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Supply Chain Analysis

(A Power BI-based Diagnostic Report)





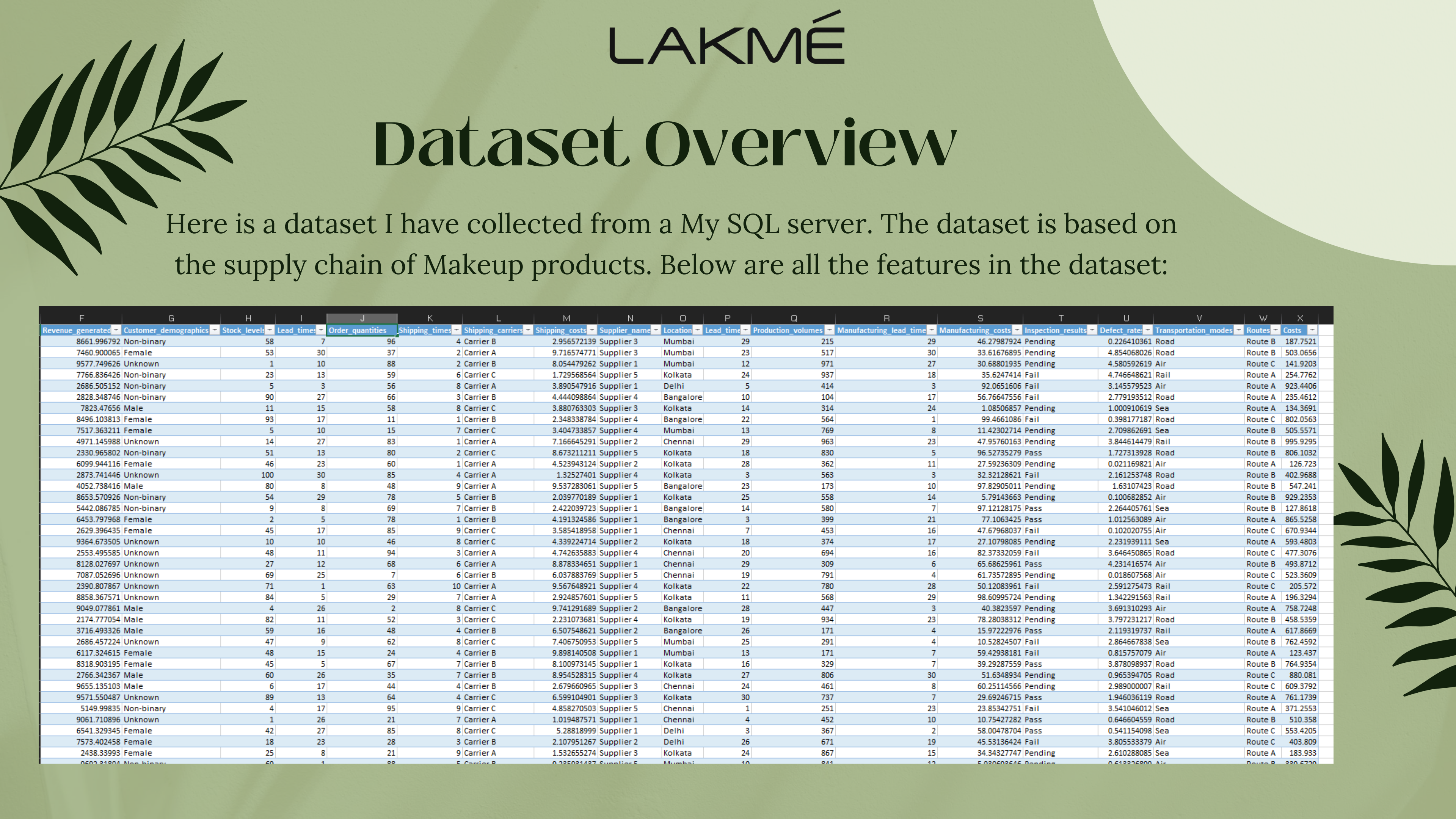
Hi, Welcome

I am Varun S, and today I'm thrilled to present my end-to-end supply chain diagnostic analysis, built using Power BI.

This project simulates a real-world scenario for a retail company lakmē, where I have analyzed multiple components of the supply chain — including inventory, sales, suppliers, production, shipping, and quality control.

The goal is to identify inefficiencies, uncover hidden patterns, and provide actionable insights to optimize overall performance.





