From Data to Decision Proactive Inventory Optimization

Minimizing Risk and Preventing Overflow with a Product Classification Matrix

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Introduction
Executive Summary

ExxonMobil

Challenges

Inventory overflow of chemical products leads to **value loss, safety risk, and storage inefficiency**

Question

How might we **optimize & predict chemicals product inventory** to prevent inventory overflow?

Solutions

Smart inventory dashboard that visualizes shelf life, turnover rate, and risk index

Rule-based transfer strategy to guide timely decisions by product type

Impacts

Reduced Overflow Incidents

Maximize Profit

Improved Warehouse Utilization across the Supply Chain

Introduction
SWOT Analysis

ExxonMobil

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Strengths

- Global distribution network and infrastructure
- Reliable data on inventory, shelf life, and turnover
- Strong brand trust and consistent product demand
- Existing warehouse and logistics capabilities

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Weaknesses

- Overstock and slow-moving inventory risks
- Lack of predictive inventory analytics to anticipate overflow or degradation
- Difficulty integrating diverse data sources into a unified inventory strategy

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Opportunities

- Real-time dashboards to guide operational decisions
- Optimize storage costs by classifying product risk types
- Enhance product movement across network to match demand

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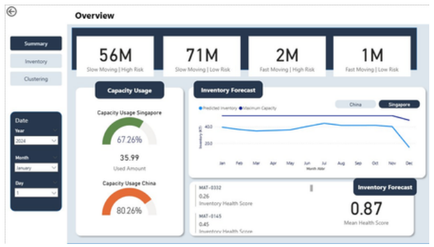
Threats

- Rising storage and logistics costs from overflow
- Product value loss from degradation or expiration
- Regulatory compliance risks for expired chemicals
- Demand unpredictability across regions and seasons

Solutions

Smart Inventory Optimization Dashboard

Overview

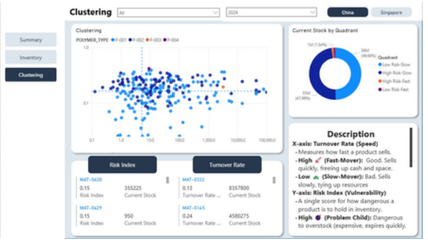


Summarize Warehouse Situation

Material

Detailed view of each material's stock

Classification



Categorizes materials into 4 types with solutions for each

Goal — **Support quick, informed decisions**

Purpose — Quickly **identify risk** and **optimize inventory actions**

Key Features — **Visualize** Risk Index, Day Left, Product Type Analysis, Stock Aging

Solves — **Overflow**, **Downgrade Loss**, **Inaction** Due to Data Overload

Benefits — **Lower Cost**, **Higher Turnover**, **Improved Supply Chain Agility**

"A dynamic dashboard that leverages risk indicators and shelf-life intelligence to drive smarter, timely inventory decisions."

Solutions
Product Classification Matrix

What is it?

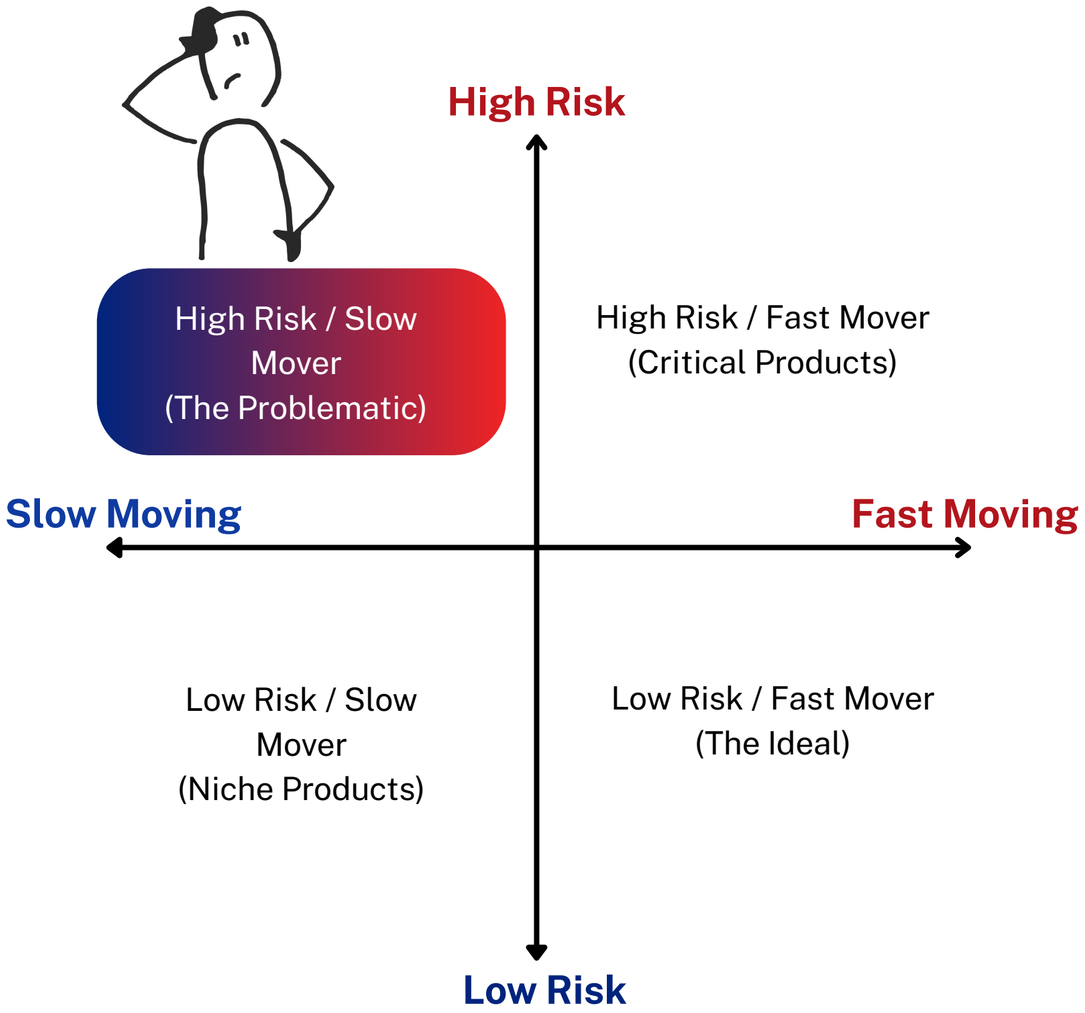
X-axis: Turnover Rate (Speed)
Measures how fast a product sells

