Supply Chain Analysis

Prepared By: Victor Ola

Date: September 22, 2023

Table of Contents

Abstract

Dataset of 100 unique values for a Fashion and Beauty startup company, with different variables that has effect on the profit, revenue and the overall welfare and deficiencies of the business. The purpose of the analysis is to demonstrate the effect of these variables to understanding key inventory metrics, e.g., product type, price, lead times, stock levels etc

Variables

There are varieties of variables that will impact the outcome of this analysis:

- Product Type
    - Skin Care
    - Hair Care
    - Cosmetics
- Price
- Availability: availability of Products
- Revenue Generated: process of creating sales of products
- Stock Levels: level of stock required for effective control of goods.

- Lead Times: the amount of time when a company has all necessary resources on hand to manufacture a product and when it finally completes the manufacturing process

- Location: cities where manufacture of different product types listed above in India
    - Mumbai
    - Kolkata
    - Delhi
    - Bangalore
    - Chennai
- Production Volumes: volumes or quantity of products produced
- Manufacturing Cost: cost of production
- Inspection Results: quality check to verify if the product meets the required standard
    - Pending
    - Fail
    - Pass
- Defect Rate
- Transportation Mode: different means of transportation mode to get products delivered
    - Road
    - Air
    - Sea
    - Rail
- Total Cost: overall cost

Objectives

The objective of the analysis is to analyze the effect of variables relevance for operations and logistics roles; to demonstrate understanding of key inventory metrics.

The analysis seeks to answer the following questions:

Cost Analysis

1. The costliest products to produce

2. How manufacturing cost relate to selling price

Supply Chain Analysis

1. The average lead times of different product type

2. Are there correlation between defects rates and inspection results

Logistics Chain Analysis

1. How different transportation mode affect total cost

2. How different routes also affect total cost

Quality Analysis

1. How do average defect rates correlate with inspection result and manufacturing costs

Production Analysis

1. Are production volume aligned with market demands

Performance Insight

1. Revenue generated from different location

2. Revenue by product type

3. Revenue contribution percentage from different location

4. Profit from different location

5. Profit by product type

6. Profit contribution percentage from different location

7. Revenue generated and their profit margin

Analysis

Cost Analysis

1. The costliest products to produce

Fig I:**Bar Chart showing the costliest product to produce**

At **₹1,959.73**, Skincare had the highest manufacturing cost and was **75.07%** higher than cosmetics, which had the lowest manufacturing cost at **₹1,119.37**. Skincare had the highest manufacturing cost at **₹1,959.73**, followed by haircare at **₹1,647.57** and cosmetics at **₹1,119.37**. Skincare accounted for **41.46%** of manufacturing cost. Haircare had **₹1,647.57** manufacturing cost, skincare had **₹1,959.73**, and cosmetics had **₹1,119.37**.

2. How manufacturing cost relate to selling price

Fig II: ***Bar Chart Showing the Relationship Between Manufacturing Cost to Selling Price***

At **₹372.02**, cosmetics had the highest Manufacturing Cost to Price higher than haircare, which had the lowest Manufacturing Cost to Price at **83.09 -₹**. Cosmetics had the highest Manufacturing Cost to Price at **₹372.02**, followed by skincare at 69.35 -₹ and haircare at **83.09 -₹.** Cosmetics accounted for **70.93%** of Manufacturing Cost to Price. Haircare had **83.09 -₹** Manufacturing Cost to Price, skincare had **69.35 -₹**, and cosmetics had **₹372.02**.