Dataset Overview

Here is a dataset I have collected from a My SQL server. The dataset is based on the supply chain of Makeup products. Below are all the features in the dataset:

F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
Revenue_generated	Customer_demographics	Stock_levels	Lead_times	Order_quantities	Shipping_times	Shipping_carriers	Shipping_costs	Supplier_name	Location	Lead_time	Production_volumes	Manufacturing_lead_time	Manufacturing_costs	Inspection_results	Defect_rate	Transportation_modes	Routes	Costs	
8661.996792	Non-binary	58	7	96	4	Carrier B	2.956572139	Supplier 3	Mumbai	29	215	29	46.27987924	Pending	0.226410361	Road	Route B	187.7521	
7460.900065	Female	53	30	37	2	Carrier A	9.716574771	Supplier 3	Mumbai	23	517	30	33.61676895	Pending	4.854068026	Road	Route B	503.0656	
9577.749626	Unknown	1	10	88	2	Carrier B	8.054479262	Supplier 1	Mumbai	12	971	27	30.68801935	Pending	4.580592619	Air	Route C	141.9203	
7766.836426	Non-binary	23	13	59	6	Carrier C	1.729568564	Supplier 5	Kolkata	24	937	18	35.6247414	Fail	4.746648621	Rail	Route A	254.7762	
2686.505152	Non-binary	5	3	56	8	Carrier A	3.890547916	Supplier 1	Delhi	5	414	3	92.0651606	Fail	3.145579523	Air	Route A	923.4406	
2828.348746	Non-binary	90	27	66	3	Carrier B	4.444098864	Supplier 4	Bangalore	10	104	17	56.76647556	Fail	2.779193512	Road	Route A	235.4612	
7823.47656	Male	11	15	58	8	Carrier C	3.880763303	Supplier 3	Kolkata	14	314	24	1.08506857	Pending	1.000910619	Sea	Route A	134.3691	
8496.103813	Female	93	17	11	1	Carrier B	2.348338784	Supplier 4	Bangalore	22	564	1	99.4661086	Fail	0.398177187	Road	Route C	802.0563	
7517.363211	Female	5	10	15	7	Carrier C	3.404733857	Supplier 4	Mumbai	13	769	8	11.42302714	Pending	2.709862691	Sea	Route B	505.5571	
4971.145988	Unknown	14	27	83	1	Carrier A	7.166645291	Supplier 2	Chennai	29	963	23	47.95760163	Pending	3.844614479	Rail	Route B	995.9295	
2330.965802	Non-binary	51	13	80	2	Carrier C	8.673211211	Supplier 5	Kolkata	18	830	5	96.52735279	Pass	1.727313928	Road	Route B	806.1032	
6099.944116	Female	46	23	60	1	Carrier A	4.523943124	Supplier 2	Kolkata	28	362	11	27.59236309	Pending	0.021169821	Air	Route A	126.723	
2873.741446	Unknown	100	30	85	4	Carrier A	1.32527401	Supplier 4	Kolkata	3	563	3	32.32128621	Fail	2.161253748	Road	Route B	402.9688	
4052.738416	Male	80	8	48	9	Carrier A	9.537283061	Supplier 5	Bangalore	23	173	10	97.82905011	Pending	1.63107423	Road	Route B	547.241	
8653.570926	Non-binary	54	29	78	5	Carrier B	2.039770189	Supplier 1	Kolkata	25	558	14	5.79143663	Pending	0.100682852	Air	Route B	929.2353	
5442.086785	Non-binary	9	8	69	7	Carrier B	2.422039723	Supplier 1	Bangalore	14	580	7	97.12128175	Pass	2.264405761	Sea	Route B	127.8618	
6453.797968	Female	2	5	78	1	Carrier B	4.191324586	Supplier 1	Bangalore	3	399	21	77.1063425	Pass	1.012563089	Air	Route A	865.5258	
2629.396435	Female	45	17	85	9	Carrier C	3.585418958	Supplier 1	Chennai	7	453	16	47.67968037	Fail	0.102020755	Air	Route C	670.9344	
9364.673505	Unknown	10	10	46	8	Carrier C	4.339224714	Supplier 2	Kolkata	18	374	17	27.10798085	Pending	2.231939111	Sea	Route A	593.4803	
2553.495585	Unknown	48	11	94	3	Carrier A	4.742635883	Supplier 4	Chennai	20	694	16	82.37332059	Fail	3.646450865	Road	Route C	477.3076	
8128.027697	Unknown	27	12	68	6	Carrier A	8.878334651	Supplier 1	Chennai	29	309	6	65.68625961	Pass	4.231416574	Air	Route B	493.8712	
7087.052696	Unknown	69	25	7	6	Carrier B	6.037883769	Supplier 5	Chennai	19	791	4	61.73572895	Pending	0.018607568	Air	Route C	523.3609	
2390.807867	Unknown	71	1	63	10	Carrier A	9.567648921	Supplier 4	Kolkata	22	780	28	50.12083961	Fail	2.591275473	Rail	Route C	205.572	
8858.367571	Unknown	84	5	29	7	Carrier A	2.924857601	Supplier 5	Kolkata	11	568	29	98.60995724	Pending	1.342291563	Rail	Route A	196.3294	
9049.077861	Male	4	26	2	8	Carrier C	9.741291689	Supplier 2	Bangalore	28	447	3	40.3823597	Pending	3.691310293	Air	Route A	758.7248	
2174.777054	Male	82	11	52	3	Carrier C	2.231073681	Supplier 4	Kolkata	19	934	23	78.28038312	Pending	3.797231217	Road	Route B	458.5359	
3716.493326	Male	59	16	48	4	Carrier B	6.507548621	Supplier 2	Bangalore	26	171	4	15.97222976	Pass	2.119319737	Rail	Route A	617.8669	
2686.457224	Unknown	47	9	62	8	Carrier C	7.406750953	Supplier 5	Mumbai	25	291	4	10.52824507	Fail	2.864667838	Sea	Route B	762.4592	
6117.324615	Female	48	15	24	4	Carrier B	9.898140508	Supplier 1	Mumbai	13	171	7	59.42938181	Fail	0.815757079	Air	Route A	123.437	
8318.903195	Female	45	5	67	7	Carrier B	8.100973145	Supplier 1	Kolkata	16	329	7	39.29287559	Pass	3.878098937	Road	Route B	764.9354	
2766.342367	Male	60	26	35	7	Carrier B	8.954528315	Supplier 4	Kolkata	27	806	30	51.6348934	Pending	0.965394705	Road	Route C	880.081	
9655.135103	Male	6	17	44	4	Carrier B	2.679660965	Supplier 3	Chennai	24	461	8	60.25114566	Pending	2.989000007	Rail	Route C	609.3792	
9571.550487	Unknown	89	13	64	4	Carrier C	6.599104901	Supplier 3	Kolkata	30	737	7	29.69246715	Pass	1.946036119	Road	Route A	761.1739	
5149.99835	Non-binary	4	17	95	9	Carrier C	4.858270503	Supplier 5	Chennai	1	251	23	23.85342751	Fail	3.541046012	Sea	Route A	371.2553	
9061.710896	Unknown	1	26	21	7	Carrier A	1.019487571	Supplier 1	Chennai	4	452	10	10.75427282	Pass	0.646604559	Road	Route B	510.358	
6541.329345	Female	42	27	85	8	Carrier C	5.28818999	Supplier 1	Delhi	3	367	2	58.00478704	Pass	0.541154098	Sea	Route C	553.4205	
7573.402458	Female	18	23	28	3	Carrier B	2.107951267	Supplier 2	Delhi	26	671	19	45.53136424	Fail	3.805533379	Air	Route C	403.809	
2438.33993	Female	25	8	21	9	Carrier A	1.532655274	Supplier 3	Kolkata	24	867	15	34.34327747	Pending	2.610288085	Sea	Route A	183.933	
9503.31804	Non-binary	60	1	88	5	Carrier B	0.335031437	Supplier 5	Mumbai	10	841	13	5.020603546	Pending	0.613336800	Air	Route B	330.6730	

