وزارة الاتصالات وتكنولوجيا المعلومات

رواد مصر الرقمية

Supclair

Supplier Chain Analysis

Capstone Project

Prepared By: Supclair

Our Team

Supclair

Clarity in Every Chain

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Introduction

In today’s competitive business environment, efficient inventory management, supplier evaluation, and logistics optimization are critical for maintaining a seamless supply chain. This project aims to leverage data analytics and visualization tools to gain actionable insights into stock availability, sales performance, supplier efficiency, and transportation logistics. By integrating advanced analytical techniques, the project seeks to enhance decision-making and operational efficiency within the supply chain framework.

Methodology

Clean and prepare the data for the analysis by dealing with duplicates, missing values, and inconsistencies.

Data modelling and structuring the dataset into relational model for accurate analysis.

EDA (Exploratory Data Analysis) to derive informative insights.

Data Visualization to present the data in a readable format.

Recommendations to improve business’s supply chain management.

Business Questions

Is stock availability consistent across different suppliers?

How well is stock meeting customer demand?

What are the best-selling products?

How do price changes impact sales volume?

Which suppliers have the shortest lead times?

Is there a correlation between lead time and defect rates?

Are certain suppliers responsible for more defective products?

Which gender brings in the most revenue?

Which Product type makes the most Revenue?

Which products have critically low stock?

Who’s spending the most to bring beauty to life?

How often do different lead times occur?

How Manufacturing and Supplier lead times are related to production volume?

Which products tends to defect more?

Data Cleaning

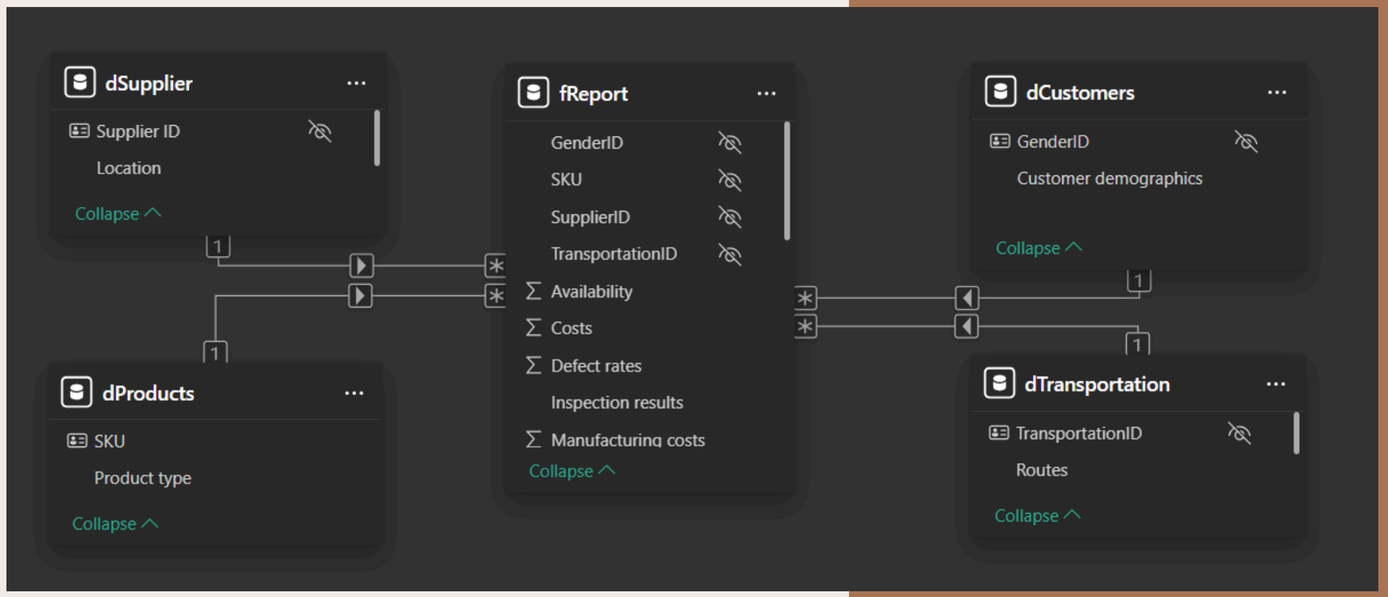
Table	Key Issues Found	Action Taken
Customer	No issues	Changed Gender ID type to text
Product	No issues	No changes
Supplier	No issues	Changed Supplier ID type to text

