

A PROJECT REPORT ON

FINANCIAL FORECASTING USING POWER BI

PROJECT REPORT SUBMITTED TO INFYOSIS SPRINGBOARD

AS

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UNDER THE SUPERVISION OF

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BY

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ABSTRACT

Forecasting is an essential process used to predict future trends and outcomes based on historical data. This project focuses on creating a Financial Forecasting Dashboard using Power BI, a versatile tool for data visualization and analysis. The dashboard enables businesses to analyze financial trends, identify patterns, and make informed decisions with the help of intuitive and interactive visualizations.

The project involves several key steps. Initially, data preparation ensures the dataset is clean, well-structured, and ready for analysis. This includes handling missing or inconsistent data and aligning it with the required level of granularity. Following this, time series visualizations, such as line charts, are designed to analyze trends over time. These visualizations enable users to gain insights into seasonal patterns and variations in financial data.

Using Power BI's built-in features, forecasting models are applied to predict future outcomes based on past trends. These models are crucial for estimating future financial metrics, such as revenue, expenses, and growth rates. The final output is an integrated dashboard that combines all visualizations and forecasts into an easy-to-navigate interface.

The Financial Forecasting Dashboard serves as a comprehensive tool for monitoring and predicting financial performance. By leveraging the advanced capabilities of Power BI, this project highlights the importance of data-driven decision-making in modern businesses. The dashboard's interactive nature allows stakeholders to explore data, assess potential risks, and plan effectively for the future.

In conclusion, this project demonstrates the practical application of data visualization and forecasting techniques in creating impactful business tools. It underscores the significance of transforming raw data into actionable insights to enhance organizational efficiency and decision-making.

INTRODUCTION

Financial Forecasting

Financial forecasting is the process of predicting future financial outcomes by analyzing historical data and identifying trends. It helps organizations estimate metrics such as revenue, expenses, profits, and cash flows over a specific period. By providing insights into potential future scenarios, financial forecasting supports strategic planning, resource allocation, and risk management.

Key benefits :

Strategic Planning: Helps in setting realistic goals and aligning resources to achieve long-term objectives.

Budgeting and Financial Management: Enables better allocation of financial resources by predicting revenue and expenditure trends.

Risk Mitigation: Identifies potential risks and uncertainties, allowing businesses to develop contingency plans.

Performance Evaluation: Provides benchmarks for comparing actual performance against forecasts, enabling adjustments and improvements.

Market Adaptation: Anticipates market changes and customer behavior, guiding product development and marketing strategies.

Key Objectives:

- * To clean, organize, and analyze financial datasets.
- * To create time series visualizations that highlight trends and seasonal patterns.
- * To apply forecasting models to predict future financial metrics, such as revenue and expenses.
- * To build a user-friendly dashboard that enables stakeholders to explore data and make data-driven decisions.

Significance:

This project demonstrates the power of modern tools like Power BI in transforming raw data into actionable insights. The interactive dashboard not only streamlines financial forecasting but also enhances decision-making processes, helping organizations identify risks, plan strategically, and achieve their financial goals effectively.

TOOLS AND TECHNOLOGIES

Power BI:

Power BI, developed by Microsoft, is a leading business intelligence and data visualization tool widely used for transforming raw data into meaningful insights. Its user-friendly interface, combined with powerful data analysis capabilities, makes it an ideal choice for building interactive dashboards and performing complex data analyses.

Features of Power BI

Power BI comes equipped with numerous features that enhance data processing, visualization, and analysis. The key features leveraged in this project include:

Data Connectivity-Power BI supports integration with diverse data sources such as Excel files, SQL databases, and cloud-based services, enabling seamless data import for analysis.

Data Transformation-Using Power Query, data can be cleaned and transformed to ensure accuracy and consistency before analysis.

Interactive Dashboards-Interactive visualizations with drill-down and slicer capabilities allow users to explore data intuitively and gain actionable insights.

Forecasting and Predictive Analysis-Power BI's built-in forecasting tools provide reliable predictions by analyzing historical trends, which is critical for financial forecasting.

Real-Time Data Analysis-With support for streaming datasets, Power BI ensures real-time data monitoring, making it highly effective for live financial dashboards.

Custom Visualizations and DAX-Custom visualizations and Data Analysis Expressions (DAX) enable advanced calculations and dynamic representations tailored to specific needs.

Components of Power BI:

1. power Query:

Power Query is a tool in Microsoft Power BI that helps you prepare your data for analysis. It is like a "data cleaner" that allows you to:

Connect to different data sources: Bring in data from files, databases, or the internet.

Clean and fix data: Remove errors, fill missing values, and format data properly.

Combine data: Merge or append multiple tables to create one dataset.

Transform data: Change the structure of data, like splitting columns, pivoting tables, or sorting rows.

The best part is that Power Query is easy to use because it works like a step-by-step recipe. You don't need to write code; instead, you use a simple interface to tell Power Query what changes you want. Once done, you can reuse the steps on new data automatically.

2. Power pivot:

Power Pivot is a tool in Power BI that helps you organize and analyze data from multiple tables. Instead of combining all your data into one big table, Power Pivot lets you:

Connect Tables: Create relationships between different tables, so you can analyze them together.

Handle Big Data: Work with large datasets without slowing down your analysis.

Do Advanced Calculations: Use DAX (a formula language) to calculate totals, averages, percentages, and other metrics.

