

Supply Chain Dataset Analysis Project

Data Cleaning | Data Analysis | Forecasting Insights



Team Members



Basant Mohamed Reda Al-Samahy

Mostafa Mohamed Moharam

Mohamed El-Sayed Mohamed El-Badawy

Sameh Sobhy Ali Abdelhady

Ahmed El-Sayed Ahmed Fouda



Project Overview

1. Project Background

The supply chain plays a crucial role in ensuring products are delivered efficiently from manufacturers to customers. This project focuses on analyzing a Supply Chain Dataset to uncover insights related to product performance, supplier efficiency, lead times, and cost optimization. We aim to clean, analyze, and forecast the data to support better decision-making and improve overall supply chain performance.

2. Project Objective

The main objective of this project is to:

- Understand the structure and quality of the given dataset.
- Identify patterns and trends that affect performance and revenue.
- Build forecasting models to predict future supply or revenue behavior.
- Create visual dashboards to support management decisions.

3. Tools & Technologies Used

Tool / Library

Python (Pandas, NumPy)
Matplotlib/Seaborn
Scikit-learn
SQL
Power BI

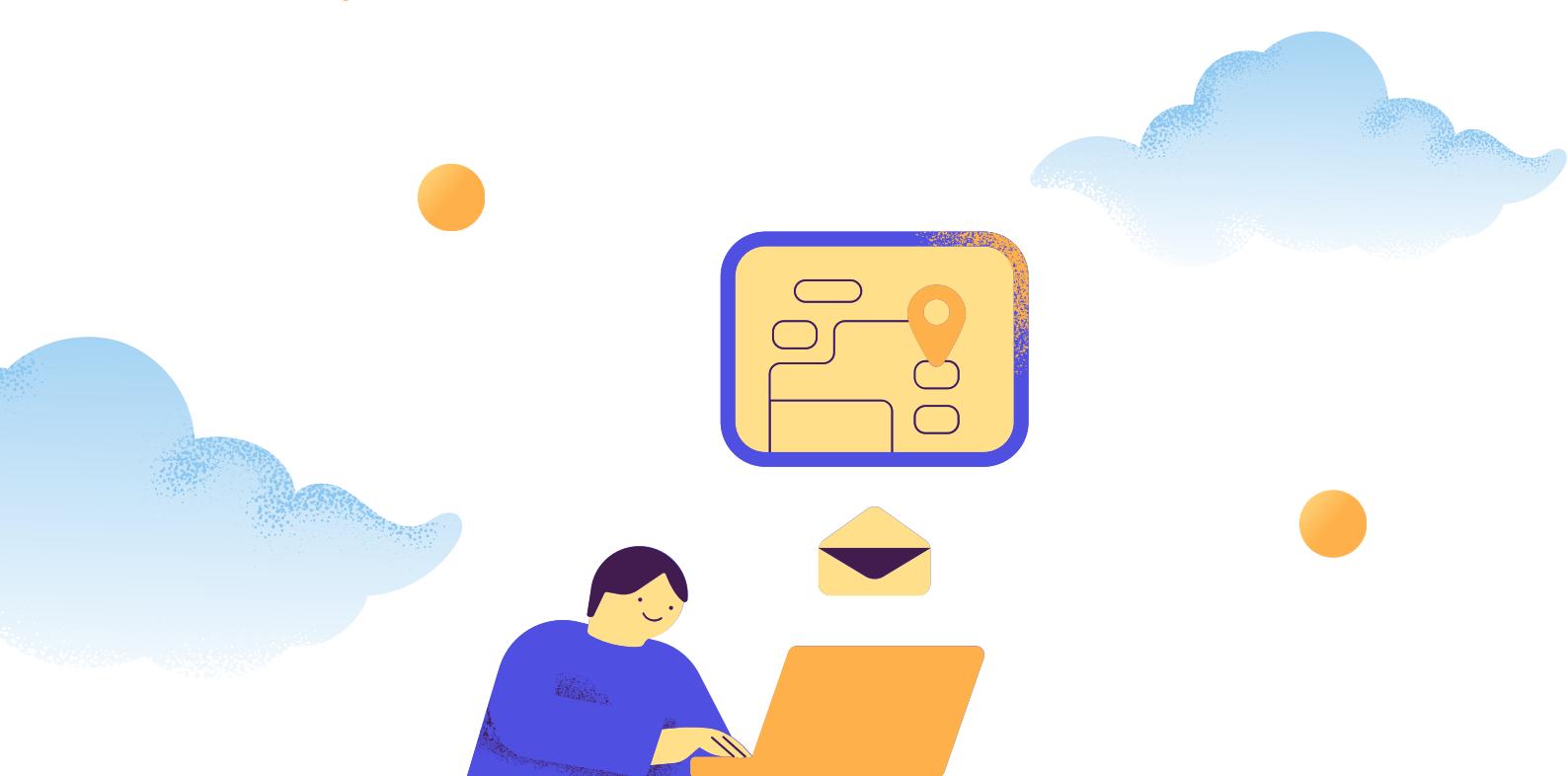
Purpose

Data cleaning and preprocessing
Data visualization and trend analysis
Forecasting models
Data extraction and querying
Interactive visualization dashboards

4. Project Scope

This project covers four main phases:

1. Week1 – Data Cleaning & Preparation
2. Week2 – Exploratory Data Analysis
3. Week3 – Forecasting Insights
4. Week4 – Visualization Dashboard & Final Report



Dataset Description



Overview

The dataset represents key components of a supply chain system, including product, supplier, manufacturing, and logistics data. It helps analyze factors affecting revenue, stock levels, and efficiency.



