Urban Retail Co. Inventory Performance Dashboard & Reporting Solution

- ## objectives and Audience

Purpose:
This dashboard and report's main goal is to give Urban Retail Co. useful, data-driven insights into inventory performance. Supply chain analysts, store and regional operations leads, warehouse managers, and business executives can use this tool to help them make timely and well-informed inventory decisions.
Reporting Frequency: As data integration advances, the dashboard can accommodate real-time updates in addition to its intended daily and weekly monitoring features. This regularity guarantees that management and operational personnel can react promptly to new inventory trends and problems.
Important Choices Assisted by the Dashboard:
Actions to Reorder: To help managers prevent stockouts and start timely replenishment, identify products that are at or below their reorder point.
Stock Adjustment: Draw attention to overstocked or slow-moving items to help guide redistribution, discounts, or promotions.
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2. Identify and Gather Key KPIs

We have determined the following critical performance indicators in Examine Stockouts to promote data-driven inventory management and generate actionable insights: Find

reoccurring stockouts of high-demand items to improve forecasting and supplier coordination.Performanc
Monitor SKU and Category Outcomes: Monitor sales, turnover, and inventory age to optimize assortment and shelf space allocation.
Supplier e: Evaluate the supplier's dependability and spot any anomalies that could impact inventory flow.
Weather-Based and Seasonal Planning: Predict demand spikes and make proactive stock adjustments by using historical sales and meteorological data.

Benchmarking by store and region: Analyze performance across various stores and regions to identify best practices and areas that need improvement.
By assisting Urban Retail Co. in moving from manual, reactive inventory management to a proactive, analytics-driven approach, this dashboard hopes to reduce costs, increase customer satisfaction, and promote business growth.

Reorder Actions: To enable managers to begin promptly restocking, ascertain which products are at or below their reorder point.

indicators (KPIs). Our SQL-driven data infrastructure makes it easy to calculate these KPIs, which are directly related to our business goals.

1. Inventory Turnover Rate

Definition: Measures how efficiently inventory is sold and replaced over a period.
Calculation:

$$\text{Inventory Turnover Rate} = \text{Total Units Sold} \text{Average Inventory Level}$$

SQL Reference:

```
WITH Aggregated AS (
```

```
  SELECT Product_ID, SUM(Units_Sold) AS Total_Sales,
AVG(Inventory_Level) AS Avg_Inventory
  FROM Inventory_main
  GROUP BY Product_ID
)
SELECT Product_ID, Total_Sales * 1.0 / NULLIF(Avg_Inventory, 0)
AS Inventory_Turnover_Rate
FROM Aggregated
WHERE Avg_Inventory IS NOT NULL;
```

2. Stockouts

Definition: Number of SKUs with zero inventory at any point, leading to missed sales opportunities.

SQL Reference:

```
sql
SELECT Product_ID, Store_ID, Date
FROM Inventory_main
WHERE Inventory_Level = 0;
```

3. Overstocked Items

Definition: SKUs with inventory levels consistently above optimal thresholds, resulting in excess holding costs.

SQL Reference:

Compare `MAX(Inventory_Level)` to average sales or a defined overstock threshold.

4. Reorder Alerts

Definition: Products where current inventory is below the calculated reorder point (ROP), indicating the need for replenishment.

Calculation:

$$\text{Reorder Point} = \text{Avg Daily Sales} \times \text{Lead Time}$$

SQL Reference:

```sql
WITH DailySales AS (
  SELECT Product_ID, Store_ID, COUNT(DISTINCT Date) AS Active_Days, SUM(Units_Sold) AS Total_Sales
  FROM Inventory_main
  GROUP BY Product_ID, Store_ID
),
ReorderPointCalc AS (
  SELECT Product_ID, Store_ID,
         ROUND(Total_Sales * 1.0 / NULLIF(Active_Days, 0), 2) AS Avg_Daily_Sales,
```

```
        ROUND((Total_Sales * 1.0 / NULLIF(Active_Days, 0)) * 3,
2) AS Estimated_Reorder_Point
  FROM DailySales
),
LatestStock AS (
  SELECT Product_ID, Store_ID, MAX(Inventory_Level) AS
Current_Inventory
  FROM Inventory_main
  GROUP BY Product_ID, Store_ID
)
SELECT R.Product_ID, R.Store_ID, R.Avg_Daily_Sales,
R.Estimated_Reorder_Point, L.Current_Inventory,
  CASE WHEN L.Current_Inventory < R.Estimated_Reorder_Point THEN
'Low Inventory - Needs Reorder' ELSE 'Sufficient' END AS Status
FROM ReorderPointCalc R
JOIN LatestStock L ON R.Product_ID = L.Product_ID AND R.Store_ID
= L.Store_ID;
```

