Power BI Data Analytics Project Documentation

Project Title:

Sales Data Analysis Dashboard

Prepared By:

Shraddha Mali, Data Analyst

Summary:

Developed an interactive Power BI dashboard that integrates key sales and performance metrics with dynamic analytics features to deliver actionable, data-driven business insights.

Executive Summary / Abstract

The Sales Data Analysis Dashboard was developed using Microsoft Power BI to provide comprehensive insights into sales performance, profitability, customer behavior, and promotional effectiveness. The project utilized a star schema data model with four tables — Customer, Product, Promotion, and Fact table — enabling a relationship-driven analytic approach.
Key business KPIs like Top/Bottom products, sales trends, profit margins, discount patterns, sales by geography, and time-based comparisons were incorporated. The solution empowers decision-makers to quickly identify sales performance patterns, compare time periods, and evaluate promotional impacts, resulting in improved business strategy and revenue optimization.

Business Problem / Background

In many organizations, raw sales data is stored without a structured analytical framework, making it difficult for stakeholders to extract actionable insights. The lack of interactive analytical tools can lead to:

- Poor identification of best- or worst-performing products.
- Inability to track sales and profit over time.
- Limited capacity to measure the true impact of promotions.
- Difficulty in comparing different time periods or regions.

This project addresses these challenges by integrating sales data into a well-structured analytics environment with intuitive visualizations that enable real-time, user-driven business analysis.

Data Overview

Data Link

Data Sources:

- Primary: SQL Server Database (core fact table with sales transactions)
- Secondary: Excel file imports (Store-Data.xlsx) containing updated dimension tables (Customers, Products, Promotions) and historical transaction data.

Records:

- ~50,000 individual sales transaction line items across multiple years (2020–2024).

Features:
(Combined from fact table & dimension tables — main analysis fields)

- Product ID → Unique identifier for each product, linked to product details in Dim Product.
- Product Name → Name of the sold product.
- Product Category / Line → Standardized categories, e.g., Electronics, Footwear, Clothing, Home Appliances, Accessories, Kitchenware, Bags, Personal Care.
- Region / City / State → Geographical indicators from Dim Customers for mapping and regional analysis.
- Sales Amount (Total Sales) → Units Sold × Unit Price before discounts.
- Profit → Earnings after deducting cost (calculated or available in transactions).
- Quantity (Units Sold) → Number of units sold per transaction.
- Order Date → Transaction date, supports time-series (daily, monthly, quarterly, yearly) analysis.
- Customer Segment → Derived from Dim Customers (e.g., by type, region, or inferred segment).
- Promotion Details → Promotion Name, Ad Type, Price Reduction Type, Coupon Code (from Dim Promotion).
- Discount % and Discount Value → From fact table, used to calculate Net Sales.
- Net Sales → Total Sales − Discount Value (actual revenue).

Type:

- Structured tabular data in relational/star schema format:
    - 1 Fact table (sales)
    - 3 Dimension tables (Customers, Products, Promotions)

Cleaning Steps:

1. Removed Duplicates – Ensured order-line item uniqueness in fact table.
2. Fixed Data Types – Converted Order Date to standard date format; numeric fields to decimal; text fields trimmed for spaces.
3. Handled Missing Values – Calculated missing profit values using sales and cost information; filled missing promotions as "No Promotion".
4. Normalized Product Categories – Standardized product line names (e.g., Elec. → Electronics).
5. Validated Relationships – Ensured all foreign keys in fact table match valid entries in dimension tables.

Methodology

The project followed a systematic data analytics process:

1. **Data Loading**

- Imported all four datasets into Power BI Desktop.

2. **Data Profiling & Cleaning**

- Checked column distribution and quality.
- Fixed data types for date, numeric, and text fields.
- Standardized inconsistent category names.
- Created conditional columns for percentages (in the Promotion Table).
- Added calculated columns for Net Sales, Total Sales, and Discount in Fact Table.

3. **Data Transformation**

- Merged queries using Left Join/Inner Join as required.
- Removed duplicates and nulls where applicable.

4. **Data Modelling**

- Implemented a Star Schema:
    - Fact Table in the center.
    - Dimension Tables: Product, Customer, Promotion.

- Established one-to-many relationships between dimensions and fact table.