Structure

Records: 100

Columns: 28

Type: Numeric & Categorical

Format: CSV

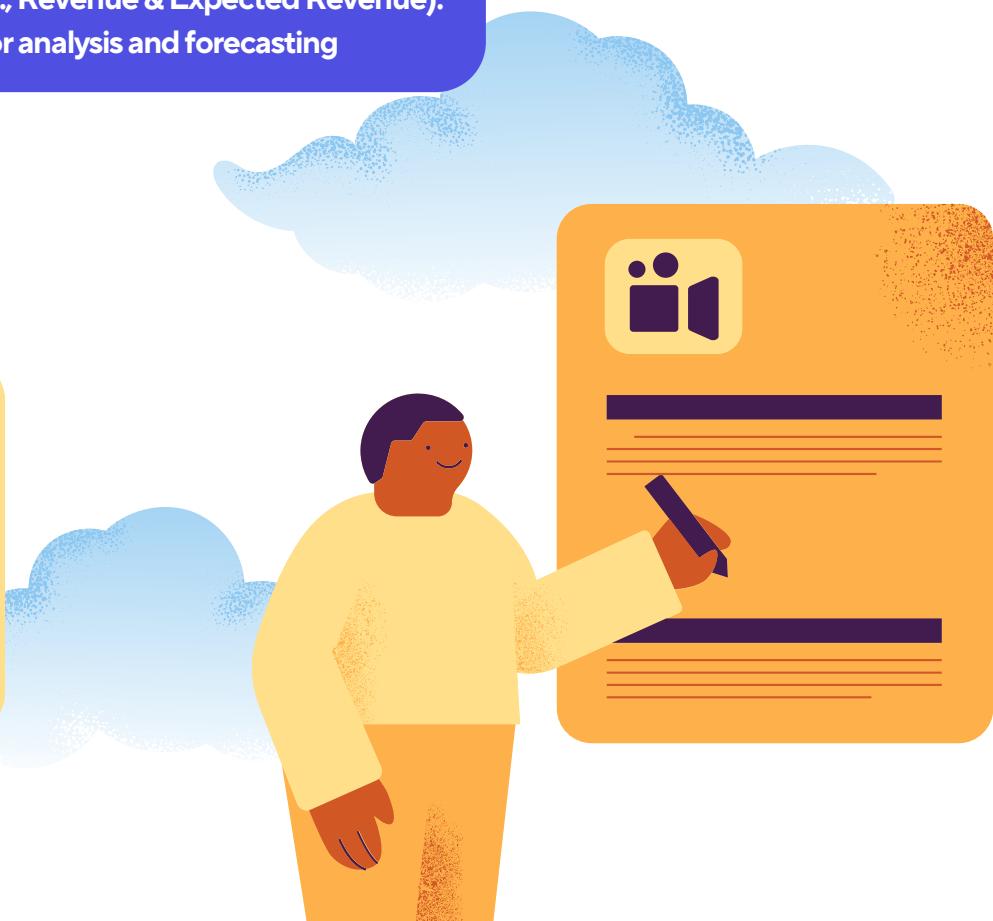


Key Insights

- Data is clean and complete (no missing or duplicate rows).
- Some columns are correlated (e.g., Revenue & Expected Revenue).
- Values are realistic and suitable for analysis and forecasting

Main Columns

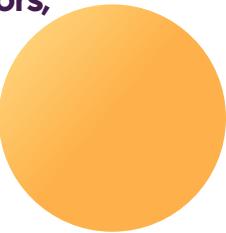
- Product type
- Price
- Revenue generated
- Lead times
- Stock levels
- Supplier name
- Manufacturing costs
- Defect rates



Data Cleaning & Preprocessing

Objective

To prepare the dataset for accurate and consistent analysis by handling errors, duplicates, and structure issues.



Steps Performed

- **Removed Duplicates:** 0 duplicate rows detected.
- **Handled Missing Values:** No missing data found.
- **Standardized Columns:** Unified formats for names, numbers, and dates.
- **Created Calculated Fields:**
- **Revenue Diff = Expected Revenue – Actual Revenue**
- **Stock Levels (Adj) = Adjusted stock after violations**
- **Validated Data Types:** Ensured numeric/categorical consistency.

Result

A fully clean, structured, and analysis-ready dataset suitable for both exploratory and forecasting phases.



