



# Supply Chain Analysis

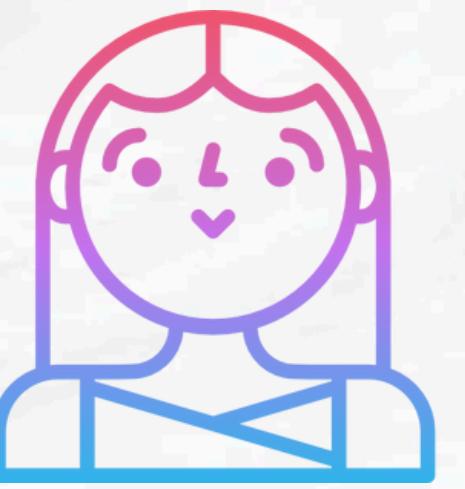
Instructor: Ammar Mustafa



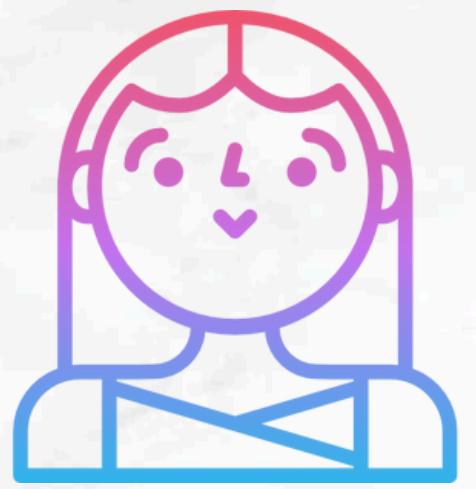
# Our Team



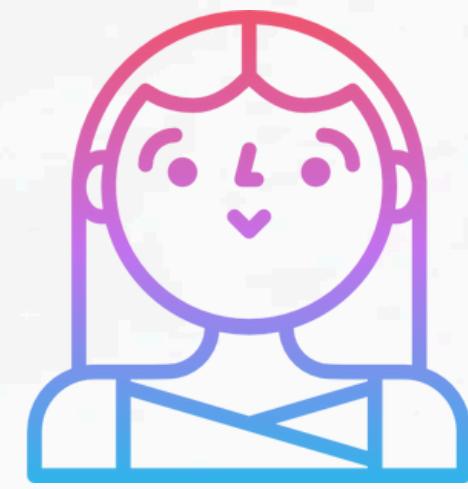
Dina Mohamed



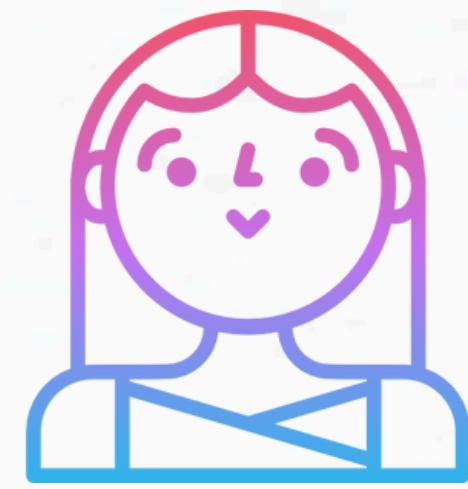
Nour sheref



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Doaa mahmoud



Sohaila Makled

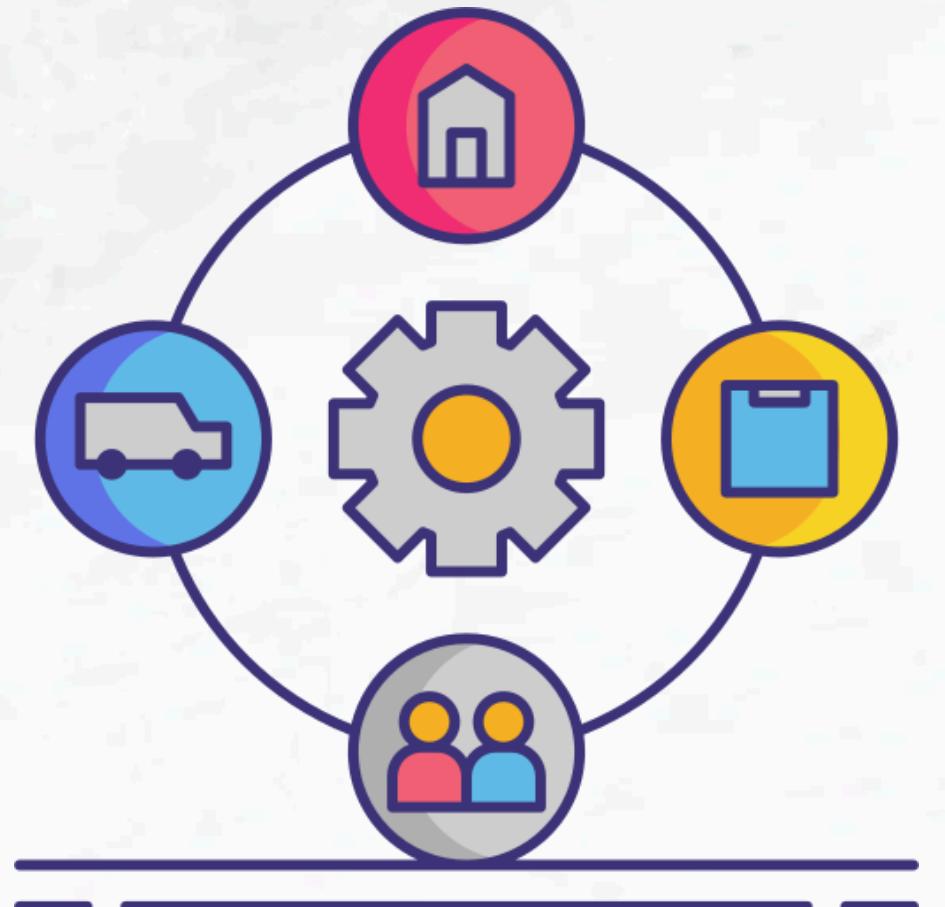
# Agenda

- Introduction to Supply Chain Analysis
- Types of Supply Chain Analytics
- Objective
- Data overview
- Cleaning & Modelling
- EDA with python
- Dashboards
- Analysis Report



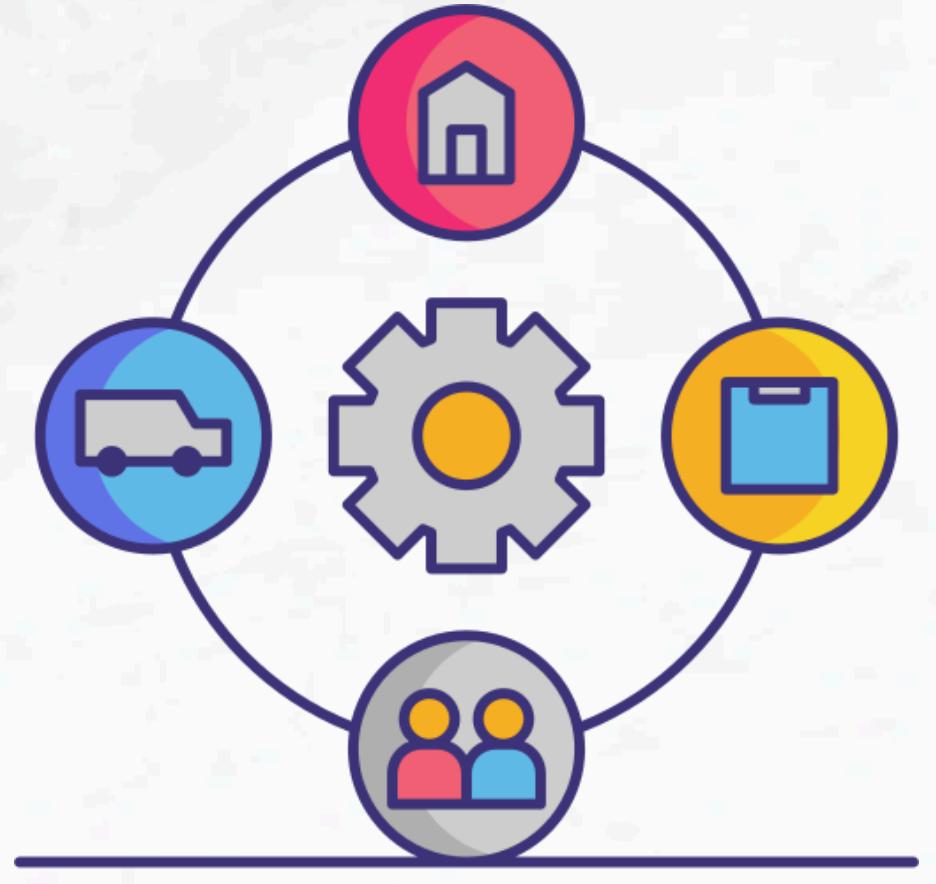
# Introduction to Supply Chain Analysis

The supply chain is the network of production and logistics involved in producing and delivering goods to customers. Supply chain analysis involves evaluating each stage of a supply chain, from acquiring raw materials to delivering final products, to identify areas for improvement and efficiency.



# Objective

To analyze and optimize the supply chain process by examining sales performance, profitability, stock levels, and supplier efficiency, while leveraging predictive models to support data-driven decision-making.



# Data overview

The dataset offers a detailed view of a supply chain across 24 columns, including key data on Product Type, SKU, Price, Stock Levels, Units Sold, and Revenue Generated. It also tracks logistics such as Lead Times, Order Quantities, Shipping Times, Carriers, and Shipping Costs, along with production details like Supplier, Location, Manufacturing Lead Time, and Costs. Additionally, it includes Customer Demographics, Defect Rates, and Transportation Modes, providing a comprehensive overview of both product performance and logistics.



