Inventory Management Analysis: Addressing Deadstock and Stock Discrepancies

By
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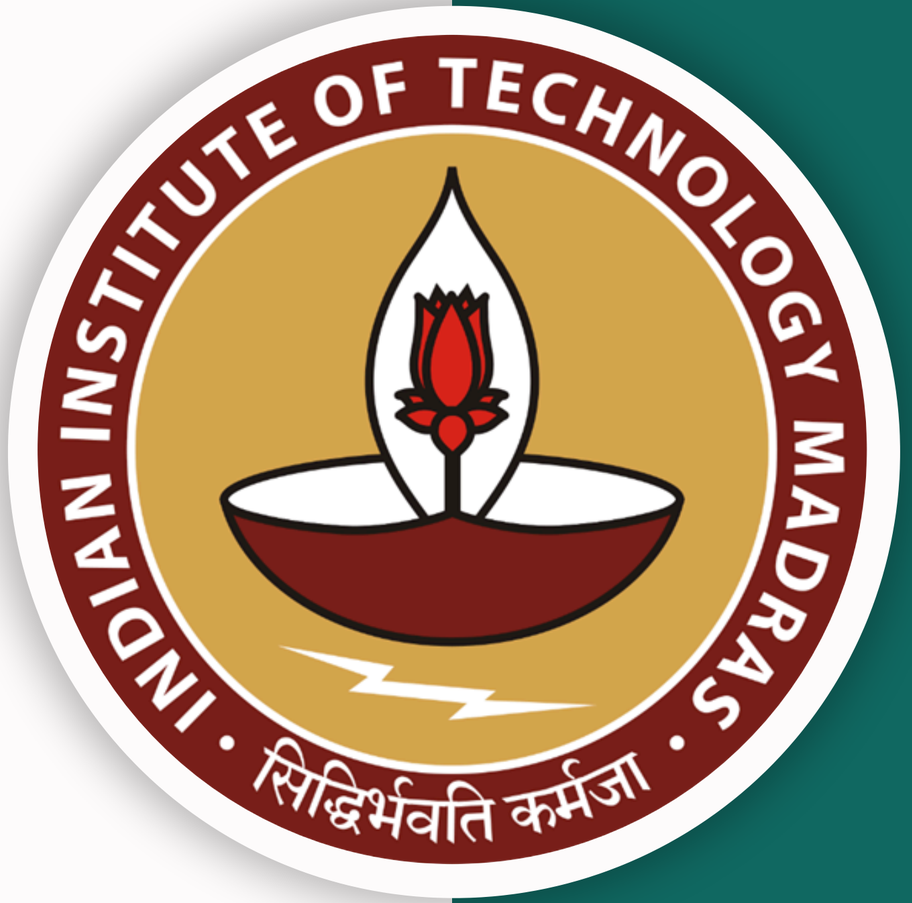
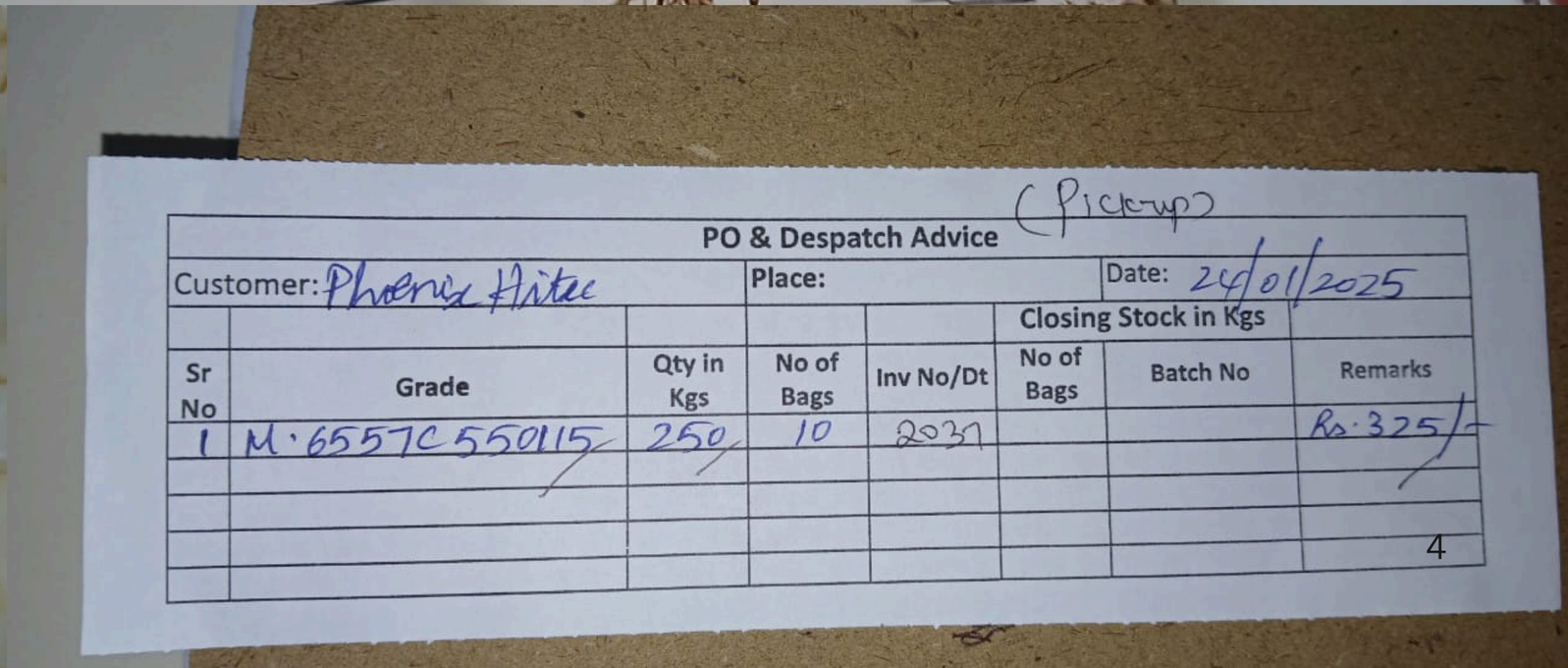


