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# Optimizing Workforce Efficiency through Inventory Levels Reduction in the Manufacturing Industry of Chengalpattu

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### ABSTRACT

This research identifies ways of cutting down inventory levels at manufacturing industry with the aim of improving warehouse operations and supply chain management. Given the importance of inventory management in business efficiency, the research delves into different means of cutting down stock levels without compromising the supply of important crane components and equipment. Through the use of methods like Just-in-Time (JIT), demand forecasting, lean inventory methods, and Effective inventory management is paramount to the operational effectiveness and profitability of manufacturing firms. A premier producer of cranes and crane parts. Through the examination of existing inventory management practices, production processes, and demand forecasting methods, the research seeks to establish areas of inefficiency and surplus stock. Applying Lean techniques, Just-in-Time (JIT) practices, 5S (Sort, Set in Order, Shine, Standardize and Sustain) and sophisticated forecasting algorithms, the study recommends pragmatic solutions to maximize inventory without sacrificing product availability or production schedules. The outcomes of this research are anticipated to decrease warehousing expenses, increase cash flow, and increase overall supply chain effectiveness, leading to a more responsive and agile manufacturing environment.

**Key Words:** *Just-In-Time, Sort, Set in order, Shine, Standardize and Sustain, Cost Reduction, Lean Inventory.*

### INTRODUCTION

Inventory reduction in a warehouse is an important operational strategy for boosting efficiency and cost savings. It entails optimizing inventory management in accordance with consumers' demands, thus freeing up valuable warehouse space and creating room for more profitable products. By effecting successful inventory reduction strategies, companies can attain various advantages such as lower costs, less waste, and enhanced cash flow. Inventory reduction is more than just reducing excess stock but also stopping excess inventory from building in the first place and optimizing procurement plans to concentrate on more probable stock-keeping units (SKUs) to sell. This helps companies to utilize their procurement budget to the fullest and maximize profits. In addition, lowering inventory levels can result in a more streamlined and cost-effective warehouse operation that can get the product out the door faster, minimize errors, and enhance customer satisfaction. High service levels and waste must be minimized while balancing inventory carrying costs with labour costs to be profitable and satisfy customers.

### REVIEW OF LITERATURE

**Ashutosh Verma (2023)** has stated that warehouse management is the most important component for an unbroken flow of products in a supply chain. This paper focuses on the critical factors responsible for generating a significant influence on warehouse management functioning. The analysis entails the identification of critical factors then applying Interpretive Structural Modelling (ISM) methodology to them in order to obtain the level partition and ultimate ISM model. This study also includes the MICMAC analysis of the factors which categorizes all the chosen factors into four groups i.e., autonomous variables, dependent variables, linkage variables and driver variables.

**Natalia Burganova, PatrikGrznar (2021)** have analyzed that warehouse management and internal logistics planning and control are gaining significance. Nowadays, various methods have been created in the fields of warehouse management and internal logistics planning and control. Internal logistics plays a crucial role in value creation and profit maximization by optimizing internal logistics activities. As an important measure of logistic processes, effectively is established transport time. The article addresses the potential of streamlining logistics and warehousing by employing available methodologies with the lowest possible input capital and reducing the transport time. In the first phase, the warehouse is refurbished, and lean techniques like Kanban and Milk run are implemented. The given design is 8 applied to the newly built hall.

**Atnafu. D. &Balda, A. (2018)** have illustrated that inventory management & illustrates the relation of inventory management practices with competitive advantage & organizational performance. Result of the research based on analysis of data is that there will be a positive association between inventory management performance and competitive advantages. And improved organizational performance provides an enterprise with greater capital to use various inventory management techniques.

**Ashutosh Verma (2023)** has suggested that warehouse management is the most important feature for an uninterrupted flow of products in a supply chain. The present paper is concerned with the critical factors that are accountable for developing an impactful influence on the functioning of warehouse management. The analysis includes the identification of critical factors followed by the application of Interpretive Structural Modelling (ISM) methodology to them to obtain the level partition and final ISM model. This study also encompasses the MICMAC analysis on the factors which categorizes all the selected factors into four categories namely, autonomous variables, dependent variables, linkage variables and driver variables.

**S. Singh (2006)** has analyzed the inventory control practices of single fertilizer company named IFFCO. He statistically examined the inventory system with consumption, sales and other variables along with growth of these variables and inventory patterns. He concluded that an increase in components of inventory lead to an increase in the proportion of inventory in current assets. A special focus was made on stores and spares in order to calculate excess purchases resulting in loss of profit.

**Bernatde William(2008)** has reported that the main focus of inventory management is on transportation and warehousing. The decision taken by management depends on the traditional method of inventory control models. The traditional method of inventory management is how much useful in these days the author tell about it. He is also saying that the traditional method is not a cost reducing, it is so much expensive. But the managing the inventory is most important work for any manufacturing unit.