Supply Chain Analysis

1. The average lead time of different product

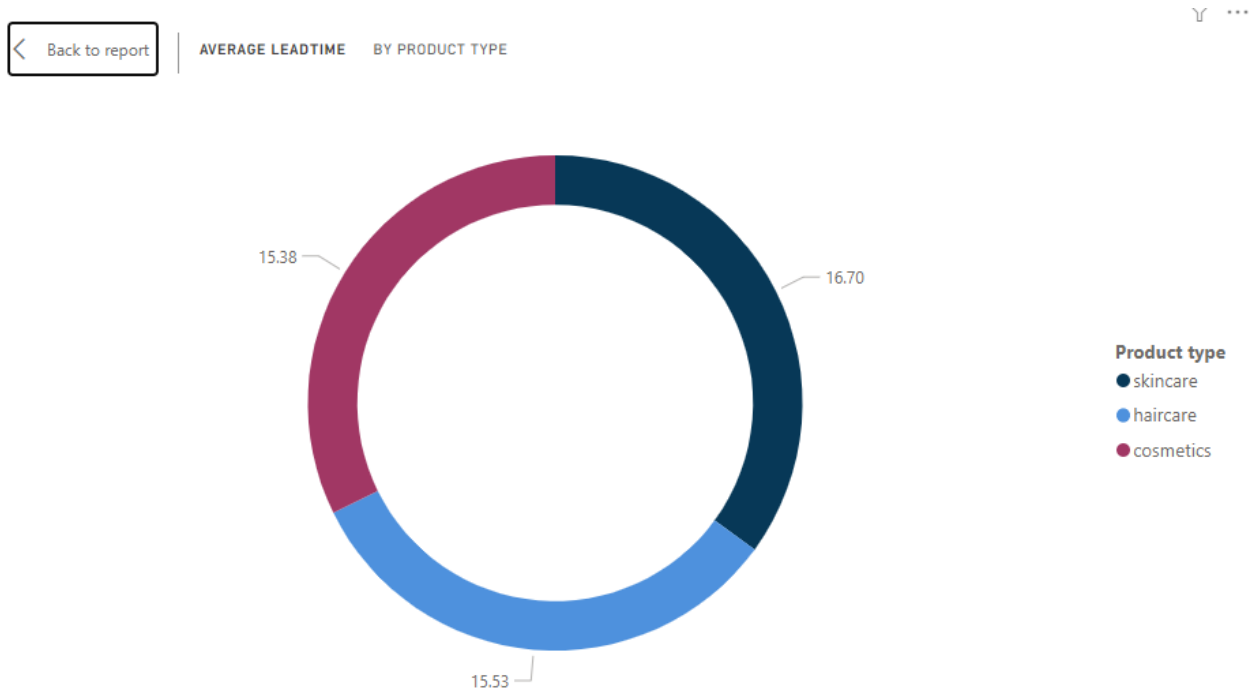

Fig III: ***Pie Chart Showing the Average Lead Time of Different Product***

Skincare had the highest Average Leadtime at **16.70**, followed by haircare at **15.53** and cosmetics at **15.38**. Usually, more or an increased lead time could affect decrease in profit and revenue as lead time is the amount of time when a company has all necessary resources on hand to manufacture a product and when it finally completes the manufacturing process.

To avoid this raw material should be bought and brought in in batches and to avoid over stocking and having a good inventory control will come a long way to saving the business.

2. Are there correlation between defects rates and inspection results

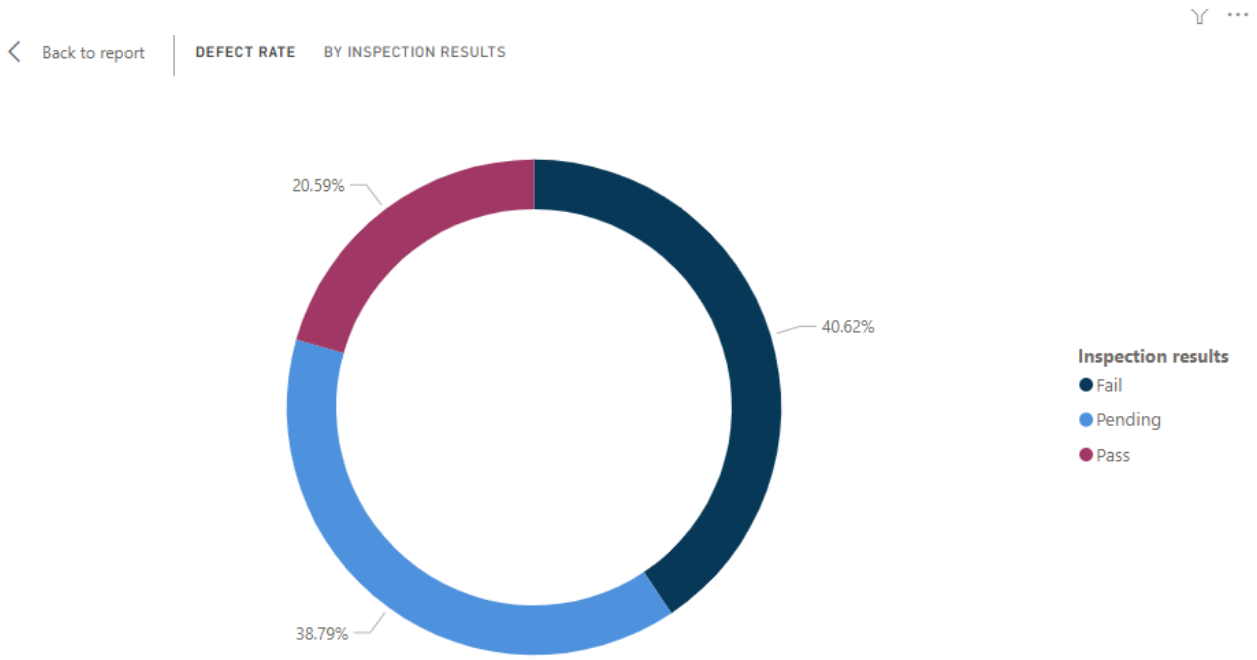

Fig IV: ***Pie Chart Showing Defect Rate of Different Product***

Fail had the highest sum of defects at **92.49**, followed by Pending at **88.32** and Pass at **46.90**. Fail accounted for **40.62%** of defect rate.

