| Supply Chain data Analysis | |
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### Introduction

#### Purpose

This comprehensive supply chain analysis aims to:

* Optimize operational efficiency by identifying bottlenecks in procurement, production, and logistics.
* Enhance profitability through data-driven decisions on inventory, supplier performance, and transportation modes.
* Mitigate risks by predicting defects, demand fluctuations, and delivery delays.

#### Scope

The analysis covers:

* **Data Dimensions:** 100 transactions × 24 features (e.g., Product type, Defect rates, Lead times).
* **Key Areas:**
* Demand forecasting and inventory optimization.
* Supplier performance evaluation (cost, quality, lead times).
* Logistics cost and route efficiency.
* **Methods**: Exploratory Data Analysis (EDA), predictive modeling (XGBoost, Linear Regression), and prescriptive optimization (Linear Programming).

#### Importance

* **Cost Savings:** Identified 15% potential reduction in shipping costs by prioritizing sea/rail over air transport.
* **Customer Satisfaction**: Highlighted Kolkata and Delhi as high-demand regions needing stock prioritization.
* **Strategic Alignment**: Supports the company’s goal to reduce defects by 20% in 2025 through supplier audits.

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### Vision & objectives

#### Vision

"To build a resilient, data-driven supply chain that balances cost efficiency with customer satisfaction, leveraging AI/ML for real-time decision-making."

#### Long-term objectives

* **Automation:** Integrate predictive analytics into ERP systems for dynamic inventory replenishment by Q3 2025.
* **Supplier Collaboration:** Establish KPIs with top suppliers (e.g., defect rate <1.5%, on-time delivery >95%) by 2026.
* **Sustainability:** Reduce carbon footprint by 30% by optimizing transportation routes (e.g., rail over air).

#### Roadmap alignment

| Phase | Timeline | Deliverables |
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| Diagnostic EDA | Mar 2025 | Identify cost/revenue drivers (e.g., skincare contributes 45% of revenue). |
| Predictive Models | Jun 2025 | Deploy demand forecasting for inventory. |
| Optimization | Dec 2025 | Implement LP-based shipping cost reduction. |
| Continuous Monitoring | 2026+ | Real-time dashboards for defect/lead time tracking. |