

“FINANCIAL FORECASTING DASHBOARD USING POWER BI”

PROJECT REPORT

Submitted in partial fulfillment of the
requirements for the award of the Internship of

DATA VISUALIZATION IN INFOSYS SPRINGBOARD

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Under the guidance of



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ACKNOWLEDGMENT

I am deeply appreciative of the opportunity provided by Infosys Springboard to embark on this enriching internship journey in the intriguing field of financial forecasting using Power BI Desktop. I extend my heartfelt gratitude to my mentor, whose unwavering support, insightful guidance, and constructive feedback were instrumental in shaping this project. Their expertise and encouragement have been invaluable throughout this experience.

I am equally thankful to the entire Infosys Springboard team for curating an internship program that seamlessly blends learning with hands-on application, enabling me to acquire critical technical and analytical skills that will undoubtedly enhance my future endeavors.

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This report represents the collective efforts and contributions of many, and I deeply value the role each individual played in bringing it to fruition. Thank you to all who supported me on this journey.

ABSTRACT

Financial forecasting plays a pivotal role in business decision-making, empowering organizations to anticipate future financial trends, optimize resource allocation, and address potential risks effectively. This project leverages Power BI Desktop, a powerful tool for data visualization and analytics, to develop interactive dashboards tailored for financial forecasting.

The internship encompassed gathering and preparing historical financial data, applying forecasting methodologies, and creating visual representations to deliver actionable insights. Key aspects of the project included the use of predictive models, such as exponential smoothing, and the integration of DAX formulas for dynamic and precise calculations.

The interactive dashboards developed through this project enable stakeholders to effortlessly analyze financial trends, interpret key performance indicators, and make data-informed strategic decisions. This initiative underscores the value of advanced analytics tools like Power BI in enhancing business intelligence and supporting robust strategic planning.

This report provides a detailed account of the methodologies employed, the challenges encountered, and the outcomes achieved, illustrating how effective data visualization can revolutionize the financial forecasting process and drive efficiency through data-driven insights.

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INTRODUCTION

The Role and Significance of Financial Forecasting

Financial forecasting is essential for organizations to predict their financial future based on past performance, current market trends, and broader economic factors. This process is integral to strategic planning, as it helps businesses make informed decisions about budgeting, resource allocation, and investment opportunities. By forecasting future revenues, costs, and profits, companies can not only avoid financial pitfalls but also seize growth opportunities with greater confidence.

Project Objective

The primary goal of this project is to utilize Power BI Desktop to develop an interactive dashboard that aids in financial forecasting. The process involves collecting and cleaning historical financial data, applying forecasting methods, and visualizing trends through dynamic graphs and charts. This approach aims to provide decision-makers with valuable insights into future financial performance, helping them make data-driven choices.

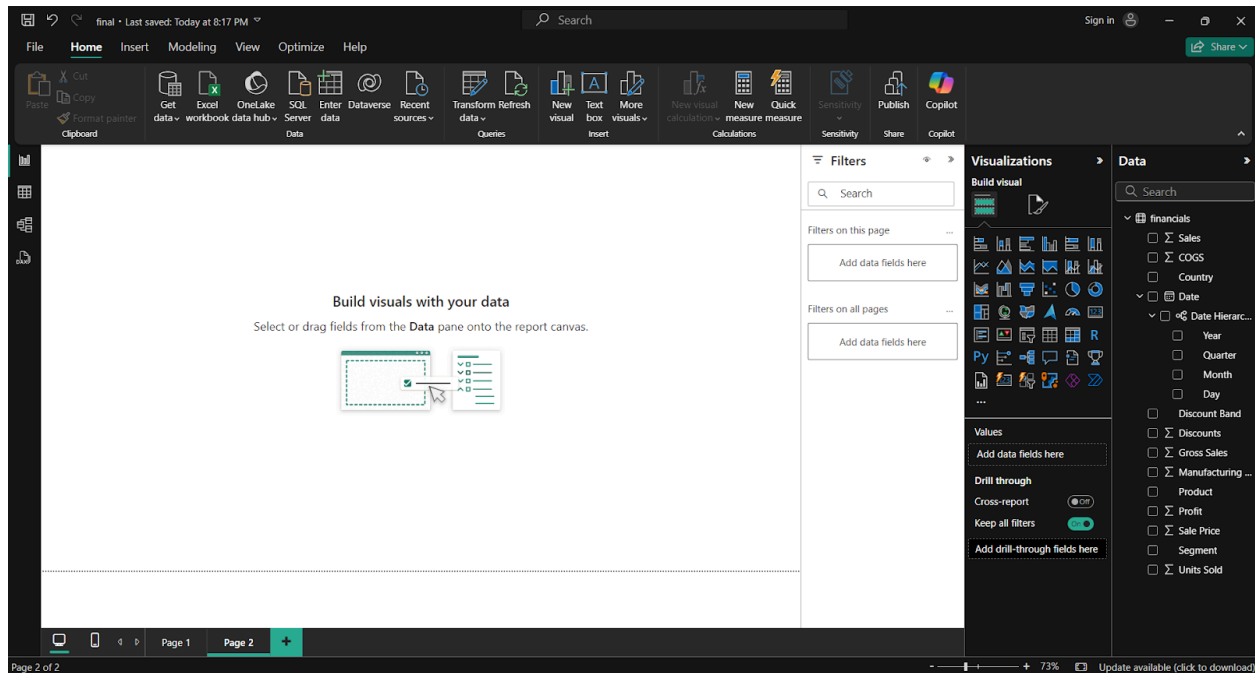
Key Deliverables of the Project Include

- Gathering and processing financial data for analysis.
- Implementing forecasting models to predict revenue and expenses.
- Designing interactive visualizations that make financial data more accessible and understandable.
- Creating an engaging platform that allows users to explore financial trends and metrics in real-time.

Why Power BI Was Selected?

Power BI Desktop was chosen for its powerful data visualization and analytics features, along with its user-friendly interface. Its ability to handle complex calculations through DAX (Data Analysis Expressions) and incorporate forecasting models made it an excellent fit for the project's needs. Furthermore, Power BI supports seamless integration with multiple data sources and allows for real-time updates and collaboration. This makes it a versatile tool for businesses seeking to transform their raw data into actionable insights for better decision-making.

This project illustrates how modern tools like Power BI can simplify complex processes like financial forecasting, providing businesses with an intuitive and accessible way to navigate their financial future. By making this information easily digestible and interactive, Power BI empowers organizations to stay competitive in a data-driven world.



Project Objectives

1. Data Collection and Preparation

To gather and clean historical financial data from various sources, ensuring its accuracy and readiness for analysis. This includes handling missing values, formatting data, and structuring it for forecasting.