Logistics Chain Analysis

1. How different transportation modes affect cost

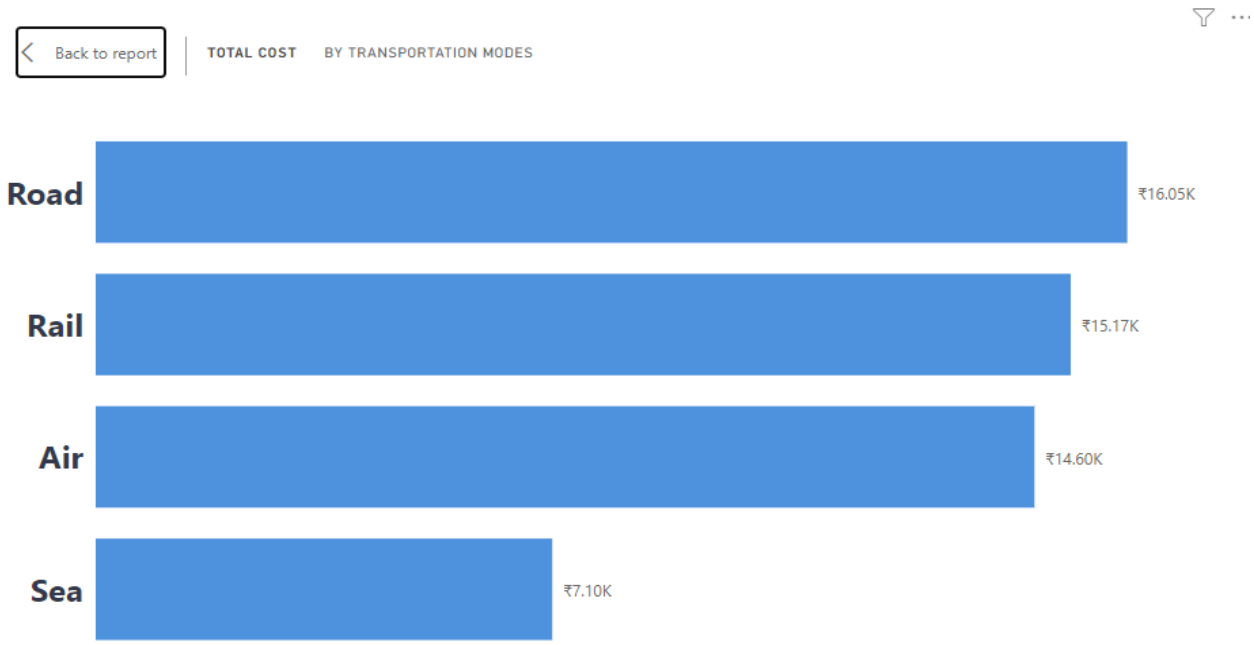

Fig V: ***Bar Chart Shows How Different Transportation Mode Affect Cost***

At **₹16,048.19**, Road had the highest Total Cost higher than Sea, which had the lowest Total Cost at **₹7,102.93**. Road had the highest Total Cost at **₹16,048.19**, followed by Rail, Air, and Sea. Road accounted for **30.32%** of Total Cost. Across all 4 Transportation modes, Total Cost ranged from **₹7,102.93** to **₹16,048.19**.

2. How different routes also affect Total cost

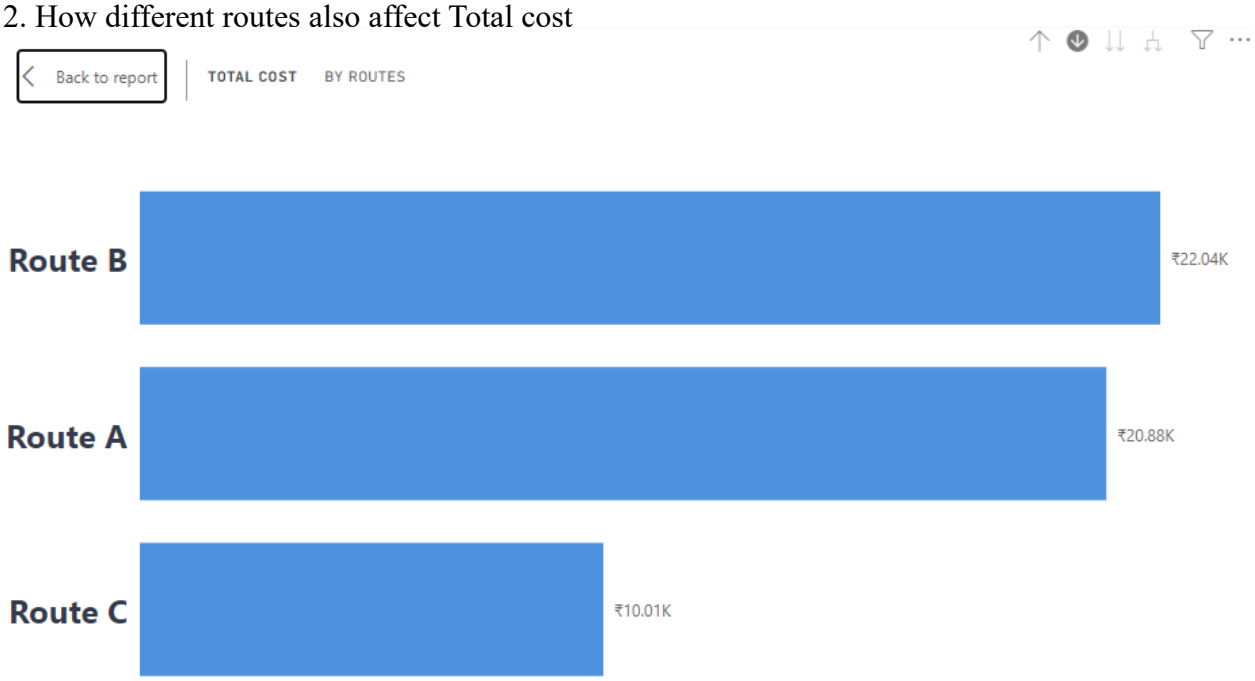

Fig VI: ***Bar Chart Shows How Different Routes Also Affect Total Cost***

At **₹22,039.38**, Route B had the highest Total Cost higher than Route C, which had the lowest Total Cost at **₹10,009.42**. Route B had the highest Total Cost at **₹22,039.38**, followed by Route A at **₹20,875.77** and Route C at **₹10,009.42**. Route B accounted for **41.64%** of Total Cost. Route B had **₹22,039.38** Total Cost, Route C had **₹10,009.42**, and Route A had **₹20,875.77**.

