

# Retail Sales Performance Analysis

## Overview

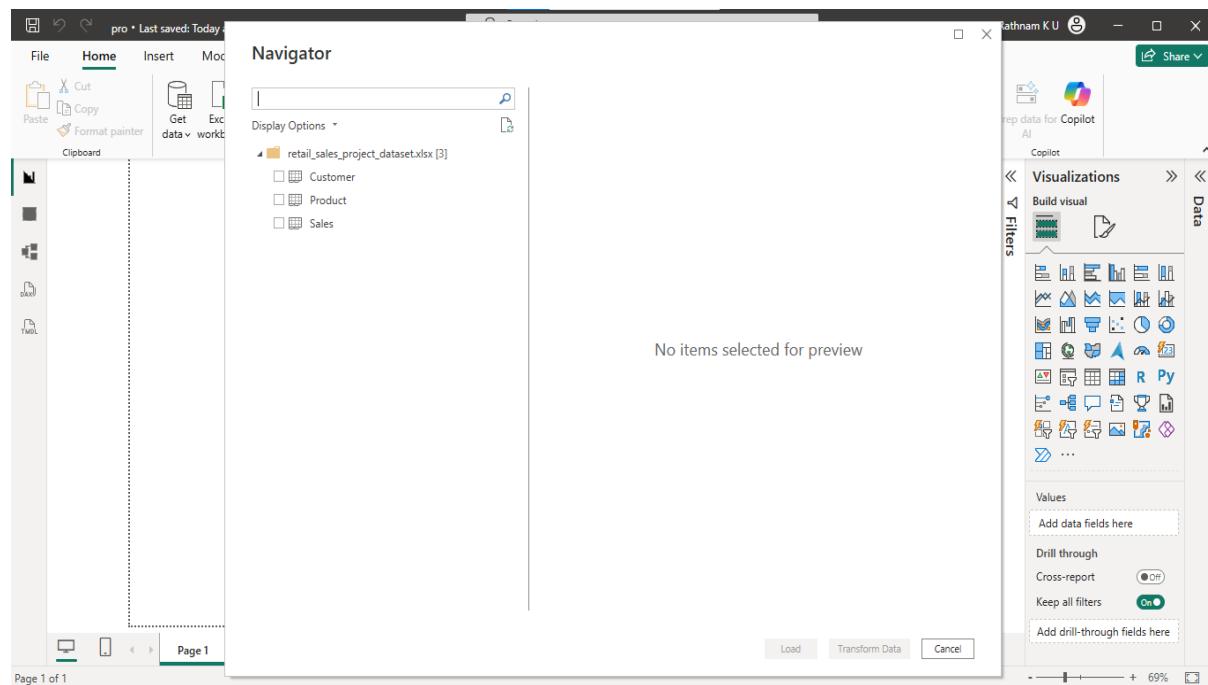
This Power BI dashboard provides a consolidated overview of retail sales performance across regions, product categories, and customer segments. It highlights key business metrics such as Total Sales, Total Profit, Profit Margin, and Number of Orders, enabling quick assessment of overall performance. The dashboard allows management to compare regional sales trends, identify high- and low-performing product categories, and observe monthly sales patterns through interactive visuals and filters. This overview supports data-driven decision-making for improving profitability, optimizing inventory, and planning targeted promotions.

The step-by-step process involves loading the sales data into Power BI, cleaning and validating it using Power Query, and creating a star schema data model. DAX measures were then applied to calculate key metrics such as Total Sales, Total Profit, and Profit Margin. Finally, an interactive overview dashboard was designed to analyze regional and category-wise performance and support business decision-making.

Below is the step-by-step process,

### STEP 1: Load Data into Power BI

The raw retail sales dataset was loaded into Power BI using the *Get Data* option. Customer, Product, and Sales tables were imported to support structured analysis and reporting.



Customer

	CustomerID	CustomerName	Segment	Region
1	Customer_1	Home Office	South	
2	Customer_2	Consumer	East	
3	Customer_3	Corporate	East	
4	Customer_4	Consumer	East	
5	Customer_5	Corporate	West	
6	Customer_6	Consumer	South	
7	Customer_7	Corporate	South	
8	Customer_8	Corporate	North	
9	Customer_9	Home Office	East	
10	Customer_10	Home Office	South	
11	Customer_11	Consumer	West	
12	Customer_12	Corporate	West	
13	Customer_13	Corporate	North	
14	Customer_14	Consumer	West	
15	Customer_15	Corporate	North	
16	Customer_16	Home Office	North	
17	Customer_17	Home Office	East	
18	Customer_18	Home Office	North	
19	Customer_19	Consumer	South	
20	Customer_20	Home Office	North	

4 COLUMNS, 100 ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED ON THURSDAY

## STEP 2: Data Cleaning (Power Query)

Data cleaning was performed using Power Query. The dataset was checked for missing values in critical columns such as Sales, Profit, Quantity, and Order Date. Records with missing or invalid values were handled appropriately to ensure data consistency. Duplicate records were identified using Order ID and Product ID combinations and were removed. Date formats and category names were standardized to improve data quality.

### Customer:

Customer

	CustomerID	CustomerName	Segment	Region
1	Customer_1	Home Office	South	
2	Customer_2	Consumer	East	
3	Customer_3	Corporate	East	
4	Customer_4	Consumer	East	
5	Customer_5	Corporate	West	
6	Customer_6	Consumer	South	
7	Customer_7	Corporate	South	
8	Customer_8	Corporate	North	
9	Customer_9	Home Office	East	
10	Customer_10	Home Office	South	
11	Customer_11	Consumer	West	
12	Customer_12	Corporate	West	
13	Customer_13	Corporate	North	
14	Customer_14	Consumer	West	
15	Customer_15	Corporate	North	
16	Customer_16	Home Office	North	
17	Customer_17	Home Office	East	