# Cleaning & Modelling



# Cleaning & Modelling

First, we imported libraries like Pandas for cleaning, Matplotlib & Seaborn for visualization Then, we uploaded the file and checked the number of rows and columns, and there was 101 rows and 24 columns.

```
import pandas as pd  
import numpy as np  
import matplotlib.pyplot as plt  
import seaborn as sns
```

```
df = pd.read_csv('C:\\\\Users\\\\AQ\\\\Downloads\\\\supply_chain_data.csv')
```

```
print(df.head())
```

	Product type	SKU	Price	Availability	Number of products sold	\
0	haircare	SKU0	69.808006	55	802	
1	skincare	SKU1	14.843523	95	736	
2	haircare	SKU2	11.319683	34	8	
3	skincare	SKU3	61.163343	68	83	
4	haircare	SKU4	1.965423	82	674	

# Cleaning & Modelling

second, we checked each column for its data type and the number of null values, Then we examined how many duplicates were in the data and reviewed the format of each column.

```
print(df.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 100 entries, 0 to 99
Data columns (total 24 columns):
 #   Column           Non-Null Count  Dtype  
 --- 
 0   Product type    100 non-null    object  
 1   SKU              100 non-null    object  
 2   Price             100 non-null    float64 
 3   Availability     100 non-null    int64
```

```
print(df.drop_duplicates(inplace=True))
```

None

# Cleaning & Modelling

A new column titled 'Inventory Turnover' has been added to the dataset to assess inventory management effectiveness.

```
df['Inventory Turnover'] = df['Number of products sold'] / df['Stock levels']
print(df)
```

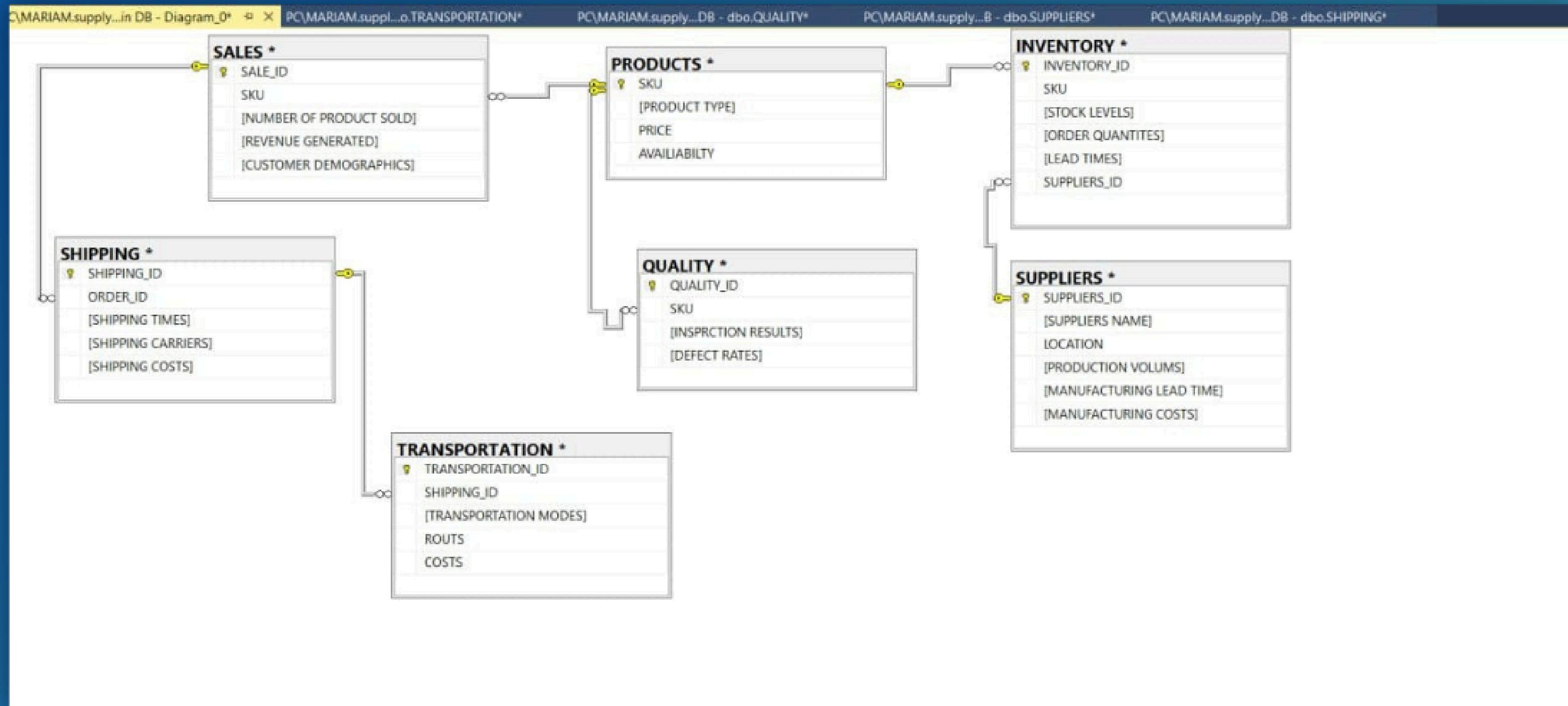
	Product type	SKU	Price	Availability	Number of products sold	\
0	haircare	SKU0	69.808006	55		802
1	skincare	SKU1	14.843523	95		736
2	haircare	SKU2	11.319683	34		8
3	skincare	SKU3	61.163343	68		83
4	skincare	SKU4	4.805496	26		871
..	..	..	..	..	..	..
95	haircare	SKU95	77.903927	65		672
96	cosmetics	SKU96	24.423131	29		324
97	haircare	SKU97	3.526111	56		62
98	skincare	SKU98	19.754605	43		913

# Cleaning & Modelling

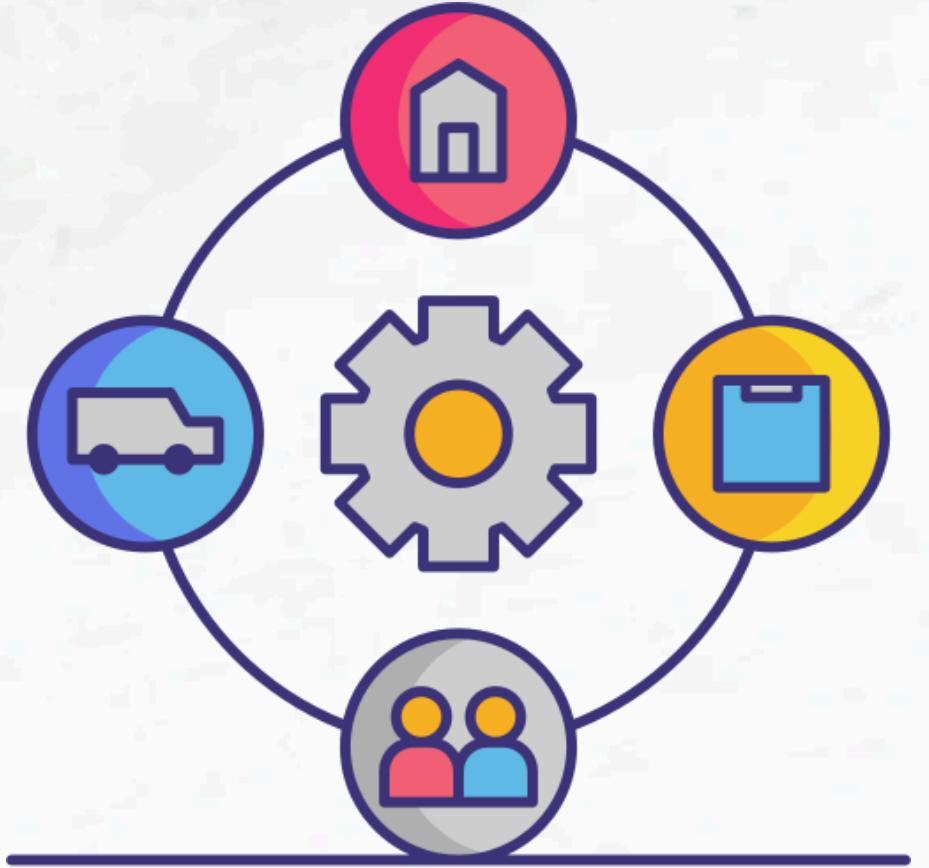
Product Type	SKU	Price	Availability	Number of Products Sold	Revenue Generated	Customer Demographics	Stock Levels	Lead Times	Order Quantities	...	Location	Lead Time	Production Volumes	Manufacturing Lead Time	Manufacturing Costs	Inspection Results	Defect Rates	Transportation Modes	Routes	Costs
Haircare	SKU0	69.8080	55	802	8661.9968	Male	58	7	96	...	Mumbai	29	215	29	46.2799	Pending	0.2264	Road	Route-B	187.7521
Skincare	SKU1	14.8435	95	736	7460.9001	Female	53	30	37	...	Mumbai	23	517	30	33.6168	Pending	4.8541	Road	Route-B	503.0656
Haircare	SKU2	11.3197	34	8	9577.7496	Female	1	10	88	...	Mumbai	12	971	27	30.6880	Pending	4.5806	Air	Route-C	141.9203
Skincare	SKU3	61.1633	68	83	7766.8364	Male	23	13	59	...	Kolkata	24	937	18	35.6247	Fail	4.7466	Rail	Route-A	254.7762
Skincare	SKU4	4.8055	26	871	2686.5052	Male	5	3	56	...	Delhi	5	414	3	92.0652	Fail	3.1456	Air	Route-A	923.4406
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
Haircare	SKU95	77.9039	65	672	7386.3639	Female	15	14	26	...	Mumbai	18	450	26	58.8907	Pending	1.2109	Air	Route-A	778.8642
Cosmetics	SKU96	24.4231	29	324	7698.4248	Male	67	2	32	...	Mumbai	28	648	28	17.8038	Pending	3.8720	Road	Route-A	188.7421
Haircare	SKU97	3.5261	56	62	4370.9166	Male	46	19	4	...	Mumbai	10	535	13	65.7652	Fail	3.3762	Road	Route-A	540.1324
Skincare	SKU98	19.7546	43	913	8525.9526	Female	53	1	27	...	Chennai	28	581	9	5.6047	Pending	2.9081	Rail	Route-A	882.1989
Haircare	SKU99	68.5178	17	627	9185.1858	Female	55	8	59	...	Chennai	29	921	2	38.0729	Fail	0.3460	Rail	Route-B	210.7430