Data Cleaning

Table	Key Issues Found	Action Taken
Transportation	No issue	Changed Transportation ID type to text
Report	No issues	ID columns were added and normalized columns were removed. Changed Price, Revenue, Shipping cost, Manufacturing cost, and Costs to fixed decimal number (Curreny)

Data Modeling

After cleaning, the dataset was structured into a relational model to ensure efficient analysis. Star schema was implemented for better performance with fact table in the middle (Report Table) and the dimensions tables connected to it (Supplier Table, Product Table, Customer Table, Transportation Table)



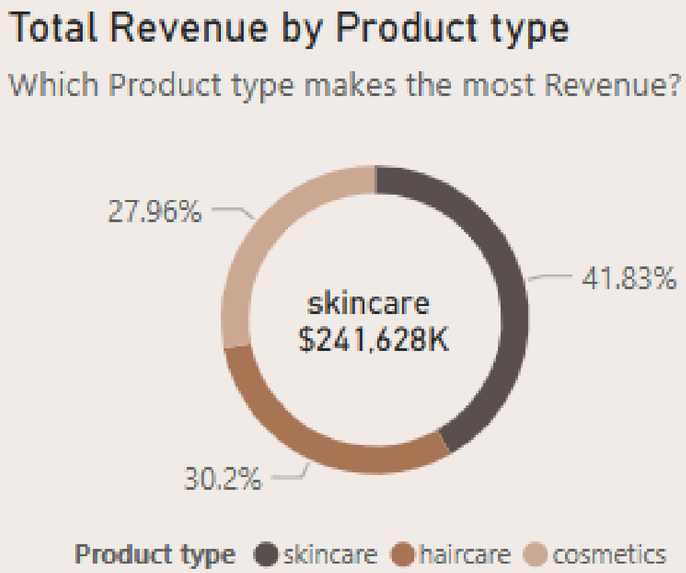
Analysis and Insights

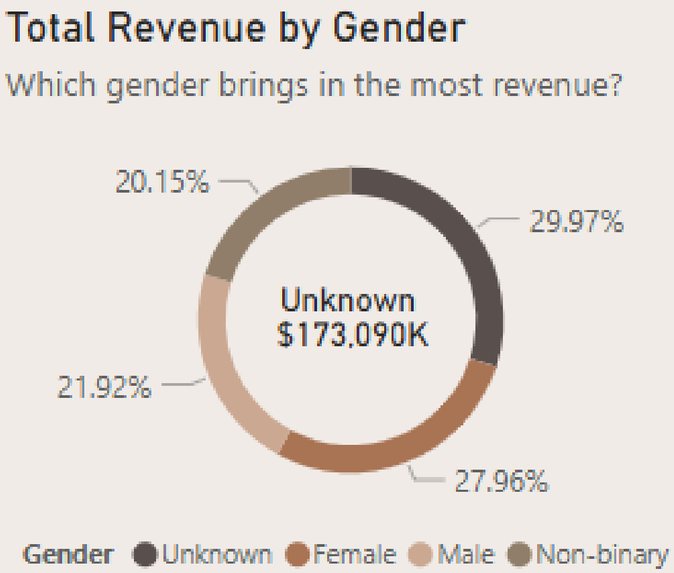
Which gender brings in the most revenue?