Quality Analysis

1. How do average defect rates correlate with inspection result and manufacturing costs

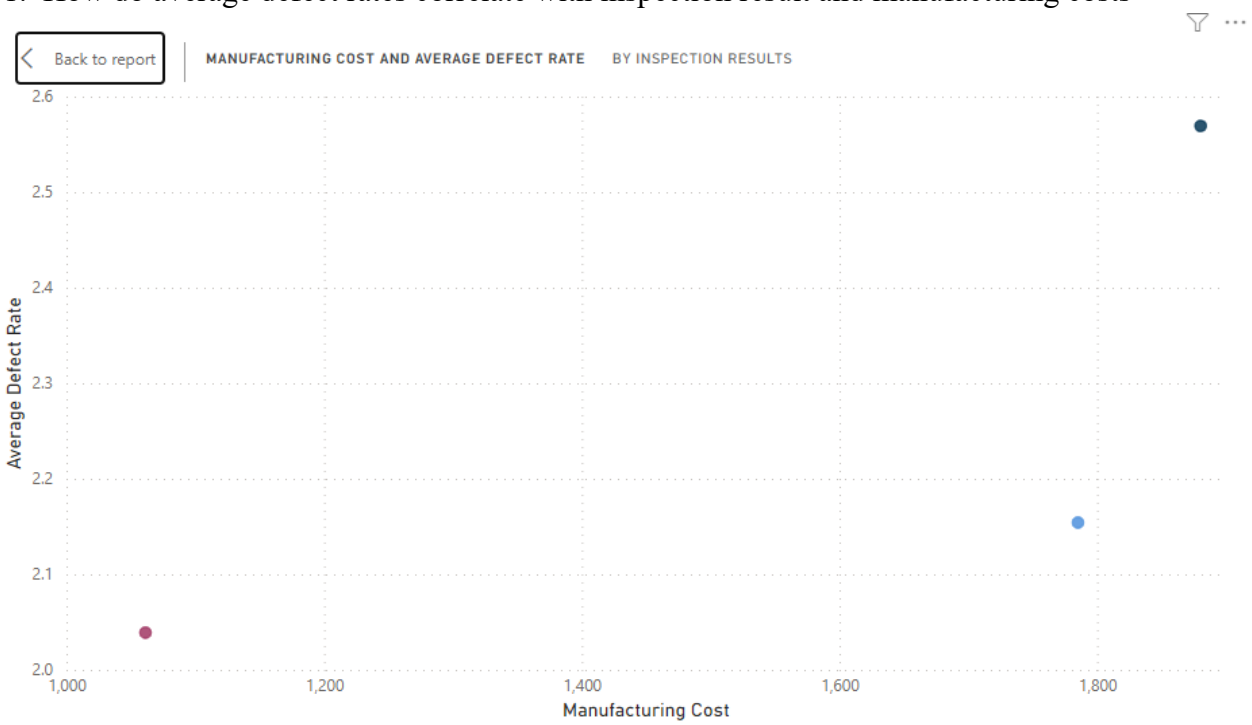

Fig VII: ***A Scatter Chart Showing Correlation Between The 3 Factors***

Fail had the highest Manufacturing Cost **(₹1,880.30)** and Average Defect Rate **(2.57)**.

Production Analysis

1. Are production volume aligned with market demands

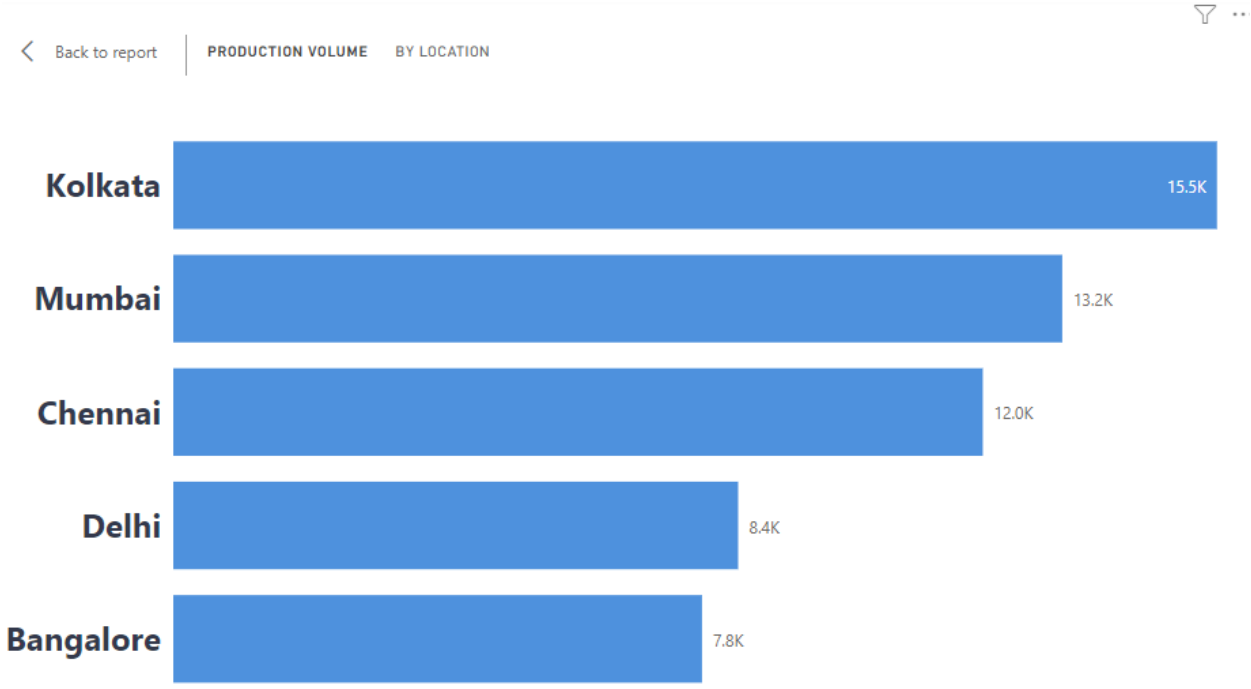

Fig VIII: ***Bar Chart of Production Volume with Market Demands***

At **15451**, Kolkata had the highest Production Volume and was **97.41%** higher than Bangalore, which had the lowest Production Volume at 7827. Kolkata accounted for **27.21%** of Production Volume. Across all 5 Location, Production Volume ranged from **7827** to **15451**.