2. Implementation of Forecasting Models

To apply advanced forecasting techniques, such as exponential smoothing, to predict key financial metrics like revenue, expenses, and profitability for future periods. This will help in making reliable projections.

3. Visualization of Financial Trends

To create interactive and dynamic dashboards using Power BI that clearly represent financial data through charts, graphs, and KPIs. The goal is to make the data more accessible and easy to interpret for stakeholders.

4. Development of Actionable Insights

To generate actionable insights from the visualized data that assist decision-makers in understanding financial trends, patterns, and potential areas for improvement or investment.

5. Enhancement of Business Intelligence

To enable users to interact with the dashboards, explore various financial scenarios, and use the information for better strategic planning, budgeting, and resource allocation.

METHODOLOGY

The approach taken during this internship for financial forecasting using Power BI Desktop followed a systematic and structured workflow to ensure accurate and actionable insights. The methodology was divided into the following key stages:

1. Data Collection and Source Identification

The first step was to gather historical financial data from credible and reliable sources, including:

- Internal company systems, offering insights into past financial records.
 - Publicly available datasets, typically in CSV or Excel formats, to supplement internal data.
 - APIs providing external financial and economic data for broader context.
- The data gathered focused on essential financial variables such as revenue, expenses, and sales volume, which were crucial for generating accurate forecasts.
-

2. Data Preparation and Cleansing

Once the raw data was imported into Power BI Desktop, the next task was cleaning and preparing the data to ensure it was suitable for analysis. Key steps involved:

- **Handling Incomplete Data:** Missing values were addressed using suitable methods like imputation or exclusion, depending on the context.
 - **Removing Redundant Entries:** Duplicate records were identified and removed to maintain data consistency.
 - **Standardizing Numerical Data:** The numerical fields were adjusted to ensure uniformity and consistency across the dataset.
 - **Transformation in Power Query Editor:** Relevant columns were filtered, and data was aggregated by specific time periods, such as months or quarters. This data was then formatted to make it compatible with the forecasting models.
- Finally, the data was validated for accuracy, ensuring that it was ready for the next steps.
-

3. Choosing and Applying Forecasting Models

Power BI's built-in forecasting capabilities were leveraged to predict future financial outcomes. Methods used included:

- **Exponential Smoothing:** Applied to detect and forecast trends based on past performance.
- **Time-Series Analysis:** Identified seasonal fluctuations and growth patterns to enhance the forecast's precision.
Calculated measures were created using DAX (Data Analysis Expressions) to refine the models, such as:
- **Year-over-Year Growth:** To track changes in key financial metrics across periods.

- **Moving Averages for Trend Analysis:** Used to smooth out fluctuations and identify long-term patterns. Various forecasting parameters, including confidence levels, were tested to fine-tune the models and ensure their reliability.

4. Developing Dashboards and Visual Representations

Interactive dashboards were designed to present the forecasts in an intuitive and engaging manner. The visualizations included:

- **Line Graphs:** These illustrated trends over time, enabling a clear view of both short- and long-term financial projections.
 - **Bar and Column Charts:** These were used to compare different financial metrics across various periods or categories.
 - **Slicers and Filters:** These features allowed users to customize the dashboard, enabling them to focus on specific time frames or financial aspects.
- The forecasting results were integrated into the visualizations, making it easy for users to understand and explore future financial trends.

5. Validation and Refining the Model

To ensure the accuracy of the forecasting models, the results were compared with historical data. This comparison served to validate the model's precision and reliability. Based on the feedback and testing outcomes, the forecasting parameters were adjusted and optimized, refining the model for more accurate predictions.

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File Home Help Table tools													
Name: financials													
Structure													
Mark as date table Manage relationships New measure measure column Calculations													
Segment Country Product Discount Band Units Sold Manufacturing Price Sale Price Gross Sales Discounts Sales COGS Profit Date													
Government	Germany	Carretera	None	1513	3	350	529550	0	529550	393380	136170	01 December 2014	
Government	Germany	Paseo	None	1006	10	350	352100	0	352100	261560	90540	01 June 2014	
Government	Canada	Paseo	None	1725	10	350	603750	0	603750	448500	155250	01 November 2013	
Government	Germany	Paseo	None	1513	10	350	529550	0	529550	393380	136170	01 December 2014	
Government	Germany	Velo	None	1006	120	350	352100	0	352100	261560	90540	01 June 2014	
Government	France	VTT	None	1527	250	350	534450	0	534450	397020	137430	01 September 2013	
Government	France	Amarilla	None	2750	260	350	962500	0	962500	715000	247500	01 February 2014	
Government	Mexico	Carretera	Low	1210	3	350	423500	4235	419265	314600	104665	01 March 2014	
Government	Mexico	Carretera	Low	1397	3	350	488950	4889.5	484060.5	363220	120840.5	01 October 2014	
Government	France	Carretera	Low	2155	3	350	754250	7542.5	746707.5	560300	186407.5	01 December 2014	
Government	France	Paseo	Low	2155	10	350	754250	7542.5	746707.5	560300	186407.5	01 December 2014	
Government	Canada	VTT	Low	943.5	250	350	330225	3302.25	326922.75	245310	81612.75	01 April 2014	
Government	Mexico	VTT	Low	1397	250	350	488950	4889.5	484060.5	363220	120840.5	01 October 2014	
Government	Canada	Carretera	Low	2852	3	350	998200	19964	978236	741520	236716	01 December 2014	
Government	Canada	Paseo	Low	2852	10	350	998200	19964	978236	741520	236716	01 December 2014	
Government	Germany	Velo	Low	2966	120	350	1038100	20762	1017338	771160	246178	01 October 2013	
Government	Germany	Velo	Low	2877	120	350	1006950	20139	986811	748030	238791	01 October 2014	
Government	Germany	VTT	Low	2877	250	350	1006950	20139	986811	748030	238791	01 October 2014	
Government	United States of America	VTT	Low	266	250	350	93100	1862	91238	69160	22078	01 December 2013	
Government	Mexico	VTT	Low	1940	250	350	679000	13580	665420	504400	161020	01 December 2013	
Government	Germany	Amarilla	Low	2966	260	350	1038100	20762	1017338	771160	246178	01 October 2013	
Government	Germany	Montana	Low	1797	5	350	628950	18868.5	610081.5	467220	142861.5	01 September 2013	
Government	Mexico	VTT	Low	1642	250	350	574700	17241	557459	426920	130539	01 August 2014	
Government	United States of America	Carretera	Low	274	3	350	95900	3836	92064	71240	20824	01 December 2014	
Government	United States of America	Paseo	Low	3450	10	350	1207500	48300	1159200	897000	262200	01 July 2014	
Government	United States of America	Paseo	Low	274	10	350	95900	3836	92064	71240	20824	01 December 2014	
Government	France	Velo	Low	2177	120	350	761950	30478	731472	566020	165452	01 October 2014	