The gender category labeled as "Unknown" brings in the most revenue, contributing 29.97% of the total revenue, which amounts to $173,090K. This is higher compared to other gender categories such as Female (27.96%), Male (21.92%), and Non-binary (20.15%).

Which product type makes the most revenue?

Skincare is the top revenue-generating product type, contributing 41.83% of the total revenue, amounting to $241,628K. Haircare follows with 30.2%, while cosmetics account for 27.96% of total revenue.



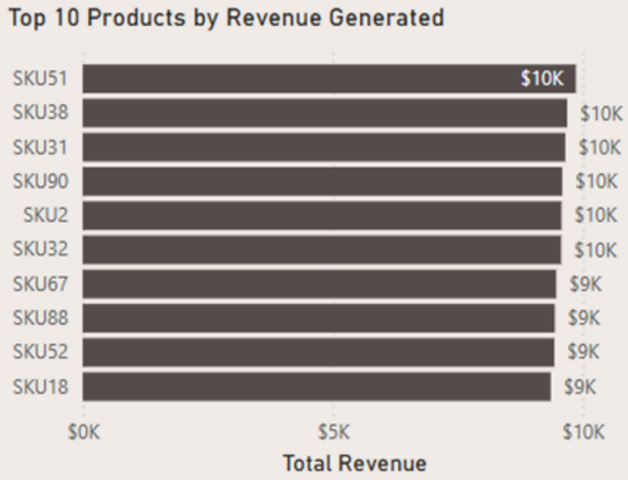


Analysis and Insights

What are my best-selling products?

Best-selling products can be identified in two ways: by revenue generated and by quantity sold:

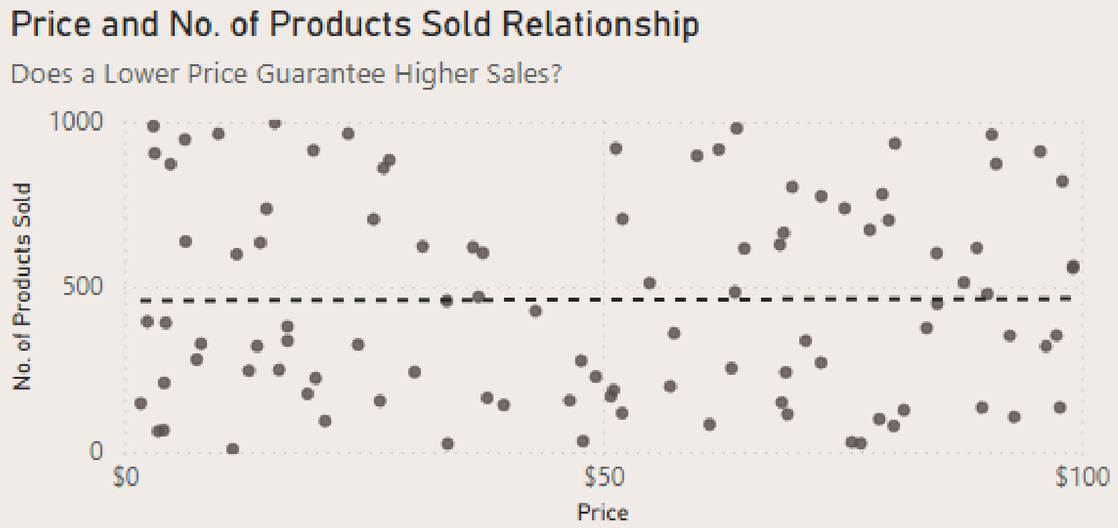
- Top Products by Revenue: The highest revenue-generating products include SKU51, SKU38, SKU31, SKU90, and SKU2, each contributing around $10K in sales. These products are likely higher-priced items or have a strong profit margin.
- Top Products by Quantity Sold: The most sold products in terms of units are SKU10 (996 units), SKU94 (987 units), and SKU9 (980 units). These products are in high demand, even if their revenue contribution may not be the highest.



Analysis and Insights

·How do price changes affect sales volume?