Performance Insight

1. Revenue generated from different location

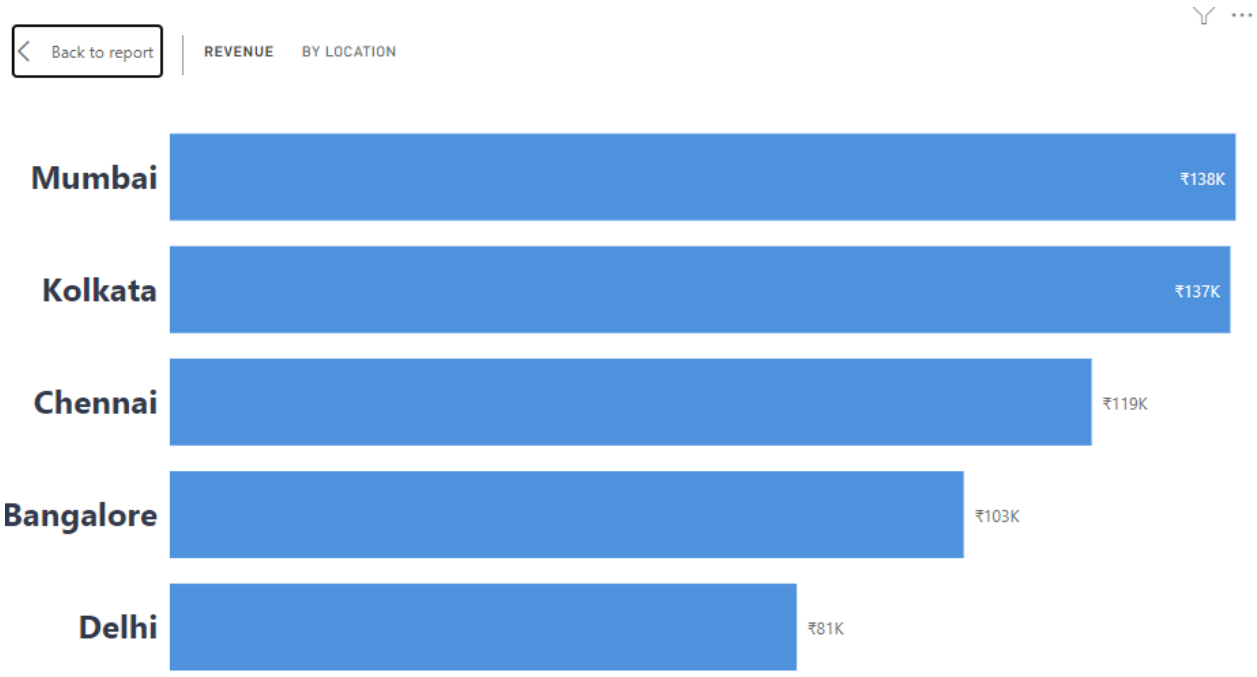

Fig IX: ***Bar Chart of Revenue from Different Location***

At **₹137,755.03**, Mumbai had the highest Revenue and was **70.01%** higher than Delhi, which had the lowest Revenue at **₹81,027.70**. Mumbai accounted for **23.85%** of Revenue. Across all 5 Location, Revenue ranged from **₹81,027.70** to **₹137,755.03**.

2. Revenue by product type

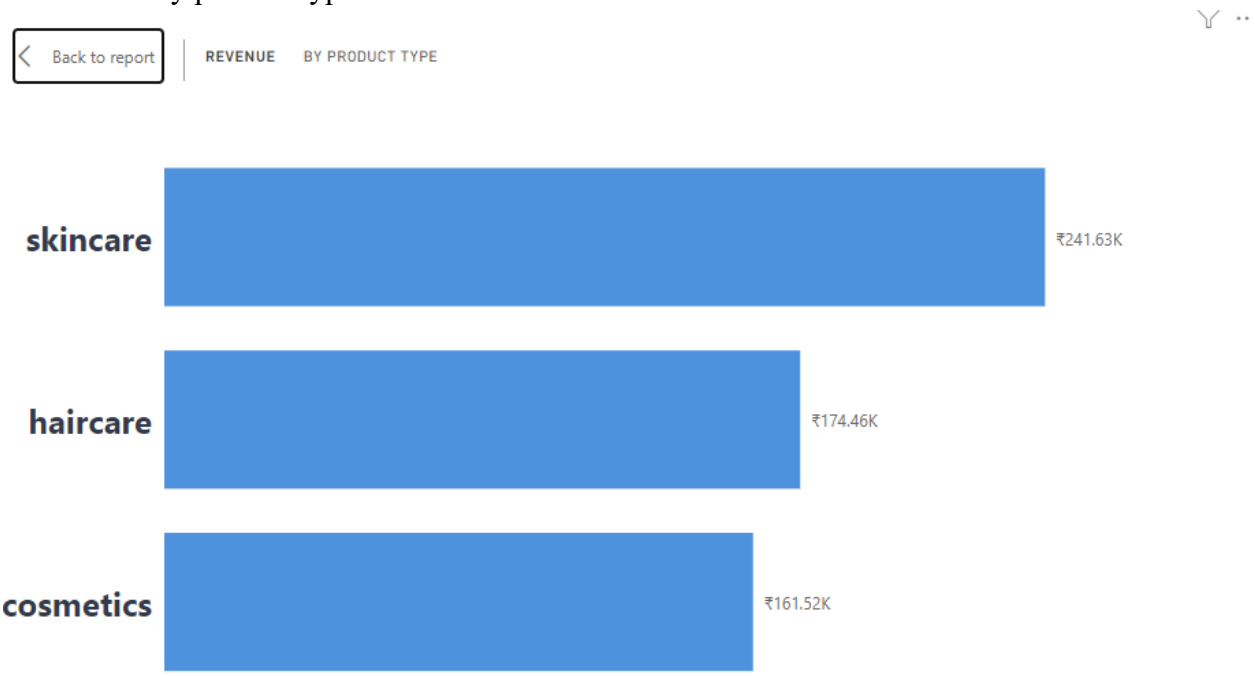

Fig X: ***Bar Chart of Revenue from Different Product***

At **₹241,628.16**, skincare had the highest Revenue and was **49.60%** higher than cosmetics, which had the lowest Revenue at **₹161,521.27**. skincare had the highest Revenue at **₹241,628.16**, followed by haircare at **₹174,455.39** and cosmetics at **₹161,521.27**. skincare accounted for **41.83%** of Revenue. haircare had **₹174,455.39** Revenue, skincare had **₹241,628.16** while cosmetics had **₹161,521.27**.

