		Moderate		Slow		Very Slow	
	Res *	%	Res *	%	Res *	%	Res *	%	Res *	%
Stock Verification Frequency	36	35	34	33	22	22	7	7	3	3
Product Delivery Time	43	42	35	34	20	20	4	4	0	0
Warehouse Automation	40	39	34	33	22	22	6	6	0	0

Most respondents view warehouse operations positively, with over 68% rating speed, stock verification, 76% for delivery times, and 72% for automation as fast or very fast, indicating strong operational efficiency and performance.

Table: 13 Lead Time for Order Fulfilment

Lead Time for Order Fulfilment	No. of Respondents	%
Very short	38	37
Short	32	31
Moderate	22	22
Long	8	8
Very long	2	2
Total	102	100

Most respondents report favorable fulfillment speeds, with 68% indicating that lead times for order fulfillment are very short or short, reflecting high operational efficiency.

Table: 14 Respondents Opinion on Warehouse layout and Safety measures

Efficiency on Warehouse Layout & Safety Measures	Excellent		Good		Average		Poor		Very Poor	
	Res *	%	Res *	%	Res *	%	Res *	%	Res *	%
Warehouse Layout	28	27	32	31	24	24	12	12	6	6
Operational Efficiency	42	41	36	35	20	20	4	4	0	0
Safety Measures	40	39	34	33	20	20	8	8	0	0

Most respondents view supply chain factors favorably, with over 58% rating warehouse layout, 76% rating operational efficiency, and 72% rating safety measures as good or excellent. .

Table: 15 Overall satisfaction of Warehouse Operations

Overall satisfaction of Supply Chain Operations	No. of Respondents	%
Highly satisfied	42	41
Satisfied	36	35
Neutral	20	20
Dissatisfied	4	4
Highly dissatisfied	0	0
Total	102	100

Most respondents express positive sentiment, with 76% indicating they are highly satisfied or satisfied with overall supply chain operations, reflecting effective management practices and strong workplace performance.

III. CHI SQUARE TEST-I

Relationship Between Age and Efficiency of Overall Operations

Null Hypothesis: H0:

There is no significant relationship between Age and Efficiency of overall operations

Alternative Hypothesis: H1:

There is significant relationship between Age and Efficiency of overall operations.

Observed Frequency:

The observed frequency for Chi Square Test is given in the table below

Table 16: Observed Frequency

Age	Overall Satisfaction of Warehouse Operations					Total
	Highly Satisfied	Satisfied	Neutral	Dissatisfied	Highly Dissatisfied	
Below 20	4	3	2	1	0	10
21- 30	14	12	7	2	0	35
31- 40	14	8	5	1	0	35
41- 50	5	4	2	1	0	12
Above 50	4	3	2	1	0	10
Total	42	36	20	4	0	102

Source: Primary Data

$$\text{Expected Frequency} = \frac{\text{Row Total} \times \text{Coloum Total}}{\text{Grand Total}}$$

Applying the row value and column value for each row and column using the above formula, the following expected frequency is arrived.

Table 16: Expected Frequency

Age	Overall Satisfaction of Warehouse Operations					Total
	Highly Satisfied	Satisfied	Neutral	Dissatisfied	Highly Dissatisfied	
Below 20	4.12	3.53	1.96	0.39	0.00	10
21- 30	14.41	12.35	6.86	1.38	0.00	35
31- 40	14.41	12.35	6.86	1.38	0.00	35
41- 50	4.94	4.24	2.36	0.46	0.00	12
Above 50	4.12	3.53	1.96	0.39	0.00	10
Total	42	36	20	4	0	102

$$\chi^2 = \frac{\sum (O_i - E_i)^2}{E_i}$$

Table 17: Calculation of Chi Square

Observed frequency	Expected frequency	O _i -E _i	(O _i -E _i) ²	(O _i -E _i) ² /E _i
4	4.12	-0.12	0.0144	0.0035
3	3.53	-0.53	0.2809	0.0796
2	1.96	0.04	0.0016	0.0008
1	0.39	0.61	0.3721	0.9541
14	14.41	-0.41	0.1681	0.0117
12	12.35	-0.35	0.1225	0.0099
7	6.86	0.14	0.0196	0.0029
2	1.38	0.63	0.3969	0.2897
14	14.41	-0.41	0.1681	0.0117
12	12.35	-0.35	0.1225	0.0099
7	6.86	0.14	0.0196	0.0029
2	1.37	0.63	0.3969	0.2897
5	4.94	0.06	0.0036	0.0007
4	4.24	-0.24	0.0576	0.0136
2	2.35	-0.35	0.1225	0.0521
1	0.47	0.53	0.2809	0.5977
4	4.12	-0.12	0.0144	0.0035
3	3.53	-0.53	0.2809	0.0796
2	1.96	0.04	0.0016	0.0008
1	0.39	0.61	0.3721	0.9541
Total				3.3684

$$\sum[(O_i - E_i)^2 / E_i] = 3.3684$$

Degrees of freedom = (No. of Rows - 1) (No. of Columns - 1) = (5-1) x (5-1) = 16

At 5% level of significance the value is **23.685** Calculated value = **3.3684**

Table value > Calculate value, H₀ is accepted

Inference

Hence, there is no significant relationship between Age and Efficiency of overall operations.

Coefficient of Correlation

Correlation coefficient is the statistical tool used to measure the degree to which two variables are linearly related to each other. Correlation measures the degree of association between two variables.

Table 17 Relationship between Years of Experience and Level of Automation

35	40	1225	1600	1400
20	34	400	1156	680
30	22	900	484	660
12	6	144	36	72
5	0	25	0	0
ΣX = 102	ΣY = 102	ΣX² = 2694	ΣY² = 3276	ΣXY = 2812

Source: Primary Data

Formula:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

$$r = \frac{5(2812) - (102)(102)}{\sqrt{[5(2694) - (102)^2][5(3276) - (102)^2]}} \quad r = 0.8541$$

Calculated value = **0.8541**

Interpretation

The correlation coefficient ($r = 0.8541$) indicates a strong positive relationship between Years of Experience and Level of Automation

Suggestions for Better Prospects

To optimize warehouse operations, key recommendations include increasing automation, fully implementing digital documentation, and improving space utilization via strategic layout planning. Additionally, organizations should provide regular employee training, enhance RFID tracking systems, standardize workflows, and invest in advanced material handling equipment. Finally, strengthening inventory control, improving workforce planning, and maintaining a strong focus on continuous improvement will drive efficiency and elevate customer satisfaction.

IV. CONCLUSION

This study reveals that warehouse operations are efficient and well-managed, supported by modern technology and a skilled workforce. Addressing process inefficiencies, space limits, and partial automation will further boost productivity. Overall, the organization possesses strong potential for continued growth as a top-tier logistics service provider.

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