Key Insights & Analysis

• Key Findings:

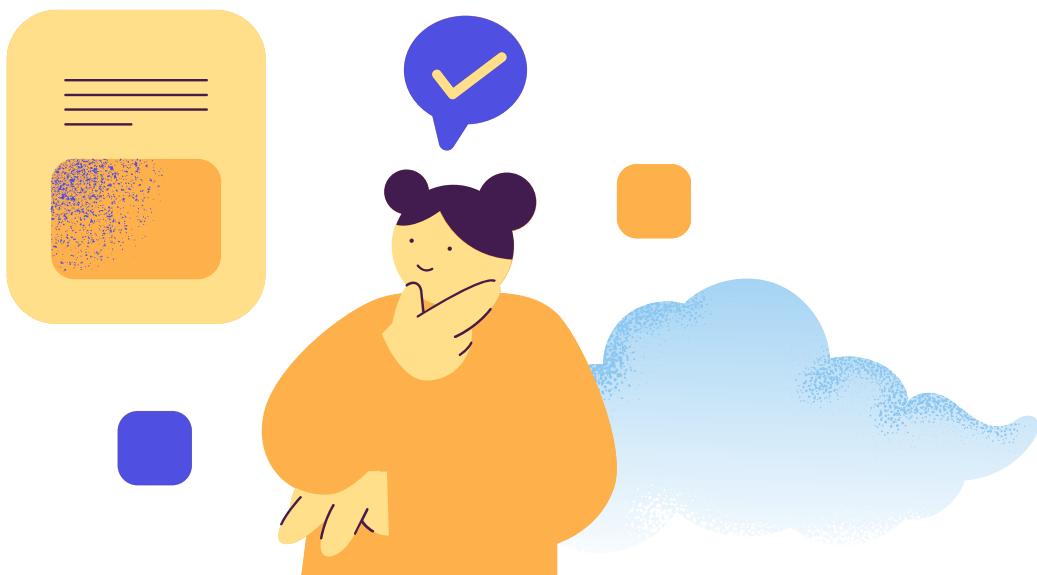
- Analyzed the supply chain data for the defined period.
- Identified top-performing suppliers with the lowest defect rates.
- Detected frequently delayed shipments and bottlenecks.
- Recognized seasonal demand patterns affecting inventory levels.

• Suggested Visualizations:

- Bar Chart: Supplier performance comparison (Defect Rate & Lead Time).
- Line Chart: Revenue forecast over the period.
- Area/Line Chart: Forecasted stock levels.
- Scatter/Bubble Chart: Relationship between shipping cost and delivery time or Lead Time vs. Defect Rate.

• Key Performance Indicators (KPIs):

- Total Revenue – Sum of revenue generated.
- Average Defect Rate – Supplier quality performance.
- Average Lead Time – Efficiency of deliveries.
- Supplier Performance Score – Overall supplier effectiveness.



Conclusions & Recommendations

• **Conclusions:**

- The supply chain data analysis revealed key bottlenecks in delivery times and inventory management.
- Local suppliers generally perform better than international ones in terms of lead time and reliability.
- Seasonal demand significantly impacts stock levels, requiring proactive planning.
- KPIs show that while revenue targets are on track, defect rates and some supplier performances need improvement.

• **Recommendations:**

- **Supplier Optimization:** Select and monitor suppliers based on defect rate, lead time, and overall performance.
- **Inventory Management:** Implement better forecasting tools to handle seasonal demand and avoid shortages or overstock.
- **KPI Monitoring:** Set up dashboards for continuous tracking of key performance metrics.
- **Automation & Prediction:** Use predictive analytics to anticipate shipment delays and stock issues.
- **Process Improvement:** Streamline logistics and supply processes to reduce delays and defects



Future Steps & Next Actions

Strategic Future Steps

- Enhanced Forecasting: Deploy advanced predictive models for demand and inventory management.
- Supplier Collaboration: Strengthen partnerships with key suppliers to improve lead times and reduce defects.
- Automation & Technology: Integrate automated tools to monitor shipments, stock levels, and KPIs in real-time.
- Continuous Improvement: Regularly review supply chain processes to identify inefficiencies and cost-saving opportunities.
- Sustainability Practices: Adopt eco-friendly logistics and sourcing strategies for long-term sustainability.

Action Plan & Timeline

1. Forecasting

Action: Apply predictive analytics for demand and inventory management.

Timeline: Within the next 3 months

Team Responsible: Data & Supply Team

1. Supplier Collaboration

Action: Organize quarterly supplier reviews and workshops.

Timeline: Over the next 6 months

Team Responsible: Procurement Team

1. Automation

Action: Implement tracking and monitoring tools for real-time visibility.

Timeline: Next 4 months

Team Responsible: IT & Operations

1. Continuous Improvement

Action: Conduct monthly audits of supply chain processes.

Timeline: Ongoing

Team Responsible: Supply Chain Team

1. Sustainability

Action: Review and enhance sourcing and logistics practices for eco-friendly operations.

Timeline: Within 6–12 months

Team Responsible: Sustainability Officer