rows × 24 columns

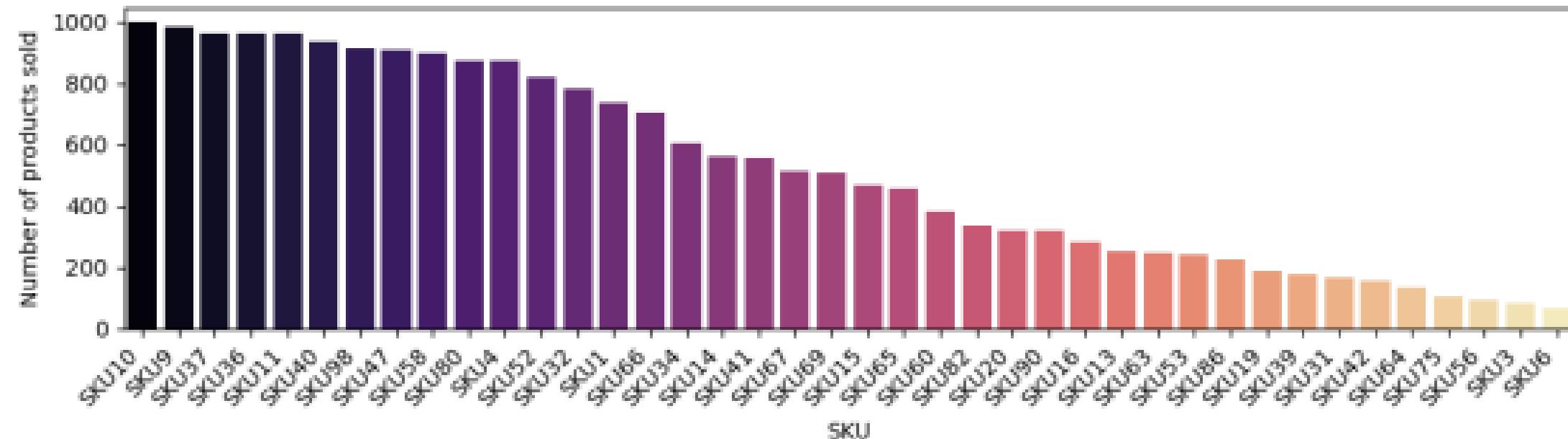
# Cleaning & Modelling



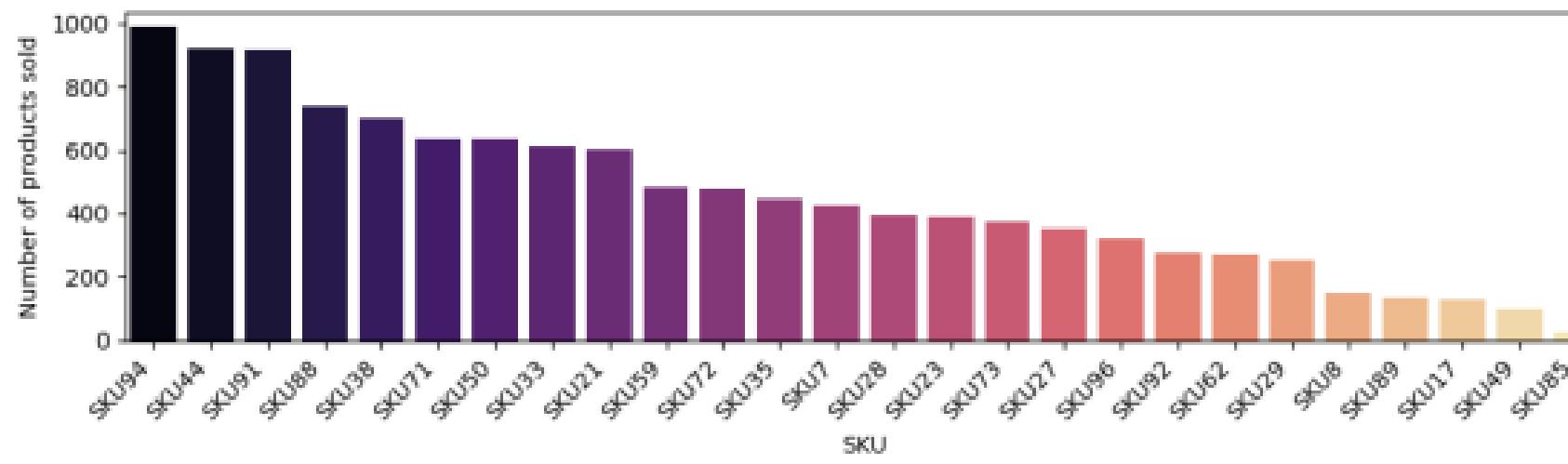
# EDA with python



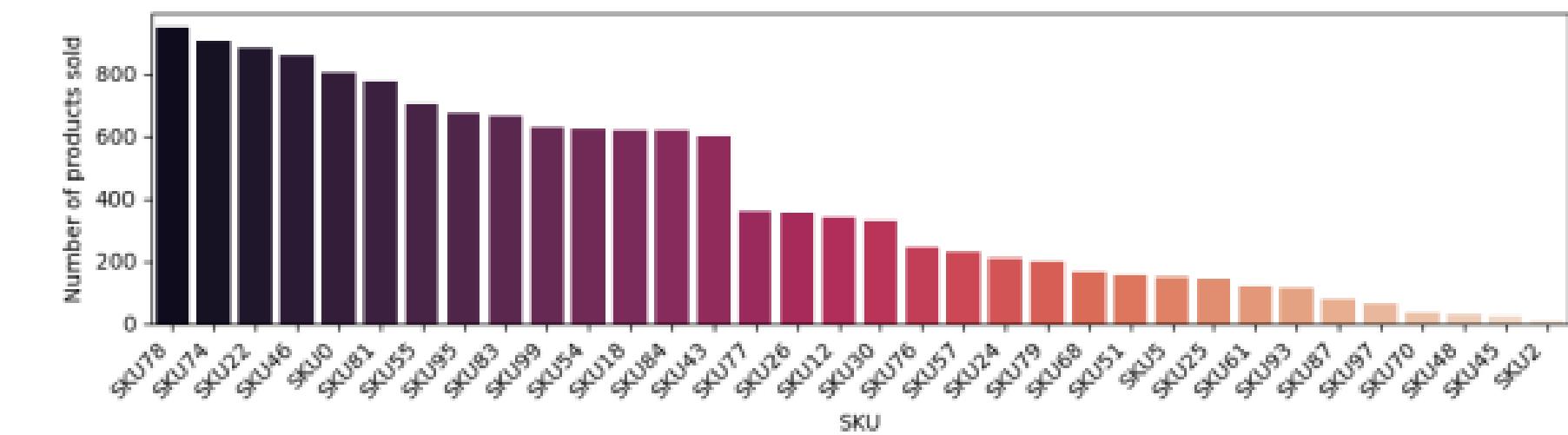
## Number of sold Skincare products by SKU



## Number of sold cosmetics by SKU



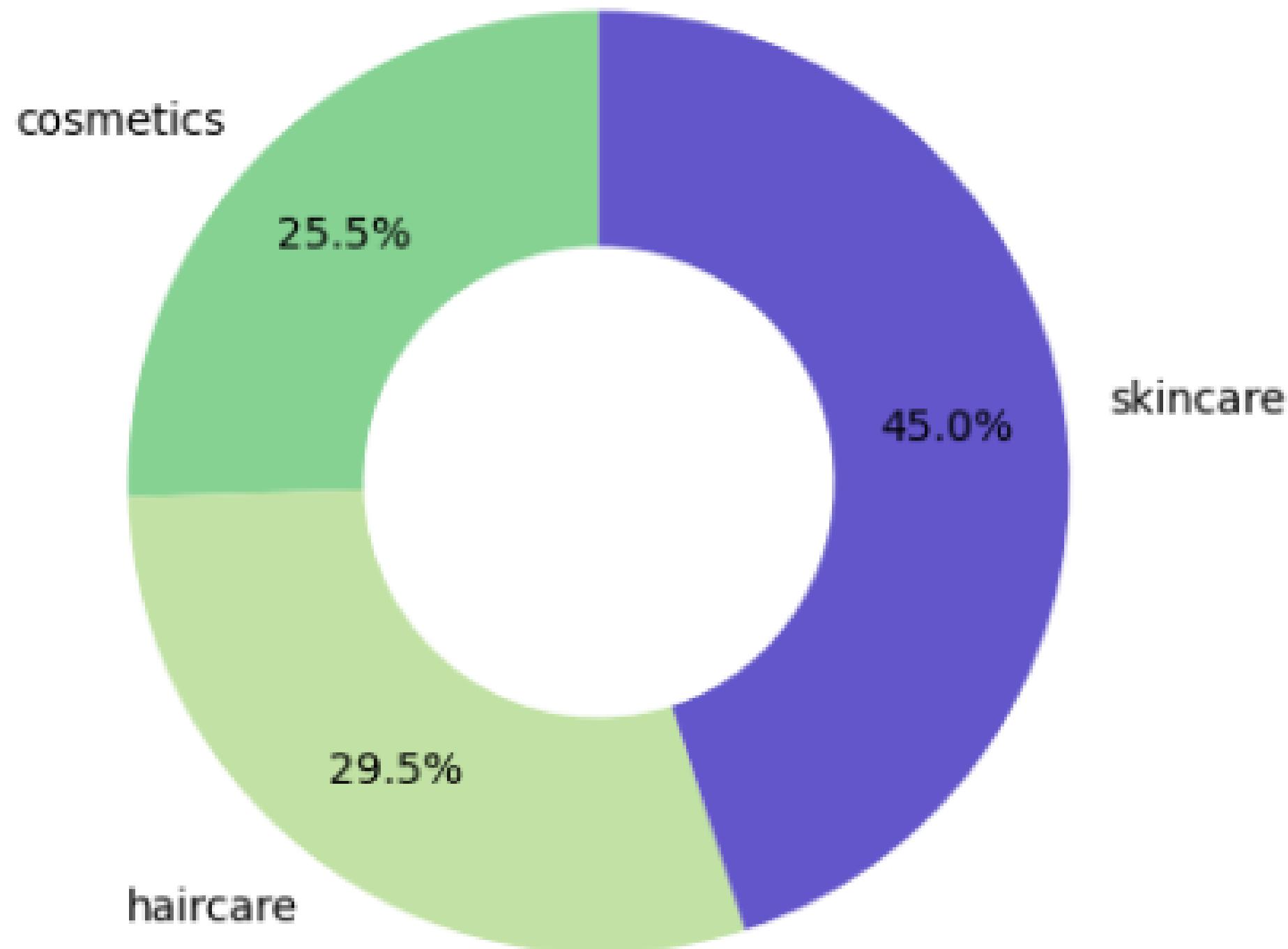
## Number of sold Haircare products by SKU



