Inventory Risk Management

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SDP GROUP 8
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PROBLEM DEFINITION AND OBJECTIVES

Background

o AMS holds a large amount of inventory to ensure quality-of-service to customers and to avoid obsolete inventory
o AMS needs to manage their inventory risks which may arise due to quality issues, recoverable/non-recoverable damages, expired excesses

Project objectives

Improve the current inventory risks reporting process
o Identify improvement areas in simplifying the current inventory risk reporting tool
o Develop a new inventory reporting model for deriving excess inventory

Problem Breakdown

Man → Machine

Report builder - Prone to human error

Excel - Hard to manage large amount of data - Underestimation of risk

Manual Process - Tedious, time consuming

Information Dissemination - Difficulty in data interpretation

Methodology — Management

Low efficiency and accuracy in managing inventory risk
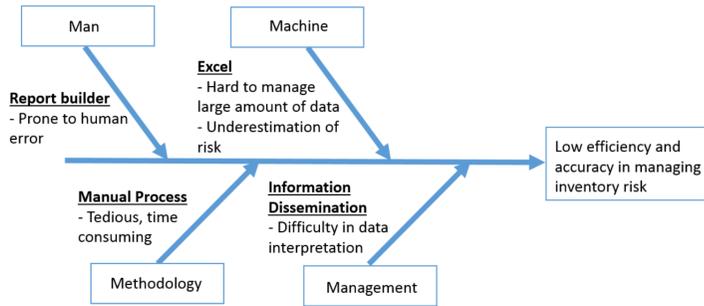
Types of Inventory

Raw Materials	Packaging Materials	Intermediates	Finished Goods

Types of Inventory Risks

Expiring Excess	Inventories near expiry at-risk of disposal if not used within 1-12 months
Quality issues	Spoiled or damaged inventories that are no longer fit for use
On-hold	Inventories withheld from production (for inspection or future uses)
Others	Temperature-controlled Items, Anticipated Risks

METHODOLOGY

Step 1	Step 2	Step 3	Step 4	Step 5
• Identify As-Is Process	• Define To-Be Model	• Development of New Model	• Implementation	• Evaluation and User Feedback

Current Inventory Risk Reporting Process

• At-risk inventories are highlighted in Inventory Risk Report
• Material Review Board (MRB) meetings are held with representatives from Purchasing, Planning and Quality Assurance departments
• Remedial actions are taken to reduce and mitigate identified risks

Inventory Report is prepared → First MRB meeting → Remedial actions → Second MRB meeting

Demand Forecast, SAP Data, Finance Policy → **Inventory Risk Report**
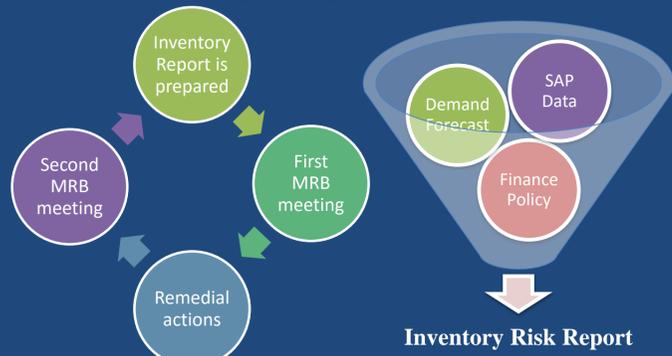
Development of the New Reporting Model

Objective 1: Improve Existing Risk Reporting Tool
• **Automated Report Generation**
  ➤ Programme Excel Macros to generate Inventory Risk Report
  ✓ Eliminate human errors
  ✓ Reduce preparation time
• **Data Visualization**
  ✓ Include graphs and charts in the report
  ✓ Help users analyze data and trends
  ✓ Improves understanding and presentation of report