3. Revenue contribution percentage from different location

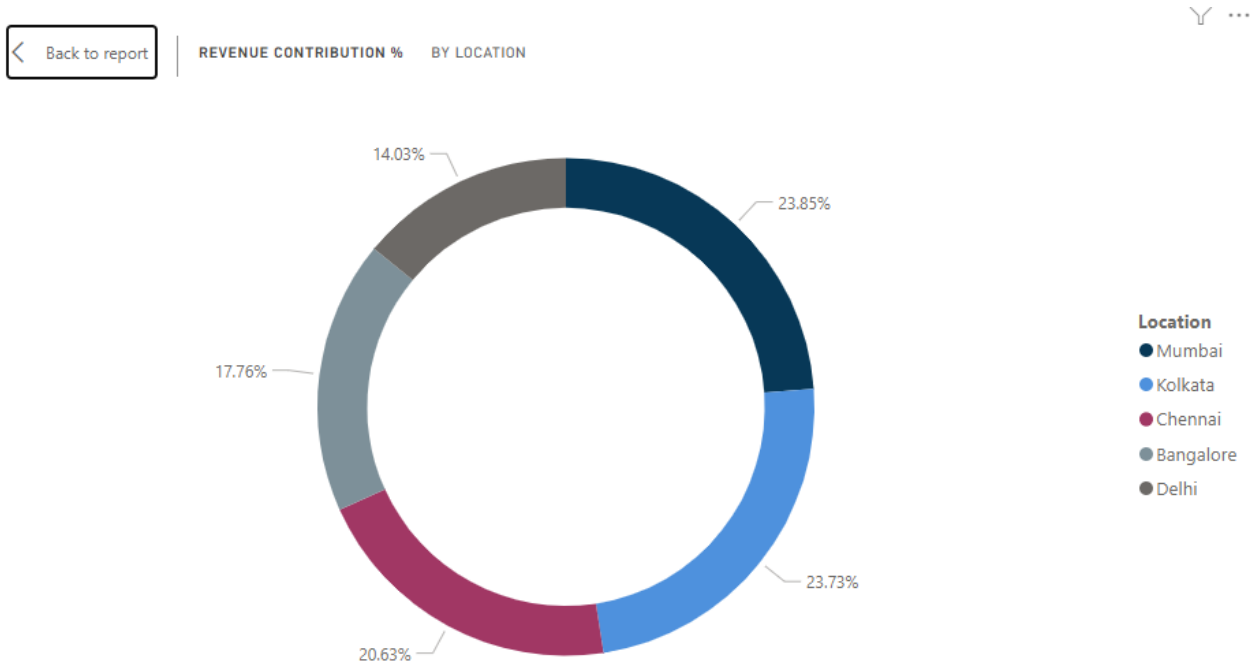

Fig XI: ***Pie Chart of Revenue Contribution Percentage from Different Location***

4. Profit from different location

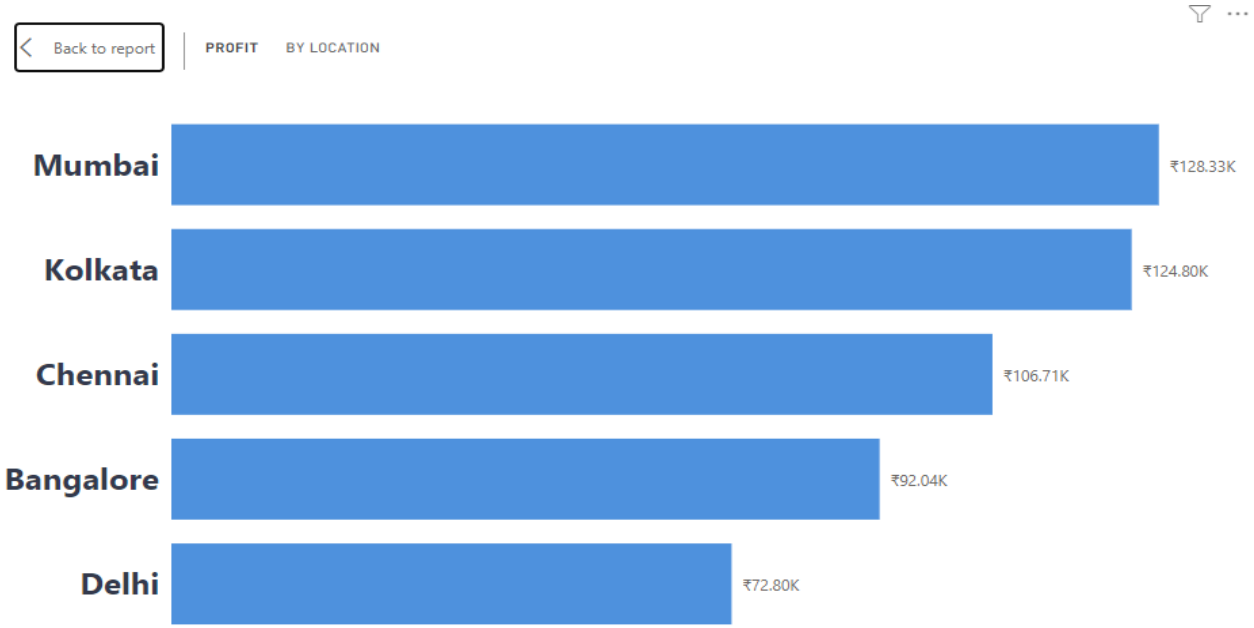

Fig XII: ***Bar Chart of Profit from Different Location***

At **₹128,331.50**, Mumbai had the highest Profit and was **76.27%** higher than Delhi, which had the lowest Profit at ₹72,804.13. Mumbai accounted for **24.46%** of Profit. Across all 5 Location, Profit ranged from **₹72,804.13** to **₹128,331.50**.

