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IMPACT OF DATA-BASED INVENTORY MANAGEMENT ON OPERATIONAL EFFICIENCY:A STUDY OF MADRAS PLASTICS

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ABSTRACT
Inventory management plays a critical role in ensuring operational efficiency in manufacturing organizations. With the advancement of digital technologies, data-based inventory management systems have become essential for improving accuracy, reducing costs, and enhancing decision-making. This study aims to analyze the impact of data-driven inventory management on operational efficiency at Madras Plastics, a manufacturing firm in Tamil Nadu. The research adopts a descriptive design and uses primary data collected from 150 employees through structured questionnaires. Statistical tools such as percentage analysis, Chi-square test, ANOVA, and correlation analysis were applied. The findings reveal a significant positive relationship between data-based inventory management and operational efficiency, along with improved cost reduction. The study concludes that adopting data-driven systems enhances organizational performance.

Keywords: Inventory Management, Data Analytics, Operational Efficiency, Cost Reduction

1. INTRODUCTION

Inventory management is a crucial function in manufacturing organizations as it directly affects production efficiency, cost control, and customer satisfaction. Traditional inventory systems often lead to inefficiencies such as stockouts, overstocking, and inaccurate forecasting.

With the emergence of data analytics and digital tools, organizations are shifting toward data-based inventory management systems. These systems utilize real-time data, predictive analytics, and automation to improve inventory control and operational performance.

This study focuses on analyzing how data-based inventory management systems improve operational efficiency at Madras Plastics.

2. LITERATURE REVIEW

Several studies have emphasized the importance of digital transformation in inventory management.

Singh and Kumar (2023) found that digital inventory systems significantly improve operational efficiency and reduce delays. Sudarmi and Sunaryo (2024) highlighted that ERP systems enhance inventory accuracy and decision-making. Puspitawati et al. (2024) concluded that management accounting systems improve inventory efficiency and cost control. Yeung et al. (2024) emphasized that predictive analytics improves demand forecasting and reduces inventory imbalance.

Overall, previous research indicates that data-based inventory systems enhance efficiency, reduce costs, and improve decision-making.

3. RESEARCH METHODOLOGY

3.1 Research Design

The study adopts a descriptive research design.

3.2 Sample Size

The sample consists of 150 respondents.

3.3 Sampling Technique

Convenience sampling method was used.

3.4 Data Collection

Primary data was collected through structured questionnaires. Secondary data was obtained from journals, books, and company records.

3.5 Statistical Tools

- Percentage Analysis
- Chi-square Test
- ANOVA
- Correlation Analysis

4. DATA ANALYSIS AND RESULTS

4.1 Percentage Analysis

The majority of respondents (54.7%) belong to the age group 25–40 years. Most respondents are male and graduates. Around 56% of respondents use FIFO method and 86.7% use ABC inventory control techniques.

4.2 Chi-Square Analysis

Significant relationships were found between demographic variables and inventory efficiency, indicating that inventory practices influence cost reduction and operational performance.

4.3 ANOVA

The ANOVA results indicate that demographic variables such as age, gender, and income do not significantly influence operational efficiency.

4.4 Correlation Analysis

The correlation between data-based inventory management and cost reduction is 0.72, indicating a strong positive relationship. The correlation with operational efficiency is 0.68, showing a moderate positive relationship.

5. DISCUSSION

The study shows that implementing data-driven inventory management improves efficiency, reduces costs, and enhances decision-making. Techniques such as FIFO, ABC analysis, and real-time tracking contribute significantly to better inventory control.

However, challenges such as lack of skilled staff and poor data quality affect implementation. Organizations must invest in training and technology to overcome these issues.

6. CONCLUSION

The study concludes that data-based inventory management systems play a vital role in improving operational efficiency and cost reduction. Organizations adopting digital inventory practices achieve better performance and competitiveness.

It is recommended that firms adopt advanced analytics tools and enhance employee training for effective implementation.

7. REFERENCES

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