Price changes have minimal impact on sales volume. The scatter plot demonstrates no clear pattern between price fluctuations and sales, and this is supported by a correlation coefficient of 0.005739484 and an R-squared value of 0.0000329, both indicating a negligible correlation. This suggests that sales volume remains largely unaffected by price variations within the observed range.

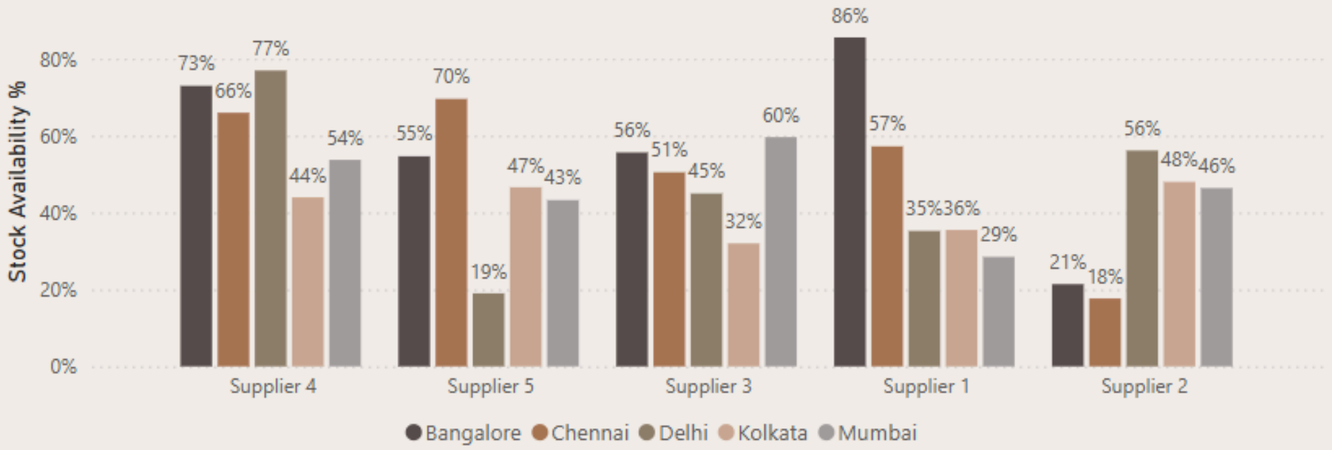


Correlation Cofficient	R-Squared
0.005739484	3.29417E-05

Analysis and Insights

Is my stock availability consistent across different suppliers?

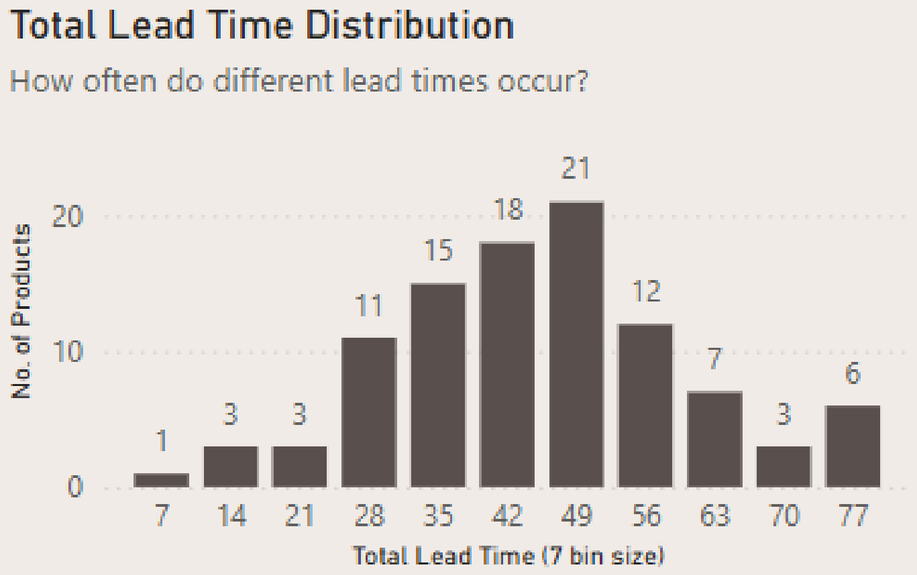
Stock availability is inconsistent across different suppliers and locations. Some suppliers, like Supplier 1, show high stock levels in Bangalore (86%) but significantly lower availability in other cities, such as Mumbai (29%). Similarly, Supplier 5 has a strong stock presence in Delhi (70%) but drops sharply in Mumbai (19%). This variation suggests potential supply chain inefficiencies, logistical challenges, or supplier performance issues affecting different regions.