5. Stock to Sales Ratio

Definition: Compares the value of inventory held to the value of sales, indicating inventory efficiency.

Calculation:

$$\text{Stock to Sales Ratio} = \text{Inventory Value} + \text{Sales Value}$$

SQL Reference:

Aggregate `SUM(Inventory_Level * Price)` and `SUM(Units_Sold * Price)`.

6. Sell-Through Rate

Definition: Percentage of inventory sold relative to the amount received, reflecting demand and sales effectiveness.

Calculation:

$$\text{Sell-Through Rate} = (\text{Units Sold} \text{Units Ordered}) \times 100$$

SQL Reference:

```sql
SELECT Product_ID, SUM(Units_Sold) AS Total_Sold,
SUM(Units_Ordered) AS Total_Ordered,
  (SUM(Units_Sold) * 100.0 / NULLIF(SUM(Units_Ordered), 0)) AS
Sell_Through_Rate
FROM Inventory_Fact
GROUP BY Product_ID;
```

7. Days Sales in Inventory (DSI)

Definition: Average number of days inventory is held before being sold; lower DSI indicates faster turnover.
Calculation:

$$\text{DSI} = (\text{Average Inventory} \text{Total Units Sold}) \times \text{Period Length}$$

SQL Reference:
Use `AVG(Inventory_Level)` and `SUM(Units_Sold)` over the desired period.

8. Weeks On-Hand

Definition: Number of weeks current inventory will last at the current sales rate.
Calculation:

$$\text{Weeks On-Hand} = \text{Current Inventory} / \text{Average Weekly Sales}$$

SQL Reference:
Calculate `MAX(Inventory_Level)` divided by average weekly sales.

9. Backorder Rate

Definition: Percentage of orders not fulfilled due to insufficient stock, indicating supply chain gaps.
SQL Reference:
If tracked, count orders where `Units_Ordered > Inventory_Level` at order time.

10. Inventory Age Ratio

Definition: Indicates how long products remain in stock; higher values highlight slow-moving inventory.
Calculation:

$$\text{Inventory Age Ratio} = \text{Average Inventory} / \text{Total Units Sold}$$

SQL Reference:
`sql`

```
WITH SalesSummary AS (
  SELECT Product_ID, Store_ID, SUM(Units_Sold) AS Total_Sales,
AVG(Inventory_Level) AS Avg_Stock
  FROM Inventory_main
  GROUP BY Product_ID, Store_ID
)
SELECT Product_ID, Store_ID, ROUND(Avg_Stock /
NULLIF(Total_Sales, 0), 4) AS Inventory_Age_Ratio
FROM SalesSummary;
```

These KPIs will be calculated and visualized in this report to provide Urban Retail Co. with a comprehensive, actionable view of inventory health and performance.

3. Collect and Prepare Data

. The denormalized format of the data was supplied for this analysis. The dataset was organized into the following relational tables and normalized into Third Normal Form (3NF) to guarantee consistency, accuracy, and query efficiency:

. Store: Holds distinct Store IDs along with the regions that correspond to them.

. Product: Provides categories, pricing details, and Product IDs.

. Weather: Monitors each store's seasonality and daily weather conditions.

.Inventory_Fact: Keeps track of daily stock levels, sales, orders, and demand projections for every product at every store.

.The process of normalization

. Redundancy Reduction: Repeated fields (such as product details, store details, and weather) were divided into separate tables.