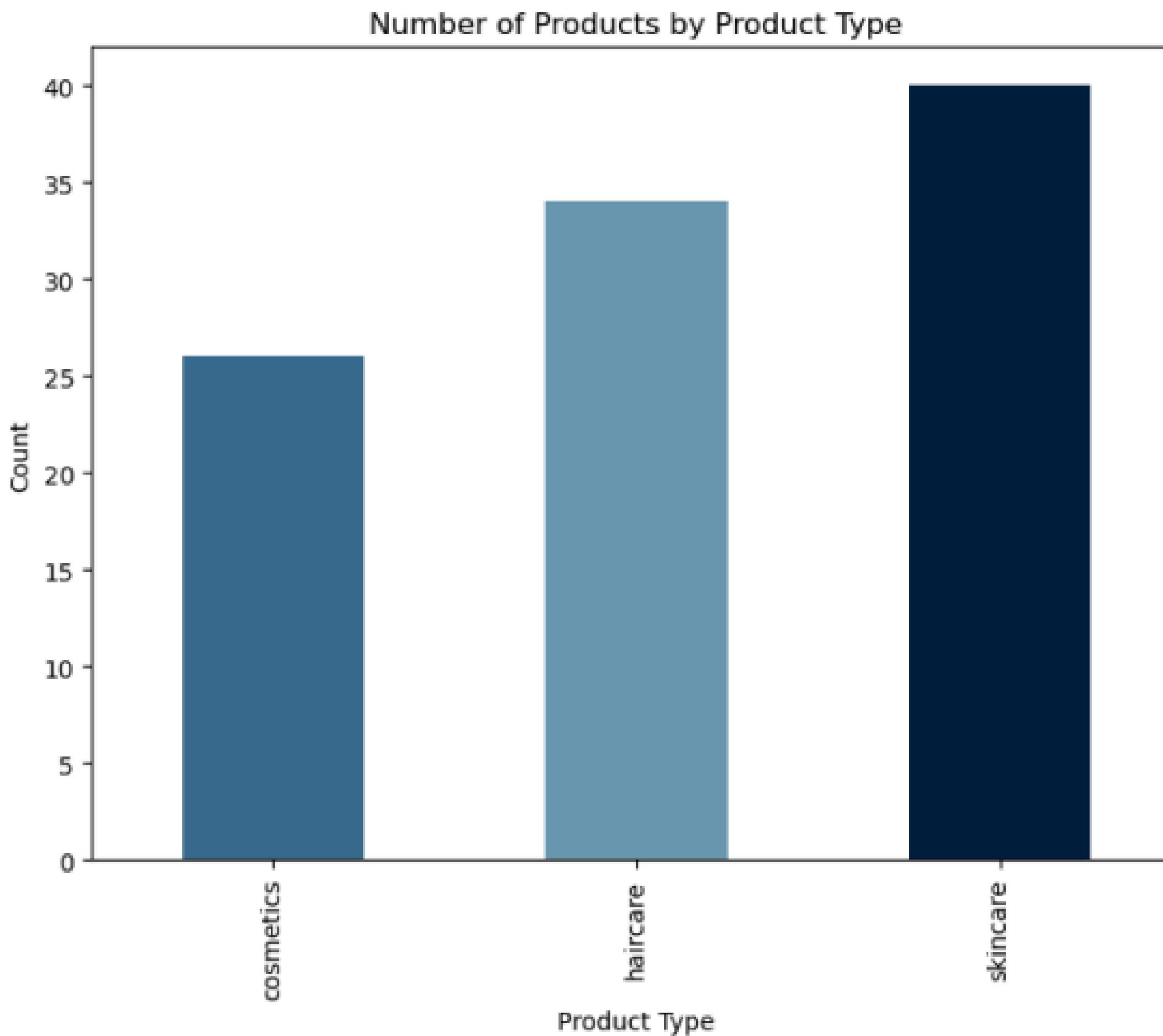
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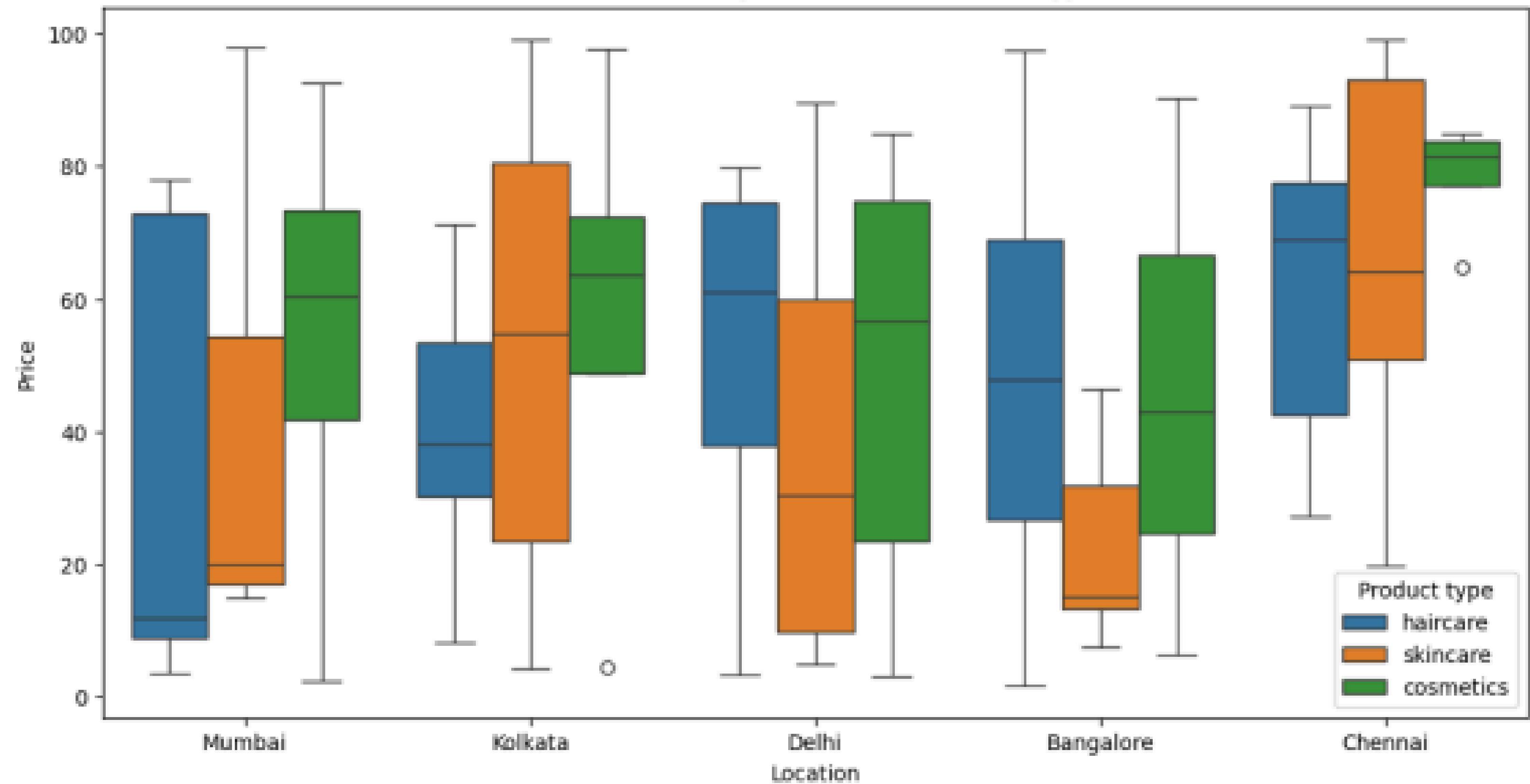
## Sales by product type



•••

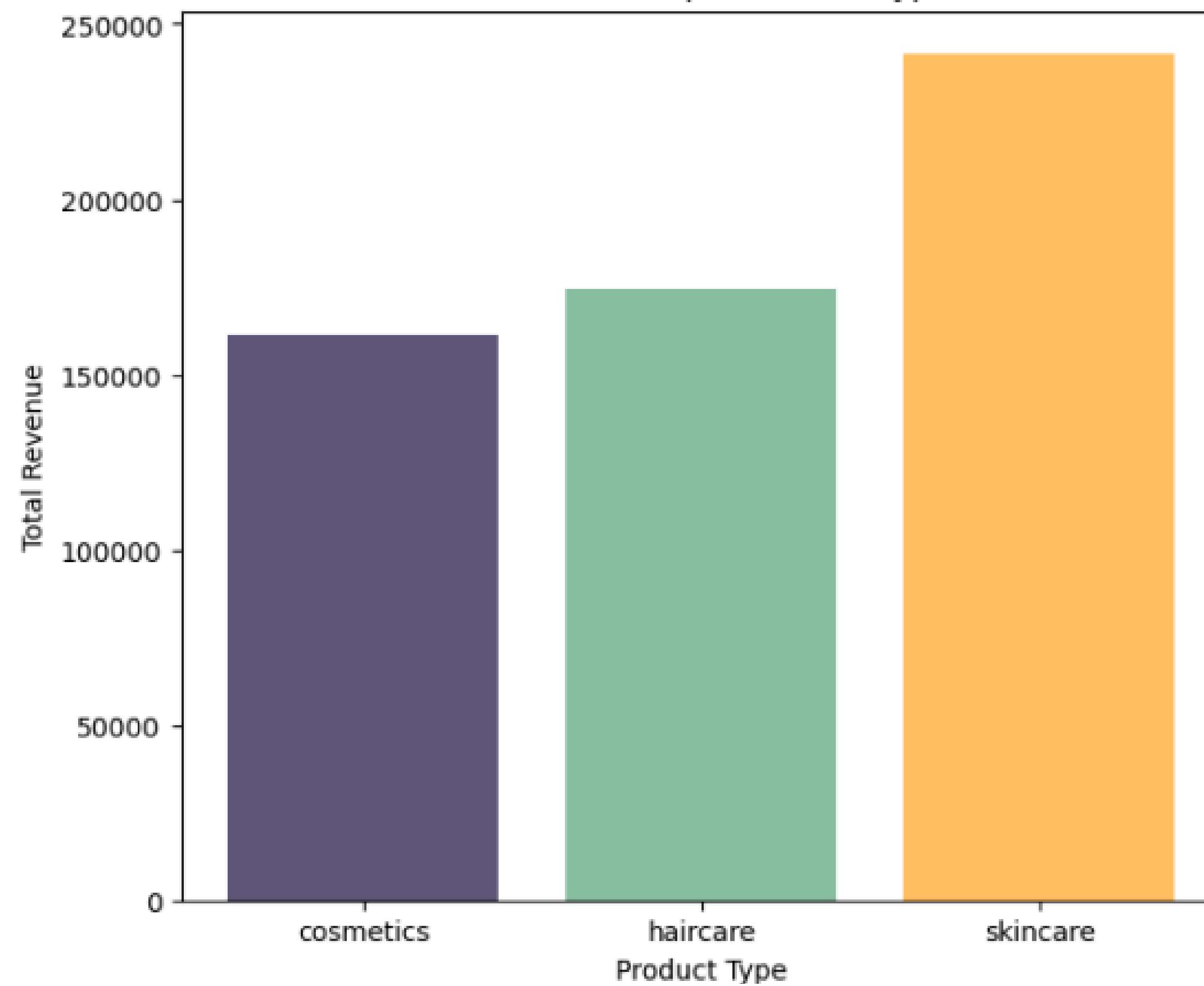


### Product Prices by Location and Product Type



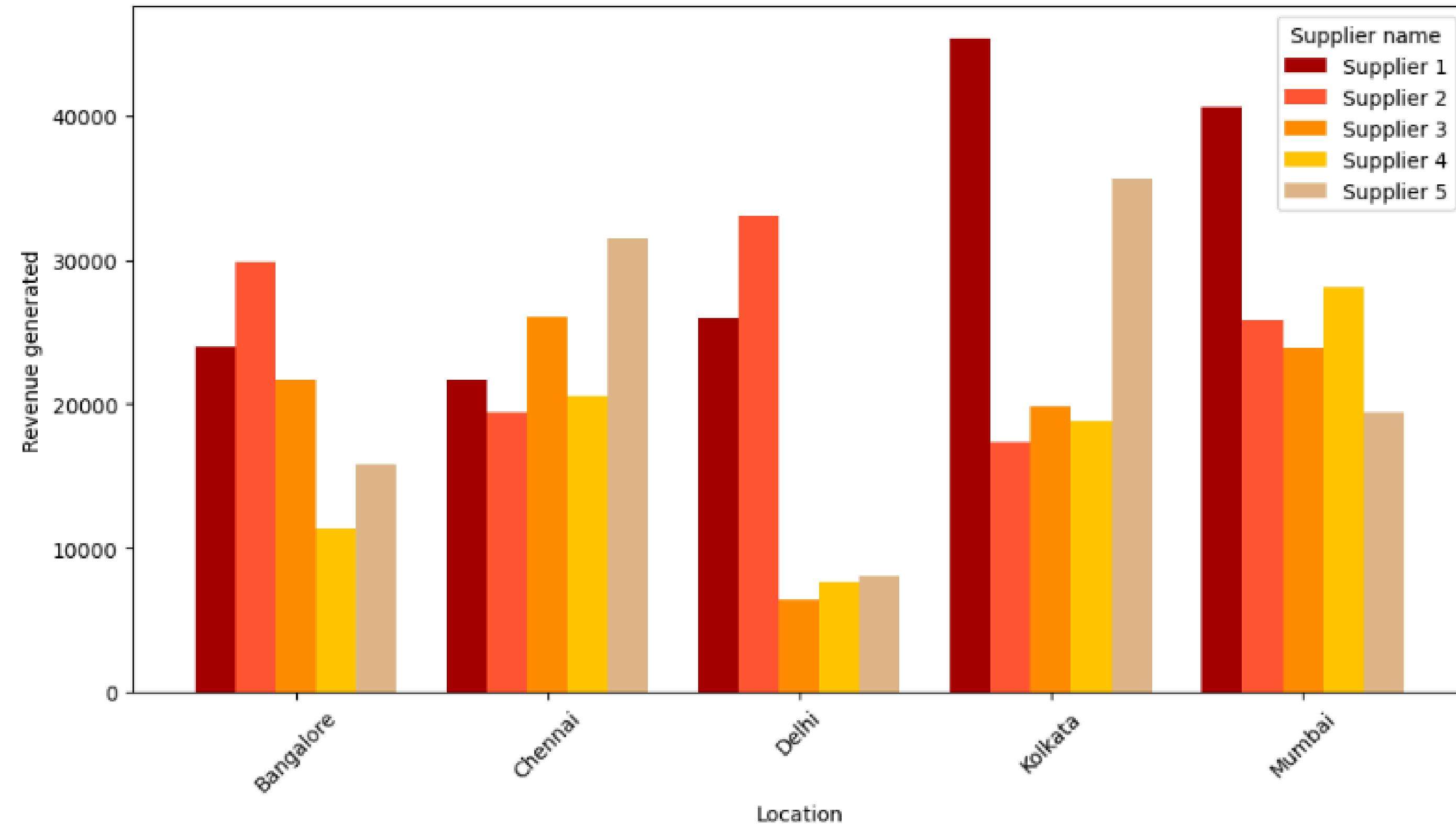
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Total Revenue per Product type