5. **DAX Calculations**

- Created measures for Total Sales, Total Profit, Total Quantity Sold, Average Discount.
- Built time intelligence calculations for period comparison analysis.

6. **Build Dashboards**

- Designed intuitive, interactive dashboards in Power BI with slicers, drill-through actions, and dynamic filters to allow stakeholders to explore data from multiple perspectives.

Dashboard Design & Features

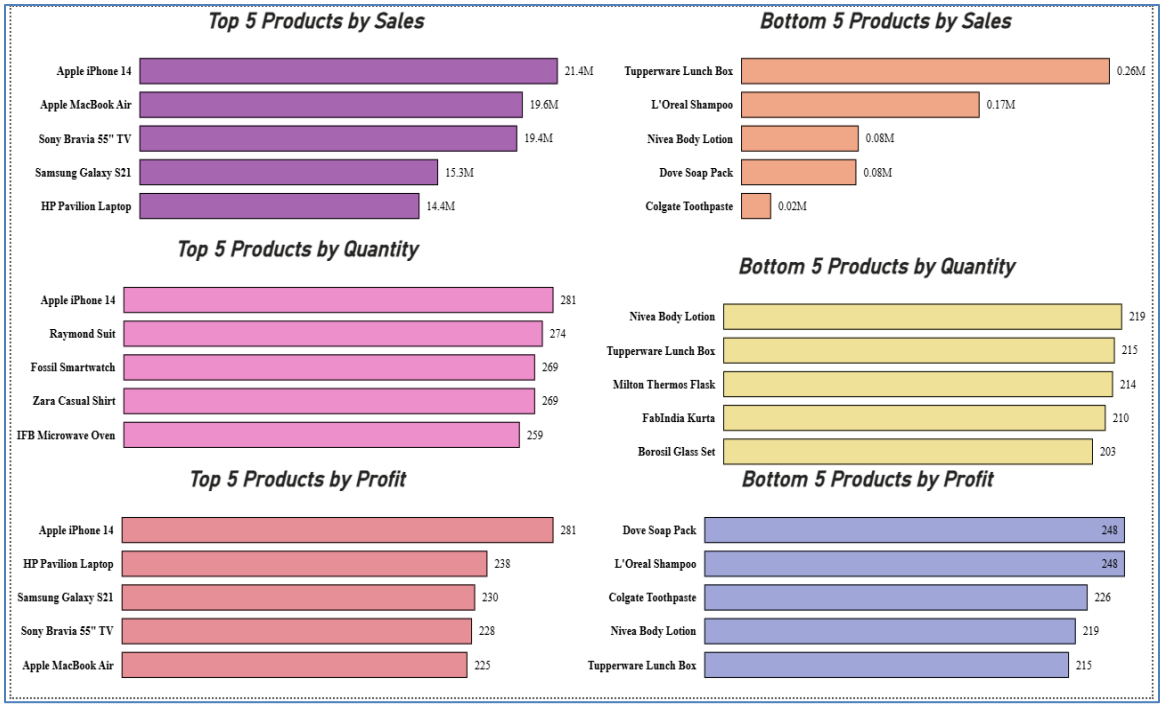
The dashboard is designed for interactivity, clarity, and detailed filtering.
Key visuals and features include:

1. Top/Bottom 5 Products by Sales, Profit, and Quantity (Dynamic bar charts).
2. Sales Trends Analysis (Area Chart) – with options for daily, monthly, quarterly, and yearly views.
3. Sales vs Profit Relationship – Scatter plot showing correlation patterns.
4. Period Comparison Tool – Comparing Sales, Profit, and Quantity Sold between two user-selected time frames using dual date tables.
5. Average Discount by Category – Bar chart highlighting promotional strategy effectiveness.
6. Sales by Geography – Map visualization by city.
7. Total Orders KPI – Card visual for fast overview.
8. Detailed Order View – Matrix visual showing all relevant metrics with slicers for:
    - Date
    - Product
    - Customer
    - Promotion

