رواد مصر الرقمية

Ministry of Communications and Information Technology

Supply Chain

Analysis & Visualization

Report

Data Analytics

Microsoft Power BI Specialist Track

Part 2

Project Methodology & Implementation

Outline

- Data Dictionary
- Business Questions and Objectives
- Data Cleaning steps
- Data Modeling steps
- Dax Measures and Calculated tables
- Key insights
- Visual Mockups of the reports

Data Dictionary

A total of 24 columns and 100 rows are comprised in the dataset, below are the various columns;

Column	Data Type	Range / Values	Description
Product Type	Text	Cosmetics, haircare and skincare	-
SKU	Text	SKU0, SKU1,...SKU99	Stock Keeping Unit
Price	Decimal Number	[1.69 - 99.17]	Price of each item
Availability	Whole Number	[1 - 100]	-
Number of Products Sold	Whole Number	[8 - 996]	-
Revenue Generated	Decimal Number	[1061.61 - 9866.4]	-
Stock Levels	Whole Number	[0 - 100]	-
Customer demographics	Text	Female, Male, Non-binary and Unknown	-
Lead times	Whole Number	[1 - 30]	Time to receive products
Order Quantities	Whole Number	[1 - 96]	Economic Order Quantities
Shipping times	Whole Number	[1 - 10]	Time to ship to customers
Shipping carriers	Text	A, B and C	-
Shipping costs	Decimal Number	[1.01 - 9.92]	-
Supplier name	Text	[1,2,3,4 and 5]	-
Location	Text	Bangalore, Chennai, Delhi, Kolkata and Mumbai	-

Lead time	Whole Number	[1 - 30]	Time to obtain materials from supplier
Production volumes	Whole Number	[104 - 985]	-
Manufacturing lead time	Whole Number	[1 - 30]	Time required to produce a product
Manufacturing costs	Decimal Number	[1.08 - 99.46]	-
Inspection results	Text	Fail, Pass and Pending	Material quality inspection
Defect rates	Decimal Number	[0.018 - 4.93]	The level of defects in products produced
Transportation modes	Text	Air, Rail, Road and Sea	-
Routes	Text	A,B and C	-
Costs	Decimal Number	[103.9 - 997.3]	Costs related to various aspects of supply chain

Business Questions & Objectives

1. Supply Chain Operations Page

Business Objectives

- Evaluate the efficiency of supply chain operations by monitoring order, manufacturing, and shipping processes.
- Measure overall product availability and supplier reliability to ensure smooth product flow and customer satisfaction.

Business Questions

- What is the average order time, manufacturing time, and shipping time?
- Which product type (skincare, haircare, cosmetics) shows the highest inventory turnover rate and availability?
- Which suppliers have the highest percentage of failed or pending inspections?

KPIs Explained

- Average Order Time / Manufacturing Time / Shipping Time: Measures operational efficiency and customer service speed.
- Inventory Turnover Rate: Indicates how quickly inventory is sold and replaced — higher values mean better inventory management.
- Overall Product Availability: Shows the percentage of products available to meet demand — higher availability ensures fewer stockouts.
- Inspection Results (% Passed/Failed/Pending): Tracks supplier performance and quality consistency.

2. Performance Overview Page

Business Objectives

- Assess overall company performance across sales, revenue, and profitability dimensions.
- Identify top-performing product types and locations contributing most to total revenue.
- Track progress toward financial targets and productivity goals.

Business Questions

- What is the total revenue and how does it distribute across product categories?
- Which product types drive the most sales volume and profit?
- How close is the business to achieving its target profit goal?
- Which locations generate the highest revenue?
- What is the productivity level and how can it be improved?

KPIs Explained

- Total Revenue: Measures the total income generated from product sales.
- Target Profit Achievement: Compares achieved profit to the set financial goal — useful for performance tracking.
- Productivity: A high productivity value means you're producing more output for the same or lower cost.

3. Product Performance Page

Business Objectives

- Analyze product-level performance to identify high-defect or low-revenue items.
- Optimize production costs and pricing strategies for profitability.
- Reduce defect rates to improve quality and customer satisfaction.

Business Questions

- Which products (SKUs) have the highest defect rates?
- How does the average defect rate vary by product type?
- What is the relationship between manufacturing cost and selling price?
- Which SKUs contribute most to total revenue and sales volume?

