# Supply Chain Inventory Optimization with SQL

## Business Overview/Problem

TechElectro Inc. is currently facing multiple inventory management challenges that are impacting its operational efficiency and customer satisfaction:

**A. Overstocking:** The company often has surplus inventory for certain products, which ties up valuable capital and reduces available storage space.
**B. Understocking:** High-demand products frequently run out of stock, leading to missed sales and frustrated customers.
**C. Customer Satisfaction:** These inventory issues directly affect customer satisfaction, causing delays and disappointment when customers cannot find the products they need.

## Project Rationale

Inventory optimization involves efficiently managing a company's stock to meet customer demands without overstocking or understocking. By leveraging **SQL**, this project aims to bring a data-driven approach to inventory management, improving both operational efficiency and customer experience. Here's why this approach is crucial for TechElectro Inc.:

**A. Cost Reduction:** SQL-based inventory management helps reduce costs by avoiding overstocking.
**B. Enhanced Customer Satisfaction:** Keeping inventory levels optimal ensures products are readily available, increasing customer loyalty.
**C. Competitive Edge:** Quick adjustments to market trends and customer demands give TechElectro a strong advantage.

**D. Profitability:** Reduced waste and better cash flow contribute to a healthier bottom line through more accurate inventory control.

# Aim of The Project

This project aims to address TechElectro Inc.'s inventory management challenges by implementing a comprehensive, SQL-driven inventory optimization system. The key objectives include:

**A. Optimal Inventory Levels:** Use SQL analytics to determine the right stock levels for each product, avoiding overstock and understock situations.
**B. Data-Driven Decisions:** Enable better decision-making through the power of SQL, reducing costs while improving customer satisfaction.

# About The Dataset

We will work with three key datasets:

**1. Sales Data**
- ✓ **Product ID:** Unique identifier for each product.
- ✓ **Sales Date:** Date of product sale.
- ✓ **Sales Quantity (Units):** Number of units sold.
- ✓ **Product Cost (USD per Unit):** Cost per product unit.

**2. Product Information Data**
- ✓ **Product ID:** Unique product identifier.
- ✓ **Product Category:** Type of product.
- ✓ **Promotions:** Indicator of whether the product was on promotion.

**3. External Information Data**
- ✓ **Sales Date:** Date of sale.
- ✓ **GDP (Gross Domestic Product) (USD):** Economic data.
- ✓ **Inflation Rate (%):** Percentage change in prices.
- ✓ **Seasonal Factor:** Indicator for seasonal effects.

# Project Scope

The project will cover the following areas:

**A. Exploratory Data Analysis (EDA):** Use SQL to explore patterns, correlations, and

statistics without visualization.
**B. Optimal Inventory Levels:** Apply SQL-based optimization techniques to set ideal stock levels for each product.
**C. Documentation and Recommendations:** Provide thorough documentation, including SQL scripts and methods used in the project.
**D. Deployment:** Integrate the SQL-driven system with TechElectro's existing supply chain for real-world application.
**E. Data Transformation:** Prepare and clean the data to make it ready for analysis.
**F. Data Analysis:** Analyze trends and generate actionable insights.
**G. Data Visualization:** Present insights visually for better communication.
**H. Interpretation and Insight Generation:** Generate clear insights and strategies from the analysis.

# Tech Stack

**Tool: MySQL** will be the primary tool used for:

**A. Mathematical Operations:** Performing calculations on the data.
**B. Data Analysis and Manipulation:** Managing, transforming, and analyzing large datasets to drive inventory decisions.
**C. Inventory Optimization:** Applying SQL logic to set reorder points, calculate safety stock, and automate stock monitoring.