4 COLUMNS, 100 ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED ON THURSDAY

## Product:

5 COLUMNS, 10 ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED ON THURSDAY

## Sales

9 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED ON THURSDAY

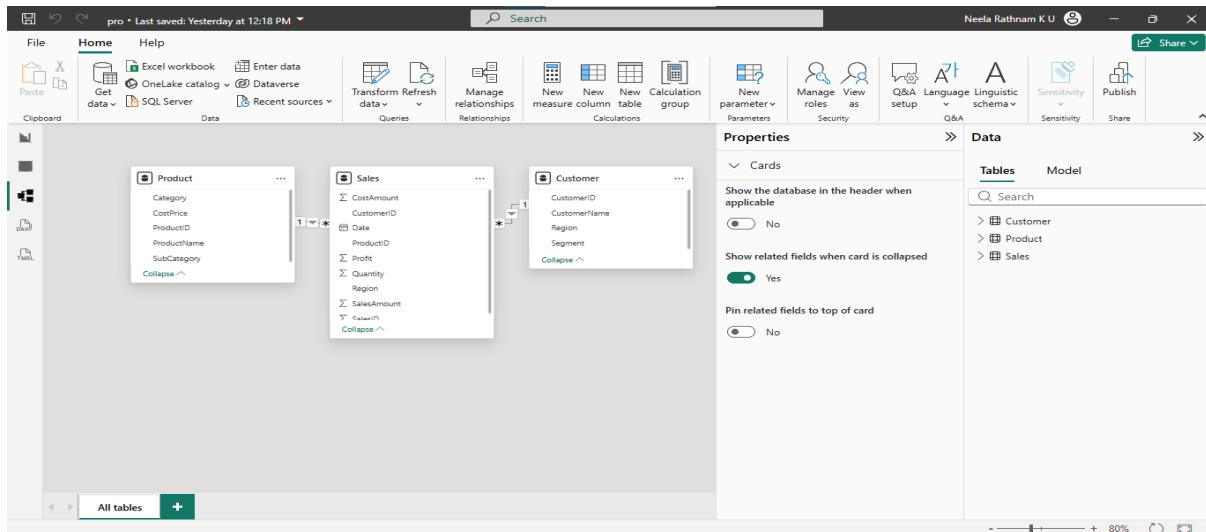
Missing values in Sales & Profit were checked and handled. Duplicate orders were removed to ensure data accuracy.

## STEP 3: Create Data Model (Relationships)

**Sales[CustomerID] → Customer[CustomerID]**

**Sales[ProductID] → Product[ProductID]**

A star schema data model was created to enable efficient analysis. The Sales table was used as the fact table and connected to Customer and Product dimension tables through appropriate relationships. This model reduces data redundancy, improves query performance, and allows easy slicing of data by region, category, and segment.



## Model structure

- ★ Sales center
  - ★ Customer + Product sides
- (Star Schema)

## Manage relationships

+ New relationship		Autodetect	<input type="button" value="Edit"/>	<input type="button" value="Delete"/>	<input type="button" value="Filter"/>
<input type="checkbox"/>	From: table (column)	↑	Relationship	To: table (column)	Status
<input type="checkbox"/>	Sales (CustomerID)	*	—> 1	Customer (CustomerID)	Active
<input type="checkbox"/>	Sales (ProductID)	*	—> 1	Product (ProductID)	Active

## ← Edit relationship

X

Select tables and columns that are related.

### From table

Sales

CostAmount	CustomerID	Date	ProductID	Profit	Quantity	Region
3964	69	12 December ...	2	658.99	4	West
7928	55	14 June 2024	2	2883.91	8	West
4955	80	04 October 2...	2	2914.92	5	West

### To table

Customer

CustomerID	CustomerName	Region	Segment
1	Customer_1	South	Home Office
2	Customer_2	East	Consumer
3	Customer_3	East	Corporate

### Cardinality

Many to one (\*:1)

### Cross-filter direction

Single

Make this relationship active

Apply security filter in both directions

Assume referential integrity

Save

Cancel

## ← Edit relationship

X

Select tables and columns that are related.

### From table

Sales

CostAmount	CustomerID	Date	ProductID	Profit	Quantity	Region
3964	69	12 December ...	2	658.99	4	West
7928	55	14 June 2024	2	2883.91	8	West
4955	80	04 October 2...	2	2914.92	5	West

### To table

Product

Category	CostPrice	ProductID	ProductName	SubCategory
Electronics	1948	1	Laptop 1	Laptop
Electronics	991	2	Printer 2	Printer
Electronics	1150	3	Monitor 3	Monitor

### Cardinality

Many to one (\*:1)

### Cross-filter direction

Single

Make this relationship active

Apply security filter in both directions

Assume referential integrity

Save

Cancel

## STEP 4: Create DAX Measures

Total Sales = SUM(Sales[SalesAmount])

Total Profit = SUM(Sales[Profit])

Profit Margin % =DIVIDE([Total Profit], [Total Sales], 0) \* 100

Orders = COUNT(Sales[SalesID])

Low Margin =IF([Profit Margin %] < 10, "Low", "Good")

Key performance metrics were calculated using DAX measures. Measures such as Total Sales, Total Profit, Profit Margin (%), and Number of Orders were created to support analysis and dashboard visuals. These measures ensure consistent calculations across all reports.

### Total Sales

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. In the top left, the measure name is set to 'Total Sales' and the home table is 'Customer'. The formula bar shows the DAX formula: `i Total Sales = SUM(Sales[SalesAmount])`. The Data pane on the right lists the 'Customer' table with fields: CustomerID, CustomerName, Region, Segment, Total Sales, Product, and Sales. The Visualizations pane shows various chart and report options. The report canvas is currently empty, awaiting data visualization.

### Total Profit

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. In the top left, the measure name is set to 'Total Profit' and the home table is 'Customer'. The formula bar shows the DAX formula: `i Total Profit = SUM(Sales[Profit])`. The Data pane on the right lists the 'Customer' table with fields: CustomerID, CustomerName, Region, Segment, Total Profit, Product, and Sales. The Visualizations pane shows various chart and report options. The report canvas is currently empty, awaiting data visualization.

## Profit Margin

The screenshot shows the Power BI desktop interface with the 'Modeling' tab selected. In the 'Calculated columns' section, there is a new column named 'Profit Margin %' with the following DAX formula:

```
1 Profit Margin % =  
2 DIVIDE([Total Profit], [Total Sales], 0) * 100  
3
```

The Data pane on the right shows the following structure:

- Customer
  - CustomerID
  - CustomerName
  - Profit Margin %
  - Region
  - Segment
  - Total Profit
  - Total Sales
- Product
- Sales

The Visualizations pane shows various chart and table icons.

## Orders

The screenshot shows the Power BI desktop interface with the 'Modeling' tab selected. In the 'Calculated columns' section, there is a new column named 'Orders' with the following DAX formula:

```
1 Orders = COUNT(Sales(SalesID))  
2
```

The Data pane on the right shows the following structure:

- Customer
  - CustomerID
  - CustomerName
  - Orders
  - Profit Margin %
  - Region
  - Segment
  - Total Profit
  - Total Sales
- Product
- Sales

The Visualizations pane shows various chart and table icons.