DATA COLLECTION AND PREPARATION

Data Sources Used

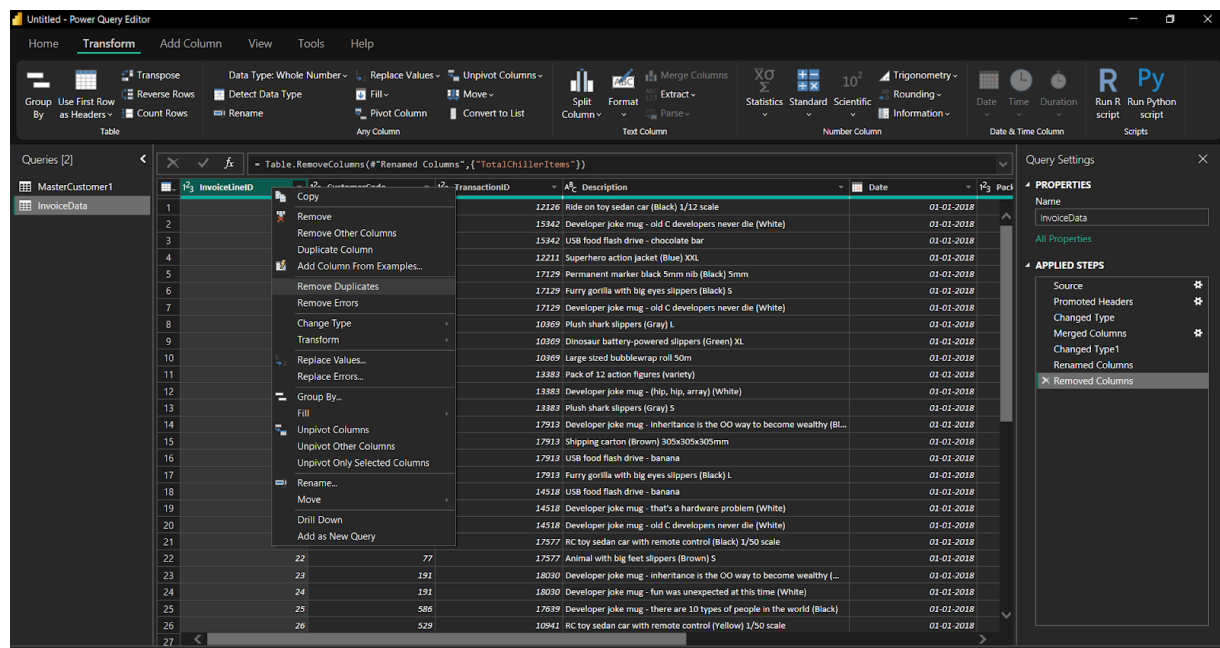
For this project, historical financial data was collected from a range of reliable sources to ensure a comprehensive and accurate foundation for forecasting. These sources included:

- **CSV Files:**
 - Contained essential raw financial data, including monthly revenue, expenses, and profit margins.
 - Exported from accounting systems or publicly available financial datasets.
 - **Excel Spreadsheets:**
 - Supplemented the dataset with organizational reports and budget data for comprehensive trend analysis.
-

Preprocessing Steps

To prepare the collected data for forecasting and analysis, the following preprocessing procedures were performed:

- **Data Cleaning:**
 - **Removing Duplicates:**
 - Duplicate entries were identified and eliminated to maintain consistency across the dataset.



- **Data Formatting:**

- **Standardization:**

- Date formats were standardized (e.g., YYYY-MM-DD) to ensure consistency for time-series analysis.
 - Categorical variables, like expense categories, were converted into numerical or textual representations for easier analysis.
 - Columns were renamed for clarity and uniformity across all datasets.

Table with 6 columns: Year, Month, Day, PackageTypeID, Quantity, Sales. The table contains 27 rows of data. The interface includes a ribbon with 'Transform' tab, a 'Queries' pane on the left, and a 'Properties' pane on the right.

	Year	Month	Day	PackageTypeID	Quantity	Sales
1	2018	1	1	7	10	10
2	2018	1	1	7	9	9
3	2018	1	1	7	9	9
4	2018	1	1	7	3	3
5	2018	1	1	7	96	96
6	2018	1	1	7	5	5
7	2018	1	1	7	2	2
8	2018	1	1	7	4	4
9	2018	1	1	7	3	3
10	2018	1	1	7	20	20
11	2018	1	1	9	4	4
12	2018	1	1	7	6	6
13	2018	1	1	7	9	9
14	2018	1	1	7	9	9
15	2018	1	1	7	75	75
16	2018	1	1	7	6	6
17	2018	1	1	7	1	1
18	2018	1	1	7	4	4
19	2018	1	1	7	9	9
20	2018	1	1	7	1	1
21	2018	1	1	7	2	2
22	2018	1	1	7	4	4
23	2018	1	1	7	5	5
24	2018	1	1	7	3	3
25	2018	1	1	7	1	1
26	2018	1	1	7	5	5
27	2018	1	1	7	5	5

Merge Columns dialog box. Choose how to merge the selected columns. Separator: Custom. New column name (optional): Merged. OK, Cancel buttons.

	Year	Month	Day	PackageTypeID	Quantity	Sales
1	2018	1	1	7	10	10
2	2018	1	1	7	9	9
3	2018	1	1	7	9	9
4	2018	1	1	7	3	3
5	2018	1	1	7	96	96
6	2018	1	1	7	5	5
7	2018	1	1	7	2	2
8	2018	1	1	7	4	4
9	2018	1	1	7	3	3
10	2018	1	1	7	20	20
11	2018	1	1	9	4	4
12	2018	1	1	7	6	6
13	2018	1	1	7	9	9
14	2018	1	1	7	9	9
15	2018	1	1	7	75	75
16	2018	1	1	7	6	6
17	2018	1	1	7	1	1
18	2018	1	1	7	4	4
19	2018	1	1	7	9	9
20	2018	1	1	7	1	1
21	2018	1	1	7	2	2
22	2018	1	1	7	4	4
23	2018	1	1	7	5	5
24	2018	1	1	7	3	3
25	2018	1	1	7	1	1
26	2018	1	1	7	5	5
27	2018	1	1	7	5	5

Table: RenameColumns(#"Changed Type1",{{"Merged", "Date"}})