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Data Preparation



1. Data Cleaning

- Duplicate and Error Removal: All duplicate records were identified and removed to avoid skewed analysis. Common data entry errors were corrected for consistency.
- Data Type Validation: Ensured that:
 - Numeric values (e.g., cost, price, quantity sold) were stored in proper numerical format.
 - Categorical values (e.g., product type, supplier name) were stored as text.
 - Currency fields (e.g., price, revenue) were formatted as currency data types.

2. Error Correction

- Revenue Correction: It was observed that the original “Revenue Generated” column contained incorrect values. To fix this:
 - A new Revenue Generated column was calculated using the formula: $\text{Revenue} = \text{Price} \times \text{Number of Products Sold}$
 - This newly calculated column was used for further analysis and visualization.

3. New Column Creation

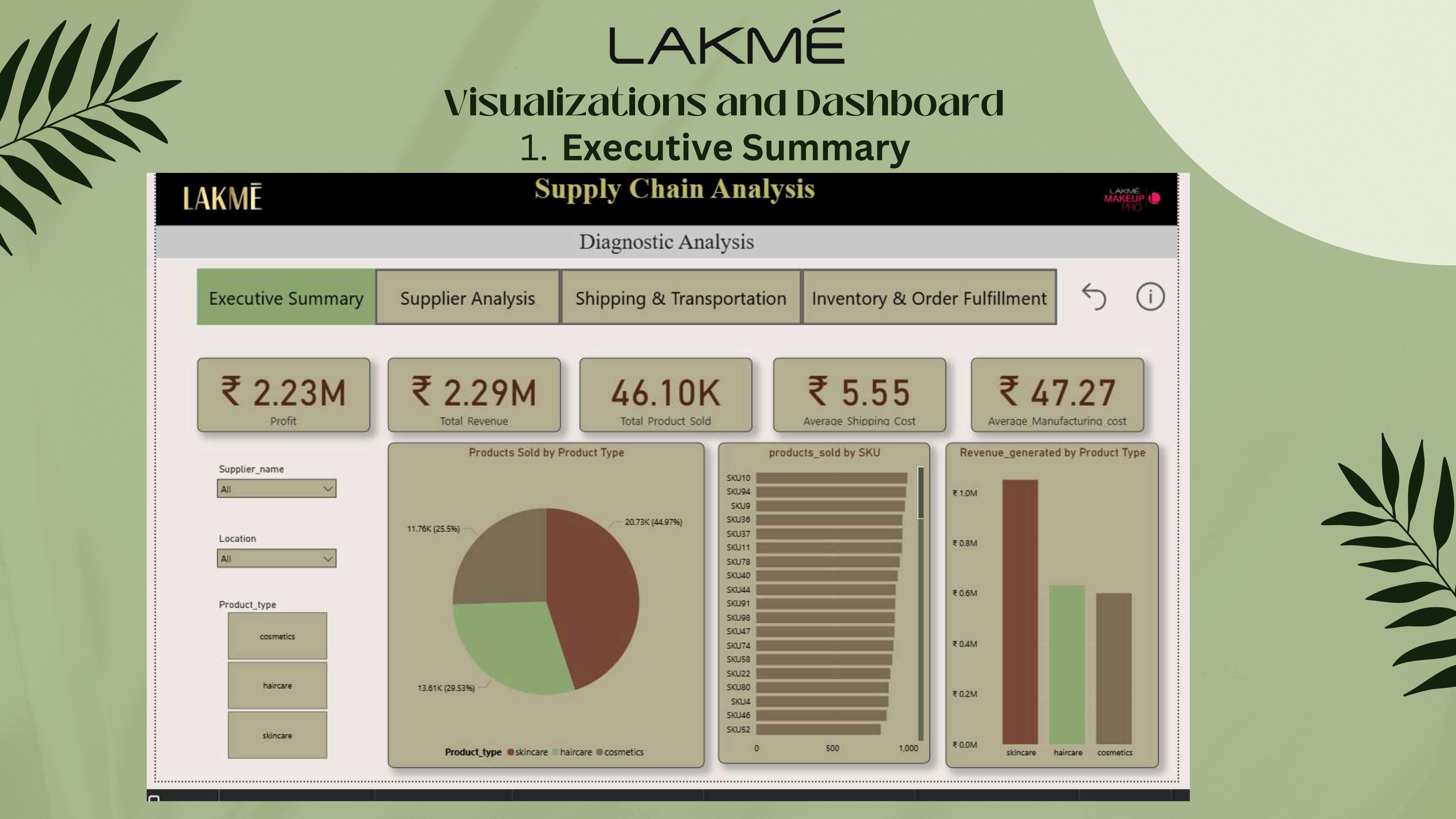
To enhance the depth of analysis, the following additional columns were created:

- Revenue per Unit: $\text{Revenue per Unit} = \text{Revenue Generated} : \text{Number of Products Sold}$
- Total Cost: $\text{Total Cost} = \text{Manufacturing Cost} + \text{Shipping Cost} + \text{Route Cost}$ These transformations and new metrics played a critical role in building accurate visualizations and deriving actionable business insights.



KPIs and Measures

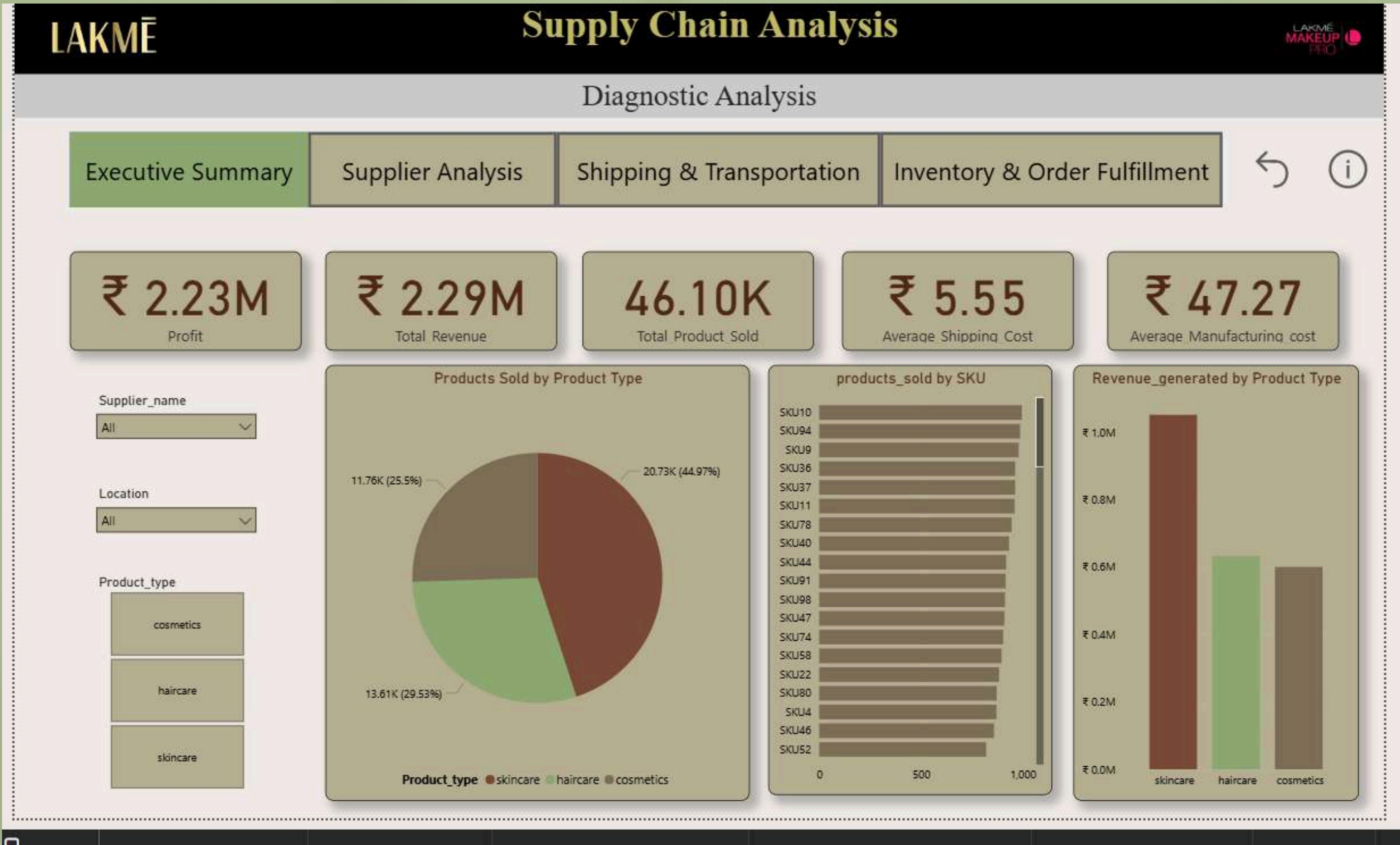
MEASURE	DAX Formula	Purpose
Total Revenue	SUM(supply_chain_table[Revenue_generated])	Total money earned from product sales
Total Product Sold	Sum(supply_chain_table[Number_of_products_sold])	Total sales volume
Total Cost	Sum(supply_chain_table[Total Cost])	Sum of manufacturing + shipping costs
Profit	[Total_Revenue]-[Total_Cost]	Business profitability
Avg. Lead Time	Average(supply_chain_table[Lead_times])	Delivery performance
Avg. Defect Rate	AVERAGE(supply_chain_table[Defect_rates])	Supplier product quality