Objective 2: New Inventory Reporting Model for Deriving Excess Inventory
▪ **Reclassification of Excess Inventory**
  ➤ Replace half–yearly monthly buckets with monthly buckets
  ✓ More accurate and representative calculation of excess inventory
  ✓ Compares expiring inventory with corresponding demand in specified month
 ✓ Enables user to focus on specific month

Results and Discussion

Data Visualization Features of New Model

1) Top 10 Materials
• Allows user to view the top 10 materials contributing to each risk category
• This would identify the materials that the company should focus on to reduce inventory risk

2) Monthly Trend
• Allows the user to view the risk values for each risk category from the previous 12 months
• The company can analyze trend and assess if the risk levels in the current month are reasonable

3) Summary Pie Chart
• Allows the user to view the contribution of each inventory risk category to the total inventory risk for the month


Impact of Reclassification of Excess Inventory

• Excess inventory risk values have increased using the new model compared to the old model
• This is because the old model underestimates the excess inventory risks as it allowed expiring inventory in earlier months in the same half-yearly period to be consumed by demand in the later months of that period

Impact of Automated Report Generation

• Report can now be generated automatically within a few minutes compared to a few hours previously
• This increases productivity and allows the company to focus on mitigating the inventory risks rather than identifying them

ANALYSIS OF INVENTORY RISK TRENDS

ABC/Pareto analysis

We identified around 20% inventory items which contribute 80% of total monthly risks and deviations in demands
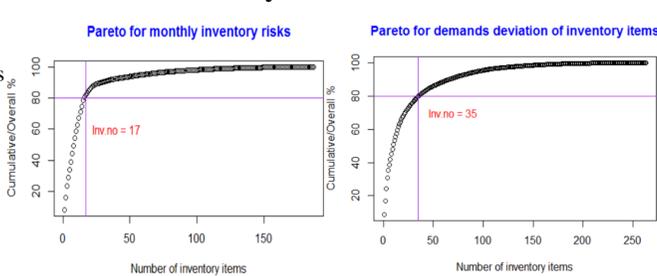
K-means clustering for similarity identifications

Based on unit price (in kg) and average monthly at-risk quantity/average demand deviations, we cluster similar inventory items using K-means. Optimal number of clusters is based on trade-off between simplicity and within-groups errors reduction
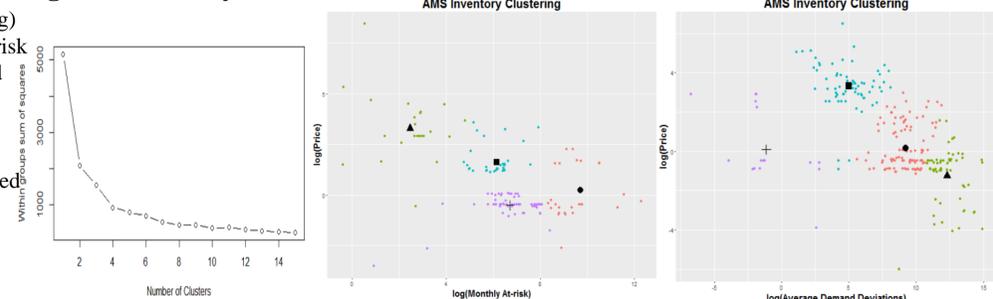
LIMITATIONS AND RECOMMENDATIONS

Limitations

➤ Reporting tool is only suitable for short term monitoring
➤ End-user has to learn VBA programming for effective use and future modifications of the new reporting tool
➤ Certain components of the report still require manual adjustments

Recommendations

➤ Variance analysis on current forecasting model to identify areas for long term improvements
➤ Excel VBA training for end-user as well as documentation for code
➤ Standardization of input data to reduce need for manual adjustments

KEY INSIGHTS

✓ Human Factors Engineering (HFE) knowledge applied to improve the visualization of the model
✓ Statistics knowledge and data analysis skills applied to interpret and evaluate the significance of data

✓ Scheduling, engineering communications, human resource management are adopted to facilitate the interaction within the team, and with the company and the department
✓ Software engineering techniques used to enable automation of the model