Analysis and Insights

How often do different lead times occur?

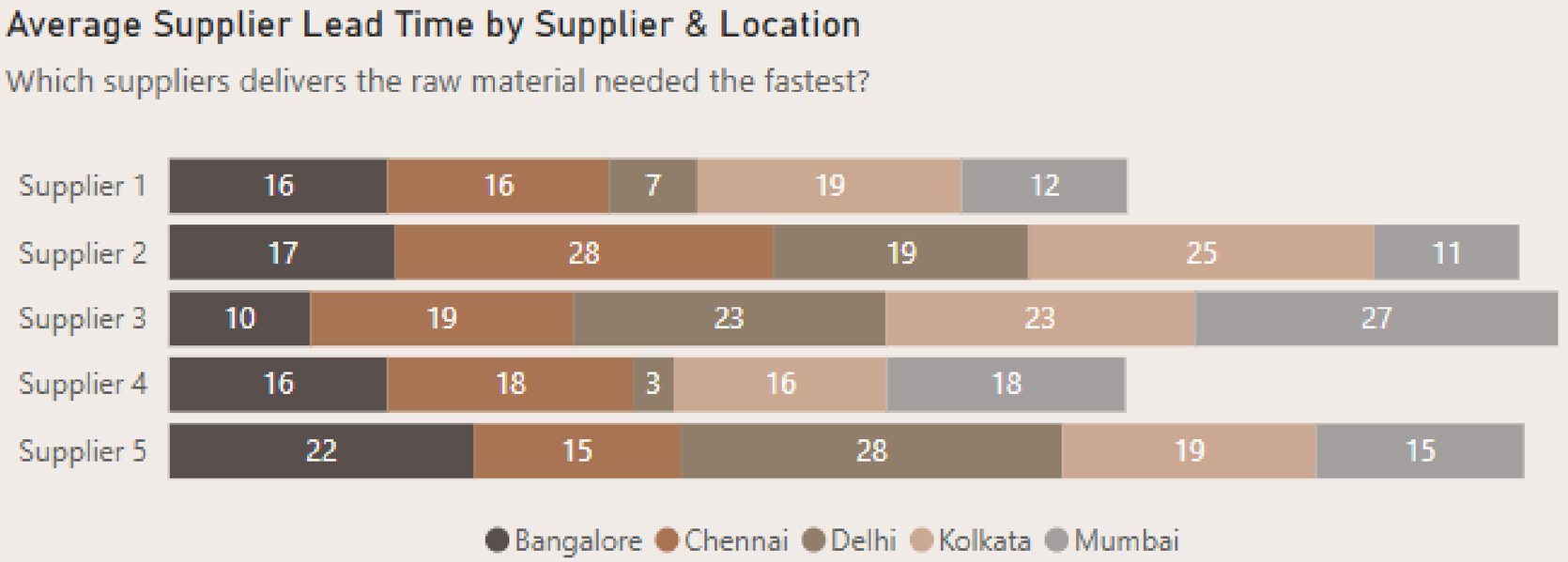
The most common lead time is 35-55 days range. The distribution appears to be slightly right-skewed. This means that there's a tail extending towards the higher lead times. In addition, frequency of products decreases as we move away from the 42-49 day range in both directions.