Create Hierarchies: Make it easier to analyze data by organizing it (e.g., Year → Month → Day).

Use of Power Pivot:

It makes working with complex data simple.

You can quickly combine data from multiple sources.

It's great for creating detailed reports and dashboards.

In short, Power Pivot is like the "brain" of Power BI, helping you make sense of big and complex data in an easy way!.

3.power view:

Power View is a data visualization tool in Power BI and Excel that helps you create interactive charts, maps, and tables. It allows users to explore, analyze, and present data visually, making it easy to understand trends and patterns.

Features of Power View:

Interactive Visualizations-Create dynamic charts, graphs, and maps that respond to user clicks and filters.

Easy Data Exploration-Users can drill down into data, filter it, and see updates across all visuals instantly.

Multiple View Options-Display data in various formats, such as line charts, bar graphs, pie charts, scatter plots, and maps.

Slicers and Filters-Add slicers to filter data on the fly and see only the information you're interested in.

Data Storytelling-Combine visuals to build interactive reports that help tell a story with your data.

Use of Power View:

Makes complex data easier to understand.

Helps create visually appealing reports.

Encourages interactive exploration, so users can gain deeper insights.

In short, Power View turns raw data into beautiful, interactive visuals that make analysis fun and informative!

4. power BI service:

Power BI Service is an online platform where you can store, share, and collaborate on Power BI reports and dashboards. It is like the cloud version of Power BI, allowing users to access their data and reports from anywhere using a web browser.

Features of Power BI Service:

Publish and Share Reports-Upload your reports and dashboards from Power BI Desktop to the cloud.Share them with team members or stakeholders easily.

Collaboration-Work together on reports by commenting, sharing insights, and co-editing dashboards.

Access Anywhere-View and interact with dashboards on any device, including laptops, tablets, or smartphones.

Real-Time Data Updates-Connect to live data sources and ensure dashboards automatically refresh with the latest information.

Security and Permissions-Control who can view or edit your reports by setting user permissions.

Alerts and Notifications-Set up alerts to notify you when certain thresholds are reached in the data (e.g., revenue falling below a target).

Integration with Other Tools-Connect with Microsoft tools like Excel, Teams, and SharePoint for seamless workflows.

Power BI Apps-Create and publish apps for sharing collections of dashboards and reports with specific audiences.

Use of Power BI Service:

Makes sharing and collaborating on reports effortless.

Provides real-time insights for quick decision-making.

Ensures data is accessible anytime, anywhere.

In short, Power BI Service is like a central hub for managing, sharing, and collaborating on all your Power BI work!

Supported Data Sources and Loading Methods

Data Sources Supported By Power BI:

Power BI supports a wide range of data sources, including:

Files: Excel, CSV, XML, JSON, and PDF files.

Databases: SQL Server, Oracle, MySQL, PostgreSQL, and other relational databases.

Cloud Services: Azure, Google Analytics, Salesforce, and SharePoint.

Web and APIs: Data from web pages and REST APIs.

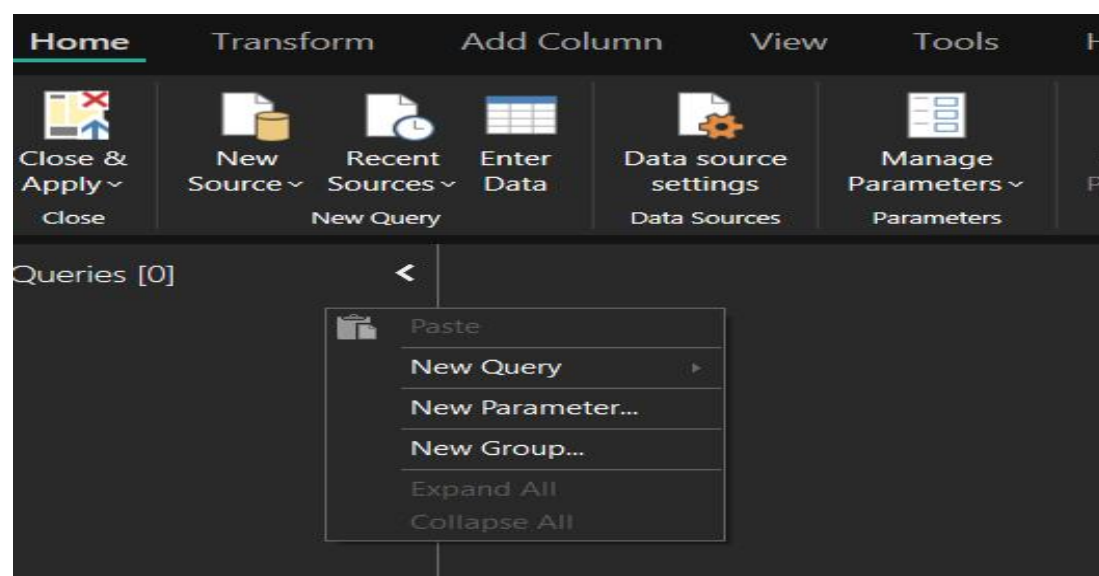
Big Data: Hadoop, Spark, and Azure Data Lake.

Ways to Load Data into Power BI:

1.Open Power BI Desktop → Click "Get Data" → Choose file type (e.g., Excel, CSV, JSON) → Browse and select the file → Click "Open" → Select sheet/table (if applicable) → Click "Load" or "Transform Data".