Overview

INTRODUCTION

- This project analyzes inventory management challenges at Jothi Polymers Private Limited, a B2B company dealing with engineering polymers. The analysis focuses on two major operational issues: deadstock accumulation and stock mismatches that have significantly impacted the company's efficiency.

- Using advanced analytical techniques including ABC analysis, ARIMA forecasting, RFM analysis, and machine learning algorithms like K-means clustering and Decision Trees, this presentation provides actionable insights to optimize inventory management and improve operational efficiency.



PO & Despatch Advice (Pickup)

Customer: Phoenix Hitec | Place: | Date: 24/01/2025

Sr No	Grade	Qty in Kgs	No of Bags	Inv No/Dt	Closing Stock in Kgs: No of Bags	Batch No	Remarks
1	M·6557C550115	250	10	2037			Rs·325/-

HIGHLIGHTS

Problem Statement

Jothi Polymers faces significant operational inefficiency due to deadstock accumulation and stock mismatches in their B2B engineering polymers business.

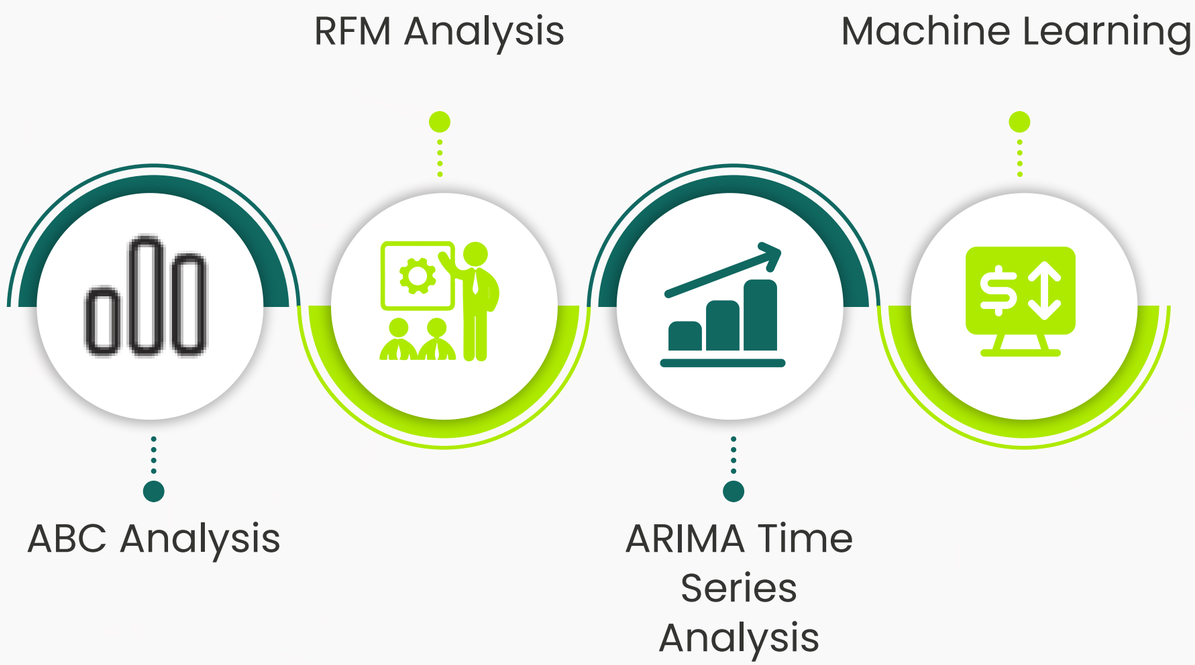
Analysis Approach

Multiple analytical techniques were employed including ABC analysis, ARIMA forecasting, RFM analysis, K-means clustering, Decision Tree analysis, and Association Rule Mining.

Key Outcomes

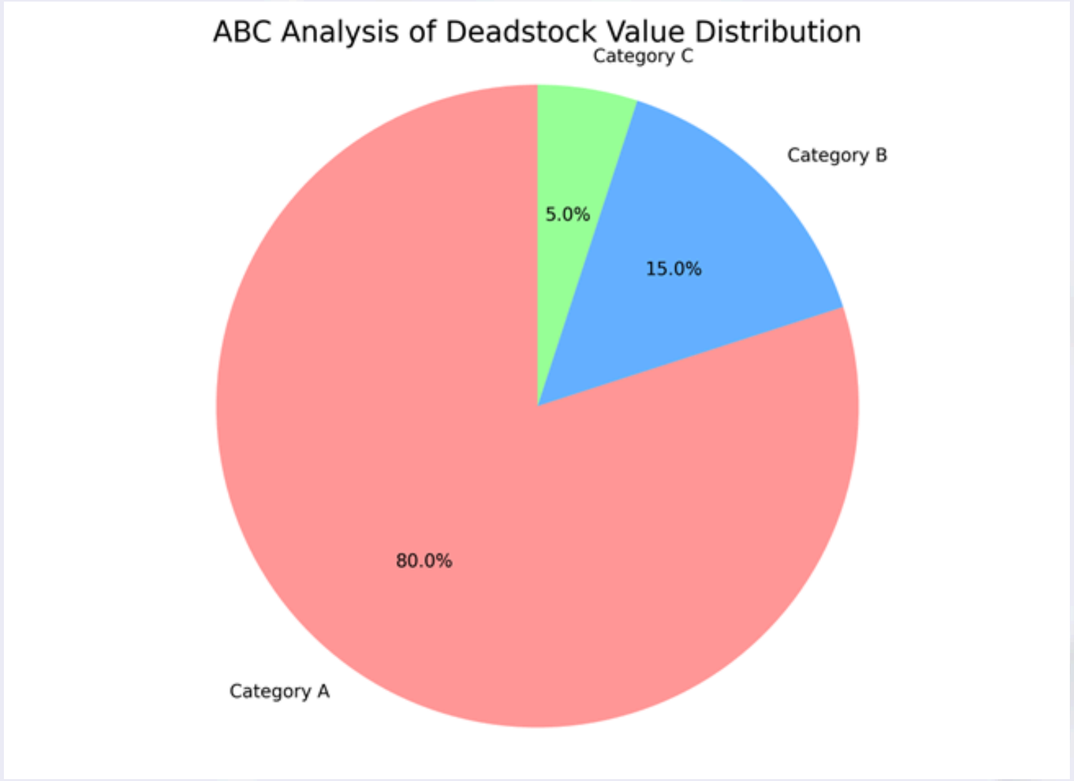
The analysis identified which stock types become obsolete, quantified financial impact, revealed underlying causes of mismatches, and provided actionable recommendations for improvement.

ANALYSIS METHODOLOGY



ABC ANALYSIS

Category A
304 items (39.28%) accounting for 80% of total deadstock value. These high-value items require immediate attention.