## Low Margin

The screenshot shows the Power BI desktop interface with the 'Modeling' tab selected. In the 'Calculated columns' section, there is a new column named 'Low Margin' with the following DAX formula:

```
1 Low Margin =  
2 IF([Profit Margin %] < 10, "Low", "Good")  
3
```

The Data pane on the right shows the following structure:

- Customer
  - CustomerID
  - CustomerName
  - Low Margin
  - Orders
  - Profit Margin %
  - Region
  - Segment
  - Total Profit
  - Total Sales
- Product
- Sales

The Visualizations pane shows various chart and table icons.

## STEP 5 : Create Visuals (Dashboard)

### Overview Dashboard

Add:

#### KPI Cards

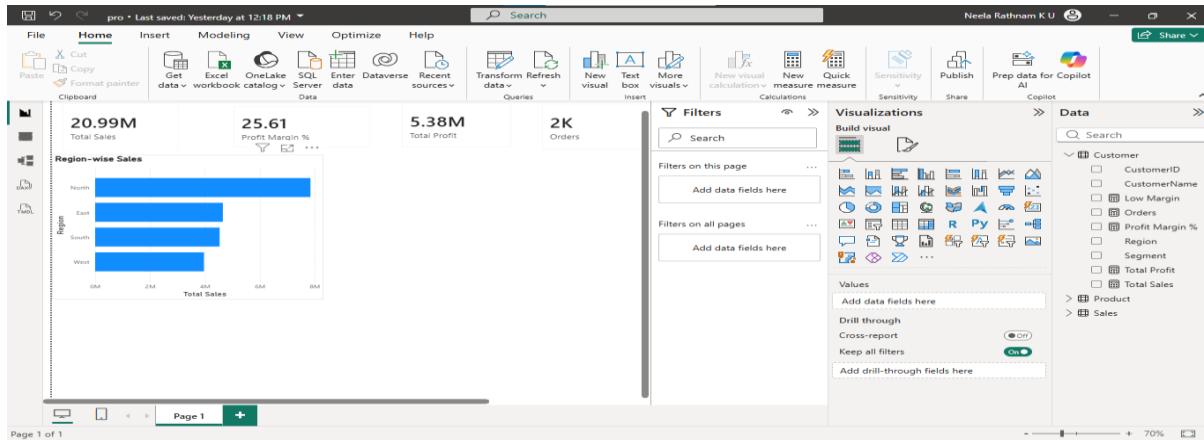
- Total Sales
- Total Profit
- Profit Margin %
- Orders

An overview dashboard was designed using KPI cards, bar charts, column charts, and line charts. KPI cards display Total Sales, Total Profit, Profit Margin, and Orders. Charts were used to visualize region-wise sales performance, category-wise profit contribution, and monthly sales trends.

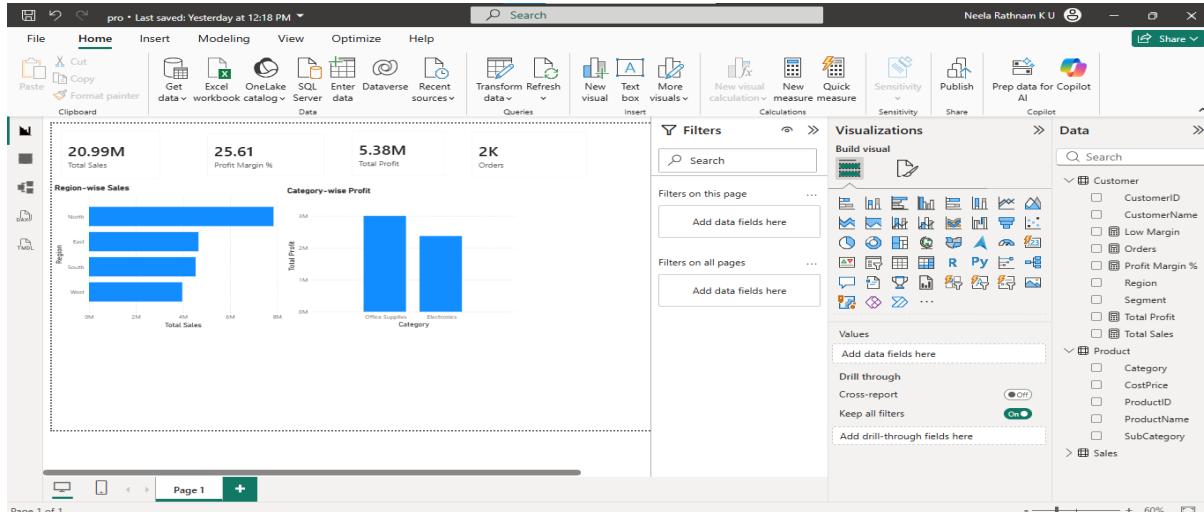
The screenshot shows the Microsoft Power BI Desktop interface. The ribbon at the top includes File, Home, Insert, Modeling, View, Optimize, and Help. The Home tab is selected. The ribbon has several sections: Clipboard (Cut, Copy, Paste, Format painter), Data (Get data, workbook catalog, OneLake, SQL Server, Enter Dataverse, Recent sources), Queries (Transform data, Refresh data), Insert (New visual, Text box, More visuals, New visual calculation, New measure, Quick measure), Calculations (Sensitivity, Share, Publish, Prep data for Copilot AI, Copilot). The main workspace displays a dashboard with four KPI cards: Total Sales (20.99M), Profit Margin % (25.61), Total Profit (5.38M), and Orders (2K). To the right of the dashboard is the 'Visualizations' pane, which contains a 'Build visual' section with various chart icons, a 'Filters' section with dropdown menus for 'Filters on this page' and 'Filters on all pages', and a 'Values' section with dropdown menus for 'Add data fields here'. The bottom of the screen shows navigation buttons for the dashboard (Page 1, +) and a status bar indicating 'Page 1 of 1' and '50%'. The overall theme is light gray with blue and green accents.

