Retail Inventory Optimization Project

Executive Summary

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Toolset: MySQL 8.0.33, Excel (PivotTables & Charts), MySQL Workbench
Duration: June 2025
Objective: Analyze retail inventory performance and provide actionable insights for optimizing stock levels, improving sales forecasting, and minimizing lost sales or excess inventory.

Project Overview

This project focuses on structuring, analyzing, and visualizing retail inventory data from multiple stores and product categories. Using a normalized SQL database and Excel-based dashboards, it highlights inventory health, sales performance, demand forecasting accuracy, and identifies critical stock-related issues.

Key Insights

1. Uneven Stock Distribution Across Regions

- Significant variations in inventory levels were observed across stores.
- **Example:** Region *West* showed comparatively lower average inventory in the *Grocery* category, increasing the risk of stockouts.

2. High Inventory Levels in Low-Performing Products

- Products like *P0010* and *P0018* maintain high inventory despite low sales.
- This indicates possible overstocking or inaccurate demand forecasting.

3. Understocking of High-Demand Items

- Some products, particularly in *Toys* and *Electronics*, frequently fall below their estimated reorder points.
- This impacts customer satisfaction and results in potential lost revenue.

4. Revenue Concentrated in Few Categories

- *Electronics* and *Furniture* account for a disproportionately high share of revenue.
- These categories should be prioritized for forecasting and promotional planning.

5. Forecast Inaccuracy Detected

- The forecast vs. actual sales comparison revealed large gaps for several products.
- The deviation was especially noticeable during promotional periods.

Dashboard Overview

The interactive Excel dashboard includes:

- **Total Units Sold by Region**
- **Average Inventory by Product**
- **Revenue by Product & Region**
- **Low Inventory Alert Table**
- **Forecast vs. Actual Sales Comparison**
  Each chart is connected to slicers for real-time filtering by category, region, and date.

Recommendations

1. Implement Reorder Automation Based on Average Daily Sales

- Use the `reorder_point_estimates` table to dynamically generate reorder triggers.
- Automate alerts for stores when products fall below safe inventory thresholds.

2. Focus Demand Forecasting on High-Revenue Items

- Improve prediction models for top-selling products in *Electronics* and *Furniture*.
- Consider external factors like seasonality and promotional effects.

3. Rebalance Stock Across Stores

- Shift surplus stock from overstocked locations to regions facing shortages.
- Helps reduce holding costs while improving service level.

4. Track Forecast Accuracy as a KPI

- Establish a monthly forecast accuracy metric (e.g., MAPE).
- Incentivize forecast reliability through regular reporting.

5. Run Monthly Inventory Performance Reviews

- Use this dashboard as a standard tool to review key KPIs like:
    - Sell-through rate
    - Average Days of Inventory
    - Stockouts vs. Overstock incidents

Business Impact

- **Improved Inventory Turnover** through smarter restocking
- **Reduced Revenue Loss** by minimizing stockouts
- **Data-Driven Decisions** across inventory, supply chain, and category planning