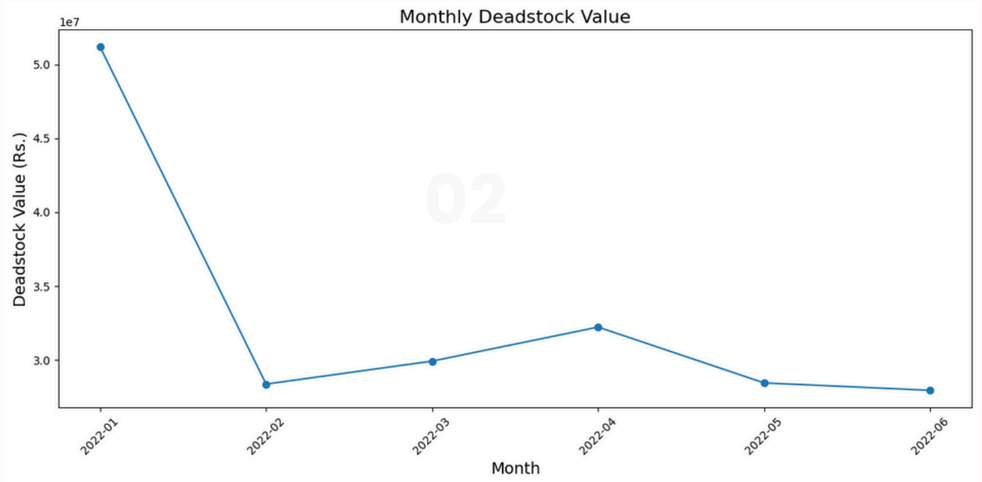
Category B
175 items (22.61%) accounting for 15% of total value. These mid-value items need regular monitoring but are less critical.

Category C
203 items (26.23%) accounting for only 5.03% of total value. These low-value items contribute minimally to deadstock accumulation.

ARIMA ANALYSIS

Historical Pattern

Sharp decrease from ₹52M in January 2022 to ₹28M in February, followed by stable values around ₹28-32M until June 2022.