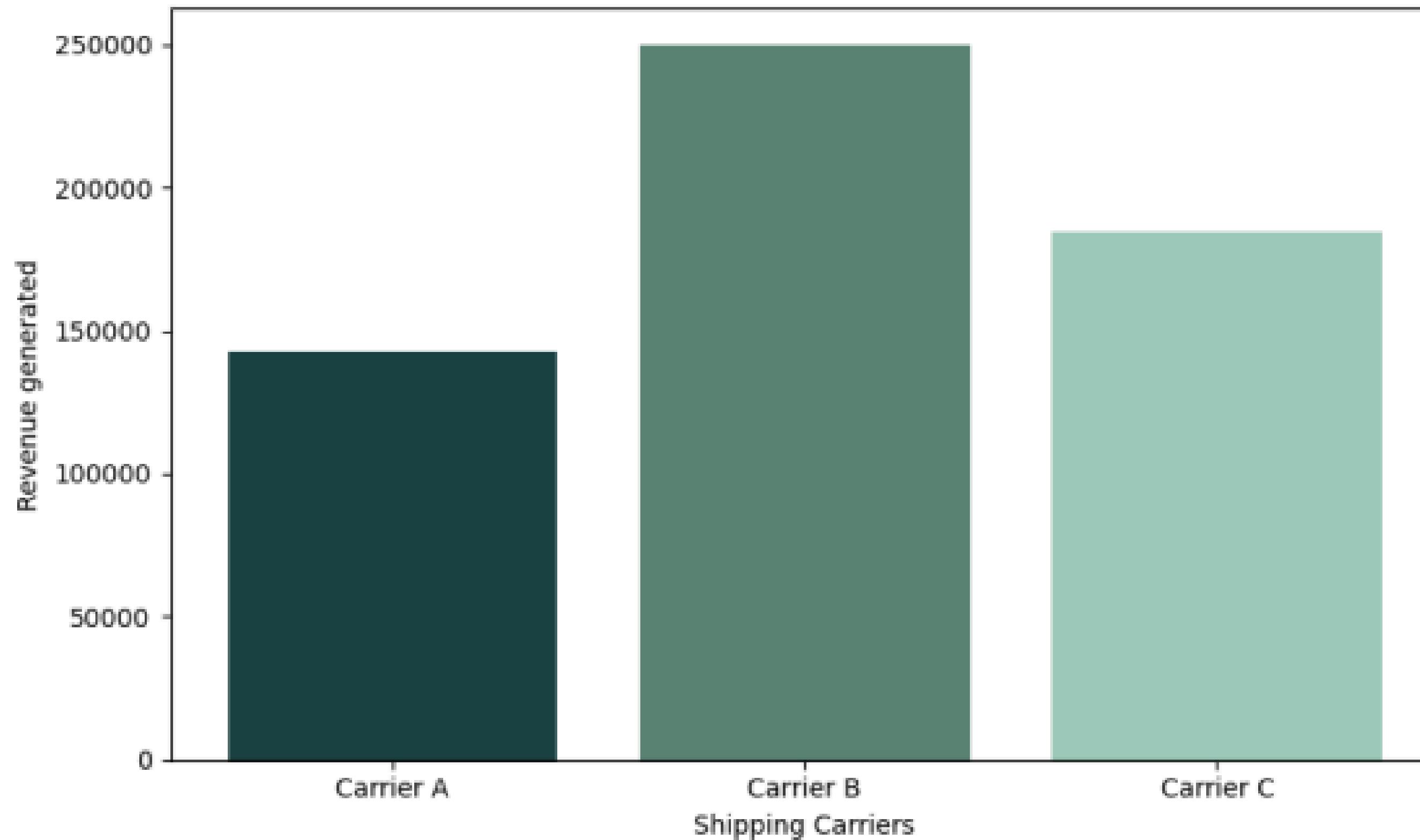
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### Total Revenue by City and Supplier



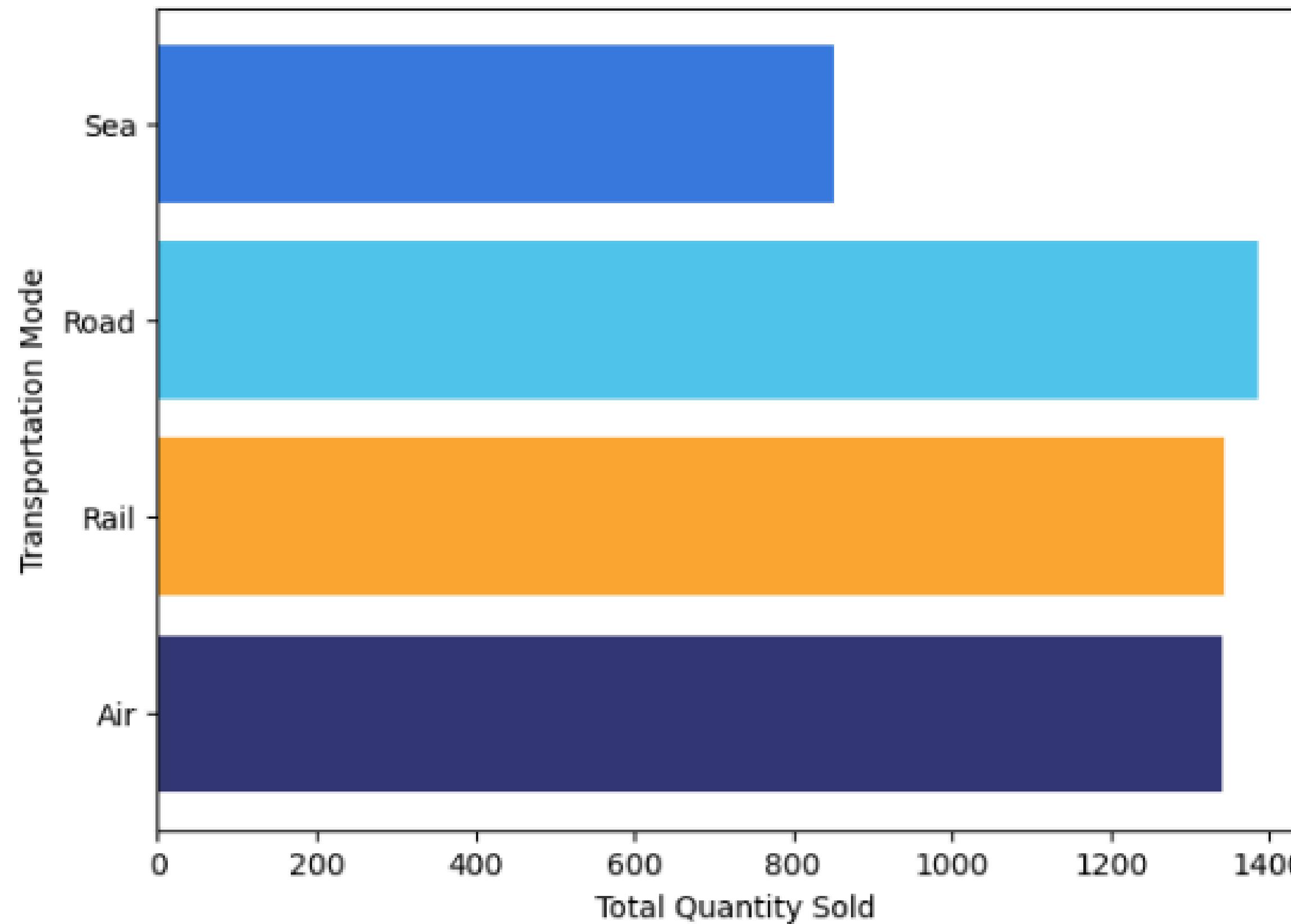
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## Total Revenue by Shipping Carriers



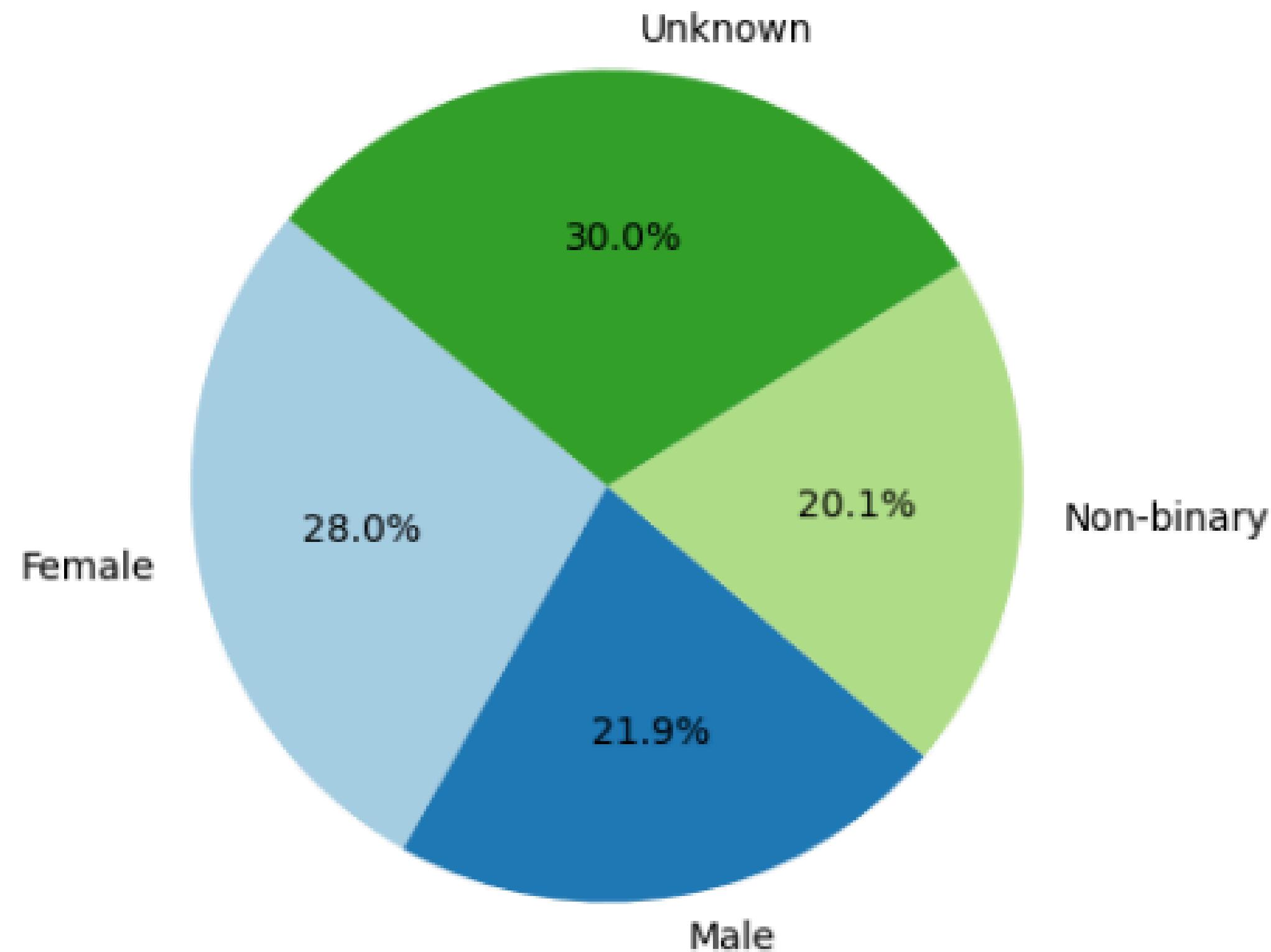
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### Total Quantity Sold by Transportation Mode