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Visualizations and Dashboard

1. Executive Summary

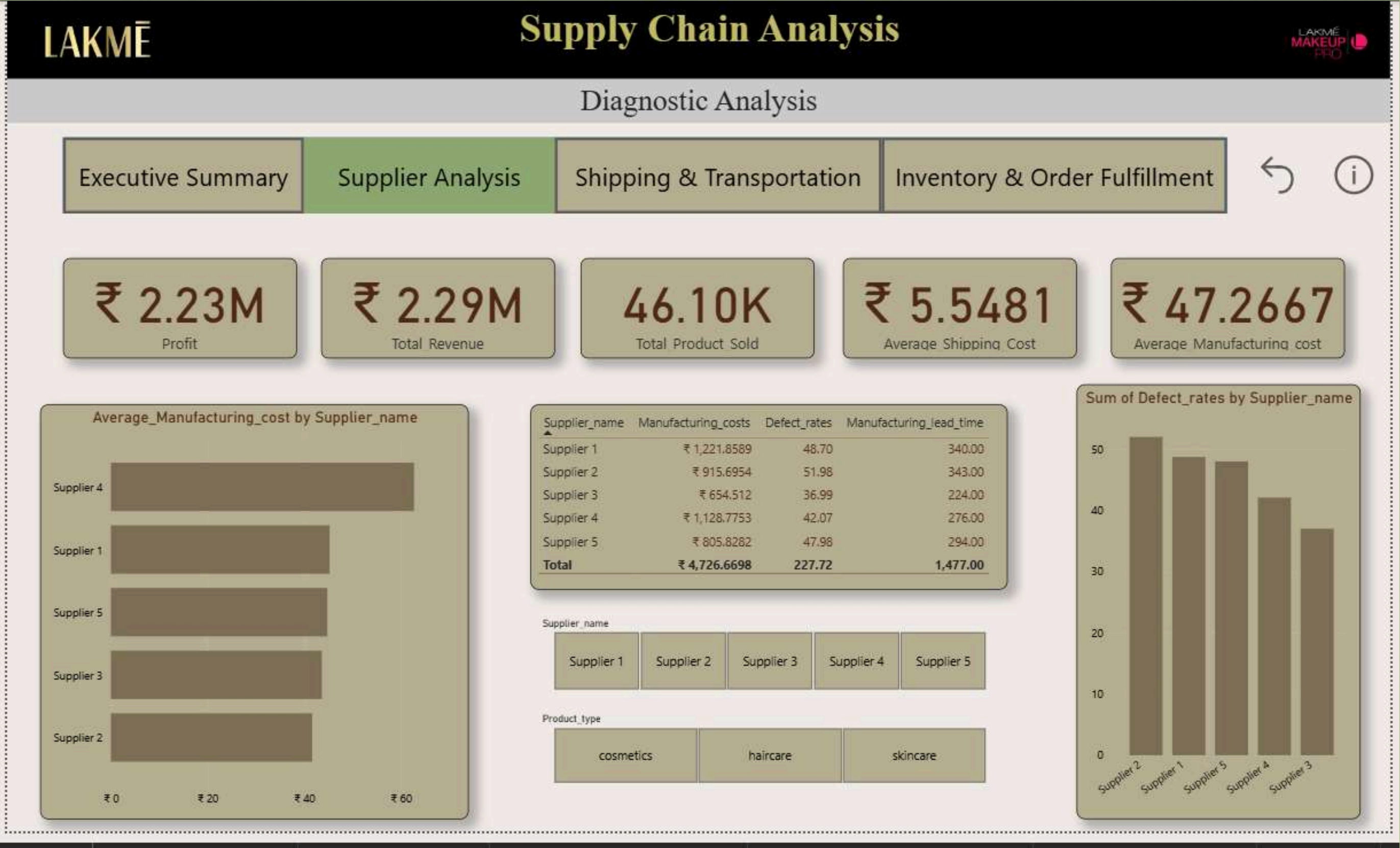


1. Executive Summary

Visuals Used:


- KPI Cards show Total Revenue, Total Products Sold, and Profit.
 - Pie Chart displays Revenue by Product Type.
 - Column chart shows SKUs by Products Sold.
 - Clustered Bar Chart compares Revenue across Product Types.
 - Slicers allow filtering by Product Type and Supplier Name
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2. Supplier Analysis

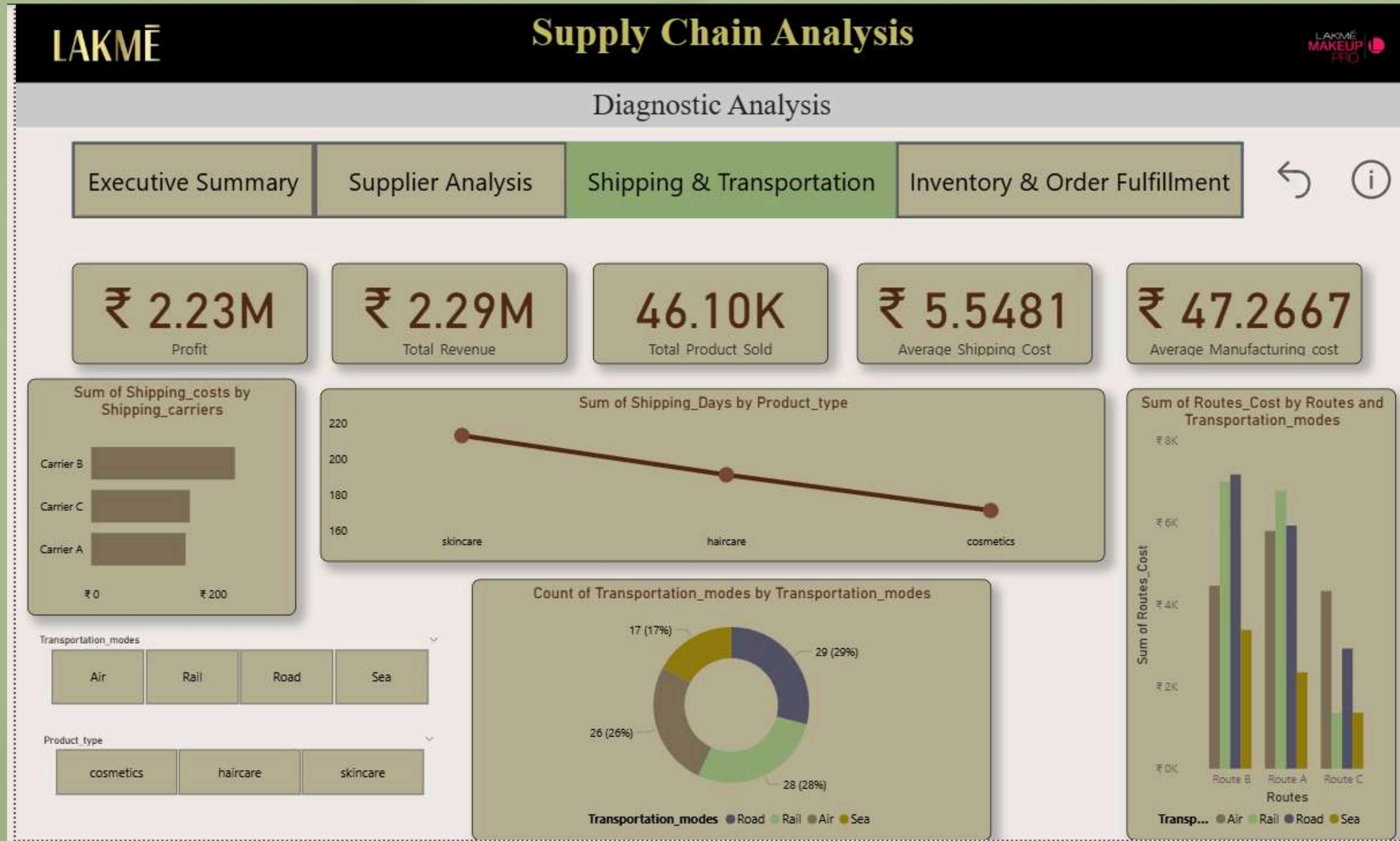


2. Supplier Analysis

Visuals Used:

- Matrix: Displays Supplier Name, Manufacturing Costs, Defect Rates, and Manufacturing Lead Time.
 - Bar Chart: Shows Average Manufacturing Cost by Supplier for easy cost comparison.
 - Stacked Column Chart: Visualizes Defect Rate by Supplier to identify quality issues.
 - KPI Card: Highlights the Average Manufacturing Cost across all suppliers.
 - Slicer: Filter the report by Supplier Name to focus on specific vendors.
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3. Shipping & Transportation