**Srinivas Rao Kasisomayajula (2014)** has concluded that all the units in the commercial vehicle industry have significant relationship between Inventory and Sales. Proper management of inventory is important to maintain and improve the health of an organization. Efficient management of inventories will improve the profitability of the organization.

## OBJECTIVE OF THE STUDY

### Primary Objective

- To assess the stock in and stock out level of reducing inventory levels in warehouse.

### Secondary Objective

- To explore and Implement Technology and Strategies for Better Inventory Management
- To implementing Just-in-Time (JIT) practices.
- To reduce Excess Inventory and Optimize Warehouse Space.

## RESEARCH METHODOLOGY

A descriptive research design was used in this study to facilitate data collection. Primary data collection Method were employed, which was gathered with the help of structured questionnaires to analyze employees' responses. The study was conducted as a sample survey of 122 respondents with specific interest in the employees of the manufacturing industry. Data analysis was conducted through percentage analysis in the form of bar charts, and statistical analysis through SPSS software, employing both Correlation and ANOVA. The study was conducted in a systematic way with pre-decided, objective-based questions. The steps include describing problem, selecting variables to be used in the study, selecting the participant, collecting data and analyzing the findings of research. The inclusion criteria must be above 18 years of age. The survey is computer based Google form. To guarantee representation across several demographics, a stratified random sampling technique is used.

## DATA ANALYSIS AND INFERENCE

### Percentage Analysis

**Table 1. Table indicating JIT Production Helps Minimize Inventory Waste in our Organization**

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	23	18.9%
Agree	33	27%
Neutral	38	31.1%

Disagree	22	18%
Strongly Disagree	6	4.9%
Total	122	100%



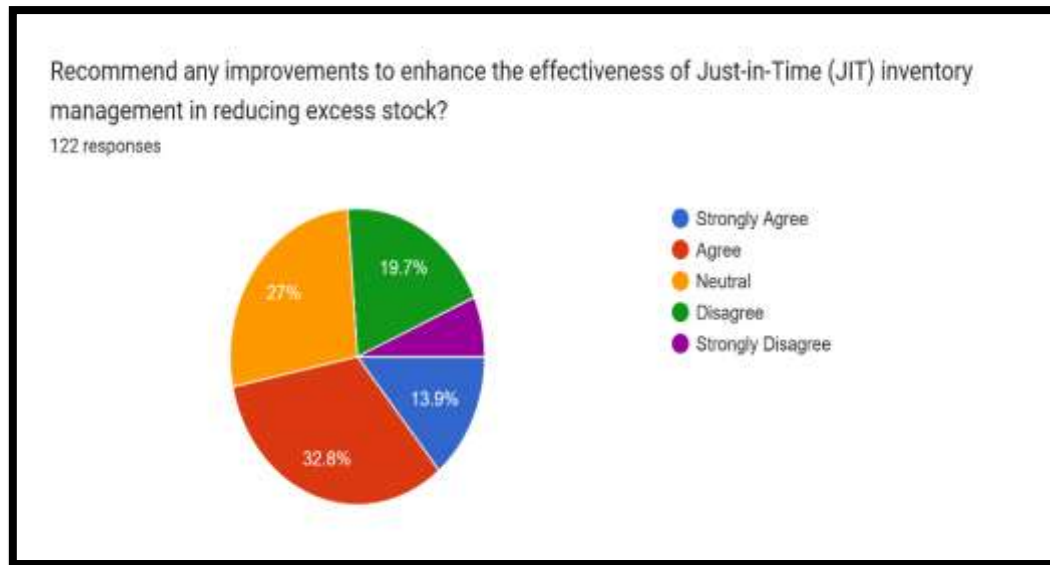
Figure 1. Figure representing JIT Production Helps Minimize Inventory Waste in our Organization

#### INFERENCE

From the table and figure 1, it represents the JIT inventory waste majority 31.1% responded it has neutral, 27% responded it has agree, 18.9% responded it has disagree, 18% responded it has strongly agree, 4.9% responded it has strongly disagree.

Table 2. Table indicating the improvements to enhance the effectiveness of just-in-time (JIT) inventory management in reducing excess stock

PARTICULARS	FREQUENCY	PERCENTAGE
Strongly Agree	17	13.9%
Agree	40	32.8%
Neutral	33	27%
Disagree	24	19.7%
Strongly Disagree	8	6.6%
Total	122	100%



**Figure 2.** Figure representing the improvements to enhance the effectiveness of just-in-time (JIT) inventory management in reducing excess stock

#### INFERENCE

From the table and figure 2, it represents effectiveness of JIT majority 32.8% responded it has agree, 27% responded it has neutral, 19.7% responded it has disagree, 6.6% responded it has strongly disagree.

**Table 3.** Table indicating ONE WAY ANOVA Test between Work experience and JIT effectiveness

$H_{01}$ : There is no significant relationship between Work experience and JIT effectiveness.

$H_{11}$ : There is a significant relationship between Work experience and JIT effectiveness.