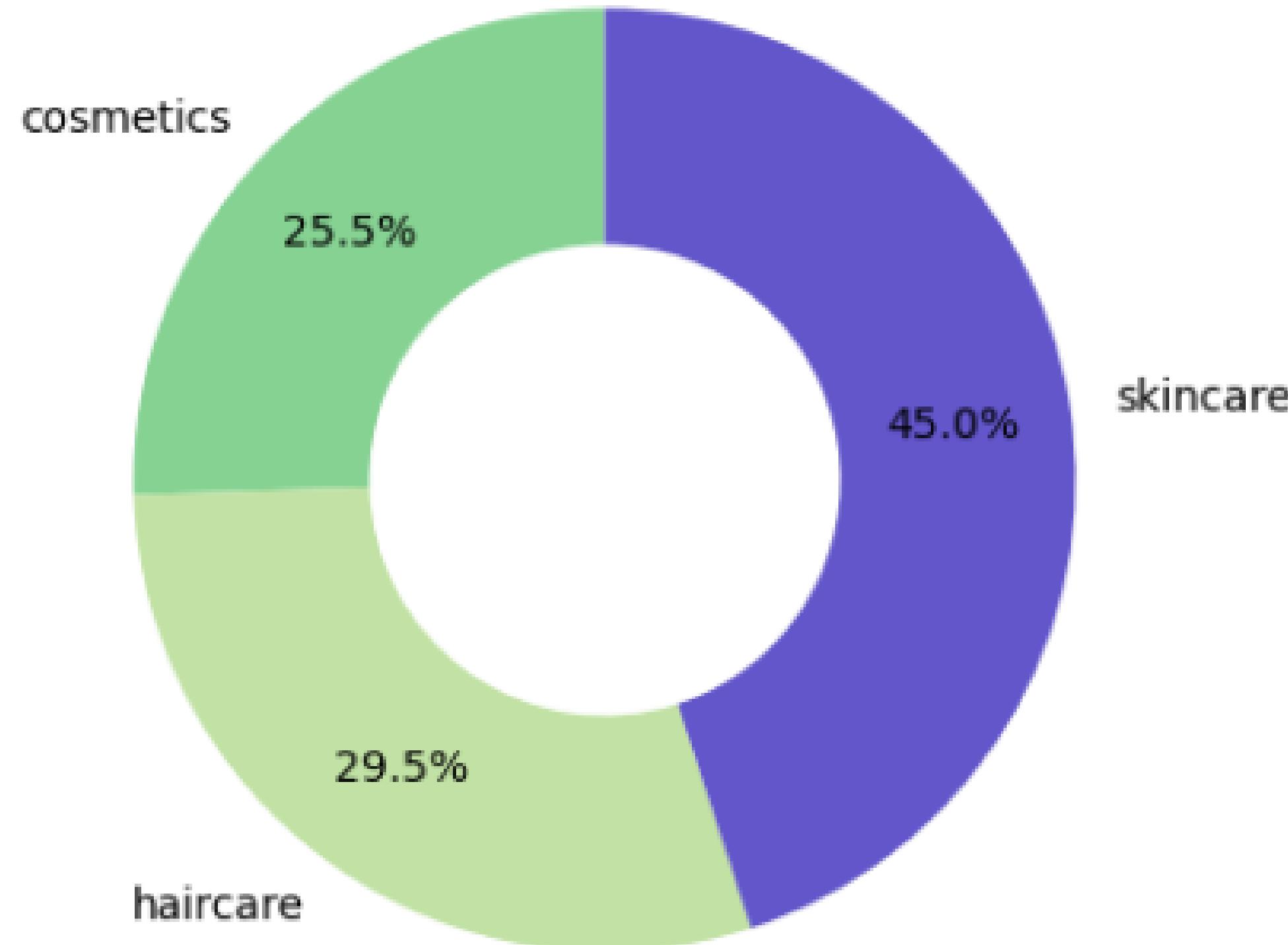
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## Total Revenue per Customer Demographics



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## Sales by product type



# Dashboards



Total Revenue

577,605

Highest selling Product

Skincare

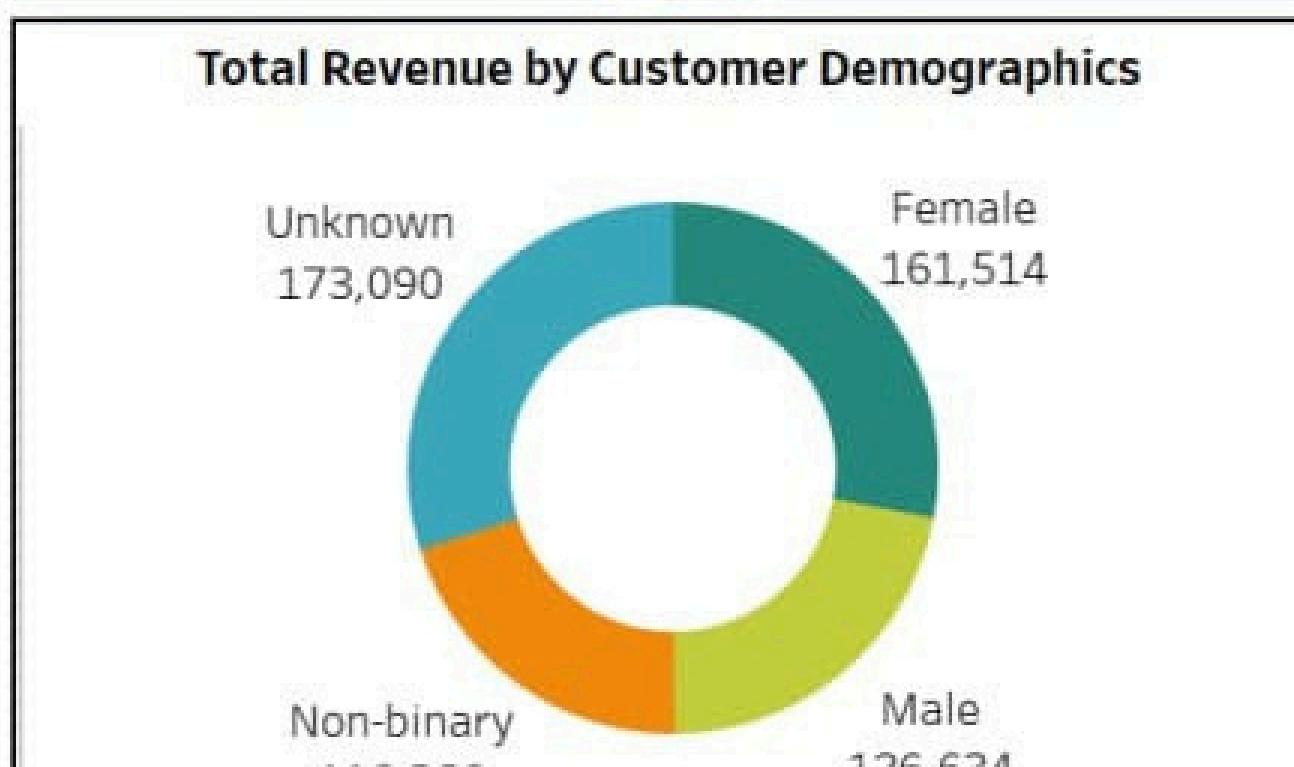
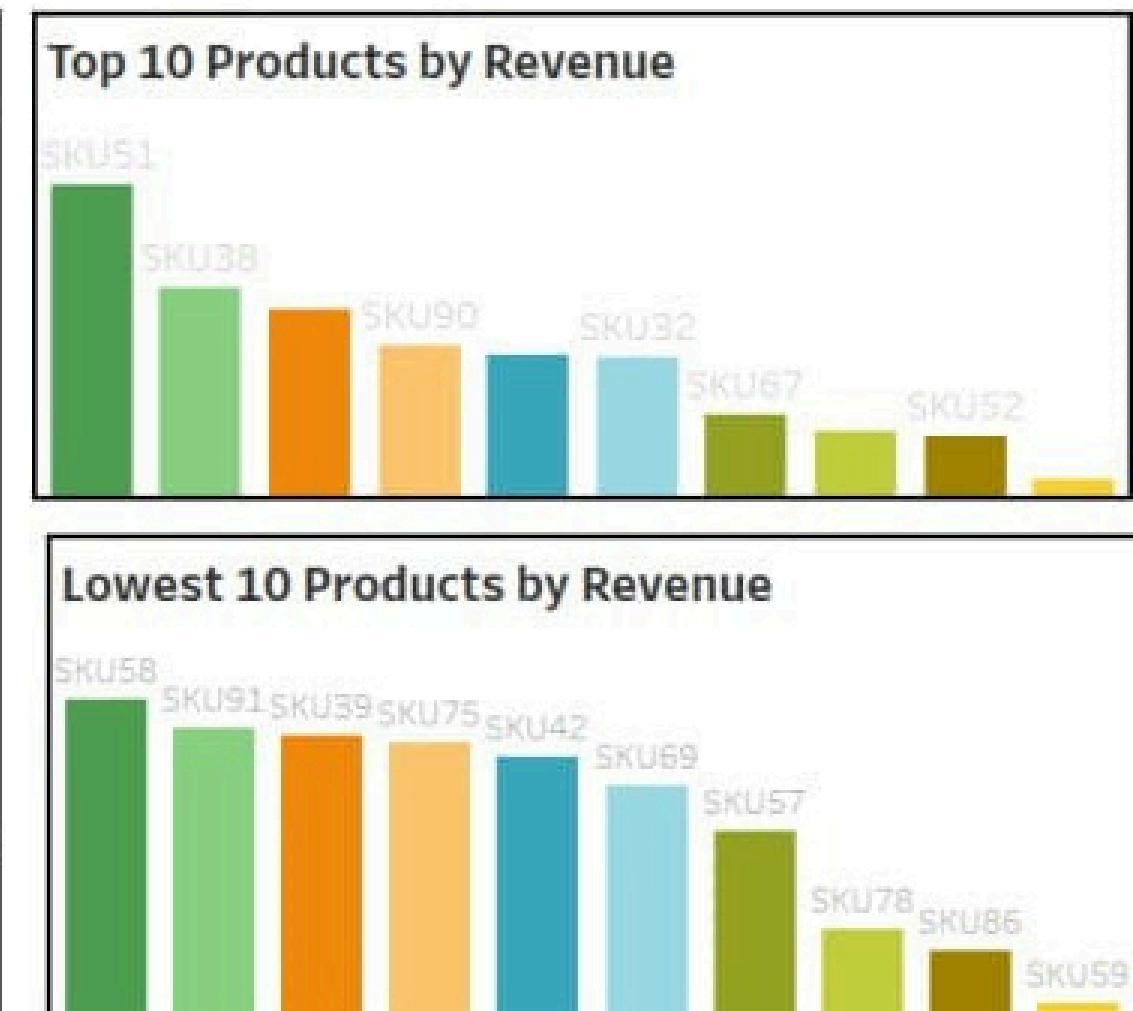
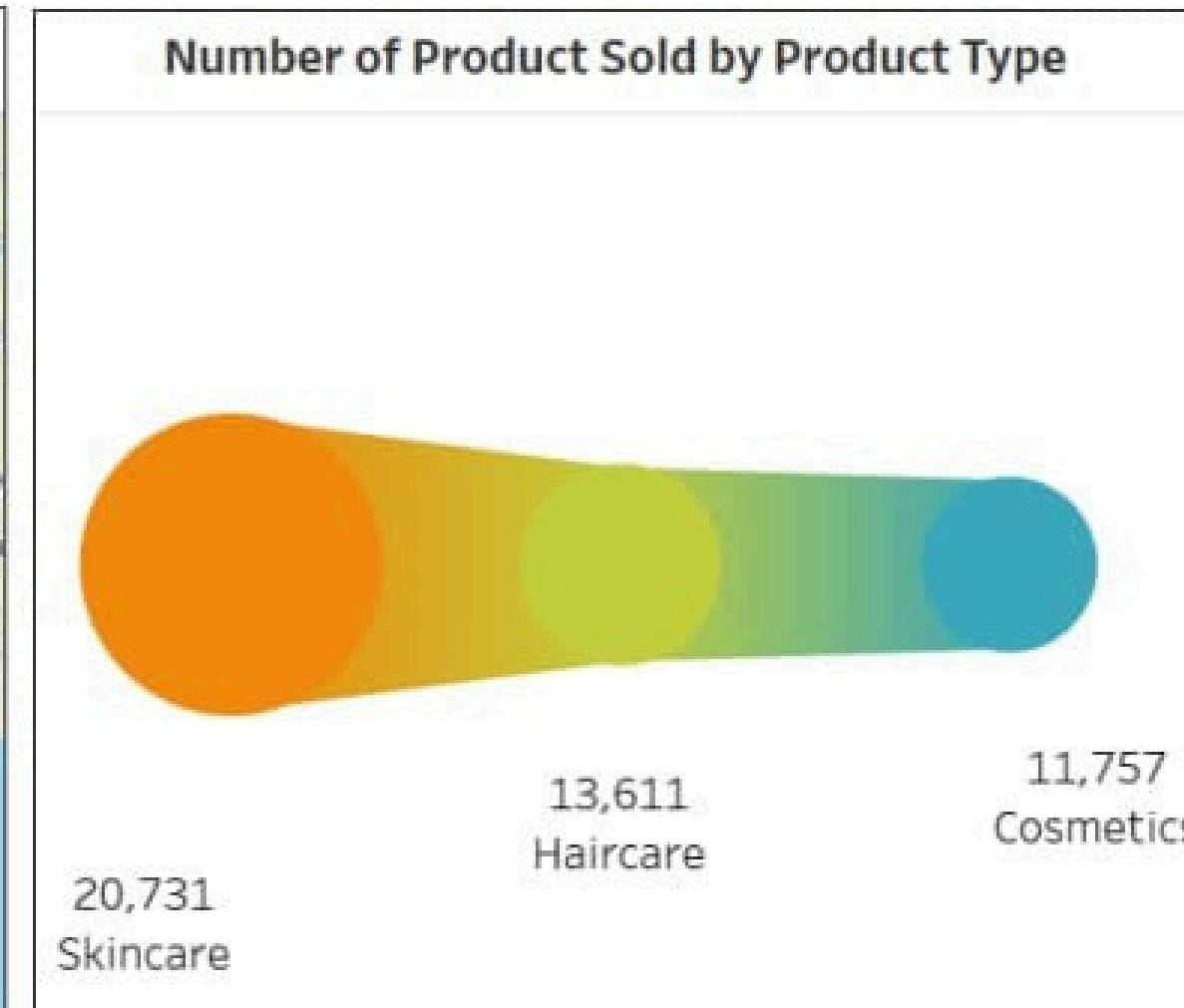
Total Products Sold

