MULTI-WAREHOUSE REORDER POINT AND SAFETY STOCK DASHBOARD IN EXCEL

1. Background and Problem Statement:

A regional distributor managing three warehouse locations faced inconsistent stock levels across its network. Centralized ordering without localized demand tracking led to simultaneous overstock in some warehouses and critical shortages in others. The client needed a custom Excel-based model that would calculate **warehouse-specific reorder points** and **safety stock levels**, along with a dynamic dashboard for inventory visibility.

2. Objectives:

- Build an Excel model to calculate **reorder points (ROP)** and **safety stock** for each warehouse
- Incorporate warehouse-level demand and lead times
- Visualize stock levels, reorder alerts, and service level adherence across locations
- Enable operational staff to update and interpret data easily

3. Methodology:

3.1 Data Inputs

- **SKUs covered:** 20 high-movement products
- **Warehouses:** North, Central, South
- **Inputs per warehouse-SKU combination:**
    - Average daily demand
    - Standard deviation of demand
    - Lead time (days)
    - Desired service level (Z-score)
    - Current stock and pipeline inventory

3.2 Core Formulas

Safety Stock:

$$Safety\ Stock = Z \times \sigma d \times L\text{Safety Stock} = Z \times \sigma_d \times \sqrt{L}$$

Where:

- Z = Z-score for the desired service level
- σ_d = standard deviation of daily demand
- L = lead time in days

Reorder Point (ROP):

$$ROP = (Avg\ Daily\ Demand \times Lead\ Time) + Safety\ StockROP$$
$$= (\text{Avg Daily Demand} \times \text{Lead Time}) + \text{Safety Stock}$$

3.3 Excel Model Design

- **Input Sheet:** Master product and warehouse input table
- **ROP Calculator Sheet:** Auto-calculates ROPs and safety stocks
- **Inventory Dashboard:**
  - Conditional formatting to highlight "below ROP" stock
  - Monthly replenishment suggestions
  - Service level compliance chart

4. Key Features of the Excel Model

- Separate ROP and safety stock for each warehouse
- Dynamic ROP alerts based on real-time inventory
- Dashboard view of SKU performance across all locations
- Automated demand recalculation when new data is uploaded

5. Results and Benefits

- 22% reduction in emergency replenishments
- Improved SKU-level balance across warehouse locations
- Increased service level consistency (from 85% to 95%)
- Non-technical staff able to maintain and operate the system

6. Deliverables

- Excel workbook with fully functional multi-warehouse inventory tool
- Customizable dashboard with graphs and KPIs
- PDF documentation for onboarding new users
- Monthly usage template for routine updates

7. Stakeholder Relevance

Academic:

- Ideal example for teaching multi-location inventory control with real data
- Combines applied statistics and Excel modeling in operations courses

Corporate:

- Ready-to-use for retail, wholesale, or logistics companies with multiple storage points
- Easily extendable to new warehouses or SKUs