KPIs Explained

- Defect Rate: Percentage of defective products; lower rates indicate better quality control.
- Products Sold (% of Total Revenue): Shows contribution of each SKU to overall revenue — used to prioritize profitable products.

4. Supplier & Manufacturing Page

Business Objectives

- Evaluate supplier performance in terms of lead time, production volume, and cost efficiency.
- Identify suppliers causing production delays.

Business Questions

- Which suppliers have the highest or lowest lead times?
- How does lead time vary by product type?
- What is the relationship between lead time and production volume?

KPIs Explained

- Lead Time: Time from order placement to delivery — shorter lead times improve responsiveness.
- Average Production Volume: Reflects supplier capacity and reliability.
- Average Manufacturing Cost: Monitors cost efficiency across suppliers.

5. Transportation Overview Page

Business Objectives

- Optimize transportation costs, time, and defect rates across different modes (road, rail, air, sea).
- Evaluate carrier performance and identify the most cost-effective and reliable routes.
- Improve delivery efficiency while minimizing shipping-related damages.

Business Questions

- Which transportation mode (road, rail, air, sea) is most cost-effective?
- What are the average shipping times and costs across different modes and routes?

- Which shipping carriers show the best performance in terms of time?

KPIs Explained

- Average Shipping Time: Measures delivery speed across transportation methods.
- Average Cost: Tracks logistics expenses to identify cost-saving opportunities.
- Average Defect Rate: Evaluates product damage during shipping — lower is better.

6. Customer Demographics Page

Business Objectives

- Identifying which customer demographic groups (e.g., male, female, unknown) contribute the most to revenue and sales.
- Understanding how location affects product demand and profitability.
- Evaluating profit distribution across product types and demographics to guide product focus.

Business Questions

- Which customer demographic contributes the most to total revenue?
- Which demographic purchases the highest number of products?
- How do sales differ by region or location?
- Which product types are the most profitable overall, and how does profitability vary by demographic group?

KPIs Explained

- Total Revenue by Demographic: Shows how much money each customer group generates — helps identify key customer segments.
- Products Sold by Demographic: Measures demand strength among different customer segments.
- Products Sold by Location: Indicates which geographical areas have the strongest sales performance.
- Profit by Product Type → by Demographics: Shows which product types and customer groups generate the highest profit margins.

Data Cleaning Steps

- No duplicates found in the data.
- No missing values or errors found in the data.
- No cleaning was required before modeling.

Data Modeling Steps

The objective of data modeling is to organize the supply chain dataset into a normalized star schema that connects key entities such as products, suppliers, customers, and locations. This structure ensures data consistency, accuracy, and efficient analysis, enabling clear insights into core supply chain operations and performance indicators.