#### ANOVA

JIT Effectiveness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.926	3	.975	.760	.519
Within Groups	151.476	118	1.284		
Total	154.402	121			

#### Descriptives

JIT Effectiveness

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
1 to 3 yrs.	48	2.50	1.092	.158	2.18	2.82	1	5
3 to 5 yrs.	34	2.56	1.050	.180	2.19	2.93	1	5
5 to 7 yrs.	25	2.84	1.248	.250	2.32	3.36	1	5
7 to 10 yrs.	15	2.87	1.246	.322	2.18	3.56	1	5
Total	122	2.63	1.130	.102	2.43	2.83	1	5

#### INFERENCE

From the table and figure 3, it analyzed that whether or not four separate classes performed the same on a test. This table allows us to know whether or not their average test scores are actually different or only kind of different by chance.

The final figure 0.519, is sort of a "chance score." Because it's relatively high (we'd prefer it to be low), what it means is that the tiny variations we observe in the class averages are most likely due to mere luck on the test day and not due to the classes being better or worse at the topic. Thus, this research fails to provide us with strong proof that the "JIT Effectiveness" varies among these four groups.

**Table 4. Table indicating Correlation Test between the Demand forecasting in inventory reduction and current inventory management system**

$H_{02}$ : There is no significant relationship between the Demand forecasting in inventory reduction and current inventory management system

$H_{12}$ : There is a significant relationship between the Demand forecasting in inventory reduction and current inventory management system.

Correlations			
		Demand Forecasting in Inventory Reduction	Current Inventory Management System
Demand forecasting in inventory reduction	Pearson Correlation	1	.178
	Sig. (2-tailed)		.050
	N	122	122
Current inventory management system	Pearson Correlation	.178	1
	Sig. (2-tailed)	.050	
	N	122	122

#### INFERENCE

From the table and figure 4, it analyzed that the given correlation table is a test for the association between "Demand forecasting in inventory reduction" and the "current inventory management system." The Pearson correlation coefficient between the two variables is .178. It signifies the weak positive relationship between how much demand forecasting is applied in inventory reduction and the effectiveness of the current inventory management system. The significance value (Sig. 2-tailed) is .050. At a significance level of .05, this figure tells us that the correlation is significant.

This is to say that there is a statistically significant but weak positive linear correlation between demand forecasting usage for reducing inventory and evaluating the existing inventory management system. That is, as demand forecasting for inventory minimization is applied more, there is a slight inclination for people to evaluate the existing inventory management system more favourably, and conversely. This association is founded on a sample size (N) of 122 observations.

#### FINDINGS

- ❖ The majority of respondents (31.1%) are neutral on whether Just-In-Time production helps minimize inventory waste in our organization.
- ❖ The majority of respondents (31.1%) are neutral regarding their satisfaction with the integration of demand forecasting in their inventory reduction strategy.
- ❖ The majority of respondents (59.8%) are "Yes" to currently using technology to help reduce inventory levels.
- ❖ The majority of respondents (26.2%) agree that the current warehouse space is fully utilized without much wasted or unused space.
- ❖ The majority of respondents (32.8%) agree on how well their current inventory management system helps in minimizing excess stock.
- ❖ The majority of respondents (32.8%) agree with the need to suggest JIT improvements for better excess stock reduction.
- ❖ The majority of respondents (32%) are satisfied with the current inventory levels in relation to available warehouse space

#### SUGGESTIONS

- Implement a real-time, automated inventory management system to track stock levels, minimize errors through manual processes, and facilitate data-driven decision-making for reorder points and demand forecasting.
- Implement correct demand forecasting mechanisms in your stock management plan to match inventory levels with genuine customer demand, avoiding overstock and stock-out situations.
- Carry out frequent space audits and restage inventory location to optimize storage space and eliminate excess space, so the warehouse is running at peak capacity.

- Enhance JIT implementation by streamlining supplier coordination and response rates, providing for timely replenishment of stock without excess inventory and related holding costs.

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## CONCLUSION

The research points out that inventory levels in warehouses can be minimized to a great extent to enhance operational efficiency and cost reduction. By implementing techniques such as demand forecasting, Just-in-Time (JIT) inventory, and automated technologies such as Warehouse Management Systems (WMS) and RFID, organizations can reduce excess stock, minimize storage costs, and improve cash flow. Proper planning, real-time tracking, and effective supplier coordination are the most important aspects of avoiding stockouts while ensuring high customer satisfaction. In general, a leaner, technology-based inventory strategy enhances agility, enhances supply chain performance, and enhances marketplace competitiveness.

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### Author Contribution

Ms.M.Swathi designed the study, conducted data collection, conceptual framework, tested hypothesis by analyzing data and prepared the manuscript. Dr.M.Lavanya provided guidance on research design and methodology and contributed to critical revisions and final approval of the manuscript.

### Conflict of Interest

The authors declare no conflict of interest in the publication of this research.

### Ethics Approval

The study involves voluntary participation by respondents through informed consent.

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