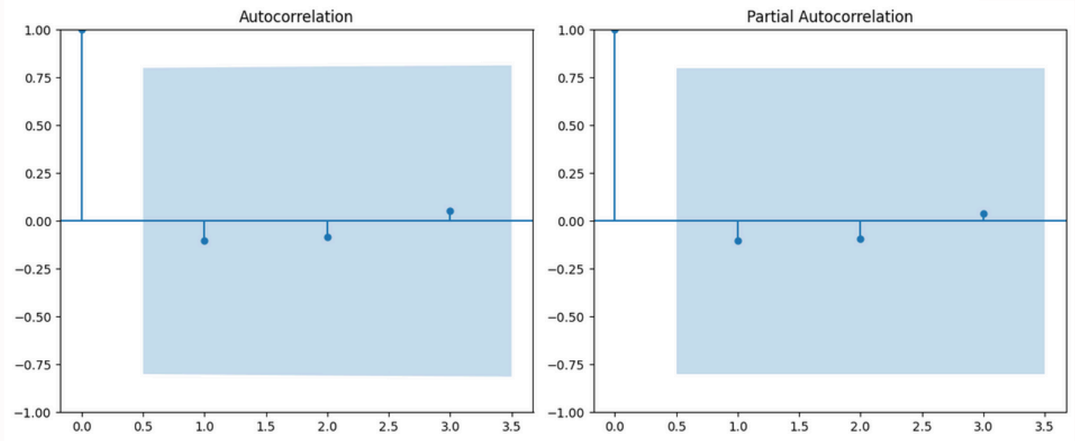


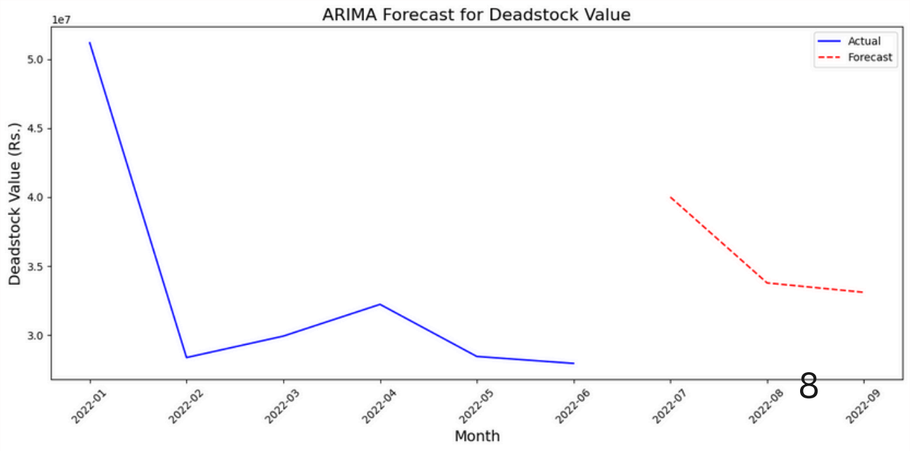
Forecast Results

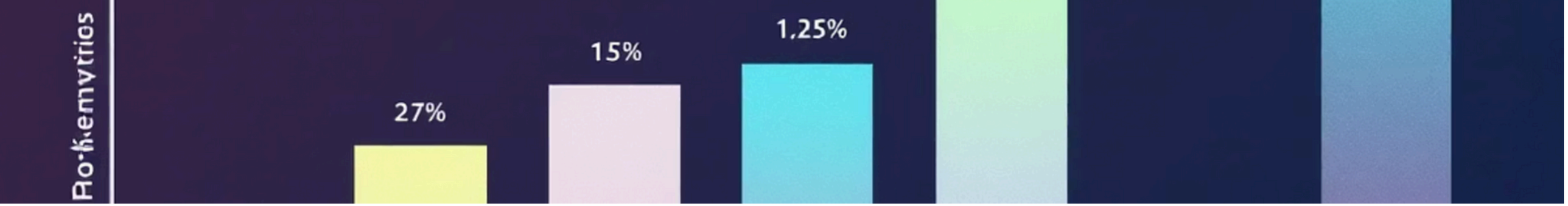
Predicted deadstock values: July (₹40M), August (₹33.8M), and September (₹33.1M), showing initial increase followed by stabilization.

Stationarity Test

ADF statistic of -10.7512 with p-value of 0.0000 confirmed time series stationarity, validating ARIMA model applicability.







RFM ANALYSIS INSIGHTS

Critical Risk

179 items (23.1%) with average age of 282 days since last movement

Medium Risk

164 items (21.2%) with average age of 548 days since last movement