46,099

Sales Performance

Supply Chain

Shipping Analysis



## Total Production Volumes

56,784

## Avg.Total Lead Time

47.8

## Avg.Defect Rate

2.277

## Sales Performance

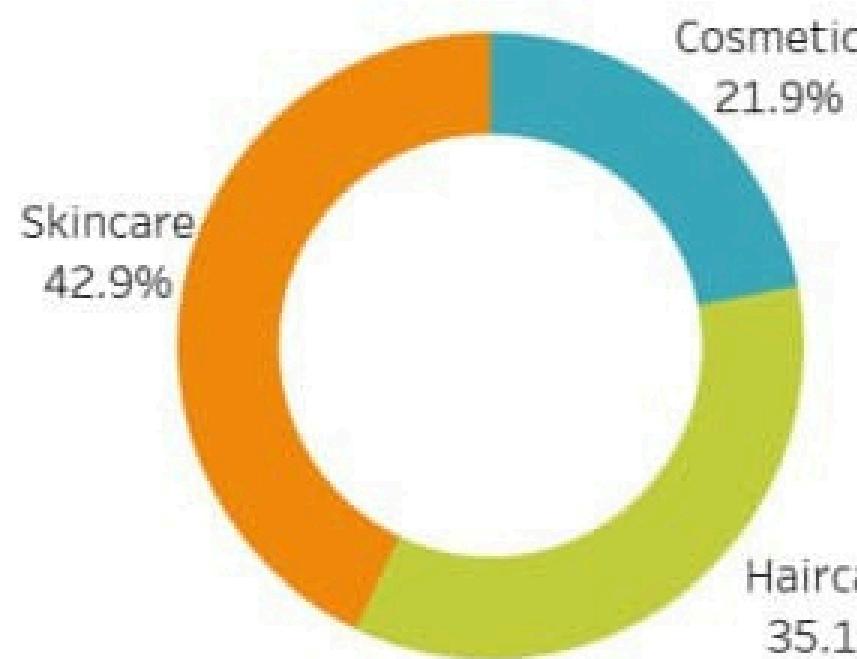
## Supply Chain

## Shipping Analysis

## Defect Rates by Product Type



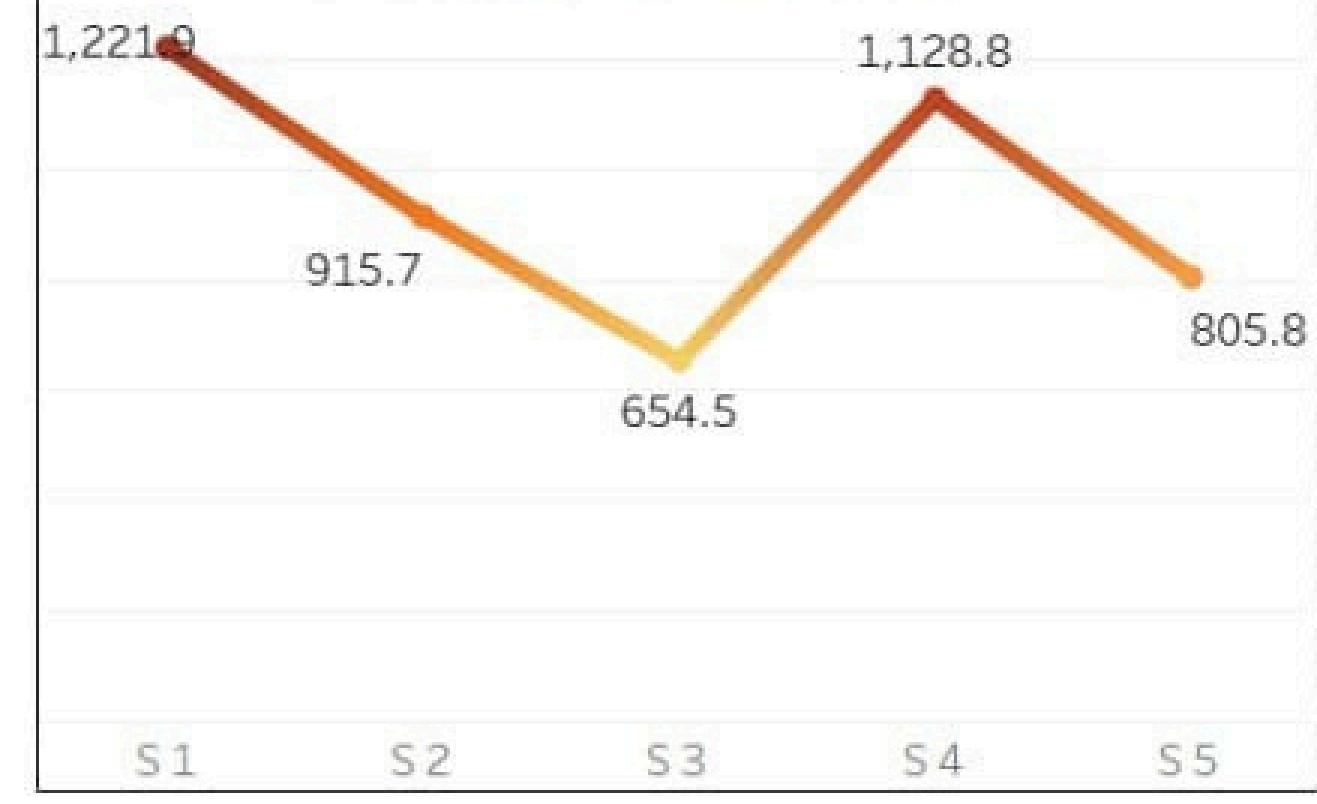
## Production Volumes by Product



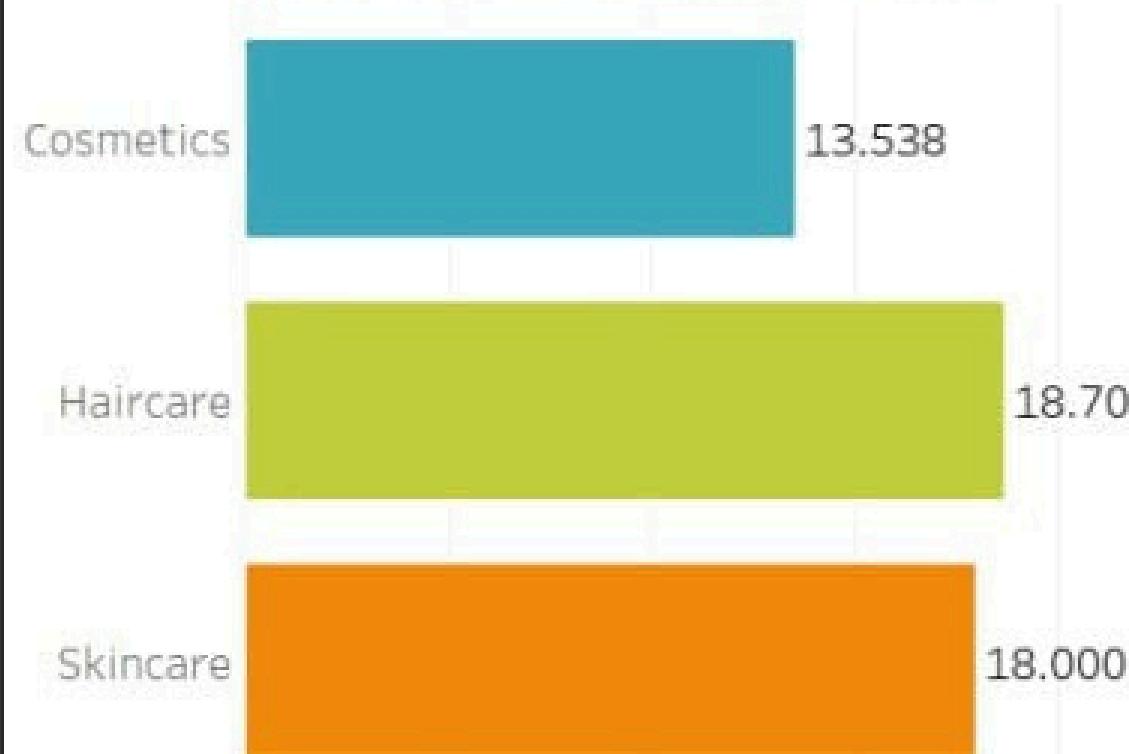
## Shipping Cost per Carrier &amp; Route



## Manufacturing Costs by Supplier



## Average Lead Time by product Type



## Top suppliers by Avg. Lead Time



Avg.Shipping Time

5.8

Avg.Shipping Cost

6

Sales Performance

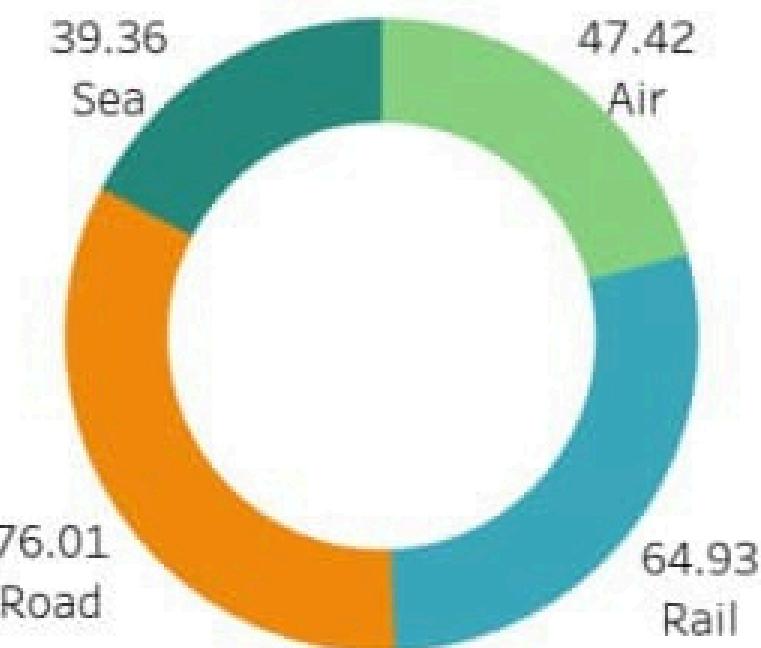
Supply Chain

Shipping Analysis

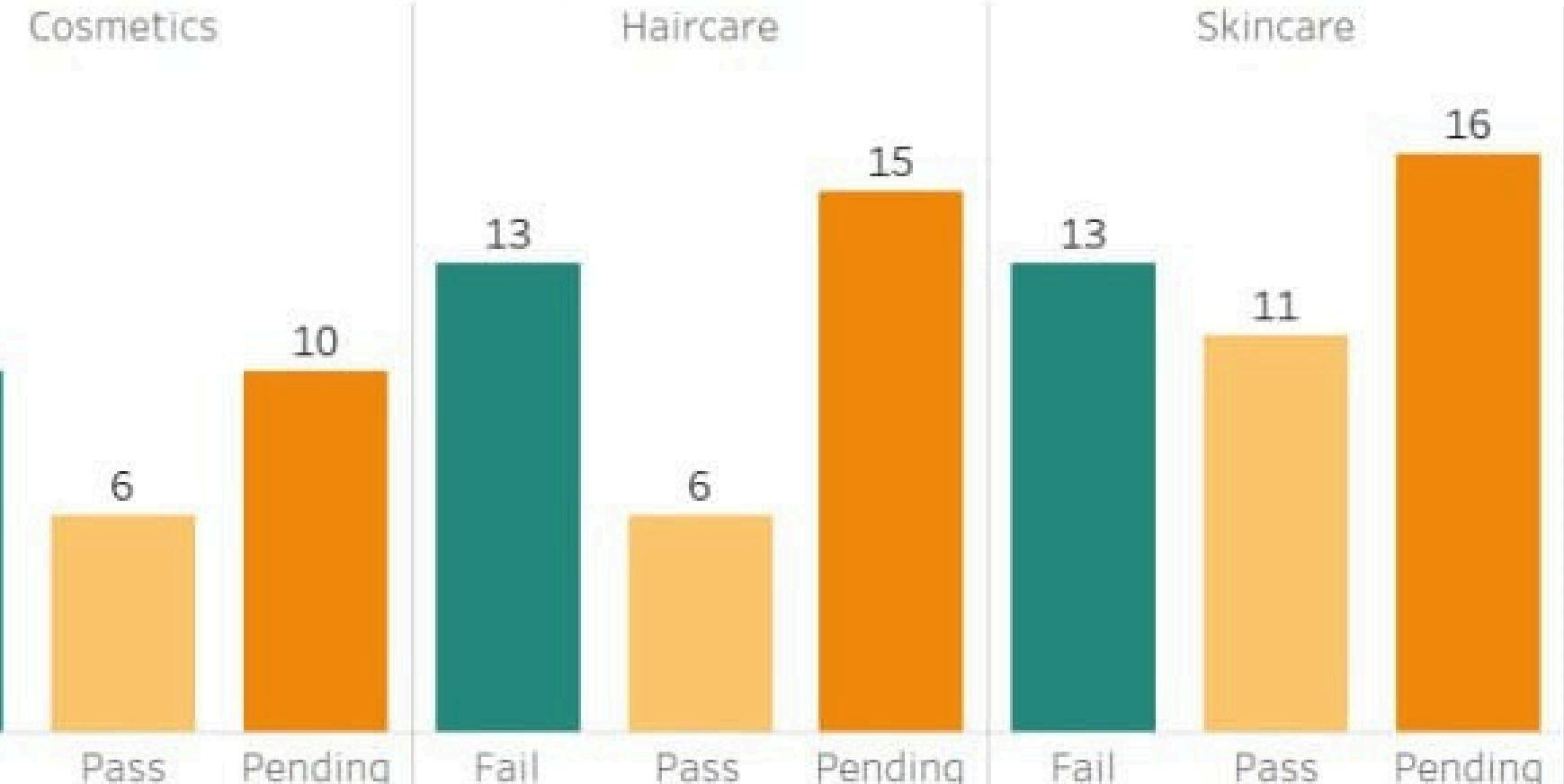
Cost by Transportation Mode and Route



Defect Rate by Transportation Mode



Inspection Pass/Fail Count by Product Type



Manufacturing Efficiency



# Analysis Report



## Sales Dashboard

- The Sales Dashboard provides valuable insights into overall sales performance, number of products sold, revenue generated, and customer behavior. One significant observation is that skincare products emerge as the top-selling category, leading in both the number of products sold and price point. This suggests that skincare products are a key revenue driver.
- The Top 10 Products by Revenue are predominantly high-performing SKUs across skincare, haircare, and cosmetics categories. Skincare products dominate this list, solidifying their position as the leading revenue driver for the business.
- In terms of customer demographics, females generate €161,514, accounting for approximately 28% of total revenue, while males contribute €126,634, which is about 22%. These figures highlight the importance of targeting female consumers, although males also represent a significant portion of sales.
- When examining product preferences, females show the highest total order quantity for skincare products, reaffirming their strong demand in this category. For males, haircare products lead in total order quantity, indicating a clear preference within this demographic.

## Supply Chain Dashboard

- The Supply Chain Dashboard provides key insights into production volume, defect rates, supplier costs, and shipping costs across product categories. A significant observation is that haircare products exhibit the highest defect rate, while cosmetics have the lowest. This suggests that haircare manufacturing processes may require attention to reduce defects and improve product quality.
