# Problem Definition and Research Questions

- **Project Name:** *Supply Chain Performance Analysis and optimization*

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## 1.Introduction:

This project aims to provide a comprehensive analysis of the company's supply chain operations. Utilizing data analysis and visualization tools, specifically Power BI, the analysis will focus on identifying key performance drivers and areas for improvement. By examining data from various stages—including sourcing, manufacturing, inventory, and logistics—this project will uncover insights to optimize efficiency, reduce costs, and enhance overall operational performance. The findings will serve as a foundation for data-driven decision-making to build a more resilient and effective supply chain.

## 2.Business Problem Statement:

**The company is experiencing challenges across its supply chain, leading to increased operational costs and potential revenue loss. Key issues include:**

➔ Inefficient inventory management, resulting in both stock shortages and surplus.

➔ High and unpredictable shipping costs due to inefficient carrier selection and suboptimal routes.

➔ Lack of visibility into supplier performance, making it difficult to assess reliability and quality.

➔ Delays in lead times from sourcing to manufacturing, affecting product availability and customer satisfaction.

➔ This project will address these issues by analyzing key supply chain data to identify root causes and provide actionable insights for optimization

### 3.Research Questions:

### Inventory & Production Efficiency:

- What is the optimal stock level for each product type to minimize carrying costs while preventing stockouts?
- How does manufacturing lead time and cost vary by product, and what factors influence these variations?
- Is there a correlation between production volume and the defect rate, and what is the impact on overall costs?

### Logistics & Shipping Optimization:

- How do shipping times, carriers, and routes impact overall shipping costs and customer delivery performance?
- What is the relationship between the number of products sold and the total shipping cost per order?

### Supplier & Quality Performance:

- Which suppliers consistently provide products with the lowest defect rate and shortest lead times?
- Is there a link between a supplier's location and their lead time, and how does this affect inventory planning?

### Overall Financial Performance:

- How do different costs (manufacturing, shipping, and supplier) affect the total revenue and profit margin for each product?
- What is the relationship between product availability and revenue generated?

### 4.Project Objective:
- Analyze Key Performance Drivers: To analyze the provided data to identify the main factors that drive efficiency and cost within the supply chain.
- Optimize Inventory Levels: To provide data-driven recommendations for managing stock levels to reduce holding costs and prevent stockouts.
- Improve Logistics Efficiency: To evaluate shipping carriers and routes to identify cost-saving opportunities and improve delivery times.
- Evaluate Supplier Performance: To assess supplier reliability based on lead times, costs, and quality to enhance sourcing decisions.
- Provide Actionable Insights: To present findings in a clear, visual format using Power BI dashboards that empower stakeholders to make informed decisions for supply chain optimization.

### 5.KPIs (Key Performance Indicators):

➔ **Inventory Turnover**: Measures how many time**s inventory is sold or** used over a period.
- **Calculation**: (Total Products Sold) / (Average Stock Levels)

➔ **Supplier Lead Time**: Measures the average time it takes for a supplier to deliver an order.
- **Calculation**: Average (Lead Time)

➔ **Defect Rate**: Measures the percentage of products that are defective.
- **Calculation**: (Total Defective Products) / (Total Production Volume)

➔ **Average Shipping Cost per Order**: Measures the average cost to ship one order.
- **Calculation**: (Total Shipping Cost) / (Number of Orders)

➔ **Manufacturing Cost per Unit**: Measures the cost to produce a single item.
- **Calculation**: (Total Manufacturing Cost) / (Production Volume)

➔ **On-Time Delivery Rate:** Measures the percentage of orders delivered on or before the scheduled time.
- **Calculation**: (Number of On-Time Deliveries) / (Total Deliveries)

## 6.Scope and Limitations:

➔ **Scope:**
- This analysis will use the provided data from your sheet, covering Product Type, Supplier Name, Shipping Costs, and other specified metrics.
- The project will focus on descriptive and diagnostic analytics to identify key trends, measure performance, and pinpoint the root causes of issues within the supply chain.
- The final output will be a Power BI dashboard with interactive reports and visualizations to present the findings.

➔ **Limitations:**
- This analysis will not include predictive or prescriptive modelling to forecast future performance or recommend specific actions automatically. The focus is on analysing historical data.
- The project will not account for external factors that could affect the supply chain, such as economic changes, geopolitical events, or unexpected market shifts.
- The insights are limited by the accuracy and completeness of the data provided in your sheet. Missing or inaccurate data points could affect the reliability of the analysis.

## 7.Expected Outcomes
- Improved Decision-Making: The project will provide a clear, data-driven view of the supply chain, enabling stakeholders to make better, more informed decisions.
- Cost Reduction: The analysis will identify specific areas to reduce costs, particularly in manufacturing, shipping, and inventory management.
- Enhanced Operational Efficiency: The findings will lead to streamlined processes and improved efficiency across the entire supply chain.
- Stronger Supplier Relationships: By evaluating supplier performance, the project will help in building relationships with the most reliable and effective partners.
- Clear Visibility: The final Power BI dashboard will offer a comprehensive and interactive view of the supply chain's performance, providing transparency and easy access to key metrics.