	Date	PackageTypeID	Quantity	Sales	TotalDryItems
1	01-01-2018	7	10	2300	2
2	01-01-2018	7	9	117	2
3	01-01-2018	7	9	288	2
4	01-01-2018	7	3	90	2
5	01-01-2018	7	96	288	3
6	01-01-2018	7	5	160	3
7	01-01-2018	7	2	26	3
8	01-01-2018	7	4	128	3
9	01-01-2018	7	3	96	3
10	01-01-2018	7	20	480	3
11	01-01-2018	9	4	64	3
12	01-01-2018	7	6	78	3
13	01-01-2018	7	9	288	3
14	01-01-2018	7	9	117	4
15	01-01-2018	7	75	300	4
16	01-01-2018	7	6	192	4
17	01-01-2018	7	1	32	4
18	01-01-2018	7	4	128	3
19	01-01-2018	7	9	117	3
20	01-01-2018	7	1	13	3
21	01-01-2018	7	2	50	2
22	01-01-2018	7	4	128	2
23	01-01-2018	7	5	65	2
24	01-01-2018	7	3	39	2
25	01-01-2018	7	1	13	1
26	01-01-2018	7	5	125	2
27					

Query Settings: InvoiceData

APPLIED STEPS:

- Source
- Promoted Headers
- Changed Type
- Merged Columns
- Changed Type1
- Renamed Columns

- **Data Transformation:**

- **Aggregation:**

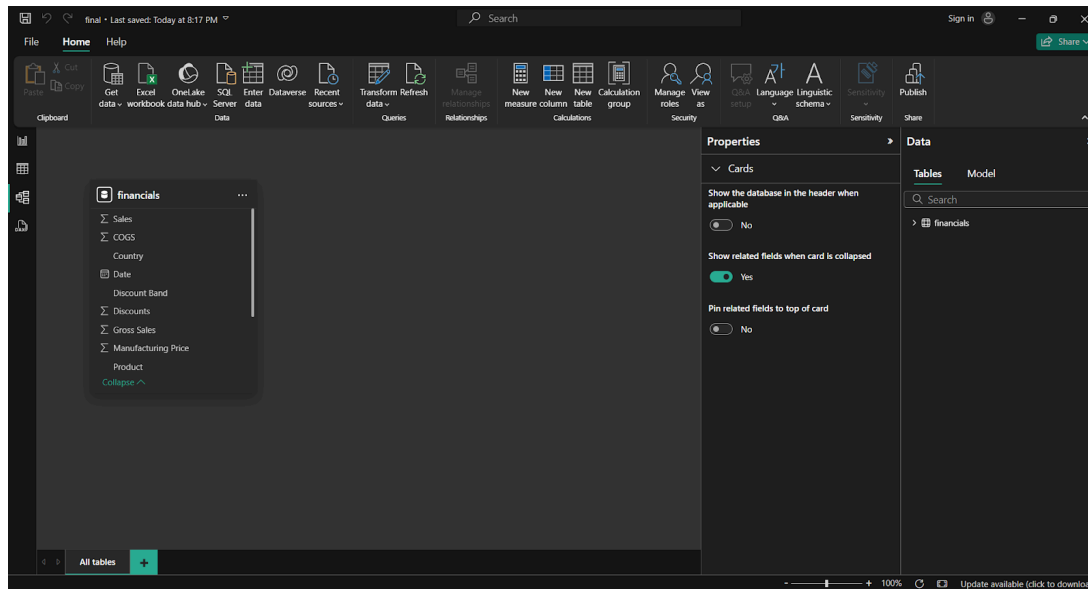
- Daily or transactional data was aggregated into monthly and quarterly summaries to align with the requirements of the forecasting models.

- **Normalization:**

- Numerical values, such as revenue and expenses, were scaled to a comparable range to ensure consistency and avoid discrepancies during analysis.

- **Loading into Power BI:**

- After the data was cleaned and formatted, it was imported into Power BI Desktop for further analysis.
 - Data model verification was performed to ensure that all relationships between tables (if applicable) were correctly defined.

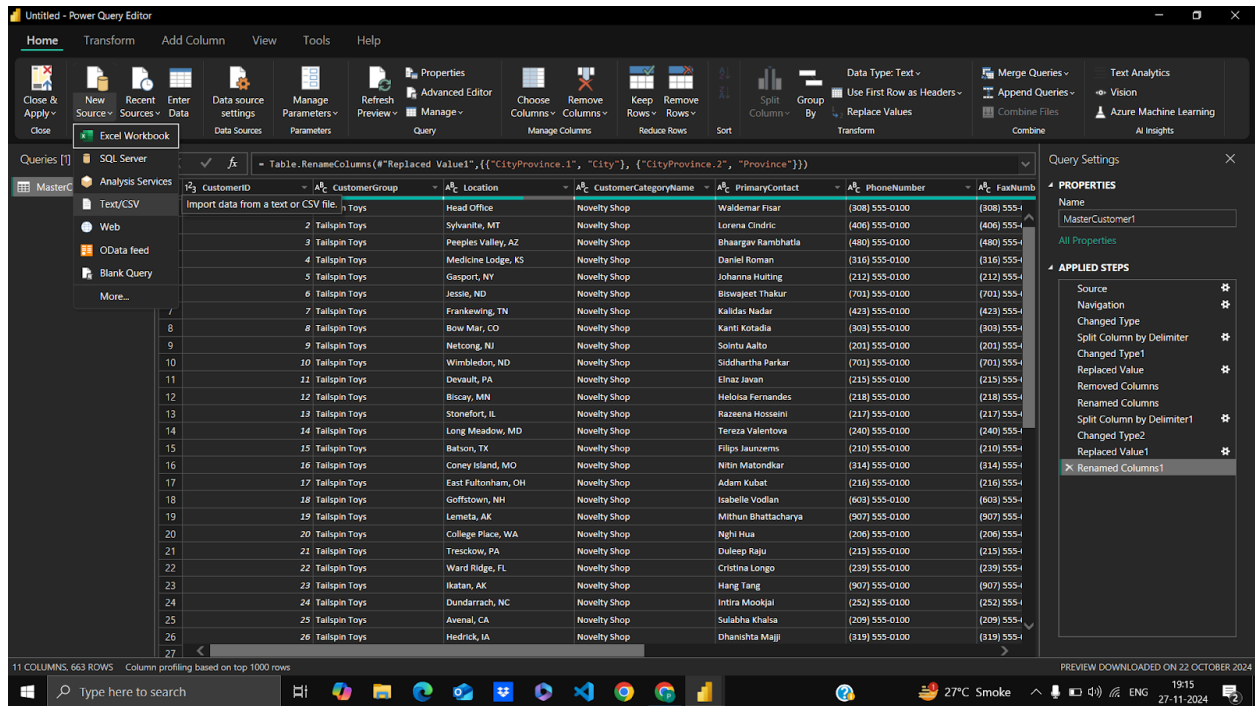


Implementation (Power BI Dashboard Development)

The development of the financial forecasting dashboard in Power BI involved a series of systematic steps, each contributing to the creation of an engaging and interactive tool for financial analysis. Below is a detailed breakdown of the implementation process:

1. Importing Data into Power BI

- To begin, Power BI Desktop was launched, and the “Get Data” feature was used to import datasets from a variety of sources:
 - CSV files
 - Excel spreadsheets
- The Power Query Editor was utilized to inspect and cleanse the data, ensuring that it was properly formatted and ready for analysis before being loaded into the Power BI data model.