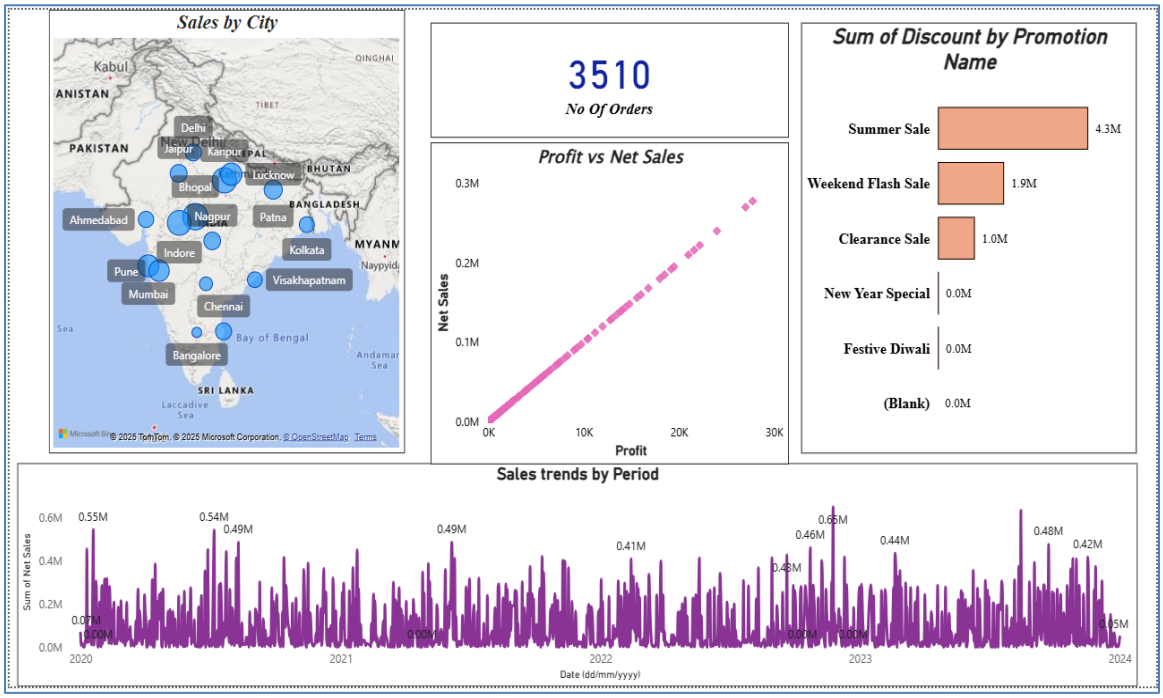
Filter Customization:
Filter behaviors tailored for relevant slicers using a “Sum Dim” measure to ensure accurate metric calculation when filters change.

Dashboards:

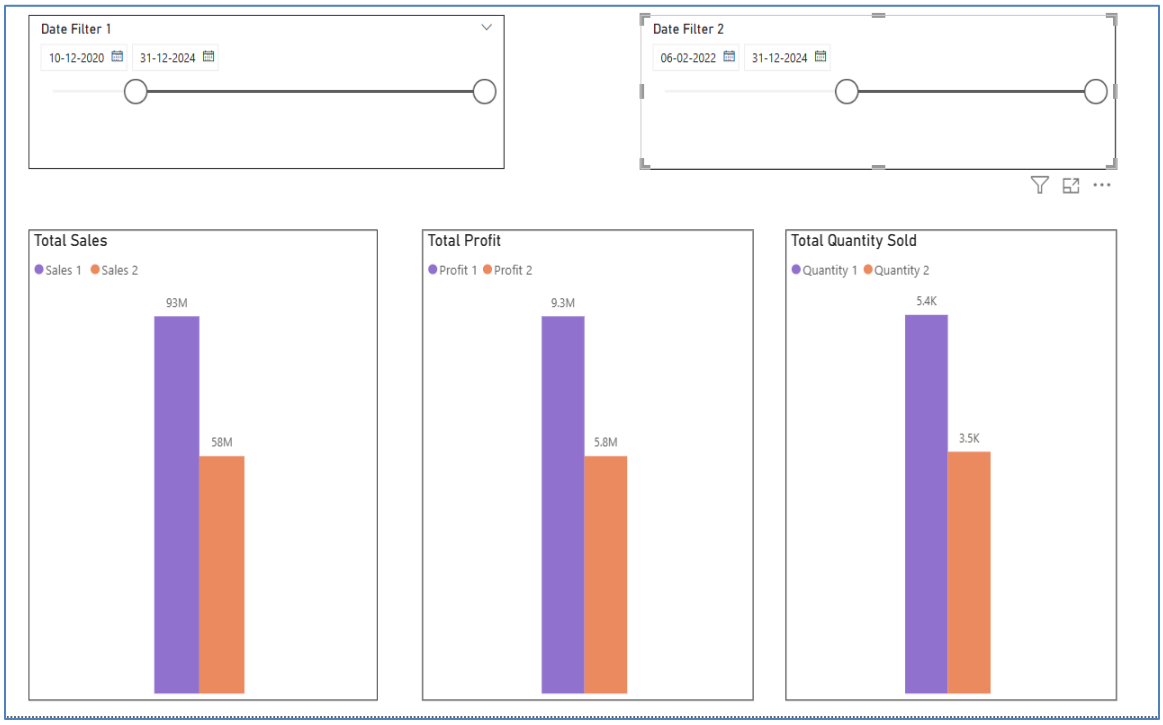
Top/Bottom 5 Products by Sales, Profit, and Quantity:



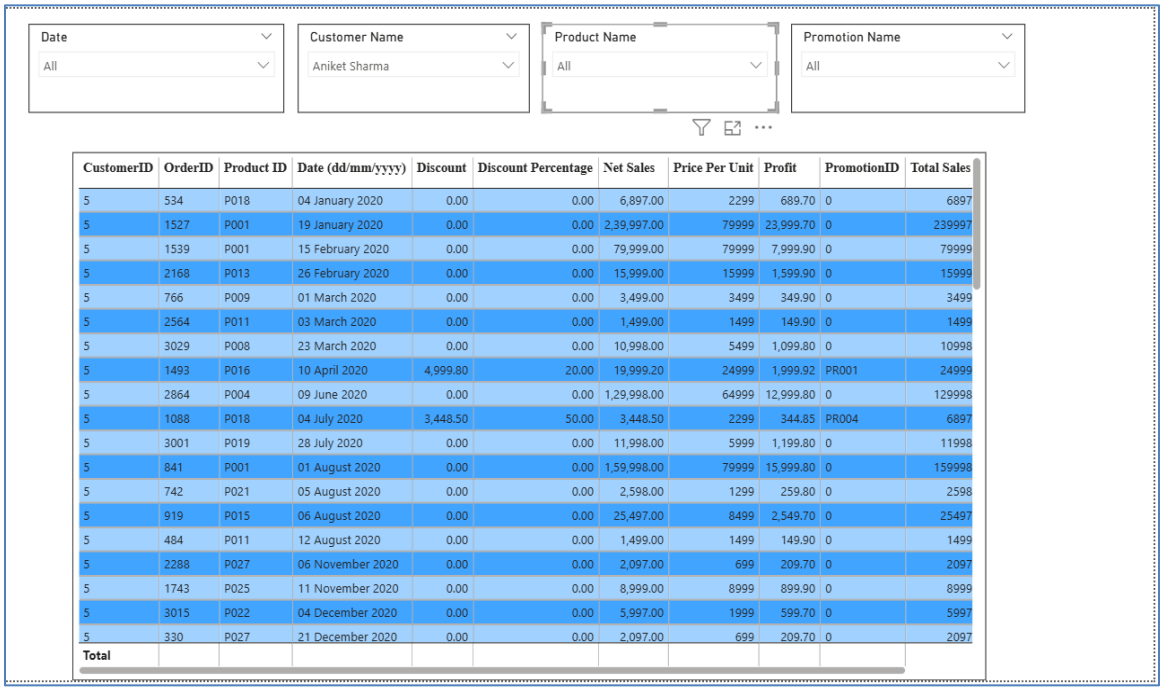
Sales Trends Analysis, Sales by City, Total No of Orders, Discount by Promotion Name, Relationship between profit and Net Sales:



Period Comparison Tool – Comparing Sales, Profit, and Quantity Sold between two user-selected time frames using dual date tables :



Detailed Order View – Matrix visual showing all relevant metrics with slicers for: Date , Customer Name, Product Name , Promotion Name