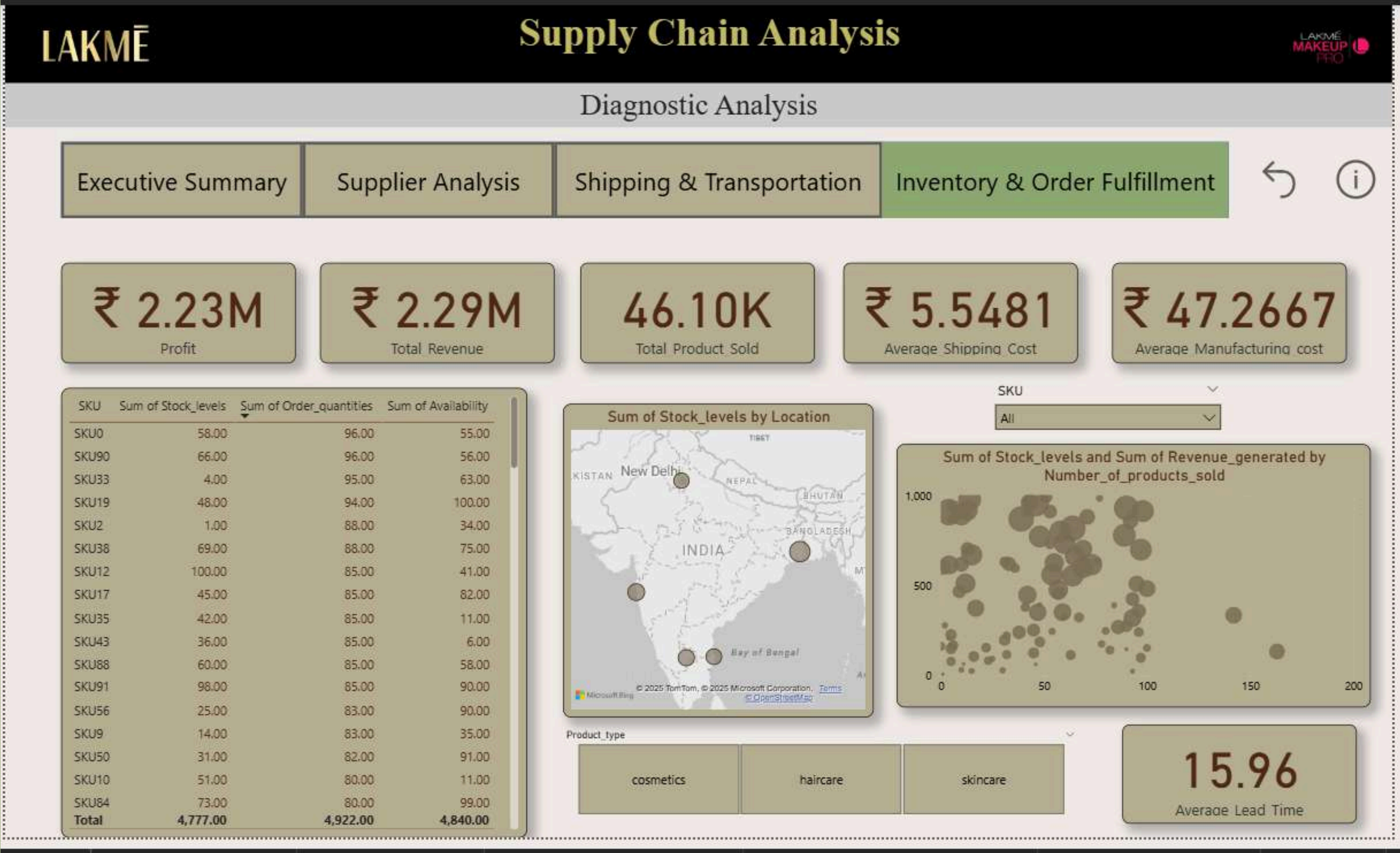


3. Shipping & Transportation

Visuals Used:

- Bar Chart: Compares Shipping Carriers by Average Shipping Costs, helping identify cost-efficient carriers.
- Donut Chart: Displays Usage Count by Transportation Mode.
- Clustered Column Chart: Shows Route-wise Shipping Costs, helping assess high-cost routes.
- Line Chart : Tracks Shipping Times by Product Type over time for delivery efficiency analysis.
- Slicer: Use Transportation Mode to filter visuals and analyze specific modes

4. Inventory and Fulfillment



4. Inventory and Fulfillment

Visuals Used:

- Table: Displays SKU, Stock Levels, Order Quantities, and Availability to monitor inventory status.
- Scatter Chart: Plots Stock Levels vs Products Sold, with Revenue as bubble size — useful for spotting overstocked or underperforming items.
- Card: Shows the Average Lead Time to fulfill orders.
- Slicer: Filter the data by SKU or Product Type for focused analysis.