## Charts

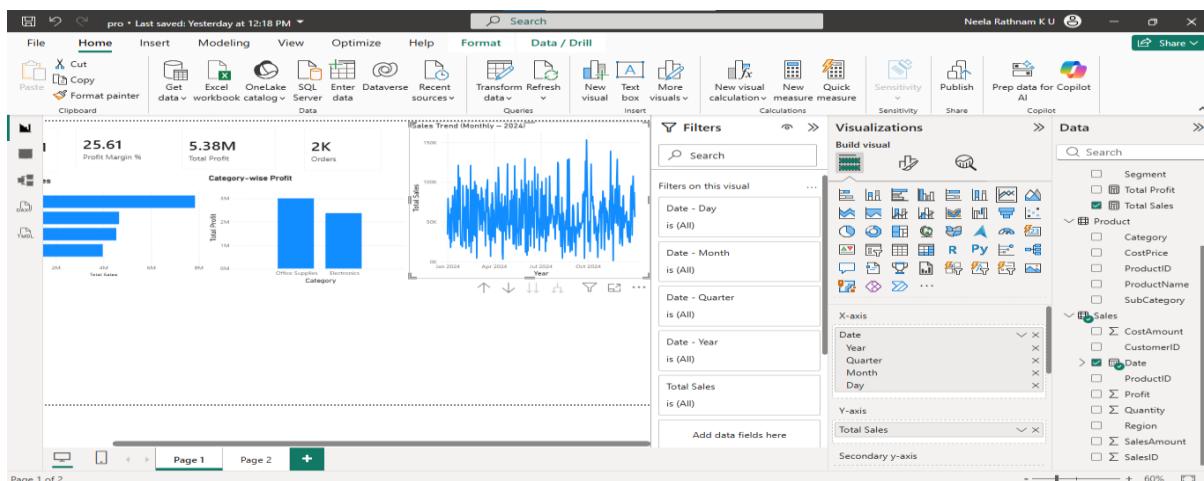
### Bar → Region vs Sales



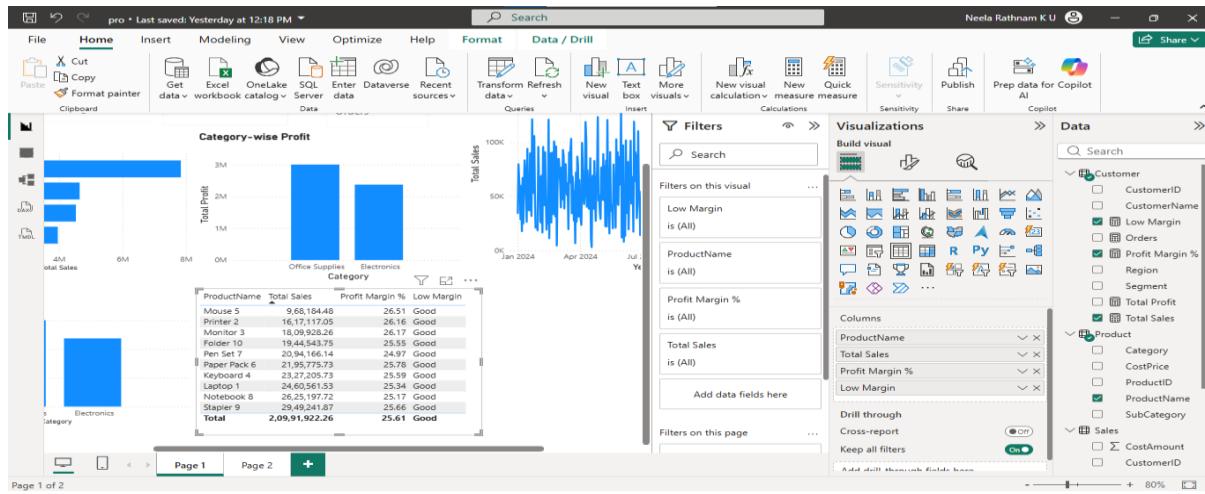
### Column → Category vs Profit



### Line → Date vs Sales (trend)



## Product Analysis

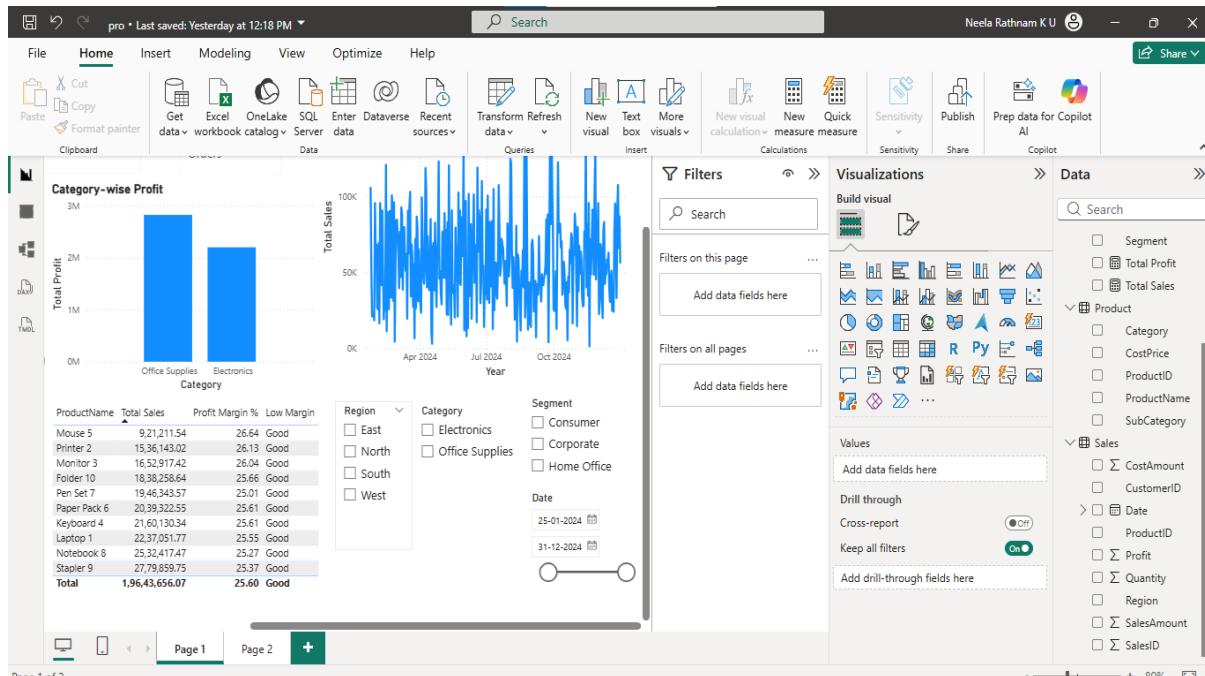


## STEP 6: Slicers (Filters)

Add slicers:

- Region
- Category
- Date
- Segment

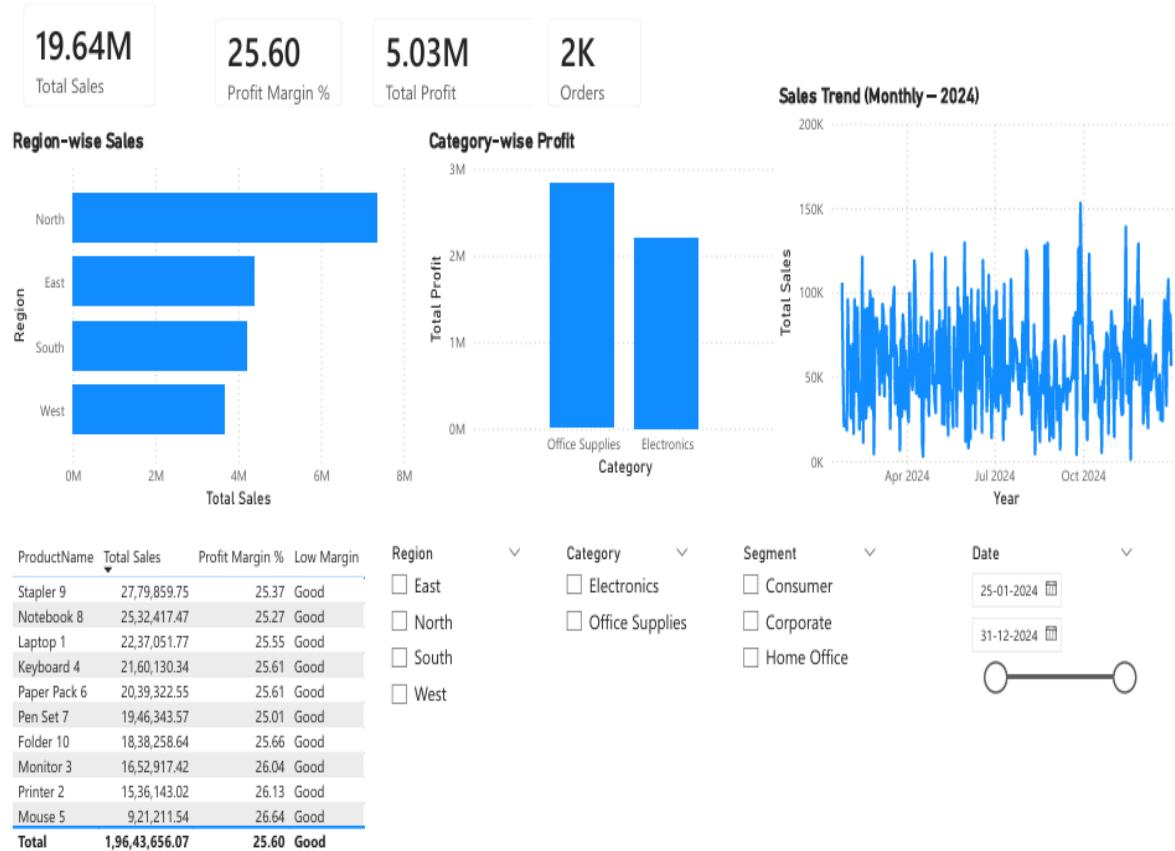
Interactive slicers were added for Region, Category, Segment, and Date. These filters allow users to dynamically explore data and analyze performance across different dimensions.



## STEP 7 : Insights and Business Recommendation

Based on the analysis, high-performing and low-performing products and regions were identified. Office Supplies emerged as the most profitable category, while certain Electronics products showed low profit margins despite high sales. These insights support decisions related to promotions, pricing strategies, and inventory planning.

### Retail Sales Performance Analysis Dashboard



### Retail Sales Performance Analysis

#### Power BI Dashboard Report

1. Identify missing values and duplicates in the Sales dataset. What cleaning steps are required?

## Data Cleaning and Validation

**Retail\_Sales\_Analysis (1)**

File Home Transform Add Column View Tools Help

Queries [3] = Table.Distinct(#"Changed Type", {"CustomerID"})

Customer Product Sales

	CustomerID	CustomerName	Segment	Region
1	Customer_1	Valid	100%	South
2	Customer_2	Error	0%	East
3	Customer_3	Corporate	100%	East
4	Customer_4	Consumer	100%	East
5	Customer_5	Corporate	100%	West
6	Customer_6	Consumer	100%	South
7	Customer_7	Corporate	100%	North
8	Customer_8	Corporate	100%	North
9	Customer_9	Home Office	100%	East
10	Customer_10	Home Office	100%	South
11	Customer_11	Consumer	100%	West
12	Customer_12	Corporate	100%	West
13	Customer_13	Corporate	100%	North
14	Customer_14	Consumer	100%	West
15	Customer_15	Corporate	100%	North
16	Customer_16	Home Office	100%	North
17	Customer_17	Home Office	100%	East

Properties Advanced Editor Query Settings

APPLIED STEPS

- Removed Duplicates

**Retail\_Sales\_Analysis (1)**

File Home Transform Add Column View Tools Help

Queries [3] = Table.TransformColumnTypes(#"Promoted Headers",{{"ProductID", Int64.Type}, {"ProductName", type text}, {"Category", type text}, {"SubCategory", type text}, {"CostPrice", type number}})

Customer Product Sales

	ProductID	ProductName	Category	SubCategory	CostPrice
1	Laptop 1	Electronics	Laptop		1948
2	Printer 2	Electronics	Printer		991
3	Monitor 3	Electronics	Monitor		1150
4	Keyboard 4	Electronics	Keyboard		1599
5	Mouse 5	Electronics	Mouse		761
6	Paper Pack 6	Office Supplies	Paper Pack		1502
7	Pen Set 7	Office Supplies	Pen Set		1398
8	Notebook 8	Office Supplies	Notebook		1841
9	Stapler 9	Office Supplies	Stapler		1961
10	Folder 10	Office Supplies	Folder		1309

Properties Advanced Editor Query Settings

APPLIED STEPS

- Changed Type

**Retail\_Sales\_Analysis (1)**

File Home Transform Add Column View Tools Help

Queries [3] = Table.TransformColumnTypes(#"Promoted Headers",{{"SalesID", Int64.Type}, {"Date", type date}, {"CustomerID", type text}, {"ProductID", type text}, {"Region", type text}, {"Quantity", type number}})