2.Power Query Editor → Click "New Source" → Choose data source type (e.g., Excel, CSV, SQL) → Browse and select file/data source → Load data into Power Query Editor

3.Power Query Editor → Right-click in the Queries pane → Select "New Query" → Choose data source type (e.g., Excel, CSV, SQL) → Browse and select file/data source → Load data into Power Query Editor → Click "Close & Load" to load the data into Power BI.



DATA PREPARATION

Transforming Data Operations in Power Query Editor:

Power Query Editor is a powerful tool in Power BI used for cleaning, transforming, and preparing data before analysis. Below are the key operations available in the Power Query Editor for transforming data:

1. Basic Transformations

Remove Rows/Columns: Eliminate unnecessary rows or columns from the dataset.

Rename Columns: Change column names for better readability and consistency.

Filter Rows: Select specific rows based on conditions, such as values or ranges.

Sort Data: Arrange rows in ascending or descending order based on column values.

2. Data Cleaning

Replace Values: Find and replace incorrect or unwanted values in the dataset.

Remove Duplicates: Identify and remove duplicate rows to maintain data integrity.

Handle Missing Data: Fill null values with default values, averages, or previous entries.

3. Column Transformations

Split Columns: Divide a column into multiple columns based on a delimiter or position.

Merge Columns: Combine two or more columns into one using a delimiter (e.g., a space or comma).

Change Data Type: Ensure columns have appropriate data types (e.g., text, number, or date).

Add Custom Columns: Create new columns with custom formulas for specific calculations.

4. Aggregation and Grouping

Group By: Summarize data by grouping it based on one or more columns and applying aggregate functions (e.g., sum, count, or average).

5. Advanced Transformations

Pivot Columns: Turn unique values from a column into new columns, rearranging the data structure.

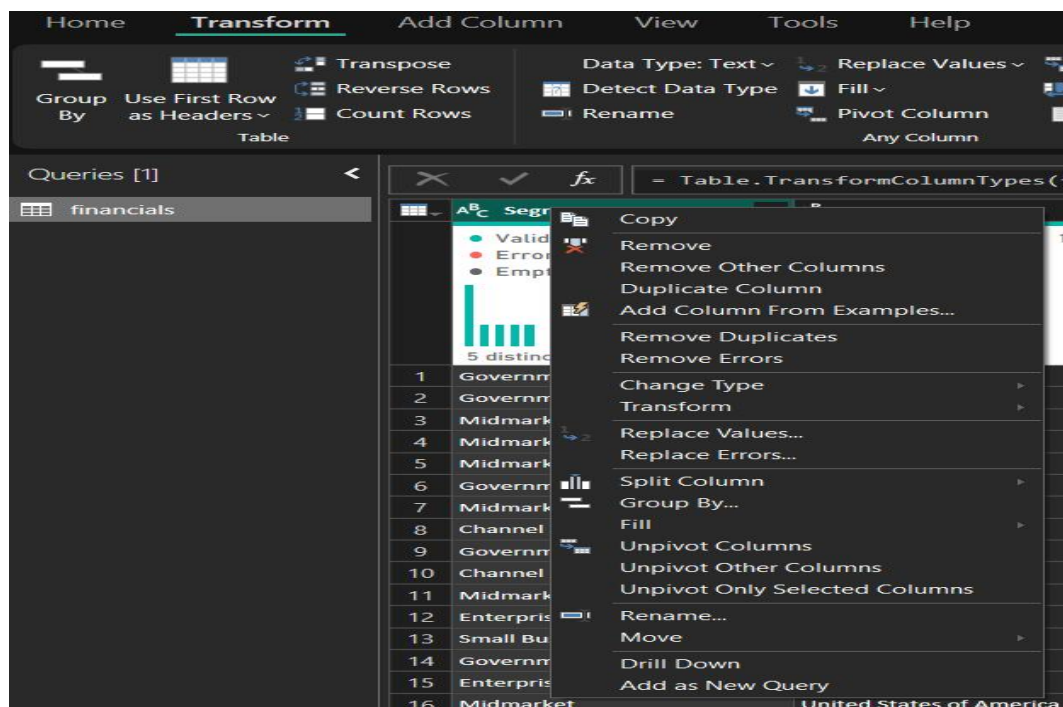
Unpivot Columns: Convert columns into rows, making the data structure simpler.

Append Queries: Combine rows from multiple datasets into one table.

Merge Queries: Join two datasets based on matching columns.

6. Applied Steps

Each transformation step is recorded in the Applied Steps panel, allowing you to review, edit, or delete previous actions.



Methods to Transform Data:

1. Using the Ribbon Menu
2. Right-Clicking on Columns

DATA MODELING

In Power BI, the Model View allows users to create and manage relationships between tables in a dataset, ensuring seamless interaction and accurate analysis across related data. Relationships define how tables are connected, enabling powerful insights and advanced calculations.

Steps to Create Relationships in Model View

1. Using Drag-and-Drop in Model View:

- Go to the Model View in Power BI.
- Drag a field (column) from one table to a corresponding field in another table.
- Power BI automatically creates a relationship based on the fields' data types.

2. Using the Manage Relationships Option:

- Navigate to the Modeling Tab in Power BI.
- Click on Manage Relationships to view existing relationships.