High Risk

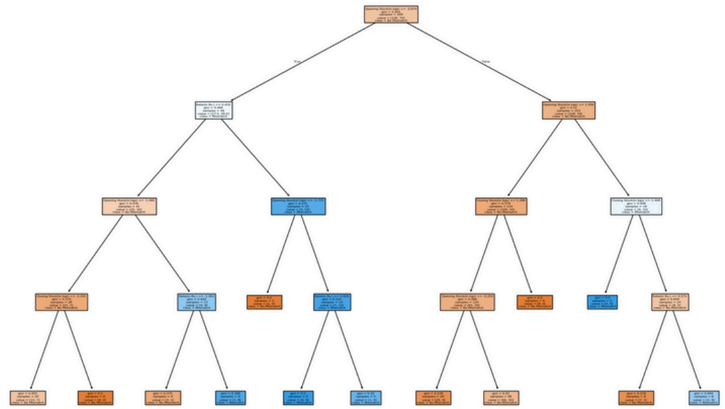
204 items (26.4%) with average age of 448 days since last movement

Low Risk

227 items (29.3%) with average age of 711 days since last movement.

The analysis reveals an inverse relationship between risk level and days since last movement. High and Critical risk segments represent 49.5% of items but account for 76.8% of inventory value, indicating significant financial exposure.

DECISION TREE ANALYSIS



Opening Stock

46.59% importance in predicting mismatches

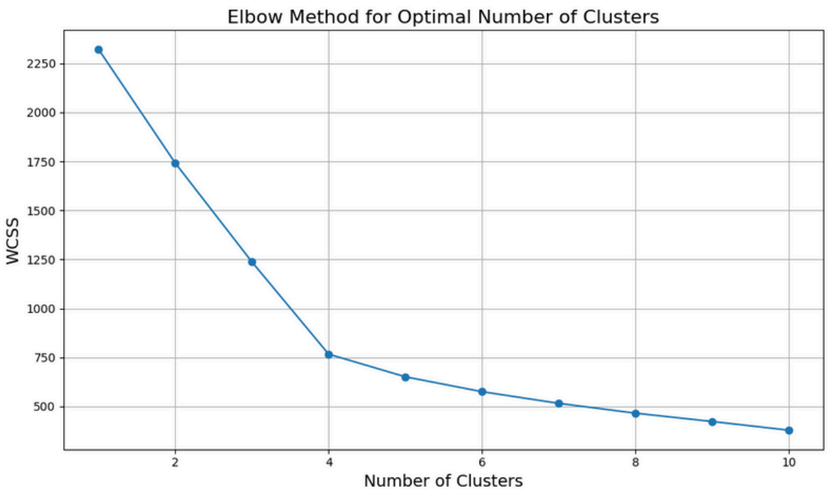
Rate(Price)