High (Fast-Mover)
Good—Sells quickly, freeing up cash and space
Low (Slow-Mover)
Bad—Sells slowly, tying up resources

Y-axis: Risk Index (Vulnerability)
A score for how dangerous a product is to hold in inventory

High (Problem Child)
Dangerous to overstock (expensive, expires quickly, etc.)
Low (Safe Bet)
Safer to hold in inventory

Methods of Selecting Threshold: Median



Solutions

How did we get the values

X-axis: Turnover Rate (Speed)

Measures how fast a product sells

To get the Turnover Rate, we calculate two things:

- **Total Quantity Sold**: We sum up the total quantity of a product sold over the entire period.
- **Average Inventory Level**: We look at the end-of-month stock for that product and find the average amount you typically have on hand.

The final formula is simple:
We divide the Total Quantity Sold by the Average Inventory Level.

This gives us a single number that tells us how many times you sold through your entire stock of that product. A higher number means it's selling faster.

Y-axis: Risk Index (Vulnerability)

we calculate four individual risks for each product:

- **Value Risk**: The average price of one unit of the product.
- **Shelf Life Risk**: How quickly the product expires.
- **Downgrade Risk**: How much value the product loses after it expires.
- **Demand Variability Risk**: How unpredictable the product's sales are from month to month.

Then we **combine these together using weights.**

This gives us one final number representing the product's total vulnerability.

Solutions
What should we do with them?

Management Guideline

Product Type	Expiry Status	Action	Rationale
Fast / High Risk	Shelf-safe	Keep	Will sell before risk hits
Fast / High Risk	Near Expiry	Transfer (partial)	Avoid downgrade / overflow
Fast / Low Risk	Any	Keep	No urgency, efficient
Slow / High Risk	Near Expiry	Transfer / Sell off	High risk of loss
Slow / Low Risk(Small stock)	Near Expiry	Keep	Low cost to hold
Slow / Low Risk(Large stock)	Near Expiry	Transfer (partial)	Reduce future cost

Opportunity for Smarter Inventory Decisions

Limitation

Transfer decisions are made without knowing the demand forecast, real-time storage availability at the destination warehouse

Information Needed

Forecasted demand and live capacity data at the receiving warehouse

Opportunity

Adding these data points enables smarter, targeted transfers that reduce waste and balance inventory more effectively

Demo

Impacts

How our Framework Impacts Exxon

Operational Impact

Reduced Overflow & Downgrade
Sell before expiry, avoid waste and loss

Maximize Infrastructure Use
Utilize current warehouse space more efficiently

Faster, Consistent Decision-Making
Rule-based actions reduce delays and errors

Better Labor Allocation
Align workforce needs with inventory activity trends

Financial Impact

Lower Product Loss & Holding Cost
Sell before expiry, avoid waste and loss

Avoid New Warehouse Investment
No need for added infrastructure spending

Improved Cash Flow
Cash freed up for marketing, R&D, or growth

Reduced Emergency Costs
Lower urgent transfer and storage expenses

Maximize Profit

Environmental Impact

Reduced Waste & Emissions