Use the following options:

Add: Create a new relationship by specifying the tables and columns.

Edit: Modify an existing relationship to change the fields or relationship type.

Delete: Remove an unwanted relationship.

Relationship Types in Power BI:

1. One-to-Many (1:M):

The most common relationship.

One record in the first table corresponds to many records in the second table.

Example: A "Customers" table (one row per customer) relates to an "Orders" table (multiple orders per customer).

2. Many-to-Many (M:M):

Used when multiple records in one table correspond to multiple records in another table.

Example: A "Products" table and a "Sales" table can have many shared records.

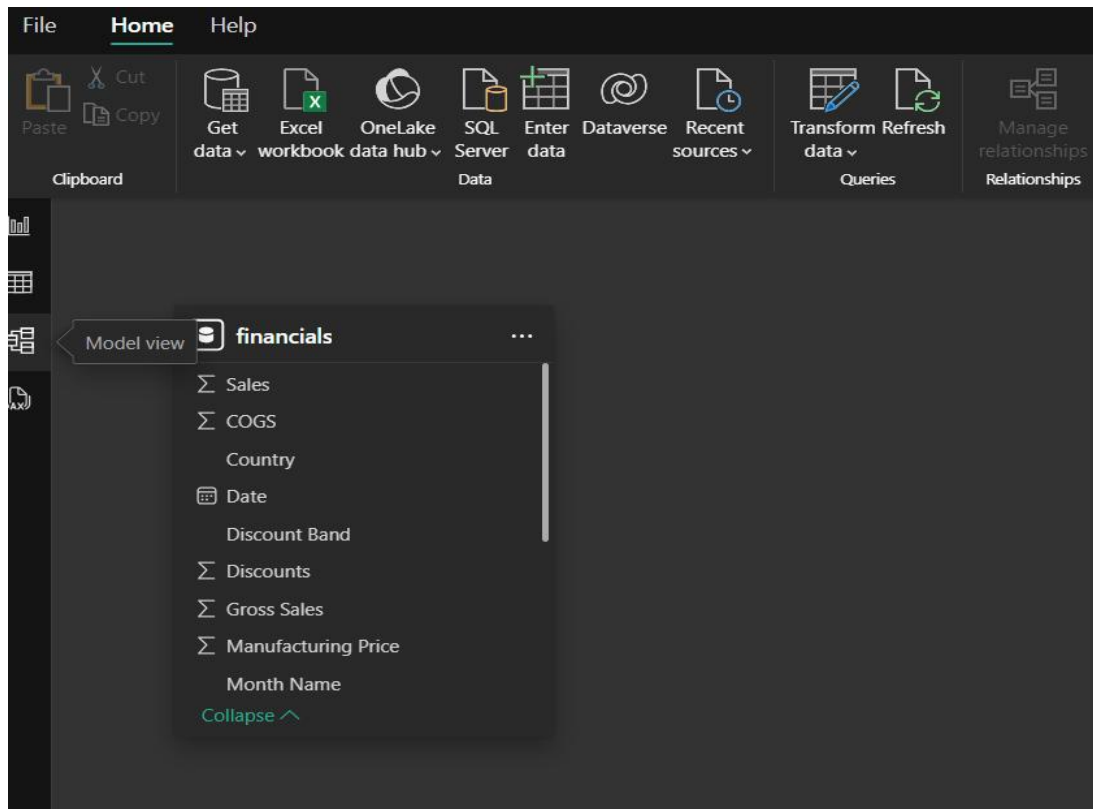
3.One-to-One (1:1):

Each record in one table corresponds to exactly one record in the other table.

Example: A "Users" table and a "User Details" table where each user has a unique entry in both tables.

Why Relationships Matter?

- Relationships link tables, enabling users to analyze data across multiple tables seamlessly.
- Proper relationships ensure accuracy in calculations, aggregations, and visuals.
- They simplify data modeling by allowing users to maintain separate tables instead of merging them.



DATA VISUALIZATION

Data visualization is the process of representing data in a visual format, such as charts, graphs, or maps, to help users understand trends, patterns, and insights more effectively. It transforms raw data into meaningful visuals, making complex information easier to interpret and act upon.

Importance of Data Visualization

- **Simplifies Complex Data:** Converts large datasets into understandable visuals.
- **Identifies Trends and Patterns:** Highlights key insights that might not be apparent in raw data.
- **Improves Decision-Making:** Provides a clear basis for strategic decisions.
- **Enhances Communication:** Makes it easier to present findings to non-technical audiences.

Key Types of Visualizations in Power BI

1. **Bar Charts:** Compare values across categories.
2. **Line Charts:** Show trends over time.
3. **Pie Charts and Donut Charts:** Represent proportions of a whole.
4. **Tables and Matrices:** Display data in structured rows and columns.
5. **Scatter Plots:** Highlight relationships between two numerical variables.
6. **Maps:** Visualize geographic data on a global or regional scale.
7. **Cards and KPIs:** Display single values for quick insights.
8. **Treemaps and Heatmaps:** Represent hierarchical and density-based data visually.