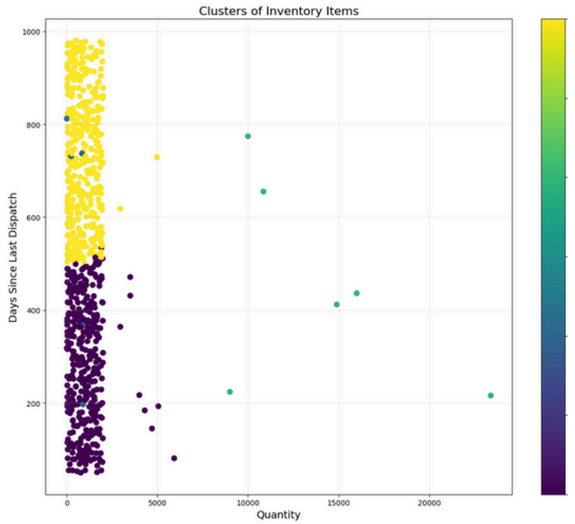
33.43% importance in predicting mismatches

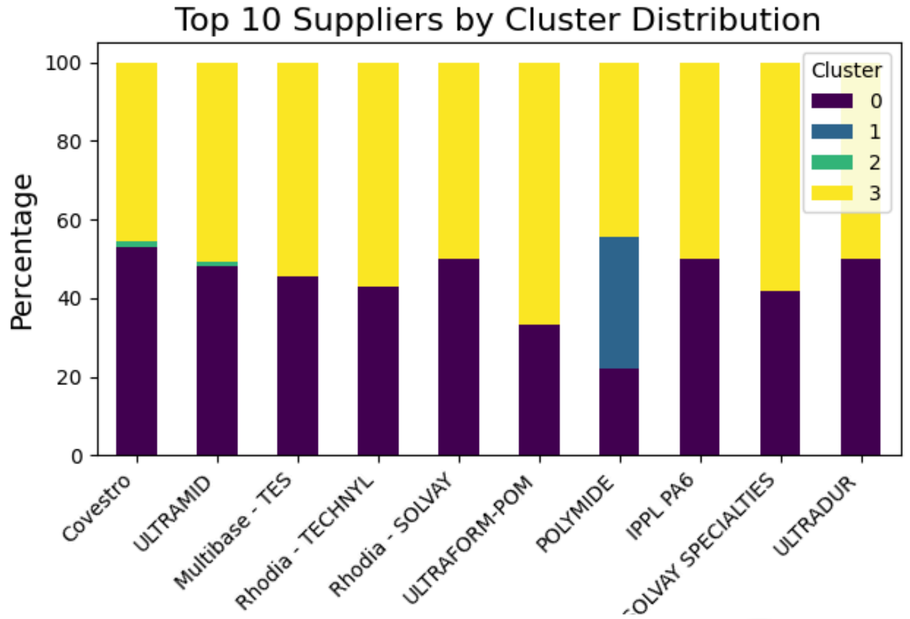
Closing Stock

19.98% importance in predicting mismatches

K-MEANS CLUSTERING RESULTS







Cluster 0: High Volume, Medium Age

382 items (49.4%) worth ₹84.7M with average quantity of 1,004 units and 284 days since last dispatch.

Cluster 3: Medium Volume, High Age

380 items (49.1%) worth ₹81.9M with average age of 734 days since last dispatch.

