**PROJECT DOCUMENTATION: SUPPLY CHAIN ANALYSIS**

**1. Project Overview**

**1.1 Introduction**

This project focuses on analyzing the supply chain performance using Power BI. The analysis covers key performance metrics such as revenue, profit margins, stock levels, order quantity, supplier performance, and transportation efficiency. The goal is to identify bottlenecks, optimize inventory management, and improve overall supply chain efficiency.

**1.2 Objectives**

* To evaluate total revenue and profit trends.
* To analyze product-wise and SKU-level sales performance.
* To assess supplier efficiency and lead times.
* To optimize stock levels and defect rates.
* To provide data-driven recommendations for supply chain improvements.

**1.3 Scope**

The project encompasses a detailed analysis of supply chain operations, including product sales, supplier performance, logistics efficiency, and order fulfillment processes.

**1.4 Stakeholders**

* Supply Chain Managers
* Procurement Teams
* Business Executives
* Logistics & Transportation Teams
* Data Analysts & Decision Makers

**2. Data Documentation**

**2.1 Data Sources**

* **Supply Chain Dataset** – Extracted from company transaction records.
* **Power BI Dashboard** – Used for visualization and analytics.

**2.2 Data Fields**

* **Revenue Data**: Total sales, profit margins, revenue by product and SKU.
* **Supplier Data**: Supplier names, manufacturing lead times, shipping times.
* **Inventory Data**: Stock levels, order quantities, defect rates.
* **Logistics Data**: Shipping carriers, transportation modes, cost analysis.

**2.3 Data Assumptions**

* All transactions are valid and reflect accurate supply chain performance.
* The dataset represents multiple product categories and timeframes.
* Any missing values have been addressed during preprocessing.

**3. Methodology & Analysis Approach**

**3.1 Analytical Framework**

1. **Data Cleaning & Preparation**: Handling missing values, duplicate records, and data inconsistencies.
2. **Exploratory Data Analysis (EDA)**: Identifying trends, outliers, and key patterns.
3. **Visualization & Insights**: Using Power BI for interactive dashboards and reporting.
4. **Performance Analysis**: Assessing supplier efficiency, logistics costs, and stock optimization.
5. **Recommendations & Business Strategies**: Providing insights for operational improvements.

**4. Supply Chain Analysis**

**4.1 Revenue & Profitability**

* **Total Revenue:** $578K
* **Average Profit Margin:** 86.07%
* **Total Products Sold:** 46.1K units

**Insight:** Profitability remains high, but product-level analysis can identify areas for growth.

**4.2 Product Sales Performance**

| **Product Type** | **Revenue ($)** | **Defect Rate (%)** |
| --- | --- | --- |
| Haircare | 233.46K | 34.65% |
| Skincare | 248.3K | 36.8% |
| Cosmetics | 191.92K | 28.49% |

**Insight:** Skincare products contribute the most revenue but have the highest defect rate.

**4.3 Supplier Performance**

| **Supplier** | **Avg Profit Margin (%)** | **Stock Levels** |
| --- | --- | --- |
| Supplier 1 | 22.72% | 1142 |
| Supplier 2 | 19.19% | 1022 |
| Supplier 3 | 13.66% | 654 |
| Supplier 4 | 15.14% | 1061 |
| Supplier 5 | 15.35% | 898 |

**Insight:** Supplier 1 provides the highest profit margins, while Supplier 3 has the lowest stock levels.

**4.4 Logistics & Transportation Analysis**

* **Transportation Cost by Mode:**
  + Road: $17.76K (30.52%)
  + Rail: $16.71K (28.71%)
  + Air: $7.87K (13.52%)
  + Sea: $15.86K (27.25%)
* **Defect Rate by Transportation Mode:**
  + Road: 28.87%
  + Rail: 25.54%
  + Air: 20.09%
  + Sea: 25.5%

**Insight:** Air transportation has the lowest defect rate but is likely the most expensive option.

**5. Insights & Recommendations**

**5.1 Key Insights**

* **Revenue Focus:** Skincare products contribute the highest revenue but have a high defect rate.
* **Supplier Optimization:** Supplier 1 yields the highest profit margin and should be prioritized.
* **Logistics Cost Reduction:** Road transport is the costliest with a high defect rate; shifting to rail or sea could improve efficiency.
* **Inventory Management:** Low stock levels in some SKUs could impact order fulfillment rates.

**5.2 Recommended Actions**

* Implement **quality control** measures for high-defect-rate products.
* Negotiate better pricing or terms with **high-margin suppliers**.
* Reduce dependence on **road transport** and optimize shipping modes.
* Improve stock management for frequently **out-of-stock SKUs**.

**6. Project Deliverables**

* **Power BI Dashboard** with interactive supply chain insights.
* **Supply Chain Analysis Report** detailing product, supplier, and logistics trends.
* **Business Recommendations Report** for optimizing operations.

**7. Conclusion**

This documentation outlines the analytical approach used in the Supply Chain project, covering data insights, methodologies, and actionable recommendations. Implementing the findings will enhance supply chain efficiency, reduce costs, and improve overall business performance.

**Prepared by:** Sahithi Patiki