Step 1: identify facts and dimensions

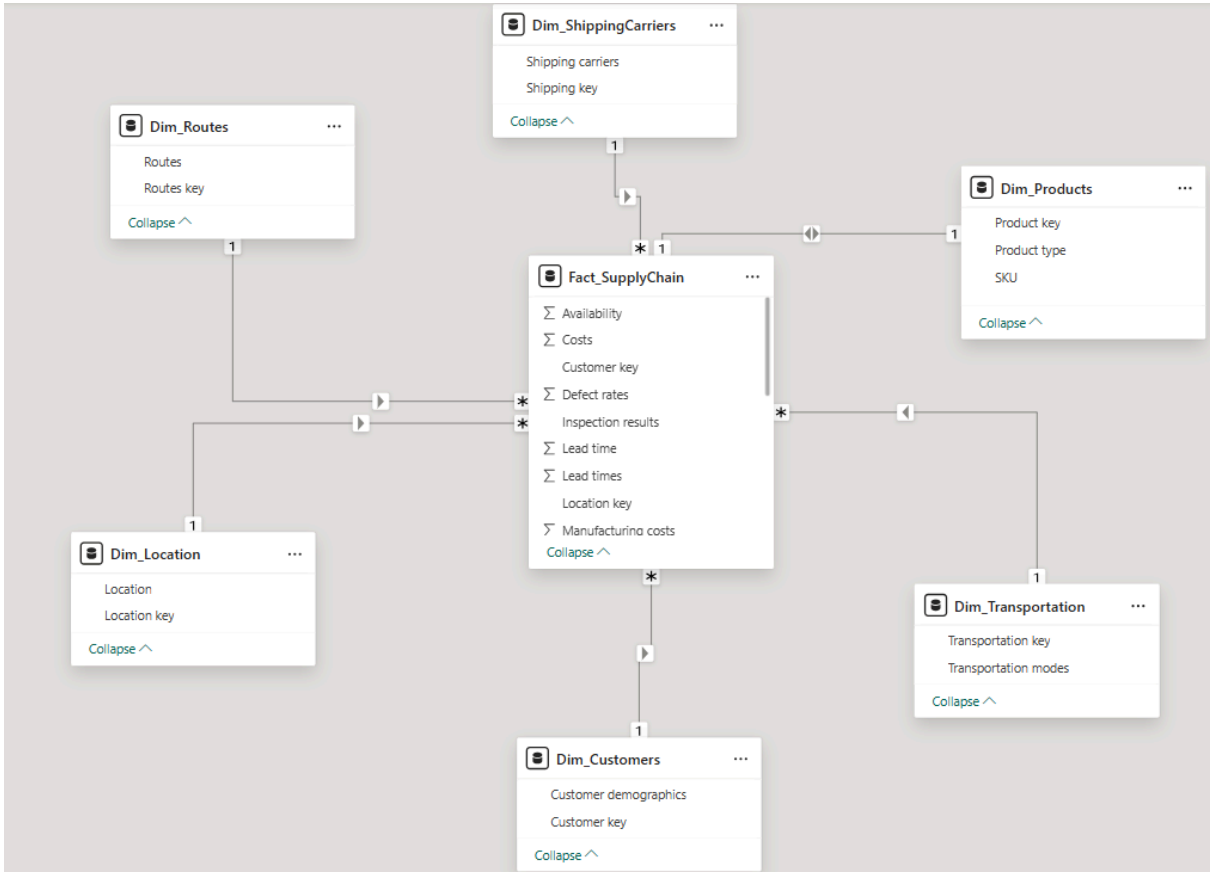
- Fact table: contains quantitative data such as: Costs, Availability, lead times, manufacturing costs, shipping times,..etc.
- Dimension table: contains descriptive columns such as: product type, shipping carrier, location,..etc.

Step 2: create dimension tables

- **Dim_Products:** Product Type, SKU
- **Dim_Customers:** Customer Demographics
- **Dim_Location:** Location
- **Dim_Transportation:** Transportation Modes
- **Dim_ShippingCarriers:** Shipping Carriers
- **Dim_Routes:** Routes

Step 3: creating relationships

1. Removed Duplicates from dimension tables.
2. Assigned primary key for each dimension table.
3. Added foreign key to the fact table to create 1 to many relationships.
4. The resulting schema is a star schema.



DAX Measures and Calculated Tables

To support data-driven insights and performance evaluation across supply chain operations, several DAX measures and calculated tables were developed. These measures focus on key performance indicators (KPIs).

Key Measures

Measure Name	Description	Formula (DAX)
Inventory Turnover	Evaluates how efficiently inventory is being sold and replaced.	DIVIDE(SUM(Fact_SupplyChain[Number of products sold]), SUM(Fact_SupplyChain[Stock levels]))
Average Unit Price	Determines the average price per sold product.	DIVIDE([Total Revenue], [Total Products Sold], 0)
Profit	Measures profitability by subtracting total costs from total revenue.	[Total Revenue] - [Total Cost]
Overall Product Availability	Indicates the proportion of available stock compared to total stock levels.	DIVIDE(SUM(Fact_SupplyChain[Availability]), SUM(Fact_SupplyChain[Stock levels]))
Productivity	Measures production efficiency in relation to manufacturing costs.	DIVIDE([Average Production Volume], SUM(Fact_SupplyChain[Manufacturing costs]))

% Failed	Percentage of products that failed inspection	DIVIDE(CALCULATE(COUNTROWS(Fact_SupplyChain), Fact_SupplyChain[Inspection results] = "Fail"), COUNTROWS(Fact_SupplyChain))
% Passed	Percentage of products that passed inspection.	DIVIDE(CALCULATE(COUNTROWS(Fact_SupplyChain), Fact_SupplyChain[Inspection results] = "Pass"), COUNTROWS(Fact_SupplyChain))
% Pending	Percentage of products with inspection results pending.	DIVIDE(CALCULATE(COUNTROWS(Fact_SupplyChain), Fact_SupplyChain[Inspection results] = "Pending"), COUNTROWS(Fact_SupplyChain))
Profit Target	Defines the desired profit benchmark.	Target Value = 600,000