- Another key insight is that skincare products have the highest production volume compared to other categories. This indicates that skincare is a primary focus area.
- In terms of manufacturing costs, Supplier 1 incurs the highest expenses, while Supplier 3 is the most cost-effective. Optimizing supplier selection or negotiating better terms with Supplier 1 may lead to significant cost savings without sacrificing quality or lead time.
- Shipping costs vary significantly between carriers. Carrier B has the highest shipping costs, whereas Carrier A is the most economical. Promoting the use of Carrier A where feasible can help reduce overall logistics expenses, improving the supply chain's profitability.
- Additionally, Supplier 1 stands out with the shortest average lead time. While this is beneficial for time-sensitive operations, the higher associated costs warrant a closer examination to ensure that the trade-off between cost and lead time is justified.



## Shipping Dashboard

- The Shipping Dashboard offers comprehensive insights into transportation modes, inspection results, and manufacturing efficiency. One key finding is that Route C consistently proves to be the most cost-effective across all transportation modes. This suggests that optimizing shipments along this route can result in significant cost savings for the company.
- Road transportation, however, incurs the highest costs among all transportation modes. While road might offer flexibility, its high cost warrants a review of other modes or the possibility of cost-saving strategies when using this option.
- Inspection results show that skincare products account for the highest pending and passing rates, while both skincare and haircare products equally contribute to the highest failure rates. These findings indicate that skincare is both a strong performer and a potential concern, requiring a deeper look into its inspection processes to address quality issues.
- Regarding manufacturing efficiency, Supplier 2 demonstrates the highest production volume but also suffers from the longest manufacturing lead time. This trade-off between production output and lead time may require balancing efficiency with the need for timely delivery.
- Lastly, road transportation is linked to the highest defect rate, further reinforcing the need to assess alternative transportation modes to improve product quality and reduce overall defect rates.

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# Thank you!



رواد مصر الرقمية

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