2. Creating Visualizations

- **Stacked Bar Chart**

Showed segment-wise profit distribution, highlighting profitable and loss-making areas.

- **Ribbon Chart**

Illustrated the relationship between discounts and profits across different countries.

- **Tree Map**

Represented sales distribution across various segments, showcasing key contributors.

- **Pie Chart**

Provided a proportional breakdown of profit by product categories.

- **KPI Cards**

Displayed key metrics like total sales, total profits, and gross revenue for a quick overview.

- **Filters and Slicers**

Included slicers for time periods and regions to make the dashboard interactive and responsive.

3. Creating Interactive Dashboards

- A user-centric layout was designed to ensure ease of navigation and interaction:
 - Visual elements were organized strategically to emphasize key insights and trends.
 - Filters and slicers were added to allow real-time data exploration.
 - Tooltips were implemented to offer detailed information when hovering over specific data points.
- The completed dashboard was published to the Power BI service, facilitating sharing and collaboration with relevant stakeholders.

4. Screenshots of Power BI Interface and Dashboard Views

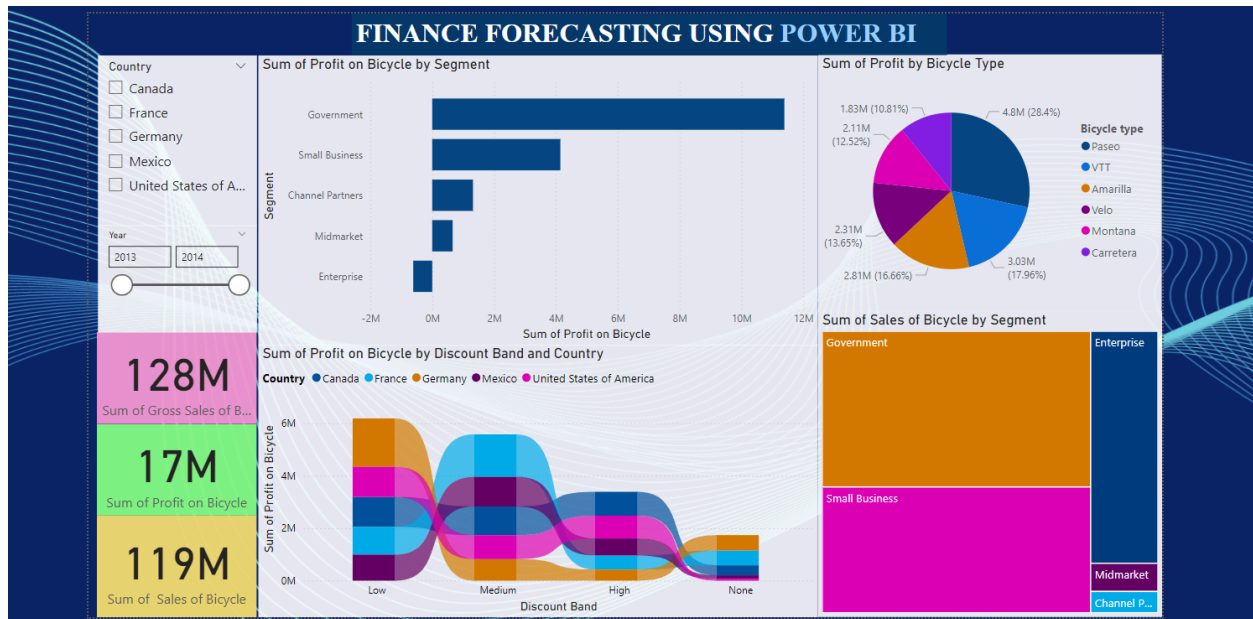
(Include your actual screenshots here, or describe placeholder screenshots.)

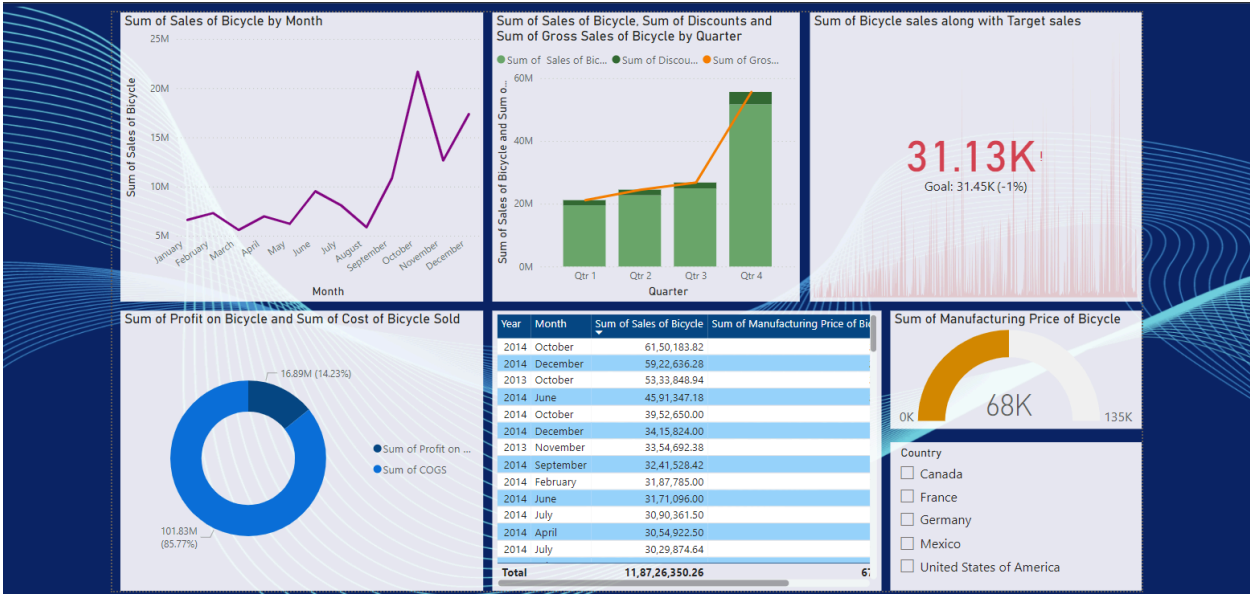
- **Power BI Interface:**

A screenshot of the Power Query Editor, highlighting the data transformation process, including cleaning, formatting, and structuring of raw financial data for analysis.

- **Dashboard Overview:**

A full-screen view of the interactive dashboard, showcasing key visuals such as line graphs illustrating financial trends, bar charts for category comparisons, and slicers for dynamic filtering of data.

