

## Warehouse Strategy & Obsolescence Reduction Project

### >Description

This project addressed the challenge of analyzing **inventory dynamics and rotation** within a warehouse environment where information came from **multiple management systems not natively integrated**.

The solution required consolidating, cleaning, and harmonizing datasets, and then applying **proprietary warehouse operational know-how** to design metrics that could drive business decisions.

A total of **47 custom metrics** were defined and implemented:

- **19 Inventory Movement Metrics** (e.g., days since last movement, movement category, receipt-to-issue ratio).
- **28 Purchase and Inventory Cost Metrics** (e.g., immobilized value, purchase-to-consumption alignment, replenishment efficiency).

These metrics were prioritized for business focus, highlighting **cost reduction opportunities** and improving **efficiency in material delivery to the plant**.

### Business Value

- **Integrated view of fragmented systems**: transformed unconnected raw data into a unified decision-making framework.
- **Replenishment Strategy Update**: parameters (ROP, EOQ) were recalibrated based on actual warehouse behavior.
- **Obsolescence Detection**: systematic identification of items for sale, seizure, or removal to free physical space.
- **Budget Optimization**: shifted financial resources toward real material usage, avoiding unnecessary immobilization.
- **Efficiency Gains**: improved service levels in material delivery to plant operations.

### Key Results – Main Findings

(exact result numbers modified to maintain confidentiality)

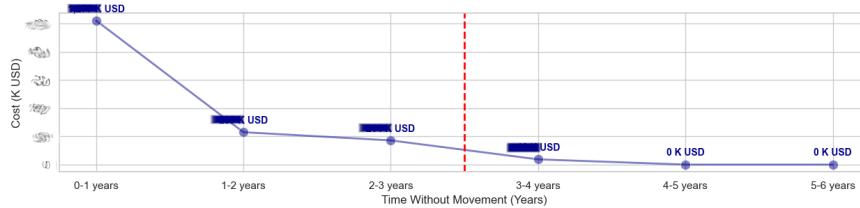
- Designed and implemented a **47-metric warehouse framework** (19 movement-related, 28 cost-related).
- Identified that **around 40-50% of items** can be considered obsolete under the defined criteria.
- Quantified **several hundred KUSD worth of materials** at risk due to inactivity in the last 1-3 years.
- Detected **hundreds of items that never moved since creation**, leading to catalog depuration.
- Provided a **clear business case** for space liberation, reallocation of budget, and service-level improvements.

### Example Visuals

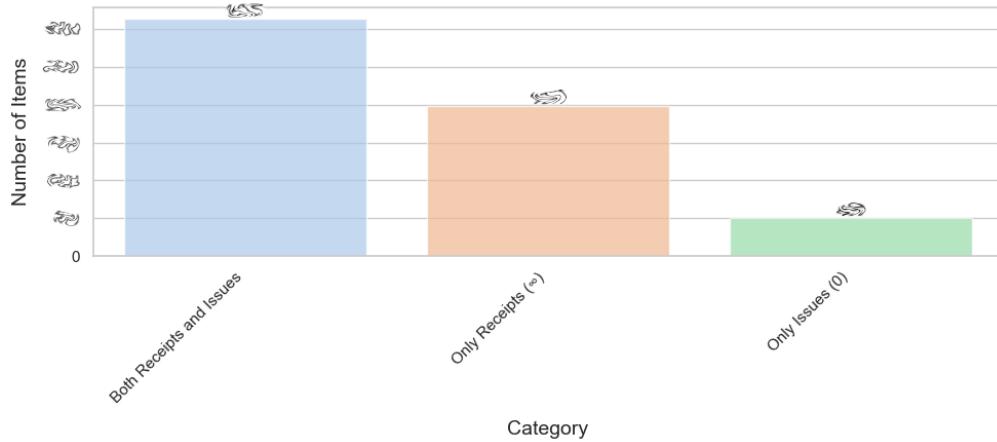
Inventory Obsolescence Impact: Items and Cost by Time Without Movement



Cost (K USD) by Time Without Movement



## Distribution of Receipt-to-Issue Ratio Categories



### 🌟 Key Benefits (Achieved / Potential)

- **Physical space liberation:** removal of obsolete or immobilized items.
- **Cost reduction:** reduction in indirect storage and maintenance expenses.
- **Risk mitigation:** early detection of obsolescence trends, reducing future immobilization.
- **Process efficiency:** service levels improved by aligning replenishment with actual demand.

### 🤝 Stakeholders Impacted

Warehouse Operations, Maintenance Teams, Procurement, Finance.

### 💻 Technologies Used

Python, Pandas, NumPy, Matplotlib, Seaborn, Plotly.

### 📊 Analytical Approach

The project required combining **advanced data analysis methods** with **operational expertise**:

1. **Metric Design:** definition of 47 custom indicators based on operational know-how.
2. **Data Wrangling:** integration, cleaning, and harmonization of multiple non-integrated management systems.
3. **EDA & Validation:** extracting insights and aligning them with operational realities.
4. **Decision Enablement:** outputs were embedded into warehouse management processes, guiding replenishment, catalog management, and budget allocation.

### 📅 Current Stage & Next Steps

*Current stage:* developed and fully implemented; analyses are being applied in warehouse processes and driving management decisions.

*Next steps:* automate metric generation and reporting; enable **dynamic strategy adaptation** where replenishment parameters and obsolescence thresholds adjust automatically according to demand.

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*Note: All numeric results have been anonymized or altered (using ranges, controlled scaling, or noise) to protect confidential company data. Visuals shown are illustrative and not representative of actual values.*