Referential Integrity: To connect transactional data (Inventory_Fact) with master data (Store, Product, Weather), foreign keys were created.
Data Integrity: Reduced update anomalies and enhanced query performance by making sure that each fact or dimension is only stored once.
Steps for Preparing Data:
SQL INSERT statements were used to extract unique records for each dimension and fact table before loading the data into the normalized schema.
Normalization eliminated structural inconsistencies and duplication, so no further cleaning was necessary.

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SQL INSERT statements were used to extract unique records for each dimension and fact table before loading the data into the normalized schema.
Normalization eliminated structural inconsistencies and duplication, so no further cleaning was necessary.
Using sophisticated SQL queries on the normalized tables, aggregations and computations (including sales totals, average inventory, reorder points, and trends) are carried out dynamically.
All ensuing KPI computations, analytics, and dashboard/report creation are based on this prepared, relational dataset.

4. Tools Used

- The following tools were employed to facilitate effective data analysis, reporting, and visualization for inventory management:
- The main tool for creating, testing, and refining complex SQL queries was SQL Workbench. Here, all data extraction, transformation, and KPI computations were

carried out, guaranteeing precise and expandable analytics using the normalized 3NF schema.

- Interactive dashboards and visualizations are made with Power BI. Power BI's direct connection to the SQL database allowed for dynamic filtering, real-time or scheduled data refresh, and user-friendly drill-downs for business users.
- Excel: Used for static summary reports, ad hoc analysis, and tabular data presentation. The output of the SQL query was exported to Excel for quick charting, additional manipulation, and stakeholder sharing.

This integrated toolset ensured a seamless workflow—from robust data modeling and query development to clear, actionable reporting and interactive

Dashboard Layout and Design

- The purpose of the inventory KPI dashboard was to give Urban Retail Co. a concise, useful summary of its inventory performance. In order to direct users from high-level status to in-depth analysis, the layout employs visual hierarchy and gives priority to the most important metrics.

- **Top-Level Metrics**: At the top of the dashboard, in large, bold tiles, are the most significant KPIs, such as Total Inventory Value, Inventory Turnover Rate, Stockouts, and Low Inventory Alerts. This enables users to promptly evaluate the general health of the inventory and pinpoint pressing problems.

- **Stock Health and Alerts**: Using bar charts and color-coded indicators, a special section shows the current stock levels by product and store. Red highlights draw attention to stockout and low inventory alerts, making them easily observable for prompt action.

- **Fast and Slow Movers:** The top five slow- and fast-moving items in each store or area are shown in tables and charts. This aids managers in concentrating on products that require promotion or replenishment, as well as those that might need to be redistributed or marked down.

- **Inventory Age and Turnover:** By displaying inventory age ratios and turnover rates in line and bar charts, users can monitor stock movement efficiency and identify slow-moving inventory.

- **Trends and Seasonality:** Line charts are used to illustrate monthly and seasonal sales trends, with weather information included when appropriate. This encourages proactive preparation for changes in demand.

- **Category and Store Performance:** To help compare performance across locations and product lines, additional tables and charts provide a summary of revenue by product category and average daily sales by store.

Design principles applied:

Clarity and Accessibility: Bold typography and important metrics are positioned at the top. Critical areas are highlighted by color coding (green for healthy stock, red for alerts), and navigation is made simple by uniform grouping and spacing.

Interactivity: For a more thorough analysis, users can concentrate on particular stores, categories, or time periods using filters and drill-down options.

User Experience: The dashboard supports both strategic planning and operational responses by guiding users from a high-level overview to actionable details.

Warehouse managers and executives alike can swiftly understand inventory status, spot problems, and make well-informed decisions to maximize stock levels and enhance business results thanks to this design.

1. KPI Cards/Tiles:

- **Inventory Worth, Stock Value, Alerts, Inventory Turnover**
- *Purpose:* Quickly communicate key metrics at a glance.
- *How to add:* Use “Card” or “KPI” visual in Power BI or a large cell with formatting in Excel.

Fast Moving Items

This horizontal bar chart displays the top-performing products (SKUs) in terms of units sold over the selected period. These “fast moving items” represent the products with the highest sales velocity across all stores and regions.