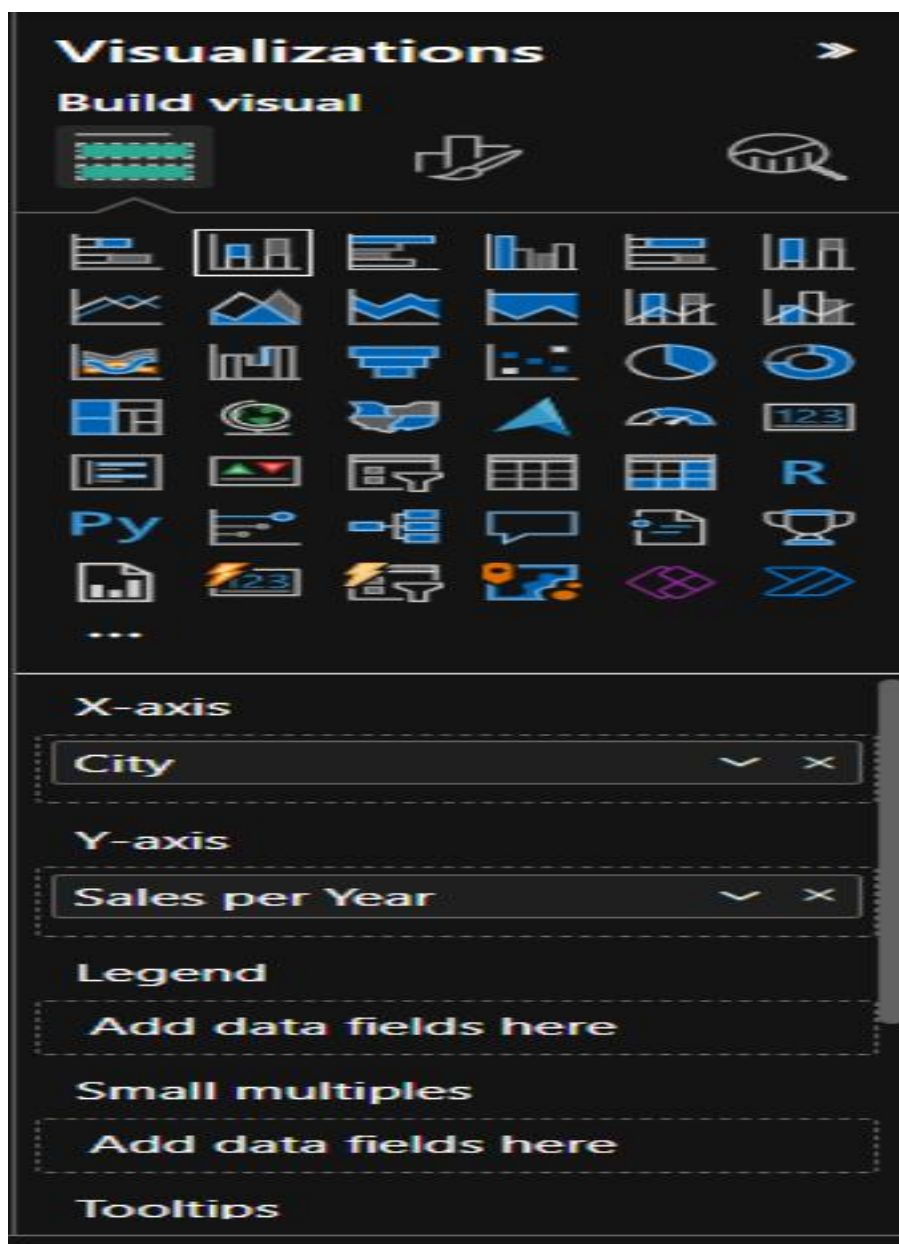
Features of Data Visualization in Power BI

- **Interactive Visuals:** Users can drill down, filter, and slice data for deeper analysis.
- **Real-Time Updates:** Dashboards automatically update with new data.
- **Customization:** Change colors, labels, and layouts to match the report's needs.
- **Advanced Analytics:** Add forecasting, clustering, and what-if scenarios for detailed analysis.

- Integration with Filters: Use slicers, filters, and bookmarks to create tailored views.

Benefits in Business Intelligence

- Faster Insights: Quickly identify actionable insights from complex datasets.
- Better Collaboration: Visual dashboards make it easy to share insights with teams.
- Enhanced Monitoring: Track KPIs and performance metrics in real-time.



METHODOLOGY

1.Data Collection

Data Sources

The data used in this project was collected from three datasets:

- **MasterCustomer1:** Contains customer-related data, including geographical, category, and contact information.it is used for customer segmentation and analysis.
- **InvoiceData:** Transaction-level details, including sales figures, quantities, and year-over-year growth percentages.it supports sales trends and transactional insights.
- **Financials:** Comprehensive financial data, including sales, profit, discounts, and cost of goods sold, along with temporal details.it provides core metrics for forecasting and performance analysis.

Data Integration

The datasets were loaded into Power BI, and relationships were created between tables using common fields like **CustomerID** and **Date** to enable seamless analysis.

2.Data Preparation and Transformation

InvoiceData Transformations

- Merged the **Day**, **Month**, and **Year** columns into a single **Date** column for easier temporal analysis.
- Changed the data type of the newly created **Date** column to ensure it is recognized as a valid date format in Power BI.
- Removed unwanted columns that were not necessary for the analysis, streamlining the dataset.

MasterCustomer1 Transformations

- Split the **CityProvince** column into two separate columns: **City** and **Province** for better clarity and easier data analysis.
- Removed unnecessary columns to ensure the dataset only contained relevant attributes.