CustomerID	OrderID	Product ID	Date (dd/mm/yyyy)	Discount	Discount Percentage	Net Sales	Price Per Unit	Profit	PromotionID	Total Sales
5	534	P018	04 January 2020	0.00	0.00	6,897.00	2299	689.70	0	6897
5	1527	P001	19 January 2020	0.00	0.00	2,39,997.00	79999	23,999.70	0	239997
5	1539	P001	15 February 2020	0.00	0.00	79,999.00	79999	7,999.90	0	79999
5	2168	P013	26 February 2020	0.00	0.00	15,999.00	15999	1,599.90	0	15999
5	766	P009	01 March 2020	0.00	0.00	3,499.00	3499	349.90	0	3499
5	2564	P011	03 March 2020	0.00	0.00	1,499.00	1499	149.90	0	1499
5	3029	P008	23 March 2020	0.00	0.00	10,998.00	5499	1,099.80	0	10998
5	1493	P016	10 April 2020	4,999.80	20.00	19,999.20	24999	1,999.92	PR001	24999
5	2864	P004	09 June 2020	0.00	0.00	1,29,998.00	64999	12,999.80	0	129998
5	1088	P018	04 July 2020	3,448.50	50.00	3,448.50	2299	344.85	PR004	6897
5	3001	P019	28 July 2020	0.00	0.00	11,998.00	5999	1,199.80	0	11998
5	841	P001	01 August 2020	0.00	0.00	1,59,998.00	79999	15,999.80	0	159998
5	742	P021	05 August 2020	0.00	0.00	2,598.00	1299	259.80	0	2598
5	919	P015	06 August 2020	0.00	0.00	25,497.00	8499	2,549.70	0	25497
5	484	P011	12 August 2020	0.00	0.00	1,499.00	1499	149.90	0	1499
5	2288	P027	06 November 2020	0.00	0.00	2,097.00	699	209.70	0	2097
5	1743	P025	11 November 2020	0.00	0.00	8,999.00	8999	899.90	0	8999
5	3015	P022	04 December 2020	0.00	0.00	5,997.00	1999	599.70	0	5997
5	330	P027	21 December 2020	0.00	0.00	2,097.00	699	209.70	0	2097
Total										

Insights & Analysis

- During the analysis, the following insights emerged:

  - Apple iPhone 14 emerged as the top-performing product across all three key metrics — Sales, Profit, and Quantity Sold — making it the strongest contributor to overall business performance.
  - Top-performing products contributed disproportionately to revenue, whereas bottom performers indicated potential for replacement or re-pricing strategies.
  - Kanpur recorded the highest Net Sales, indicating it is the top-performing city in terms of revenue generation. On the other hand, Bangalore showed the lowest Net Sales, highlighting potential gaps in market penetration or sales strategy in that region.
  - Cities with higher order volumes were not always the most profitable, underlining the importance of regional sales efficiency analysis rather than relying only on order counts.
  - The “Summer Sale” promotion category achieved the highest total discount amount, confirming its aggressive discounting strategy — which needs to be assessed for profitability impact.
  - Certain promotion categories with high discounts delivered only marginal profit gains, suggesting over-discounting risks that could erode net margins.
  - A strong linear correlation between Sales and Profit was evident, confirming that higher revenue generally corresponded with higher profitability levels.
  - Quarterly trend analysis revealed notable seasonal spikes in sales, typically aligning with holidays and major promotional events.
  - The average discount levels in some categories exceeded planned thresholds, indicating the need for stricter discount governance to protect profitability.

Outcomes & Impact

If adopted in a business environment, this solution can deliver the following impacts:

- Faster decision-making: Stakeholders can interactively explore sales data without reliance on static reports.
- Revenue growth opportunities: Identifying high-value products and top markets for targeted campaigns.
- Cost optimization: Detecting underperforming products and inefficient promotions.
- Strategic sales planning: Using time-based trends to forecast future performance.
- Regional expansion planning: Leveraging location-based sales insights.

Conclusion

This Power BI Sales Data Analysis project successfully transforms raw transactional data into actionable business intelligence through effective data modeling, DAX measures, and interactive visualizations.

By integrating multiple perspectives — product performance, customer insights, promotional effectiveness, and geographic distribution — the dashboard empowers data-driven decision-making and strategic planning. The methodology is scalable and can be extended to incorporate more KPIs, predictive analytics, and automated refreshes, ensuring it remains a valuable tool in ongoing sales strategy optimization.

----------**END**----------