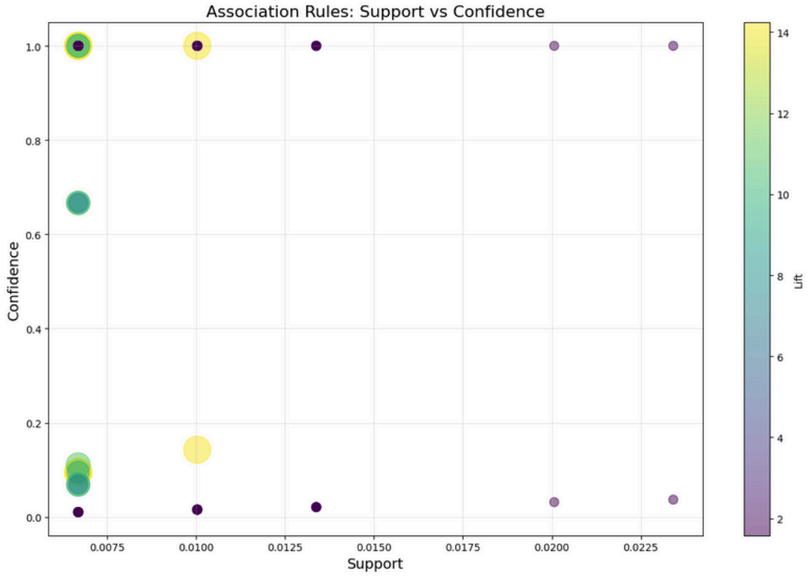
Cluster 1: Low Volume, High Value

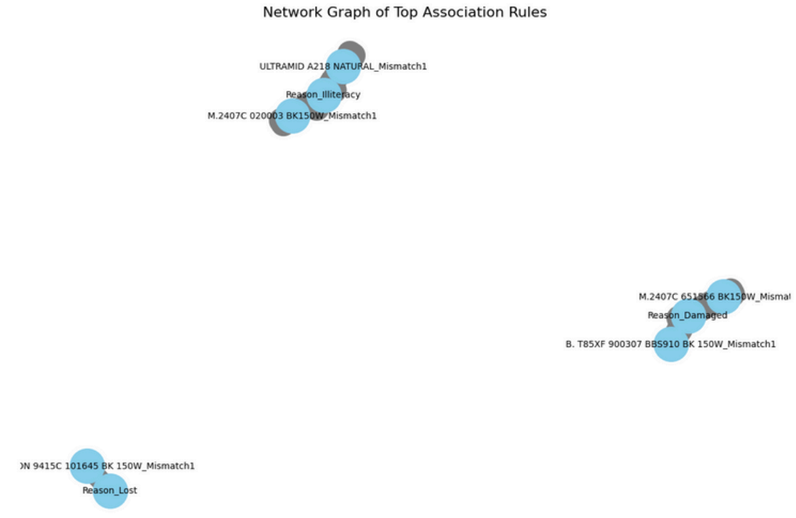
6 items (0.8%) worth ₹6.9M with average rate of ₹2,090 and 536 days since last dispatch.

Cluster 2: Very High Volume, High Value

6 items (0.8%) worth ₹24.6M with extremely high quantity (14,025 units) and 453 days since last dispatch.

ASSOCIATION RULE MINING USING APRIORI ALGORITHM





1.Strong Product-Reason Association

- Lift values of 11.07-14.24
- B. T85XF 900307 BBS910 BK 150W has 100% association with damage issues.

2.Reason-Specific Concentrations

- Certain products show perfect associations with specific mismatch reasons.
- ULTRAMID A218 NATURAL with illiteracy issues, M.2407C 651566 BK150W with damage issues, and MAKROLON 9415C 101645 BK 150W with lost items (66.7% confidence).

3.Bidirectional Relationships

- The rules show high confidence in both directions
- Thus, certain products have mismatches, they're consistently due to specific reasons, and vice versa.

KEY RECOMMENDATIONS

Deadstock Management

Implement tiered inventory control with weekly reviews for Category A items. Develop a 60-day action plan for Critical Risk items, particularly ULTRAMID products. Consider just-in-time practices for high-value items and aggressive markdown strategies for Cluster 3 items with extremely low turnover.

Stock Mismatch Prevention

Create graduated verification protocols based on opening stock quantities. Develop specialized handling procedures for high-value items and products with specific mismatch patterns. Implement an automated flagging system for transactions matching high-risk patterns identified in the decision tree.

Product-Specific Interventions

Implement enhanced packaging for damage-prone items like B. T85XF 900307 BBS910 BK 150W. Create simplified documentation and pictorial guides for products associated with illiteracy issues like ULTRAMID A218 NATURAL. Review the entire ULTRAMID product line to address recurring issues.

THANK YOU