Slow Moving Items

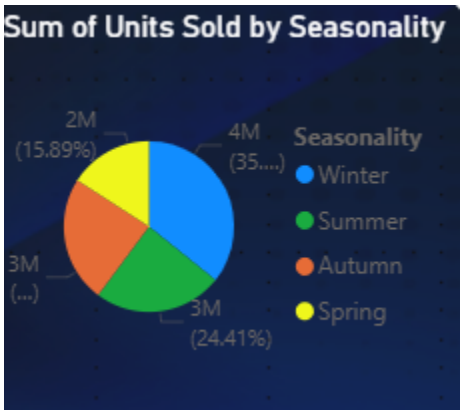
This horizontal bar chart displays the bottom-performing products (SKUs) in terms of units sold over the selected period. These “slow moving items” represent the products with the lowest sales velocity across all stores and regions.

Sum of Units Sold by Month

This line chart displays the total number of units sold each month throughout the year. By visualizing monthly sales trends, the chart helps identify periods of high and low demand, seasonal fluctuations, and emerging sales patterns.

Inventory Level by Month (Line Graph)

This line graph illustrates the total inventory levels held by Urban Retail Co. at the end of each month. It tracks how the amount of stock on hand changes over time, reflecting both replenishment activities and sales outflows.



Units Sold by Season (Pie Chart)

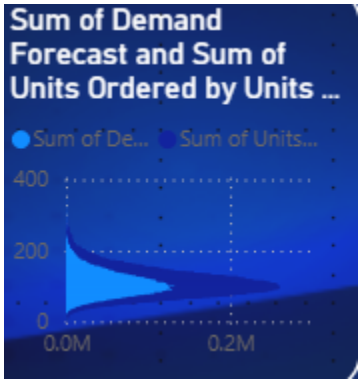
This pie chart shows the proportion of total units sold during each season (e.g., Winter, Spring, Summer, Autumn). By visualizing sales distribution across different seasons, the chart highlights how customer demand fluctuates throughout the year.

Units Sold by Region (Pie Chart)

This pie chart displays the proportion of total units sold in each region where Urban Retail Co. operates. It visually breaks down sales performance across different geographic areas.

Why it matters:

Analyzing sales by region helps identify high-performing markets as well as areas with growth potential or underperformance. Understanding regional demand patterns allows for more precise inventory allocation, targeted marketing, and tailored product assortments to better meet local customer preferences.



Demand Forecast vs. Units Ordered

> The total number of units ordered for each product or time period is contrasted with the total demand forecast in this area chart. The graphic illustrates the degree to which actual inventory orders and anticipated demand match.

Relevance:

Urban Retail Co. can assess the precision of its demand planning and ordering procedures by contrasting projected demand with actual orders. Large discrepancies between the two lines could be a sign of either under-ordering, which results in stockouts and lost sales, or over-ordering, which results in excess stock and higher expenses. Keeping an eye on this relationship lowers holding costs and missed sales opportunities, optimizes inventory levels, and enhances future forecasting.

How to apply this knowledge:

Examine goods or times when orders and forecasts diverge significantly.

Improve ordering procedures and forecasting models to better reflect actual demand.

Use these insights to inform supplier negotiations and inventory replenishment strategies.

6. Build Visualizations

A range of visualization strategies were employed in Power BI and Excel, utilizing the results of SQL queries, to efficiently convey important inventory insights:

Stock levels by product, store, or warehouse are shown using bar charts. These charts facilitate quick comparisons of inventory levels across various products or locations.

Line charts are used to show trends over time, such as changes in stock levels, sales growth, and inventory turnover rates. This makes it easier to spot long-term trends, demand spikes, and seasonality.

Pie charts are used to clearly illustrate how inventory is distributed throughout the company by product category or geographic area.

Formatting Conditions

Used to draw attention to important inventory circumstances:

- Red indicates stockouts or low stock.
- Green for a balanced stock

All visualizations were desi for clarity and interactivity, allowing users to filter by store, category, or time period, and to drill down into specific details as needed. This approach ensures that both high-level trends and granular data are easily accessible, supporting informed, data-driven inventory management decisions.

Dashboard Access