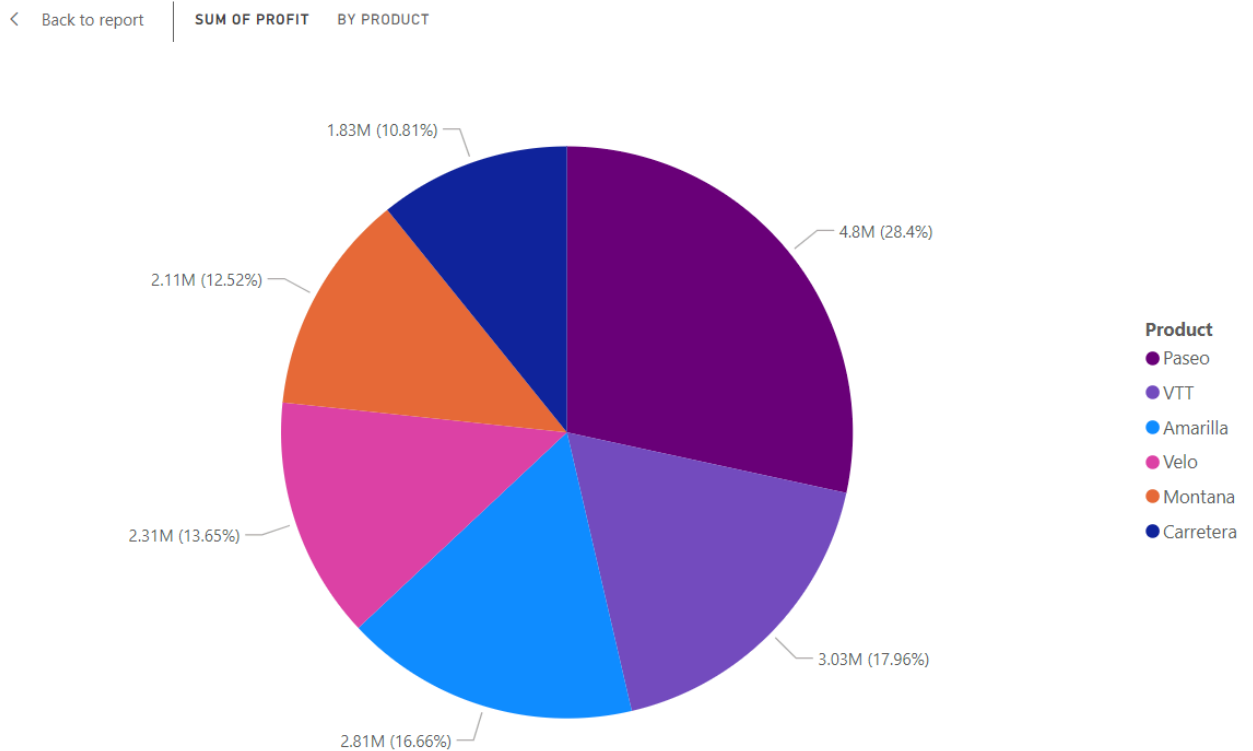




Detailed Visual:

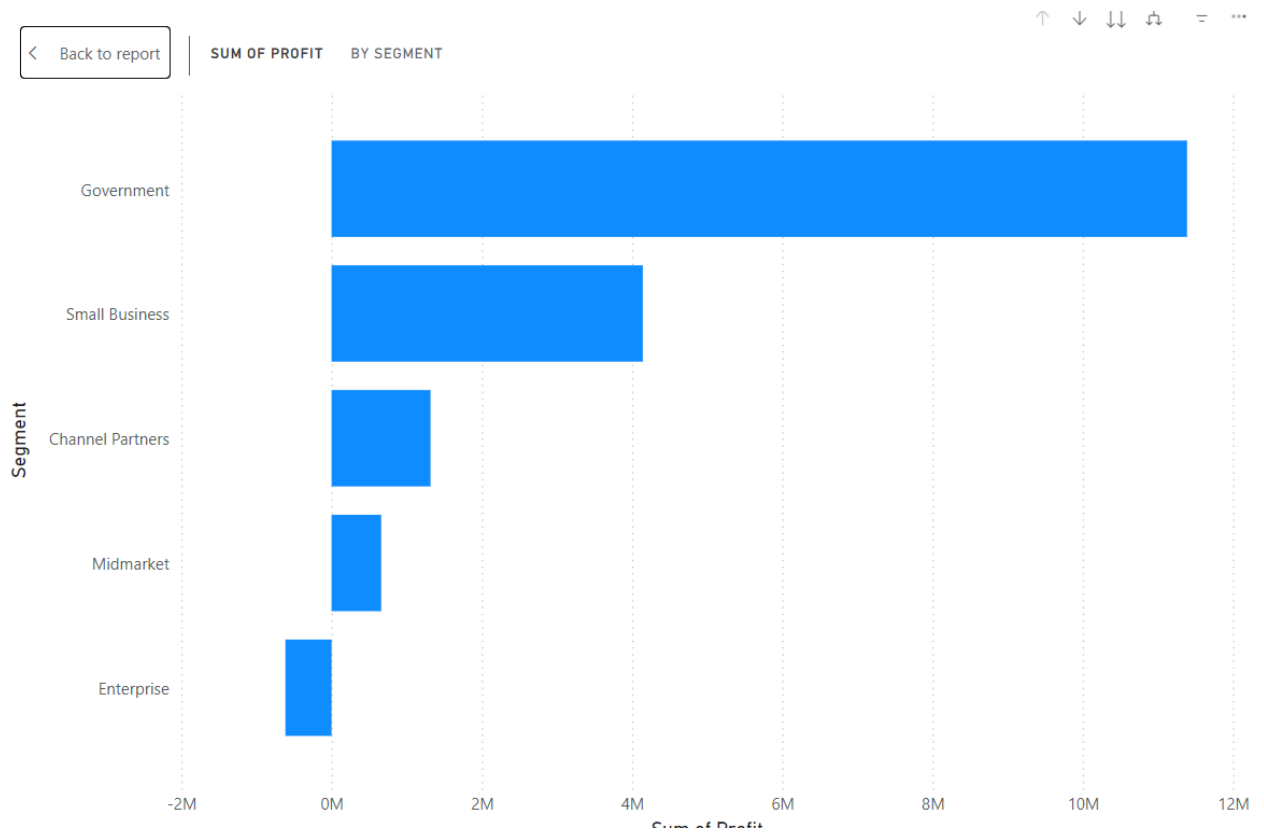
A close-up view of the forecasting graph, where both historical financial data and future predictions are clearly visible, with the forecasted trends overlaid on the actual data for comparison.