Averaged KPIs

- Defect Rate
- Manufacturing Cost
- Manufacturing Lead Time
- Production Volume

- Shipping Time
- Supplier Lead Time
- Transportation Cost

Total Measures

- Total Revenue
- Total Quantities
- Total Products sold
- Total Products produced
- Total Costs

Calculated tables

Table Name	Description	Formula (DAX)
Worst SKUs by Defect Rate	Identifies the 10 products (SKUs) with the highest defect rates for quality monitoring and process improvement.	TOPN(10, ADDCOLUMNS(Dim_Products, "Defect Rate", [Total Defect rate]), [Total Defect rate], DESC)

Key Insights

Product Performance & Demand

- Skincare demonstrates the strongest market performance, recording the highest inventory turnover (12.89), followed by Haircare and Cosmetics, indicating fast product movement and high demand.
- Skincare also generates the highest revenue, number of products sold, and total quantities ordered, confirming its dominant position in overall sales performance.
- The Skincare product type shows the highest overall product availability, suggesting that most skincare items remain well-stocked and ready for sale.

Supplier & Manufacturing Insights

- Supplier 1 achieved the highest inspection pass rate, reflecting consistent product quality.
- Supplier 4 recorded no passed inspections and the highest failure percentage, signaling critical quality control issues.
- Suppliers 2 and 3 reported the longest lead times, which may contribute to delays in product replenishment.
- Supplier 3 also has the highest average lead time, emphasizing the need for supplier performance optimization.

- Supplier 4 leads in production volume and manufacturing cost, indicating large-scale operations but potentially lower cost efficiency.

Transportation & Logistics

- The Road transportation mode is the most frequently used and incurs the second highest overall costs.
- Products shipped via Road experience the highest average defect rates, while Air transport yields the lowest defect rates, highlighting a potential trade-off between cost and quality.
- Sea mode exhibits the longest average shipping time, likely due to extended transit durations.
- Among carriers, Carrier A records the highest average shipping time, while Carrier C is associated with the highest rate of failed inspections, suggesting quality concerns during handling.
- Route B incurs the highest average transportation cost, indicating a need to reassess its efficiency and cost structure.

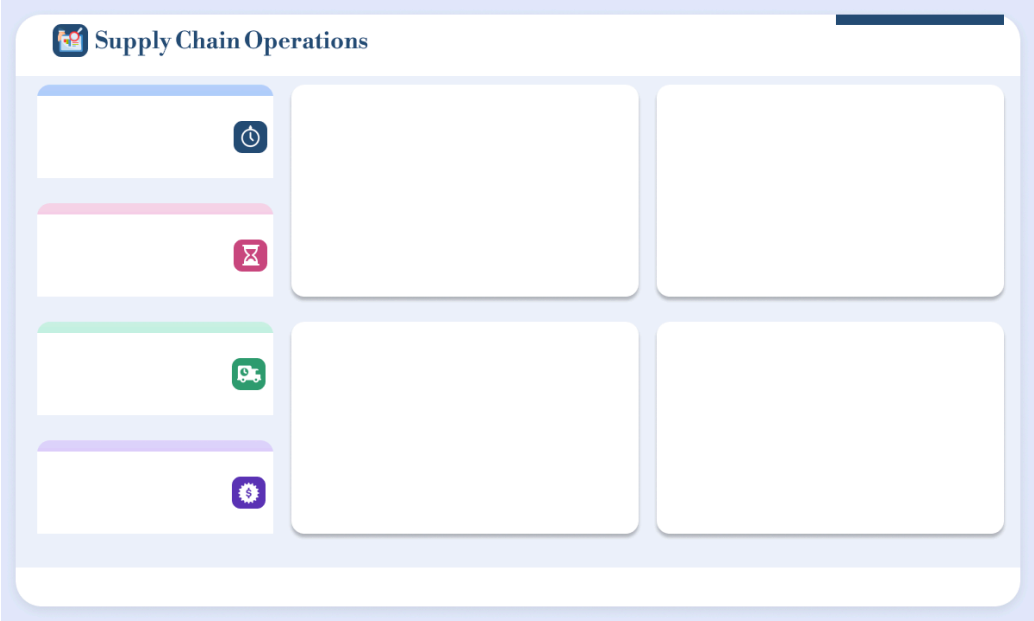
Geographic Insights

- Mumbai stands out as the top-performing location, generating the highest overall revenue across all regions, reinforcing its strategic importance for sales and distribution.

