Solving Inventory Inefficiencies Using SQL

Urban Retail Co. is a rapidly expanding mid-sized retail chain with a presence in both physical stores and online platforms. They operate across several cities and offer more than 5,000 diverse stock keeping units (SKUs), ranging from daily groceries and home essentials to electronics and personal care items. Their logistics network depends on regional warehouses that feed inventory to individual retail outlets. With growing complexity in operations, they are struggling to maintain optimal inventory levels. We utilized the data from their sales transactions, product catalogs, and warehouse logs to achieve smarter inventory decisions, reduce stockouts and overstock Improve supply chain efficiency, enhance customer satisfaction and boost profitability and finally, suggest additional insights or visualizations that Urban Retail Co. hasn't considered.

Following are the observations made by us:

- **Inventory Turnover**

We analyzed inventory turnover across 20 products. Fast-moving items like P0046 (Clothing) and P0031 (Electronics) demonstrate high sales velocity and should be prioritized for restocking. They showed high turnover (>1.6). Conversely, low-turnover items such as P0008 (Furniture) tie up capital and may benefit from clearance strategies (Turnover: <0.7). Overall, Electronics emerged as the most efficient category, while Furniture showed signs of overstocking

Action: Prioritize restocking fast-movers and reduce inventory orders for low-movers.

- **Inventory Aging (FIFO-based)**

Inventory age analysis revealed that over 40% of stocked items are older than 60 days, especially in the Furniture and Clothing categories. This indicates slow movement and potential holding cost issues. Proactive markdowns and improved forecasting are recommended to free up working capital and shelf space.

Action: Apply clearance strategies, re-evaluate demand forecasts, and optimize reorder cycles.

- **Low Inventory Detection**

Our low inventory detection identified 6 products at risk of stockouts, all in Store S001. These include fast-movers such as P0046 and P0031. Timely restocking and improved forecast integration are necessary to prevent lost sales.

Action: Increase safety stock levels and implement automated low-stock alerts for at-risk SKUs.

- **Stock Level Distribution**

Analysis of average stock levels reveals that SKUs like P0016 (Clothing) and P0159 (Electronics) consistently hold over 150 units in inventory. This may indicate overstocking and a need to align procurement more closely with real-time demand and turnover metrics.

Action: Reassess ordering frequency and storage allocation for high-volume SKUs.

- **Stockout Rate**

P0067 (Furniture) and P0096 (Toys) experienced stockouts for over 20% of the month, risking lost sales.

Action: Improve replenishment speed and update reorder points dynamically.

We also performed other Queries like Reorder Point Estimation and went beyond provided queries by adding our own queries like **Weather-Driven Sales Impact** which suggested that products tend to sell more during rainy conditions compared to cloudy ones — a ~6% increase in sales. This can influence stock allocation during monsoon seasons or weather-triggered promotions. **Most Profitable Season for Each Product** telling that most products reach peak demand in Winter, suggesting a strong seasonal skew. And **Monthly Sales Trend per Product** suggesting seasonal dips and peaks are consistent with the seasonal mapping.

We gave our analytical Inputs by identifying **fast-selling vs slow-moving product** and recommending **Inter-store Reallocation, Promotion for Overstocked SKUs and Dynamic Restocking Policy.**

Stock adjustments to reduce holding costs

After analyzing product-level sales and inventory trends across stores over the past 12 months, we identified multiple products with **high average stock levels** and **low turnover ratios**. These overstocked items contribute significantly to holding costs, tying up capital and occupying valuable storage space. We recommend **reducing reorder quantities** for products with turnover ratios below 2 and average stock levels above 100 units. In cases where inventory far exceeds monthly demand, targeted **clearance promotions** or **stock reallocation** to higher-demand regions are advised. These adjustments are expected to improve inventory efficiency, reduce warehousing costs, and free working capital for fast-moving SKUs. This approach ensures smarter replenishment and better alignment with real product demand.

Supplier Performance Inconsistencies (Simulated Data):
Based on a mock supplier orders table, Supplier SUP002 showed a **50% delay rate**, exceeding the acceptable 30% threshold. This suggests reliability concerns that may impact timely inventory replenishment. SUP001 had a moderate delay rate of 25%. These insights support reviewing supplier contracts and possibly diversifying sourcing.

Demand trends based on seasonal/cyclical data

Analysis of historical and forecasted sales data reveals that **Winter is the peak season** for most products, with projected monthly demand reaching **4,000+ units** for top SKUs like P0016, P0057, and P0046. Products show **significant seasonal variation**, with reduced sales in Summer and Autumn. Forecast trends indicate that **inventory planning should prioritize Winter**, while maintaining moderate stock levels for Spring-demand products. These insights support **dynamic, season-driven replenishment strategies** to optimize stock levels and reduce holding costs. Leveraging this forecast allows for more accurate **demand planning and promotional timing** across product categories.

Key Business Impact -

-Improved visibility across stores and warehouses.

- Reduced working capital locked in unsold stock.

- Lowered risk of stockouts during peak seasons. - Enabled data-driven decision-making.

Verdict:

This project successfully demonstrated how structured SQL analytics can address critical inventory inefficiencies in a retail environment. By normalizing raw transactional data into a relational schema, we enabled clean, scalable analysis across product, store, and time dimensions.

Key SQL queries were developed to calculate stock levels, detect low inventory, estimate reorder points, and analyze inventory turnover. These insights helped identify overstocked products, low-turnover items, and potential stockout risks. Seasonal demand trends and sales volatility were also analyzed to support smarter replenishment decisions.

A KPI dashboard was built summarizing average stock levels, stockout rates, and turnover ratios. Recommendations were made to adjust reorder thresholds, reduce holding costs, and

improve product availability.

While supplier performance data was not part of the original dataset, the system is designed to accommodate such extensions in future iterations. Overall, the solution empowers Urban Retail Co. to move from reactive inventory management to a proactive, data-driven approach—enhancing supply chain efficiency, reducing waste, and boosting profitability.

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