3. Data Modeling:

Creating Relationships

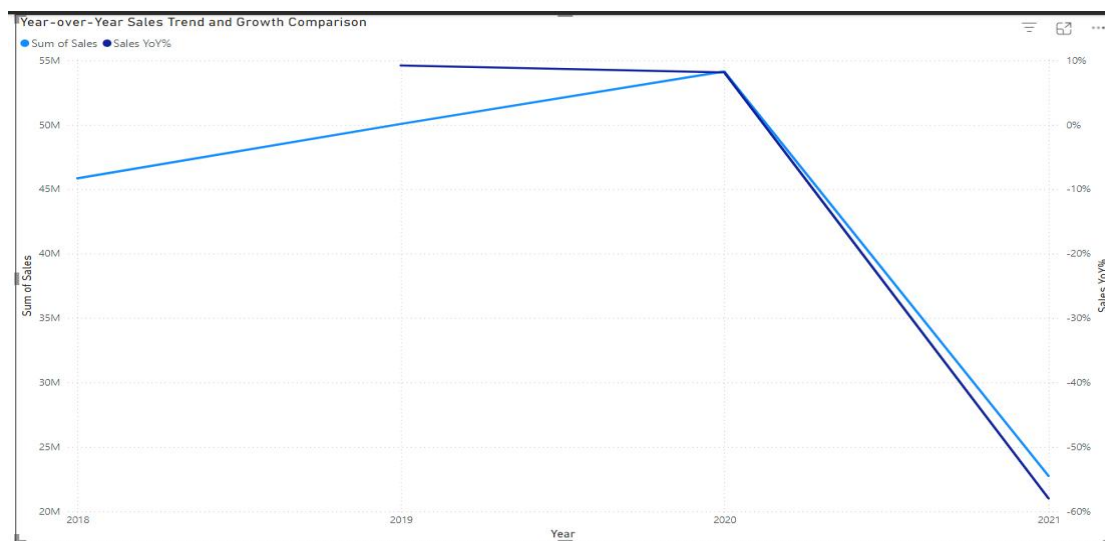
- Linked the MasterCustomer1 table to the InvoiceData table using the CustomerID and CustomerCode columns.
- Connected the InvoiceData table to the Financials table using the Date column.

Year-over-Year (YoY) Sales Change-Used Quick Measure in Power BI to calculate Year-over-Year Sales Change. This measure compares sales from the current year to the previous year, helping track growth or decline in sales over time.

Managing Relationships-Ensured all relationships between tables were correct and consistent for accurate analysis.

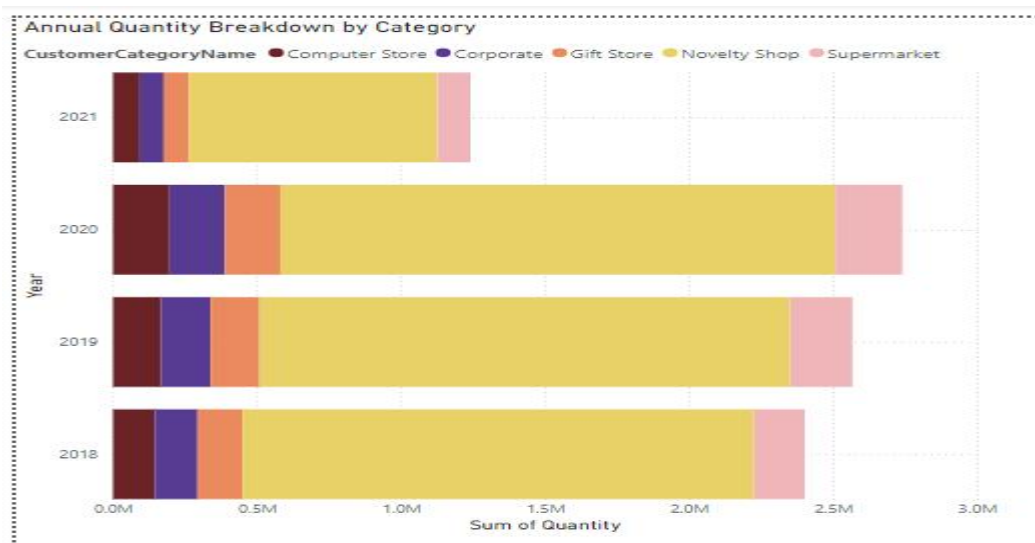
4. Data Visualization

LineChart:



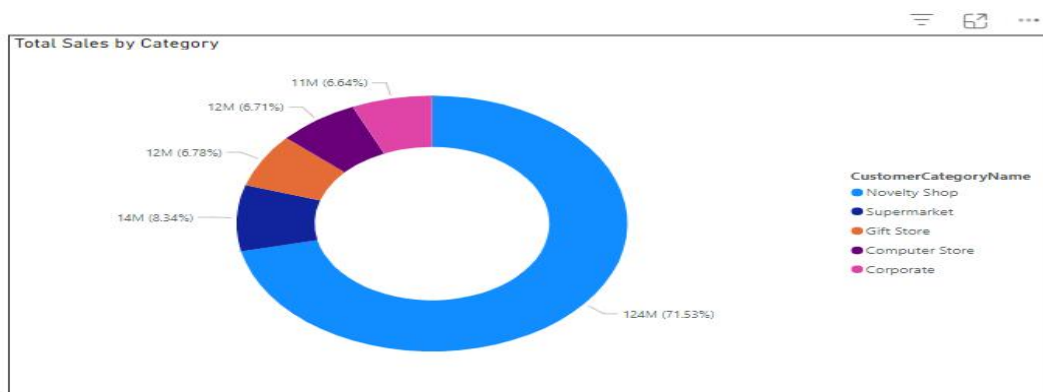
- The graph shows the sum of sales and year-over-year (YoY) sales growth from 2018 to 2021.
- The year over year growth is positive from 2018 to 2020
- In 2021 the sales volume dropped drastically while the year over year growth is negative, indicating a sharp decline in sales.
- Sales growth has been very volatile in recent years, suggesting a changing market or other factors impacting sales.