Customer Product Sales

	SalesID	Date	CustomerID	ProductID	Region	Quantity
1	1	29-10-2024	96	10	East	100%
2	2	07-07-2024	23	4	West	100%
3	3	15-01-2024	72	6	South	100%
4	4	09-07-2024	62	3	South	100%
5	5	08-02-2024	55	6	West	100%
6	6	30-09-2024	77	7	West	100%
7	7	11-10-2024	19	7	East	100%
8	8	24-02-2024	11	9	West	100%
9	9	01-12-2024	86	5	South	100%
10	10	22-03-2024	43	9	South	100%
11	11	12-06-2024	59	1	South	100%
12	12	14-11-2024	55	3	West	100%
13	13	25-06-2024	79	10	East	100%
14	14	14-05-2024	57	1	East	100%
15	15	26-04-2024	34	4	South	100%
16	16	20-06-2024	99	10	East	100%
17	17	28-10-2024	27	1	North	100%

Properties Advanced Editor Query Settings

APPLIED STEPS

- Changed Type

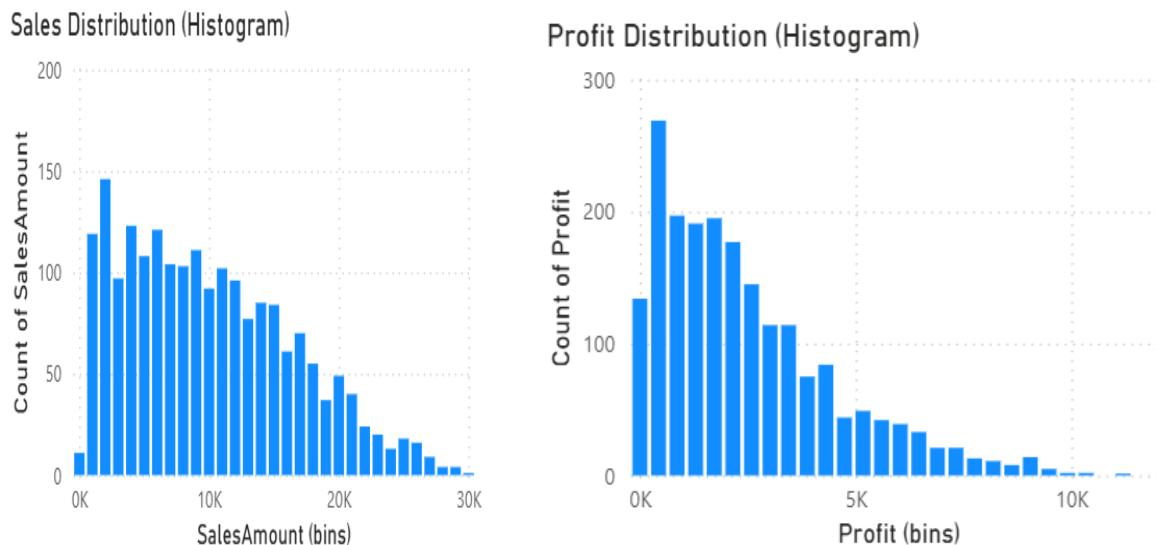
Before analysis, the raw sales data was cleaned and validated using Power Query in Power BI.

- The dataset was checked for **missing values** in key columns such as Sales, Profit, Quantity, and Order Date.
- Records with missing critical values were either removed or corrected to ensure accuracy.
- **Duplicate records** were identified using Order ID and Product ID combinations and were removed.
- Data formats such as date fields and category names were standardized.

These steps ensured the dataset was accurate, consistent, and reliable for further analysis.

## 2. Perform univariate analysis on Sales and Profit. What distribution patterns do you observe?

### Univariate Analysis on Sales and Profit



Univariate analysis was performed to understand the distribution of Sales and Profit.

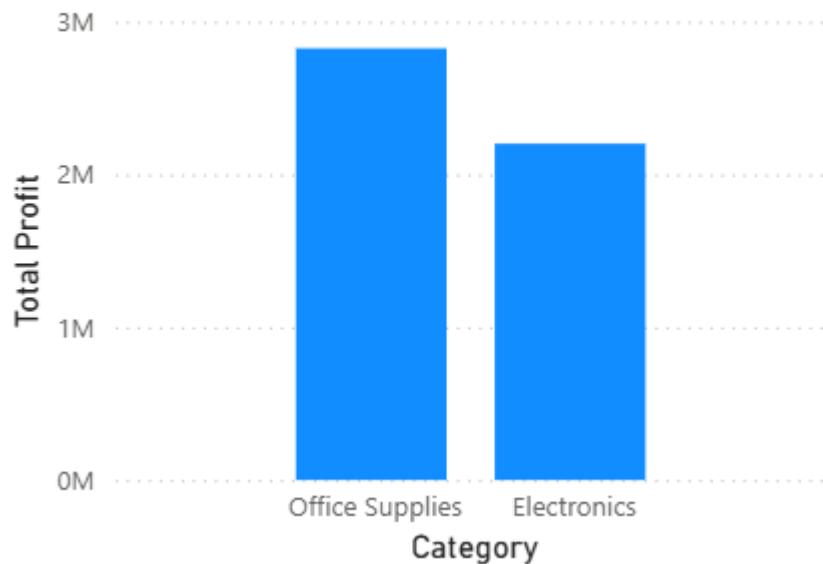
- **Sales Distribution:**  
Sales values are right-skewed, indicating that a small number of high-value transactions contribute significantly to total revenue.
- **Profit Distribution:**  
Profit values vary widely across products. Some products generate high sales but comparatively low profit, indicating margin issues.

This analysis shows that revenue growth does not always translate into consistent profitability.

### 3. Which product categories contribute the highest revenue and profit?

#### Product Category Contribution

##### Category-wise Profit



The business primarily sells products under two categories:

- Electronics
- Office Supplies

#### Key Observations:

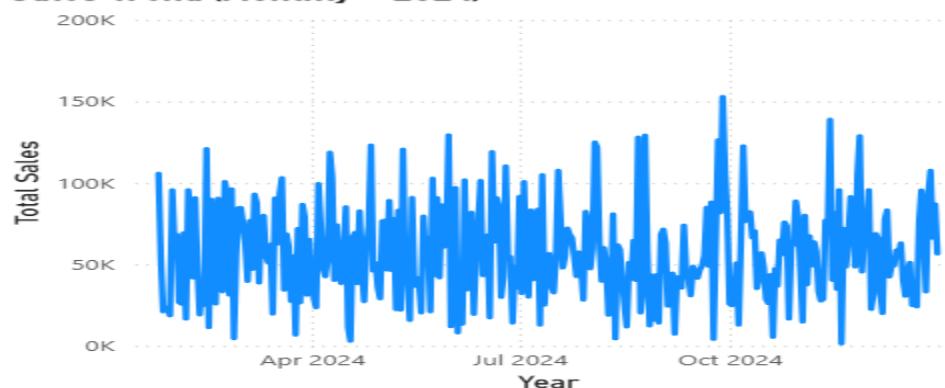
- **Office Supplies** contribute the highest profit overall.
- **Electronics** generate high sales but show relatively lower profit margins.