5. Profit by product type

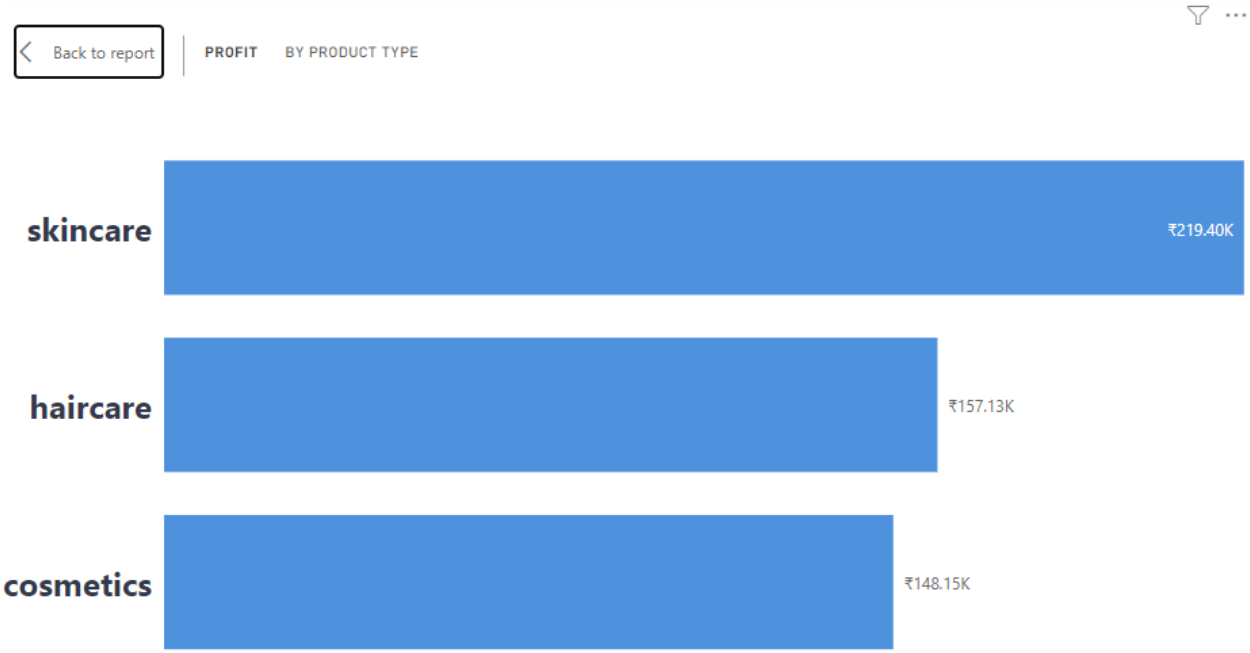

Fig XIII: ***Bar Chart of Profit by Product Type***

At **₹219,398.84**, skincare had the highest Profit and was **48.09%** higher than cosmetics, which had the lowest Profit at **₹148,154.87**. skincare had the highest Profit at **₹219,398.84**, followed by haircare at **₹157,126.53** and cosmetics at **₹148,154.87**. skincare accounted for **41.82%** of Profit. haircare had **₹157,126.53** Profit, skincare had **₹219,398.84**, and cosmetics had **₹148,154.87**.

