**Problem Statement**

The retail chain is experiencing inefficiencies in its inventory management strategy. Some stores frequently face **stockouts of high-demand items**, leading to lost sales and dissatisfied customers. At the same time, other products remain **overstocked on shelves**, tying up working capital and increasing holding costs.  
These challenges are further complicated by **regional differences in demand**, **seasonal fluctuations**, and the influence of **external factors** such as **weather, holidays, and promotions**.

As a result, the business struggles with:

* **Revenue loss** due to unfulfilled demand (stockouts).
* **Excessive holding costs** from unsold inventory.
* **Inefficient pricing strategies** that fail to maximize revenue.
* **Inaccurate demand forecasts** leading to poor replenishment timing.

**Project Goal**

The goal of this project is to design a **data-driven inventory optimization system** that ensures the right products are available in the right stores, at the right time, and in the right quantities.

Using the **Retail Store Inventory Demand Forecasting dataset**, the project will focus on:

1. **Demand Forecasting:** Build predictive models (ARIMA, Prophet, LSTM) to forecast product-level demand by store, incorporating external factors like weather, holidays, and promotions.
2. **Category-Specific Inventory Strategies:** Identify high-demand categories prone to stockouts and low-performing categories that remain overstocked, enabling smarter product prioritization.
3. **Regional Demand Optimization:** Detect regional demand variations and design location-specific stocking strategies.
4. **Dynamic Pricing Insights:** Explore the relationship between pricing, promotions, and competitor strategies to optimize revenue.
5. **Smarter Replenishment:** Recommend reorder points and quantities that balance customer satisfaction with reduced holding costs.

**Business Value**

By solving this problem, the retail chain can achieve:

* **Reduced lost sales** by minimizing stockouts.
* **Lower inventory costs** by reducing overstocking.
* **Optimized warehouse and shelf space usage.**
* **Improved customer satisfaction** through better product availability.
* **Increased revenue** through smarter pricing and promotion strategies.
* **More accurate long-term forecasts** to strengthen supply chain resilience.