Supply Chain Performance Analysis and Optimization

Executive Summary

This analysis project aims to enhance decision-making and operational efficiency across the supply chain by transforming raw operational data into actionable insights using Power BI. The dataset, consisting of 100 general supply chain transactions, was analyzed to understand production performance, quality control, and sales profitability. The final Power BI dashboard includes three pages — Production, Quality, and Sales — providing a 360° view of supply chain performance and enabling data-driven optimization.

Project Overview

• Project Name: Supply Chain Performance Analysis and Optimization
• Tool Used: Microsoft Power BI
• Techniques Applied: Power Query (data cleaning and transformation), DAX (KPI and measure creation), and data modeling (relationships among production, supplier, and sales tables).
• Dashboard Pages: Production, Quality, Sales
The project focuses on diagnosing inefficiencies in operations, assessing supplier quality, and tracking revenue performance.

Dataset Description

The dataset consists of 100 records representing general supply chain data across multiple product categories, suppliers, and logistics channels. It includes key fields such as Product Name, Supplier Name, Manufacturing Lead Time, Supplier Lead Time, Cost, Revenue, Quality Inspection Results, and Sales Metrics. No specific period was defined; data reflects a snapshot of recent operations.

Dashboard Pages Breakdown

Production Page

Focuses on manufacturing speed, efficiency, and cost control.

KPIs & Visuals:
- Avg. Manufacturing Lead Time
- Avg. Supplier Lead Time
- Production Volume vs. Manufacturing Cost
- Lead Time Breakdown (Mfg vs. Supplier)
- Inventory/Stock Levels by SKU

Purpose: Identify production bottlenecks and align manufacturing cost with output efficiency.

B. Quality Page (Quality & Risk Management)

Focuses on diagnosing quality problems by supplier and product.

KPIs & Visuals:
- Inspection Pass Rate %
- Total Products Rejected
- Defect Rate by Supplier
- Quality Trend Over Time
- Rejected Products by Product Category
- Slicers: Supplier, Product Name

Purpose: Identify high-defect suppliers, track trends, and support quality improvement.

C. Sales Page (Financial Health & Performance)

Focuses on revenue generation, profitability, and regional performance.

KPIs & Visuals:
- Total Revenue
- Profit Margin %
- Total Units Sold
- Revenue by Product Category
- Profit by Customer Demographic
- Sales by Region (Map)
- Slicers: Date Range, Region

Purpose: Assess financial performance and highlight key sales drivers.

5. Key Performance Indicators (KPIs)

- Inventory Turnover = Total Products Sold ÷ Average Stock Levels
- Supplier Lead Time = Avg. Delivery Days per Supplier
- Defect Rate = Total Defective Products ÷ Total Produced
- Manufacturing Cost per Unit = Total Manufacturing Cost ÷ Units Produced
- On-Time Delivery Rate = On-Time Deliveries ÷ Total Deliveries
- Profit Margin = (Revenue - Total Cost) ÷ Revenue

6. Insights & Findings

- Suppliers with higher lead times tend to have increased defect rates.
- Specific product categories show higher rejection levels, indicating process quality issues.
- Regional analysis reveals profit margin variations across markets.
- Aligning production and cost efficiency can significantly improve profitability.

7. Impact & Recommendations

- Operational Efficiency: Optimize supplier scheduling and production planning.
- Quality Control: Prioritize auditing of suppliers with the highest defect ratios.

- Sales Optimization: Focus on high-margin product lines and profitable regions.
- Data Visibility: Use the Power BI dashboard for ongoing performance monitoring.

8. Future Enhancements

- Add predictive analytics for demand forecasting.
- Expand dashboard scope to include supplier scoring and profit forecasting.
- Enable real-time data refresh for continuous monitoring.