

# Executive Summary:

## Urban Retail Co. Inventory Analytics Project

### Project Overview:

Urban Retail Co., a fast-growing mid-sized retail chain operating across multiple cities and platforms, faced significant challenges in managing its inventory. With over 5,000 SKUs and a complex supply chain involving physical stores and regional warehouses, the company was struggling with:

- Frequent **stockouts** of high-demand items
- Excess **overstocking** of slow-moving products
- **Manual, reactive decision-making**
- Lack of **real-time insights** into product and supplier performance

Despite having access to transactional and product data, the company had not fully leveraged this information to support data-driven decisions.

### Objective:

Our team was tasked with designing and implementing a **SQL-based inventory analytics solution** to convert raw data into actionable business insights. The project mimics the real-world responsibilities of a data analyst and aims to:

- Build a **normalized data model** for scalable analysis
- Extract key inventory **KPIs and trends** using SQL
- Provide recommendations to optimize inventory levels
- Deliver clean technical outputs and business-facing reports

### Implementation:

The solution was developed using **MySQL** and structured into three key phases:

1. **Data Cleaning & Import**
  - Cleaned a .csv inventory dataset containing 15+ fields (e.g., sales, stock, demand, pricing, weather).
  - Standardized values, transformed date formats, and calculated derived fields like revenue and effective price.
2. **Data Modeling (Schema Design)**
  - Created a **relational schema** with Regions, Stores, Categories, Products, and InventoryTransactions.
  - Ensured **normalization** to reduce redundancy and improve query performance.
  - Used **foreign key constraints** to maintain data integrity.
3. **SQL-Based Analytics**
  - Developed and tested SQL queries for:
    - Stock level summaries
    - Reorder point detection
    - Inventory turnover rates
    - Stockout rates and forecast accuracy
    - Product performance (fast vs slow-moving)
    - Impact of weather and promotions on sales

Each query delivered specific insights to aid operational and strategic decision-making.

## Key Insights & Recommendations:

- **Stockouts Identified:** Over 15% of monitored products experienced stockouts >20% of the time, suggesting gaps in replenishment planning.
- **Reorder Alerts:** Products with inventory levels below a 3-day average sales buffer were flagged across multiple stores.
- **Fast vs Slow Movers:** Categorization enabled targeted promotions for slow-movers and restocking priority for fast-movers.
- **Weather-Sensitive Sales:** Rainy and cold weather conditions correlated with decreased unit sales in specific regions.
- **Forecast Accuracy:** Discrepancies between demand forecasts and actual sales revealed over- or under-estimation patterns.

## Business Impact:

By enabling Urban Retail Co. to monitor and optimize its inventory using real-time, SQL-powered insights, the project delivers:

- Reduced **stockouts** and improved customer satisfaction
- Lower **holding costs** by minimizing overstock
- Better **supplier negotiation leverage** using performance data
- A foundation for **forecast-driven decision-making**

## Conclusion:

This project transformed Urban Retail Co.'s raw inventory data into a structured SQL-based analytics system. By designing a normalized schema, performing data cleaning during ETL, and writing targeted KPI queries, we enabled smarter inventory tracking, reduced stockouts, and improved forecasting.

The solution offers actionable insights on product performance, reorder needs, and demand trends—empowering data-driven decision-making. It reflects key skills in SQL, data modeling, and analytics that are highly relevant to software and data roles in retail operations.