6. Profit contribution percentage by different location

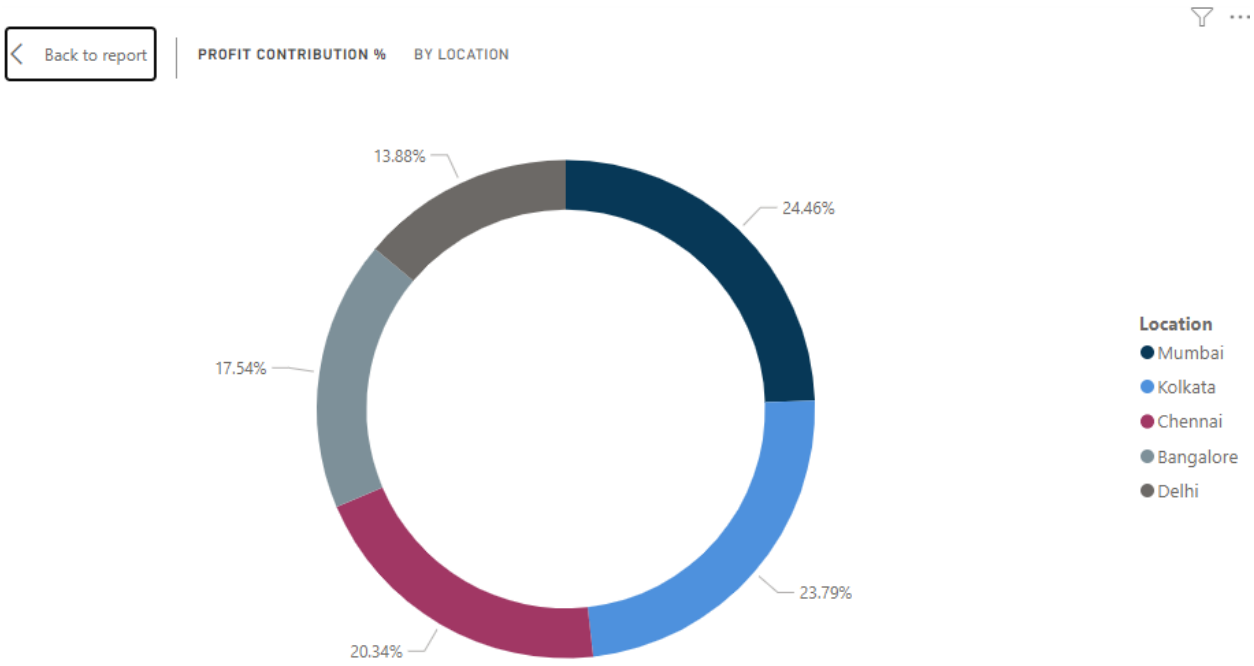

Fig XIV: ***Pie Chart of Profit Contribution from Different Location***

7. Revenue generated and profit margin percentage across different location

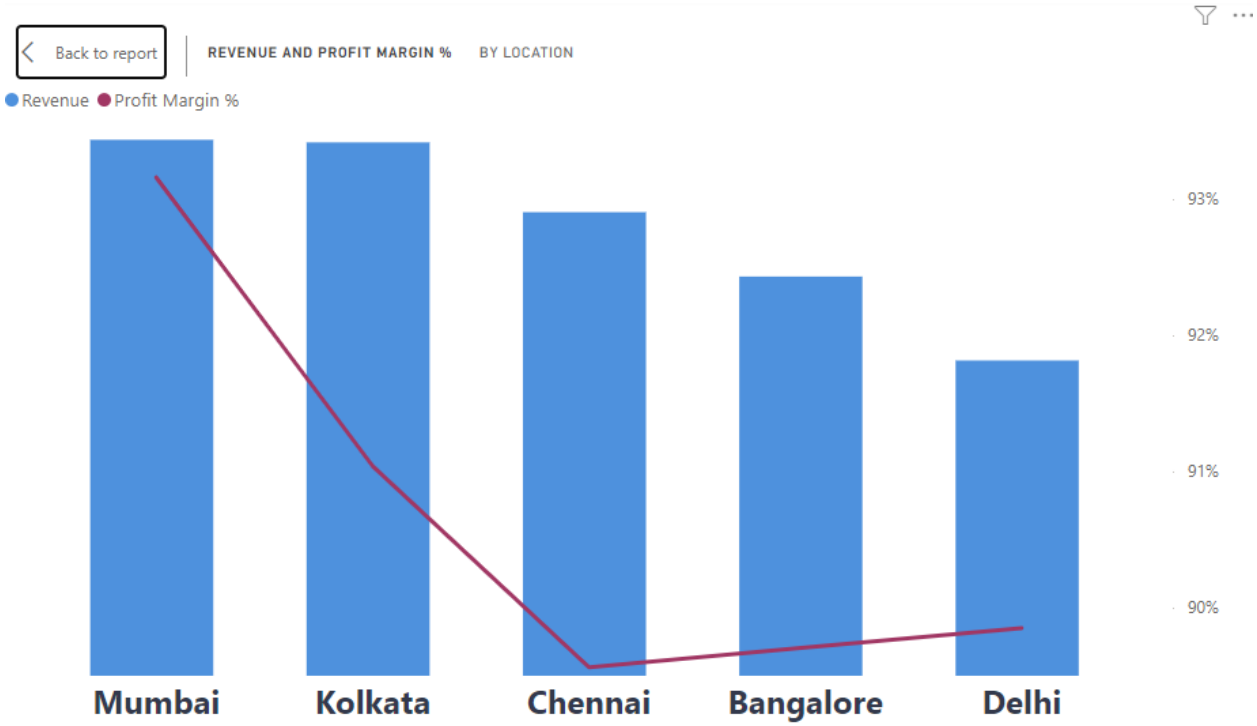

Fig XV: ***Relationship of Revenue and Profit Margin% from Different Location***

At **₹137,755.03**, Mumbai had the highest Revenue and was **70.01%** higher than Delhi, which had the lowest Revenue at **₹81,027.70**. Revenue and total Profit Margin% are positively correlated with each other. Mumbai accounted for **23.85%** of Revenue. Revenue and Profit Margin% diverged the most when the Location was Mumbai, when Revenue was **₹137,754.10** higher than Profit Margin%.

Key Insights

- For any business to make profit the sale prices should be higher than manufacturing cost but products like skincare and haircare had negative result, to cover up for a potential loss the business sold more item to make up the difference. Check Fig II: Bar Chart Showing the Relationship Between Manufacturing Cost to Selling Price

- For the growth of a business especially with businesses under manufacturing your inventory must be well controlled, Skincare was the most expensive product to manufacture and it also had the highest average of lead times. Hence, if a good inventory is kept for raw materials to be used for production there would be reduction in lead times, which will significantly reduce the manufacturing cost. Check Fig I:Bar chart showing the costliest product to produce & Fig III: Pie Chart Showing the Average Lead Time of Different Product

- There are more failed products, products that fail quality test will cost the company more especially if the product can be reamended to pass the required standard of quality. Check Fig IV: Pie Chart Showing Defect Rate of Different Product & Fig VII: A Scatter Chart Showing Correlation Between The 3 Factors

- Generating more sales or revenue does not mean the business makes more profit or gets more profit margin, out of the cities listed in Fig XV: Relationship of Revenue and Profit Margin% from Different Location Delhi had the least amount of Revenue but has higher profit margin than Chennai and Bangalore. Generating more revenue can make up for potential loss in a business especially when the business generates more sales through massive discounts and promotions.

- Generally, sea transport is the slowest and cheapest mode which actually shows in Fig V: Bar Chart Shows How Different Transportation Mode Affect Cost while air is the most expensive but moving products or manufactured goods by either air, rail or sea will require additional land transport to reach its final destination. So, it explains why road transportation was the costliest in this business.