This indicates that Office Supplies are more consistently profitable compared to Electronics.

### 4. How does sales performance vary across regions?

#### Regional Sales Performance

##### Sales Trend (Monthly – 2024)



Sales performance was analyzed across four regions: North, South, East, and West.

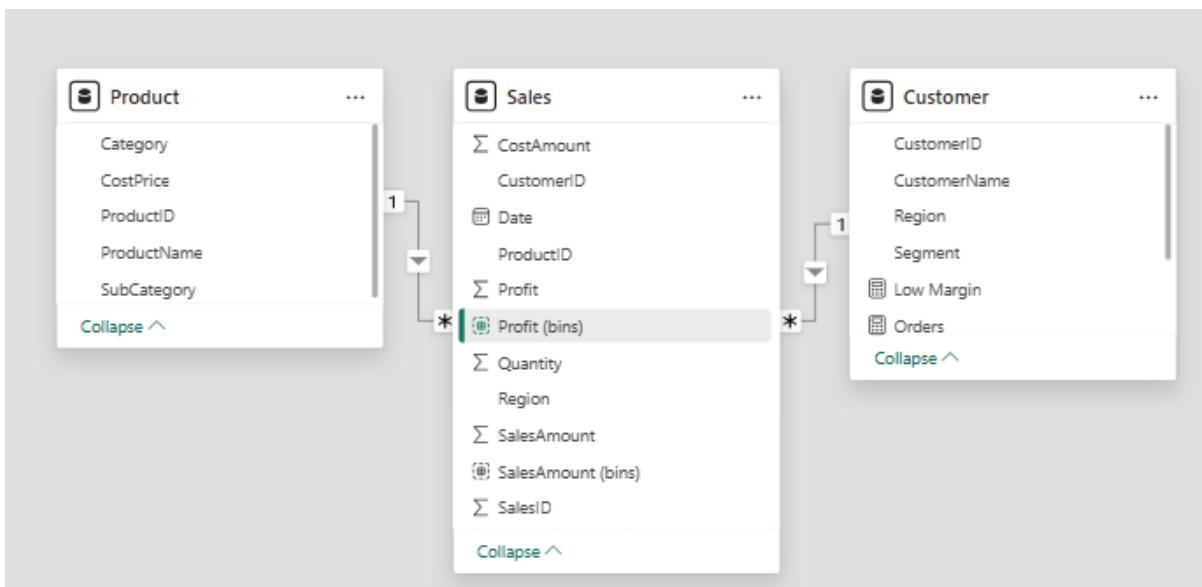
### Findings:

- The **North region** records the highest sales.
- **East and South regions** show steady and moderate performance.
- The **West region** has the lowest sales contribution.

Some regions demonstrate high sales volume but lower profit margins, highlighting regional performance gaps.

## 5. Create a star schema using Sales, Customer, and Product tables. Why is this model effective?

### Star Schema Data Model



A star schema data model was designed to support efficient analysis.

### Fact Table:

- FactSales (Sales, Profit, Quantity, Order Date, Product ID, Customer ID)

### Dimension Tables:

- DimProduct (Product Name, Category, Sub-category)
- DimCustomer (Region, Segment)

### Why this model is effective:

- Reduces data redundancy
- Improves query performance
- Enables easy filtering and slicing across dimensions

- Follows Power BI best practices for analytical reporting

## 6. Write a DAX measure to calculate Total Sales and Total Profit.

### DAX Measures for Sales and Profit



The following DAX measures were created:

Total Sales = `SUM(Sales[Sales])`

Total Profit = `SUM(Sales[Profit])`

Profit Margin % = `DIVIDE([Total Profit], [Total Sales], 0) * 100`

Orders = `COUNT(Sales[SalesID])`

Low Margin = `IF([Profit Margin %] < 10, "Low", "Good")`

These measures are used across all visuals and KPI cards in the dashboard.

## 7. Calculate Profit Margin (%) using DAX and identify low-margin products.

### Profit Margin (%) and Low-Margin Products

ProductName	Total Sales	Profit Margin %	Low Margin
Stapler 9	27,79,859.75	25.37	Good
Notebook 8	25,32,417.47	25.27	Good
Laptop 1	22,37,051.77	25.55	Good
Keyboard 4	21,60,130.34	25.61	Good
Paper Pack 6	20,39,322.55	25.61	Good
Pen Set 7	19,46,343.57	25.01	Good
Folder 10	18,38,258.64	25.66	Good
Monitor 3	16,52,917.42	26.04	Good
Printer 2	15,36,143.02	26.13	Good
Mouse 5	9,21,211.54	26.64	Good
<b>Total</b>	<b>1,96,43,656.07</b>	<b>25.60</b>	<b>Good</b>

Profit Margin was calculated using DAX:

Profit Margin % =

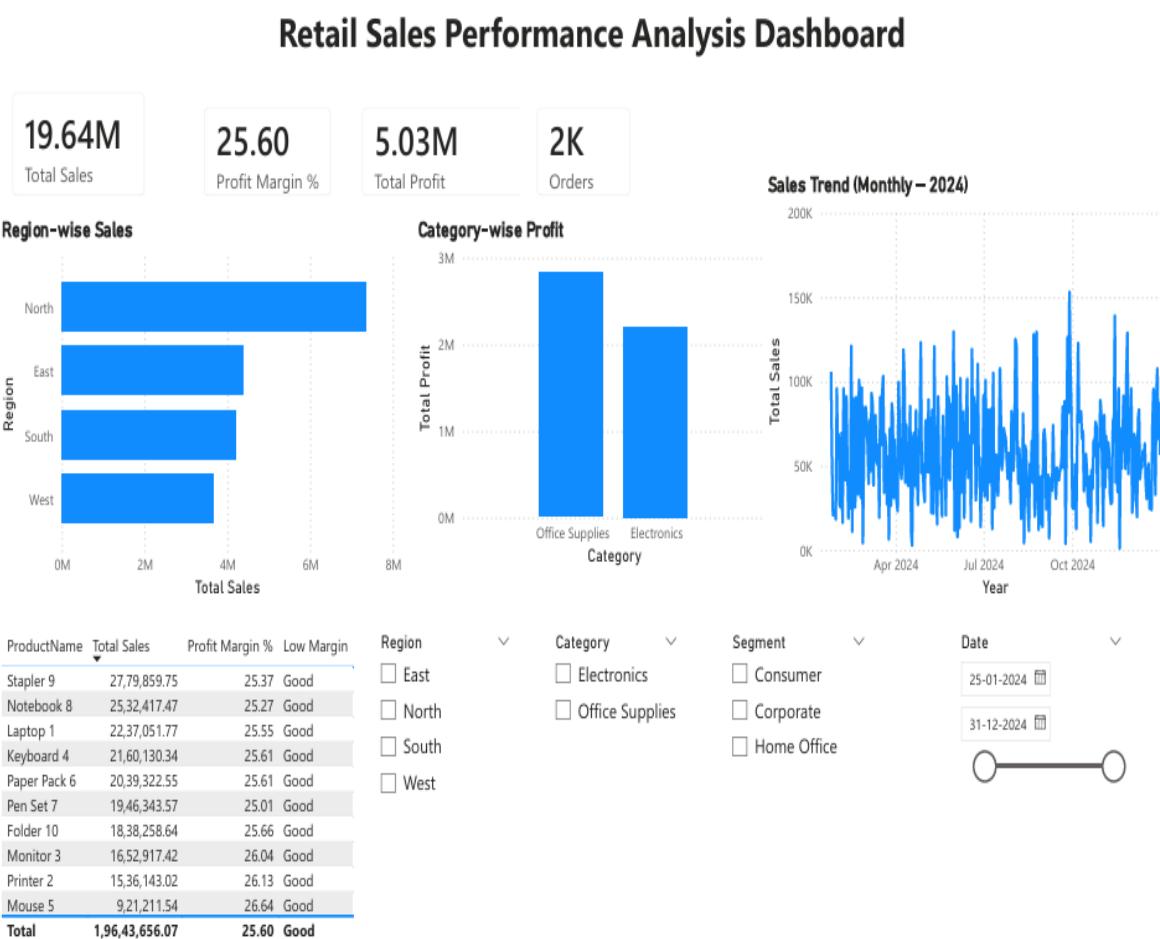
`DIVIDE([Total Profit], [Total Sales]) * 100`

## Analysis Results:

- Several products, especially in the Electronics category, show **low profit margins** despite high sales.
- These low-margin products were identified using table visuals and conditional formatting.

## 8. Which products should be discontinued or promoted based on analysis?

### Dashboard Design



A single-page Power BI dashboard was designed to present actionable insights.

The dashboard includes:

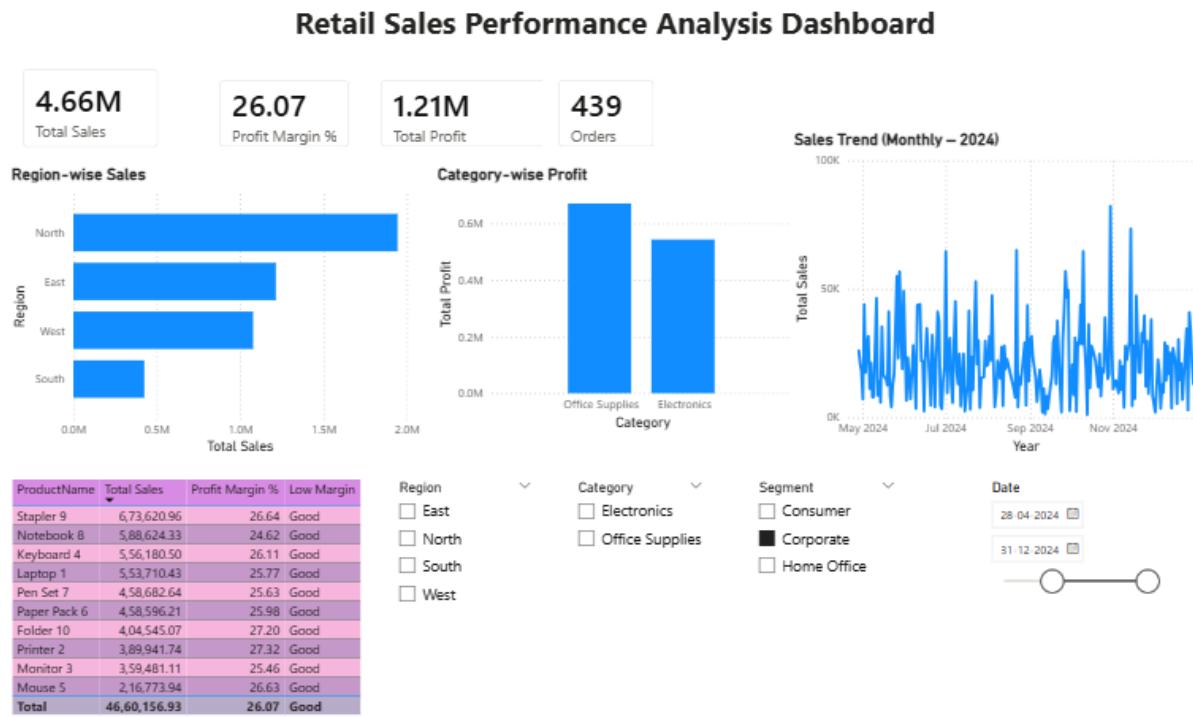
- KPI cards for Total Sales, Total Profit, Profit Margin, and Orders
- Region-wise sales comparison
- Category-wise profit analysis
- Monthly sales trend visualization

- Interactive slicers for Region, Category, Segment, and Date

This design allows management to quickly understand performance and drill down into specific areas.

## 9. Which products should be discontinued or promoted based on analysis?

### Business Recommendations



Based on the analysis:

### Products to Promote:

- Office Supplies due to high profit margins and stable demand

### Products to Review or Discontinue:

- Electronics products with high sales but low profit margins
- These products require pricing, cost, or promotion strategy review

### Conclusion

The Power BI dashboard provides a comprehensive view of sales and profitability across regions and product categories.

It helps identify profit gaps, supports data-driven decision-making, and enables effective planning for promotions and inventory management.