Stacked Bar Chart:



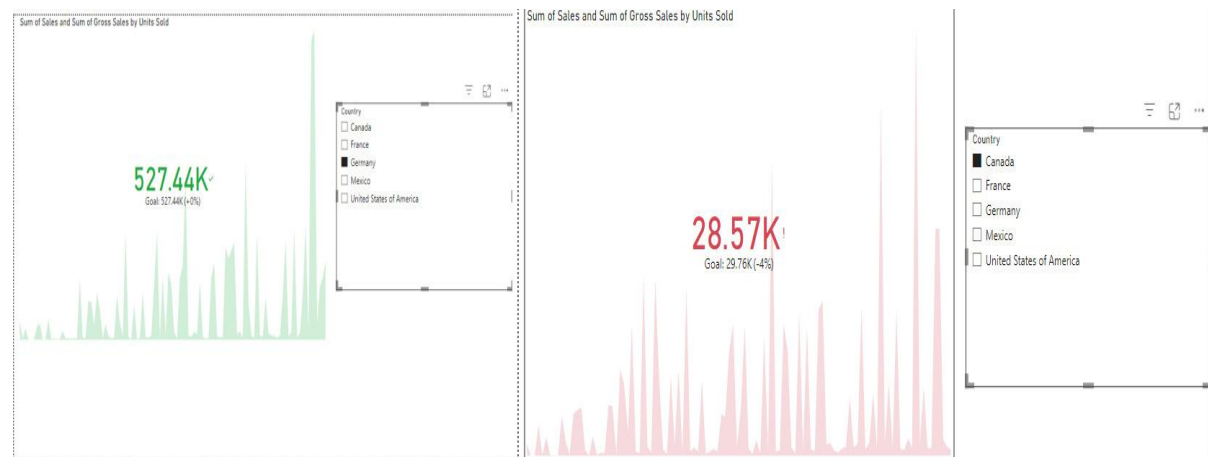
- The chart shows the breakdown of quantity by customer category for the years 2018, 2019, 2020, and 2021.
- The largest category in each year is Novelty Shop.
- The smallest category in each year is Computer Store.
- The total quantity sold has increased each year.
- The Supermarket category has seen the largest growth.

Donut chart:



- Novelty Shop is the highest selling customer category, with a total sales of 124 Million, which accounts for 71.53% of the total sales.
- The other categories, Supermarket, Gift Store, Computer Store and Corporate, account for a much smaller percentage of total sales, ranging from 6.64% to 8.34%.
- The total sales of the other categories are not insignificant, but they are significantly lower than the total sales of the Novelty Shop.

KPI Chart:

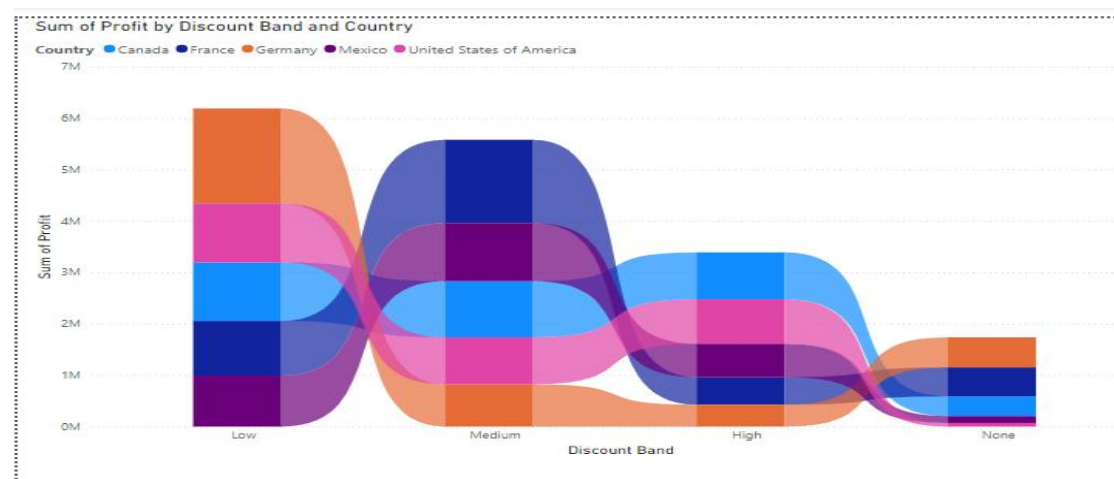


Key Findings:

- Germany has the highest sales, reaching 527.44K, meeting its target.
- United States of America has the highest gross sales, reaching 28.57K but falling short of its goal by 4%.
- The remaining countries, Canada, France, and Mexico, also did not reach their sales and gross sales goals.