PIE CHART



- **Objective:** Visualize profit contribution by product category.
- **Implementation:**
 - Product categories were used as the legend.
 - The sum of profit was calculated and used as the value.
- **Insights:**
 - The **Paseo Product** contributed the highest profit at **28.4%**.
 - **VTT** followed with approximately **18%**.
 - Other products such as **Amarilo**, **Velo**, and **Montana** contributed **17%**, **14%**, and **13%**, respectively.
 - **Carretera** generated the least profit, with a value of **1.83M** or **10.81%** of the total.

STACKED BAR CHART



Objective: Show profit distribution across segments.

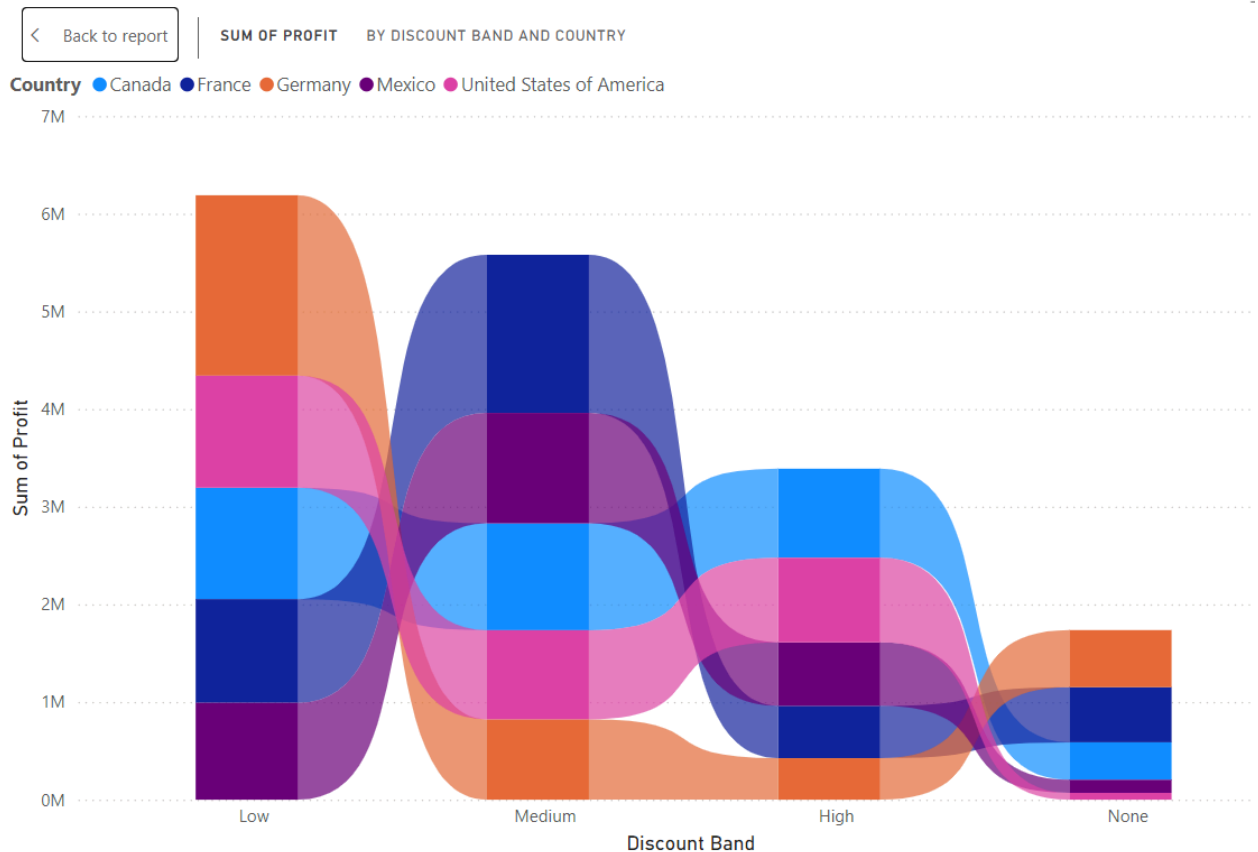
Implementation:

- Created using profit sums segmented by business types.

Insights:

- The **Enterprise segment** showed a **loss**, while other segments recorded profits.
- **Government** had the highest profit at approximately **11.5M**, followed by:
 - **Small Business:** Slightly over **4M**.
 - **Channel Partner:** **1.5M**.
 - **Mid-Market:** **1M**.

RIBBON CHART



Objective: Highlight profit trends based on discount bands and countries.

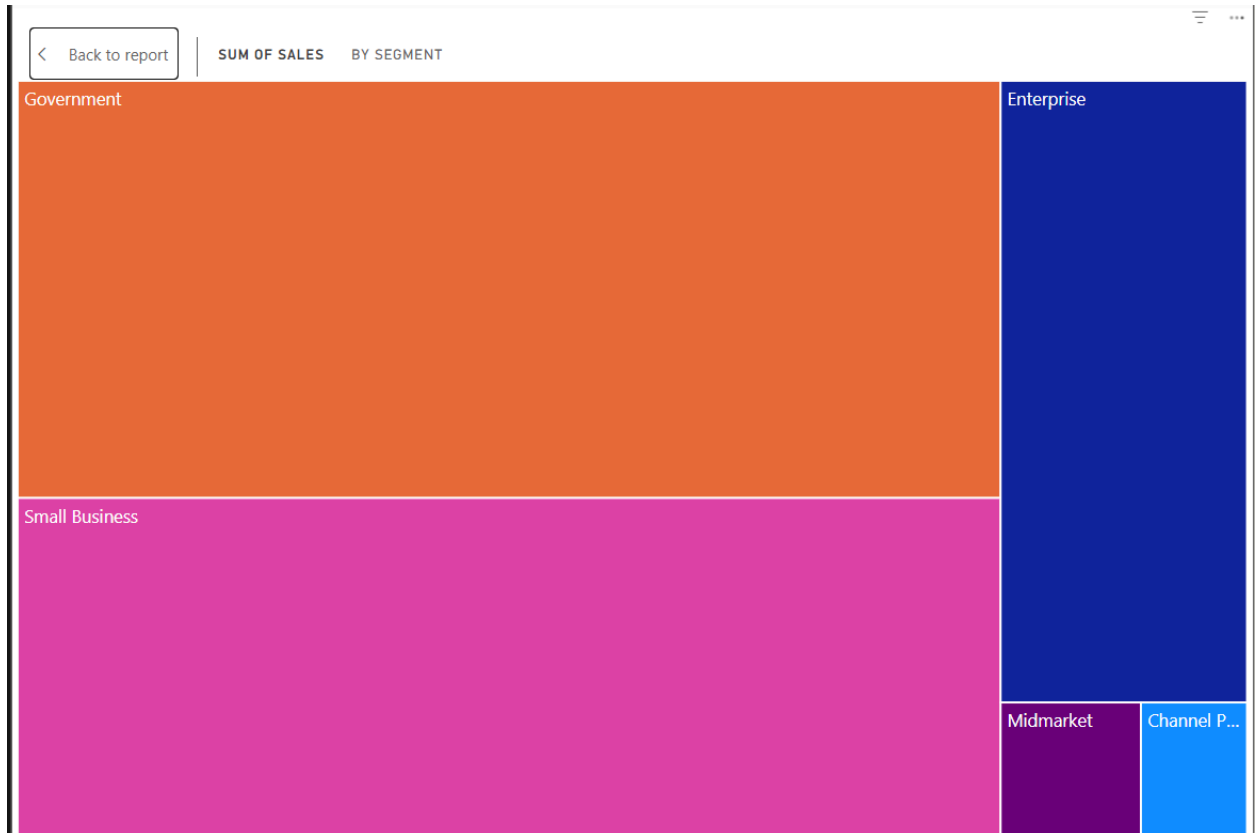
Implementation:

- Profit values were analyzed across varying discount bands (low, medium, high, none) for each country.

Insights:

- Germany:** Profits were highest with **low discounts**, dipped significantly for **medium/high discounts**, and showed a minor increase with **no discount**.
- USA:** Profits slightly declined from **low to medium discounts**, rose under **high discounts**, and dropped to zero when there were **no discounts**.
- Canada:** Profits remained **almost constant** under all discount bands, with **negligible profits** when discounts were absent.
- France:** Profits spiked significantly under **medium discounts** but sharply dropped under **high/none discounts**.
- Mexico:** Showed moderate fluctuation, with profits peaking under **medium discounts** and declining under **high/none discounts**.

TREE MAP



Objective: Display sales distribution across segments.

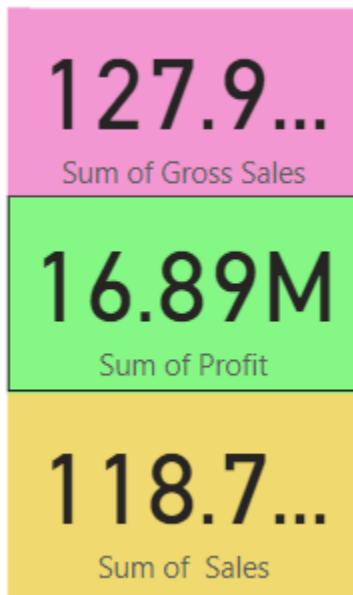
Implementation:

- Segments were used as categories, with sales sums as the measured values.

Insights:

- The **Government segment** had the **highest sales**, followed by:
 - **Small Business.**
 - **Enterprise.**
 - **Mid-Market.**
 - **Channel Partners.**

CARDS

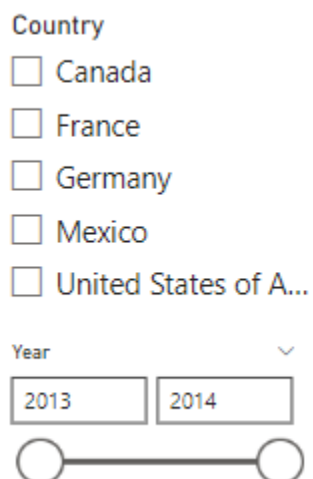


Objective: Present key metrics for high-level insights.

Metrics Displayed:

- **Gross Profit:** Approximately 128M.
- **Total Profit:** Approximately 17M.

FILTERS/SLICER



The figure shows two filter sections. The first section, labeled 'Country', contains five checkboxes, each followed by a country name: Canada, France, Germany, Mexico, and United States of A... The second section, labeled 'Year', contains two input boxes with the values '2013' and '2014', and a range slider below them with circular handles at each end.

- **Objective:** Enhance interactivity and dynamic exploration of data.

- **Slicers Added:**
 - **Year Slicer:** Allows filtering data based on specific years.
 - **Country Slicer:** Enables country-wise filtering for focused analysis.
-

Results and Analysis

The financial forecasting project provided key insights into future financial performance, helping enhance decision-making through the use of Power BI dashboards. Below is a detailed summary of the results and key insights derived:

1. Forecasting Results

- **Visualizations of Future Trends:**
 - **Revenue Growth Trends:**

A line graph demonstrated both historical revenue data and forecasted growth over the next 12 months. The graph revealed a consistent upward trajectory in revenue, with noticeable seasonal fluctuations occurring during certain months.
 - **Expense Forecasting:**

Predicted future expenses were aligned with revenue trends, identifying periods where operational costs would be higher, coinciding with peak revenue months.
 - **Profit Margins:**

Forecasted profit margins reflected a steady increase over time, suggesting improved cost management and operational efficiency.
- **Dashboard Highlights:**
 - The interactive slicers enabled users to filter data by different time frames, such as quarterly or annual projections.
 - KPI cards offered at-a-glance insights into projected financials, such as expected revenue, expenses, and net profits.

2. Insights Derived from the Dashboard

- **Seasonality and Trends:**

The forecasting revealed strong seasonal patterns in revenue, particularly with an increase in sales during the third and fourth quarters of the year. Similarly, expenses also peaked during these periods.
- **Key Financial Metrics:**

Profit margin predictions showed consistent improvement, indicating effective management of operational costs over time.

A variance analysis between actual results and forecasted values highlighted areas where performance fell short of expectations, enabling identification of underperforming departments or regions.

- **Scenario Planning:**
Using what-if scenarios, various external factors were simulated, including market changes and cost increases, to observe their impact on overall financial performance.
-

System Requirements

To successfully execute the financial forecasting project and ensure compatibility, the following hardware, software, and data specifications were outlined:

Hardware Requirements

- **Computer:**
A desktop or laptop with sufficient processing power to handle data processing tasks efficiently.
- **Storage:**
Ample storage capacity for holding large datasets, such as historical financial records, forecast models, and visualizations.

Software Requirements

- **Power BI Desktop:**
Used for data analysis, forecasting, and visualization.
- **DAX (Data Analysis Expressions):**
Leveraged for creating calculated fields, such as profit margins and growth rates.
- **Other Required Tools:**
While Power BI handled most of the analysis, additional tools may be used for supplementary tasks, including Excel for supplementary calculations.

Data Requirements

- **Historical Financial Data:**
Collected from internal databases, external APIs, and public sources for analysis.
- **Forecasting Models:**
Data covering financial history, including revenue, expenses, and key business metrics.

Conclusion

The outlined system requirements ensure the smooth execution of the financial forecasting project. By ensuring compatibility with necessary hardware and software, the project can efficiently process, analyze, and visualize data, ultimately empowering decision-makers with the insights they need to forecast future financial trends accurately.