Analysis and Insights

Which suppliers have the shortest lead times?

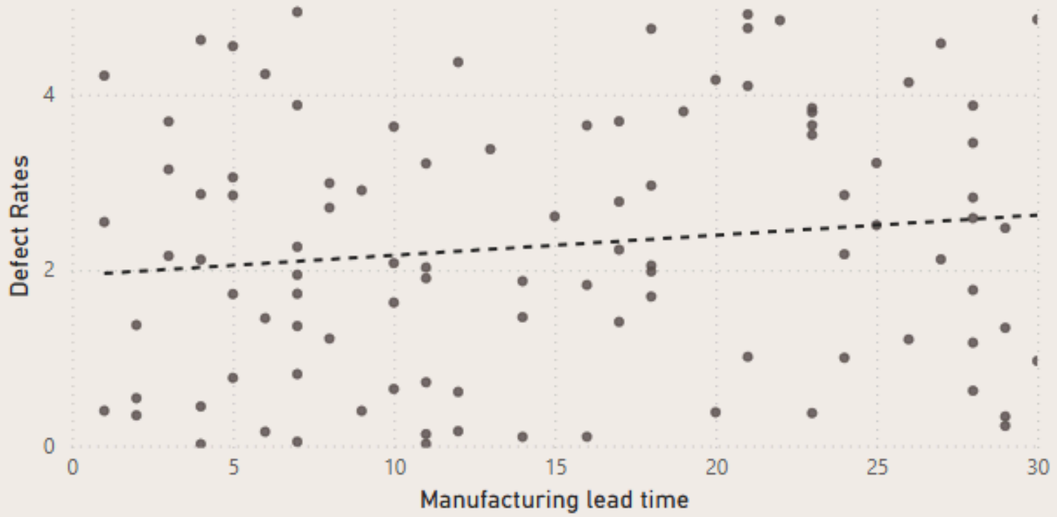
Supplier 4 has the shortest lead time specifically in Delhi with 3 days. While other suppliers have longer lead times, Supplier 1 is the next fastest, with a lead time of 7 days in Kolkata.



Analysis and Insights

Is there a correlation between lead time and defect rates?

The correlation coefficient of 0.1395 indicates a slightly positive relationship, suggesting that defect rates may increase marginally with longer lead times, but the connection is not strong. Furthermore, the R-squared value of 0.019465 suggests that only about 1.94% of the variability in defect rates is explained by changes in manufacturing lead time.

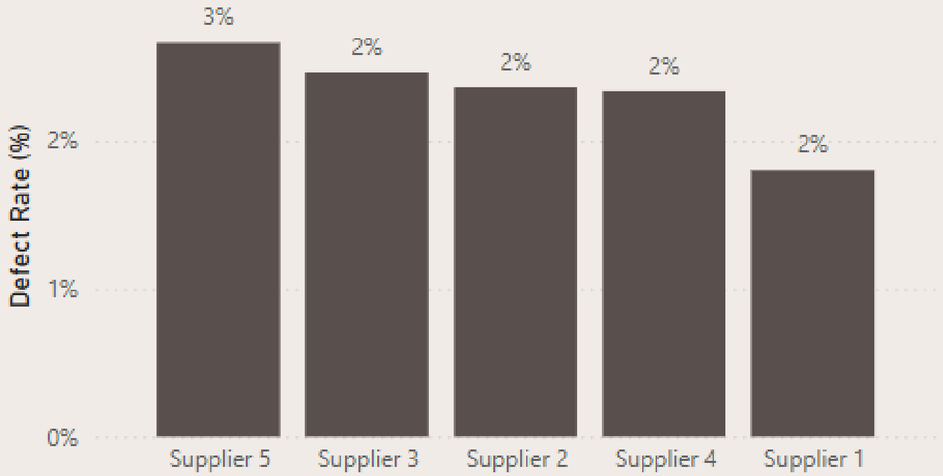


Correlation Cofficient	R-Squared
0.139518479	0.019465406

Analysis and Insights

Are certain suppliers responsible for more defective products?