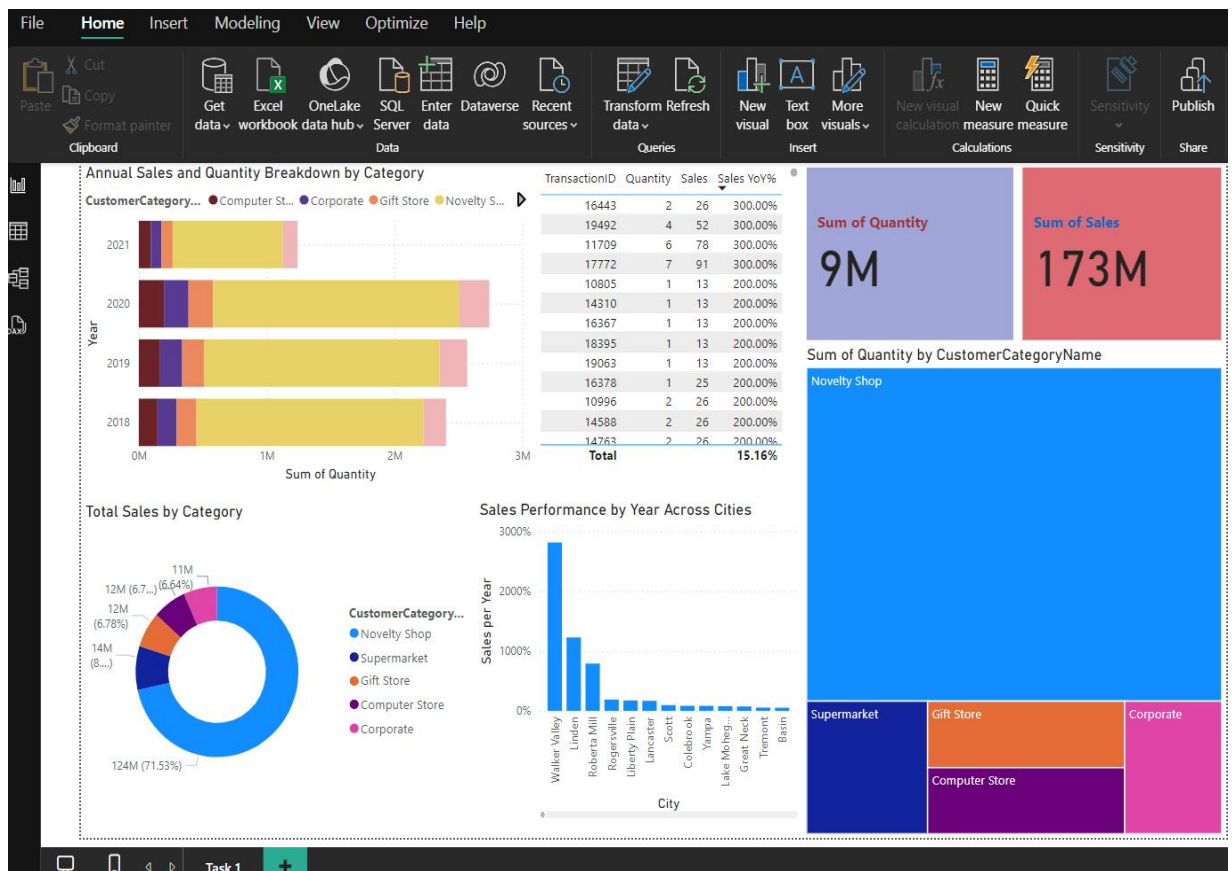
Further investigate the reasons behind the sales shortfall for the countries that did not meet their goals. This may involve examining factors such as pricing, product availability, marketing efforts, and competitor activity. Overall, the data suggests that while Germany has achieved significant success, other countries need to enhance their sales and gross sales strategies to meet their goals.

Ribbon Chart:



- Highest Profit in Low Discount Band: The highest total profit is observed in the "Low" discount band, predominantly driven by the combined contribution of "Germany" and "United States of America."
- Decline in Profit with Increasing Discount: As the discount band increases from low to high, the total profit generally decreases.
- Significant Contribution of "United States of America": "United States of America" contributes significantly to the profit across all discount bands, particularly in the "Low" and "Medium" bands.
- Relatively Low Profit from "France": "France" exhibits a significantly lower contribution to profit compared to other countries, particularly in the "High" and "None" discount bands.
- Mixed Performance of "Mexico" and "Canada": "Mexico" and "Canada" show moderate profit levels across discount bands, with a noticeable decline in the "High" and "None" bands.

Overall Dashboard:



CONCLUSION

financial forecasting is a crucial process that enables organizations to predict future financial performance based on historical data and trends. By analyzing past financial metrics, businesses can make informed decisions regarding budgeting, resource allocation, and strategic planning. Effective forecasting helps identify potential risks and opportunities, allowing companies to adapt to market changes and enhance their overall financial health. The insights gained from accurate financial forecasts empower stakeholders to set realistic goals, monitor performance, and optimize operational efficiency. Ultimately, leveraging robust forecasting techniques fosters a proactive approach to financial management, supporting long-term growth and sustainability in an ever-evolving business landscape.