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Material Planning and Inventory Optimization: A Study at Lear Automotive India Pvt. Ltd.

Mr. Vikrant Sankpal, Dr. Rajendra Jarad, Dr. Anand Dadas, Dr. Anuradha Dandnaik

Department of MBA, (Operations & Supply Chain Management), Neville Wadia Institute of Management Studies and Research, Pune, India

ABSTRACT: This On Job Training (OJT) project examines material planning and inventory optimization practices at Lear Automotive India Pvt. Ltd., a prominent supplier in the global automotive industry. The study focuses on improving inventory control by applying structured analytical tools such as ABC analysis, FSN analysis, and Minimum Inventory Level (MIL) calculations. The objective is to enhance material availability while minimizing excess inventory and associated carrying costs. The research adopts a quantitative and exploratory methodology using operational data obtained from master parts sheets, lead-time records, and internal planning documents, supplemented by interactions with procurement and production personnel. The findings indicate that a limited number of high-value components account for a major share of inventory investment, while several slow-moving and non-moving items contribute to inefficiencies in storage and working capital utilization. The study highlights the importance of systematic inventory classification, accurate data management, and regular review mechanisms. The recommendations provided aim to strengthen material planning practices, reduce stockout risks, and support uninterrupted production operations.

KEYWORDS: Material planning, Inventory optimization, ABC analysis, FSN analysis, Minimum inventory level, Automotive supply chain.

I. INTRODUCTION

Inventory management plays a pivotal role in manufacturing organizations, particularly within the automotive sector where production continuity depends on the timely availability of numerous components. Effective material planning ensures that materials are procured and issued in appropriate quantities, while inventory optimization seeks to balance service levels with cost efficiency.

Modern automotive supply chains operate under conditions of high complexity due to multiple product variants, just-in-time manufacturing practices, and dependence on geographically dispersed suppliers. In such an environment, inaccurate demand estimation, variable lead times, or inefficient inventory control can lead to production disruptions, increased holding costs, or excessive capital blockage.

Lear Automotive India Pvt. Ltd., a key supplier of automotive seating systems, manages a wide range of components with varying consumption patterns and procurement lead times. This necessitates a structured approach to inventory classification and replenishment planning. Analytical techniques such as ABC analysis, which classifies items based on consumption value, and FSN analysis, which categorizes items based on movement frequency, enable organizations to prioritize managerial focus. Additionally, Minimum Inventory Level calculations provide a practical safeguard against stockouts during supplier lead times.

This study analyzes material planning and inventory optimization practices at Lear Automotive India Pvt. Ltd. with the objective of identifying improvement opportunities and recommending data-driven inventory control measures.

Objectives

- To analyze inventory using ABC classification based on annual consumption value.
- To study inventory movement patterns through FSN analysis.
- To compute Minimum Inventory Levels using demand and lead-time parameters.
- To identify inventory-related risks such as stockouts and excess holding.

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Scope

The study is confined to selected seat assembly components at Lear Automotive India Pvt. Ltd. and is based on data collected during the internship period. The analysis focuses exclusively on inventory planning and control practices at the plant level. Strategic procurement decisions, supplier negotiations, and corporate-level policies are outside the scope of this research.

II. LITERATURE REVIEW

Existing literature emphasizes that inventory optimization is a critical driver of operational efficiency in manufacturing industries. Studies on ABC analysis consistently demonstrate that a small proportion of items contribute disproportionately to total inventory value, highlighting the need for focused control of high-value components. FSN analysis has been widely used to identify slow-moving and non-moving items that increase holding costs and risk obsolescence.

Research on inventory models such as EOQ, safety stock, and reorder point mechanisms further underscores the importance of accurate demand and lead-time data. Recent studies also highlight the growing role of data analytics tools in improving inventory visibility and enabling informed decision-making. These studies collectively establish a strong theoretical foundation for the present research.

III. RESEARCH METHODOLOGY

Research Design

The study follows a descriptive and exploratory research design aimed at analyzing existing inventory data and planning practices.

Data Collection

Primary Data:

- Discussions with procurement executives and production supervisors.
- On-site observations of material consumption and storage processes.

Secondary Data:

- Master supplier and parts datasets
- Lead-time backend records
- EOQ and inventory planning sheets
- Internal company documents

Tools and Techniques

- Microsoft Excel for data cleaning, calculations, and classification.
- ABC analysis for value-based inventory prioritization.
- FSN analysis for movement-based categorization.
- Minimum Inventory Level (MIL) calculations based on demand and lead time.

IV. DATA ANALYSIS AND FINDINGS

ABC Analysis

The results indicate that a small percentage of inventory items classified as A-class account for the majority of annual consumption value. B-class items contribute moderately, while C-class items, although large in number, have minimal value impact.

FSN Analysis

Fast-moving items form the core of production operations due to regular consumption. Slow-moving items exhibit irregular demand patterns, while non-moving items occupy storage space without contributing to production output.

Combined ABC–FSN Analysis

The combined classification highlights critical categories such as A–Slow and A–Non-moving items, which represent high investment but low utilization, posing financial and operational risks.

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Minimum Inventory Level Analysis

Items with longer supplier lead times require higher inventory buffers. Several components were found below their calculated MIL, indicating potential stockout risks, while others exceeded required levels, signaling excess holding.

V. OBSERVATIONS

- Inventory value is concentrated in a limited number of components.
- Lead-time variability significantly influences inventory requirements.
- Non-moving items contribute to hidden inefficiencies.
- Inconsistent data quality affects planning accuracy.
- Periodic inventory review is essential for sustained optimization.

VI. RECOMMENDATIONS AND CONCLUSION

Recommendations

- Conduct periodic ABC and FSN reviews to reflect changing consumption patterns.
- Implement closer monitoring mechanisms for A-class and fast-moving items.
- Introduce safety stock for components with long and uncertain lead times.
- Review and dispose of obsolete or non-moving inventory.
- Strengthen structured data management and validation practices.

Conclusion

The study demonstrates that systematic inventory classification and data-driven material planning can significantly enhance operational efficiency at Lear Automotive India Pvt. Ltd. By integrating ABC and FSN analysis with Minimum Inventory Level calculations, the organization can reduce stockout risks, optimize inventory investment, and support uninterrupted production. The findings reinforce the importance of balancing analytical tools with accurate data and regular review processes for sustainable inventory optimization in the automotive supply chain.

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