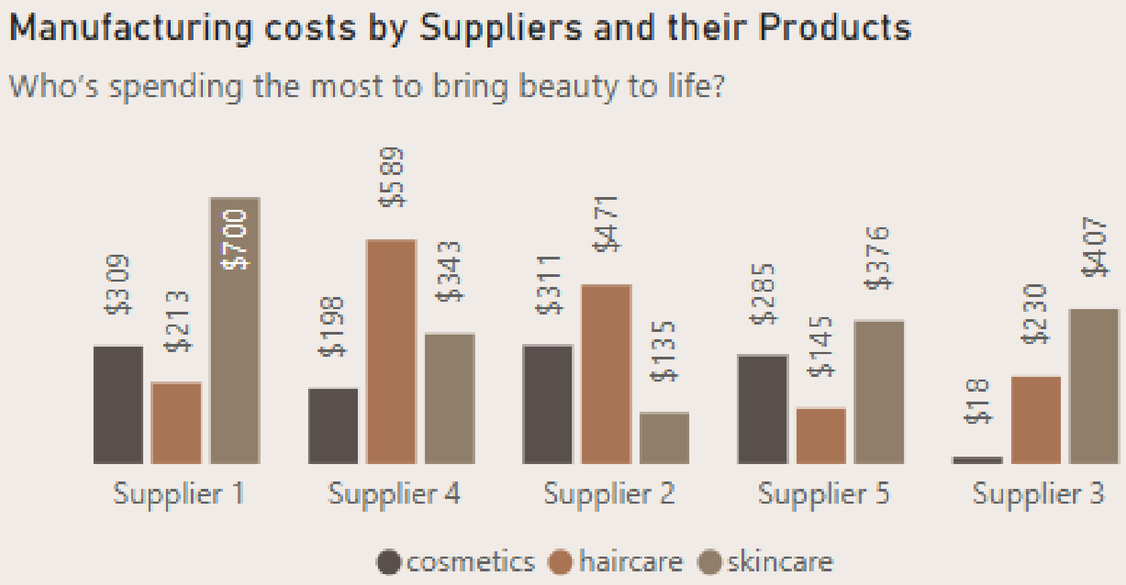
While Suppliers 1, 2, 3, and 4 all maintain a defect rate of 2%, indicating a degree of consistency in their performance, Supplier 5 exhibits a slightly elevated defect rate of 3%. Although the difference is only 1%, this still means Supplier 5 contributes proportionally more defective products compared to the other suppliers, whose performance is indeed quite close.



Analysis and Insights

Who’s spending the most to bring beauty to life?

Supplier 1 incurs the highest manufacturing costs, with a total expenditure of $700K primarily on skincare products. Supplier 4 follows closely, spending $589K, while the other suppliers have relatively lower costs.



Recommendations

Improve Stock Availability and Supplier Performance

- Identify alternative suppliers or negotiate with existing ones to ensure more balanced stock distribution.
- Strengthen logistics and inventory management in low-stock areas like Mumbai to minimize shortages.

Focus on High-Revenue Products

- Increase availability of high-revenue products.
- Explore upselling and cross-selling opportunities.
- Increase marketing efforts around skincare products.

Strengthen Supplier Relationships to Address Lead Times and Defects

- Work with Supplier 5 to reduce defect rates and enhance quality control.
- Monitor supplier performance regularly.
- Implement incentives for faster deliveries and lower defect rates.

Recommendations

Reevaluate Gender-Based Marketing Strategies

- Reevaluate customer data collection and classification.
- Review data collection processes and refine gender-based marketing efforts.

Enhance Manufacturing Cost Efficiency

- Work with Supplier 1 to optimize production costs.
- Explore alternative suppliers for better pricing or efficiency.

Thank you