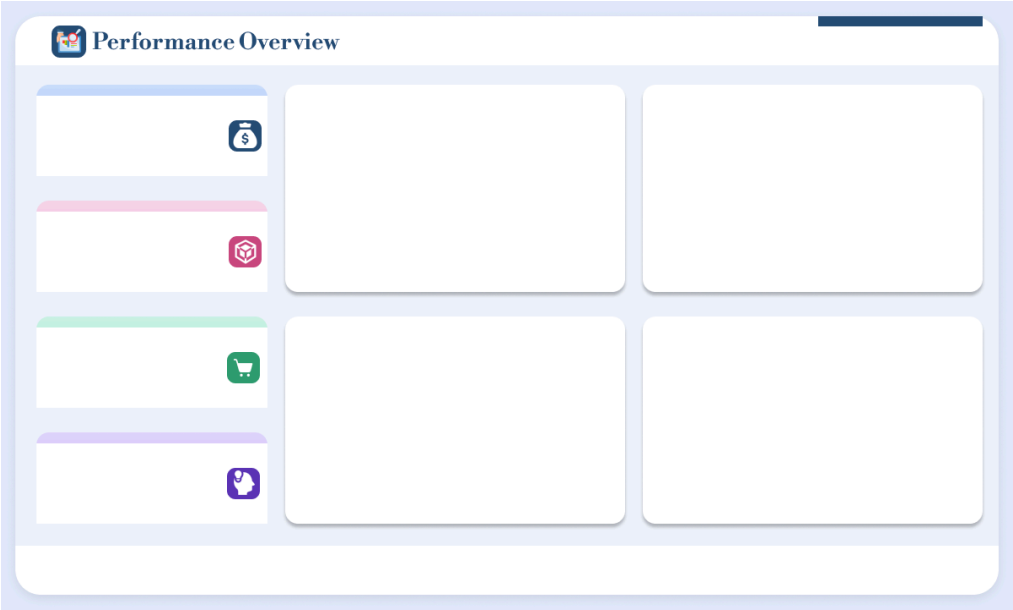
Visual Mockups of the report

Pages mockups are made using Figma.

Page 1



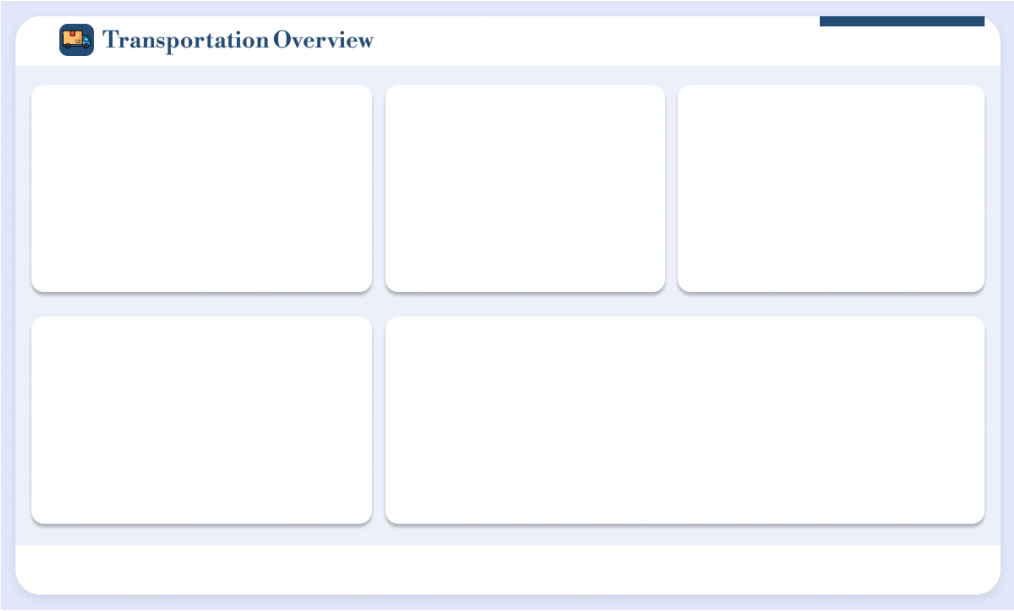
Page 2



Page 3

Page 4

Page 5



Page 6