Interactivity and Slicers Mention the use of slicers:

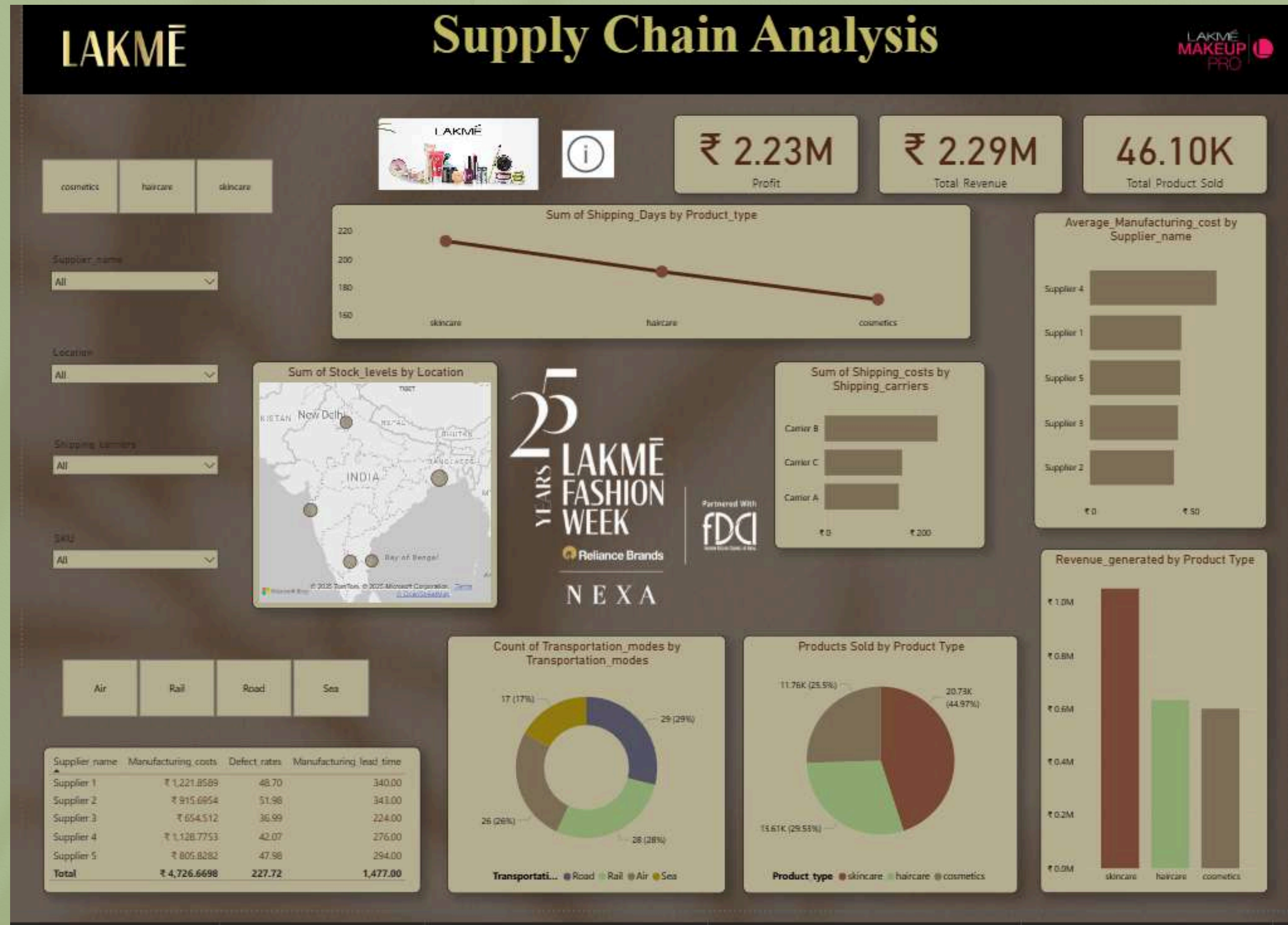
- Product Type • Supplier Name • Shipping Carrier • Transportation Mode

Users can filter visuals interactively to explore specific segments of the supply chain



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Supply Chain Analysis




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Insights

- Skincare generated the highest revenue.
- SKU10 was the best-selling item. Insights
- Supplier 1 had the lowest cost and defect rate.
- Supplier 4 was the most expensive.
- Carrier B had the lowest shipping cost.
- Sea transport is cheapest; air is most expensive.
- Several SKUs were overstocked with low sales.
- Fulfillment lead time averages 17 days.



Business Recommendations

- Set automated reorder alerts for critical SKUs (stock < 100).
 - Use ABC analysis to classify products by value and demand.
 - Optimize stock levels based on demand trends and supplier lead times.
 - Implement supplier scorecards to evaluate lead time, reliability, and quality.
 - Source locally to reduce transportation time and costs.
 - Use route optimization to lower shipping time and cost.
 - Shift bulk deliveries from road to rail to reduce costs.
 - Focus on promoting high-revenue and high-margin products.
 - Automate inspection to reduce human error and increase consistency.
 - Deploy Power BI dashboards to track supply chain KPIs in real time.
 - Set threshold-based alerts for stockouts, defects, and shipping delays.
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Thank You!



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