

Power BI Project Report



Created by:

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Projects:

[American Coffee
Taste Analysis
Project]



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Python Machine Learning	<u>Power Consumption Projectn Time Series Forecasting) -</u> https://github.com/Somnath342000/Python-ML-project-of-Power-Consumption-Forecasting-state-wise-in-India.git
	<u>Healthcare Research Project (Unsupervised ML Project for categorical target variable)-</u> https://github.com/Somnath342000/Python-Unsupervised-ML-Classification-project-on-Healthcare-Research.git
	<u>Stock Market fundamental Analysis (Unsupervised ML Project for continuous target variable)-</u> https://github.com/Somnath342000/Python-Unsupervised-ML-Regression-project-on-Fundamental-Analysis.git
Power BI	<u>American Coffee Taste Analysis Project -</u> https://github.com/Somnath342000/Power-BI-American-Coffee-Taste-Analysis-Project.git
SQL	<u>Dairy Management Information Project for Market Research Survey -</u> https://github.com/Somnath342000/Dairy-Information-System-Management-Project-SQL_Python-.git
	<u>Loan Database Analysis System project-</u> https://github.com/Somnath342000/SQL-Python-Financial-Health-Tracker.git
Tableau	<u>Pizza Sales Tableau Analysis project - Tableau Community</u> https://public.tableau.com/views/PIZZASALES_17376436150760/Dashboard1?:language=en-GB&publish=yes&:sid=&:redirect=auth&:display_count=n&:origin=viz_share_link <u>Github Link -</u> https://github.com/Somnath342000/Tableau-pizza-Sales-Analysis.git
Excel & VBA	<u>Super store Sales MIS Dashboard Report-</u> https://github.com/Somnath342000/Excel-SuperStore-Sales-Report-Dashboard.git
	<u>Automatic Grade Checker –</u> https://github.com/Somnath342000/Excel-VBA-Automatic-Grade-Checker.git

Power BI - Data Visualization Tool

Overview of Power BI Tool & Functions

1. **Data Connectivity:** Power BI connects to a wide range of data sources, including databases (SQL Server, MySQL), Excel, cloud services (Azure, Google Analytics), and web data.
2. **Data Transformation (Power Query):** Power BI's Power Query Editor allows users to clean, reshape, and transform data without needing coding skills.
3. **Visualizations:** Create various visualizations like bar charts, line graphs, pie charts, maps, and KPIs. Visualizations are interactive, allowing for drill-downs.
4. **Data Modeling:** Power BI supports creating relationships between different data tables, building complex data models for deeper analysis.
5. **Calculated Measures and Columns:** Using DAX (Data Analysis Expressions), users can create calculated columns and measures to perform advanced calculations on the data.
6. **Dashboards & Reports:** Users can build interactive dashboards and reports that can be published and shared with others.
7. **Power BI Service:** A cloud-based platform for publishing, sharing, and collaborating on reports and dashboards with real-time data access.
8. **Real-Time Data:** Supports real-time data streaming for up-to-date reporting and analysis.
9. **Mobile Compatibility:** Access and interact with reports and dashboards on mobile devices with the Power BI mobile app.
10. **Security:** Role-based access, row-level security, and integration with Microsoft's security infrastructure to protect sensitive data.
11. **Power BI Embedded:** Allows embedding interactive Power BI reports and dashboards into third-party applications.

Power BI is a powerful tool for business intelligence, enabling users to analyze data, generate insights, and share visualizations in a collaborative environment.

Overview of DAX (Data Analysis Expressions)

DAX (Data Analysis Expressions) is a formula language used in Power BI, Power Pivot, and SSAS Tabular models. It is designed for creating custom calculations and measures in reports. DAX expressions allow users to manipulate data, perform complex calculations, and enhance business intelligence reports.

Here's a brief overview of common DAX functions and examples of DAX queries:

1. Basic DAX Functions

- **SUM:** Adds up values in a column.
`Total Sales = SUM(Sales[SalesAmount])`
- **AVERAGE:** Calculates the average of a column.
`Average Sales = AVERAGE(Sales[SalesAmount])`
- **COUNTROWS:** Counts the number of rows in a table or filtered table.
`Total Orders = COUNTROWS(Sales)`
- **COUNT:** Counts the number of non-empty cells in a column.
`Number of Customers = COUNT(Sales[CustomerID])`

2. Filtering Functions

- **CALCULATE:** Changes the context of a calculation. Often used with filters.
Sales in 2021 = CALCULATE(SUM(Sales[SalesAmount]), Sales[Year] = 2021)
 - **FILTER:** Returns a table that represents a subset of another table.
High Sales = FILTER(Sales, Sales[SalesAmount] > 1000)
 - **ALL:** Removes all filters from the specified columns or tables.
Total Sales = CALCULATE(SUM(Sales[SalesAmount]), ALL(Sales))
-

3. Time Intelligence Functions

- **TOTALYTD:** Calculates the year-to-date total.
YTD Sales = TOTALYTD(SUM(Sales[SalesAmount]), Sales[Date])
 - **SAMEPERIODLASTYEAR:** Compares values for the same period in the previous year.
Sales Last Year = CALCULATE(SUM(Sales[SalesAmount]), SAMEPERIODLASTYEAR(Sales[Date]))
 - **DATEADD:** Shifts a date by a specified number of intervals.
Sales 3 Months Ago = CALCULATE(SUM(Sales[SalesAmount]), DATEADD(Sales[Date], -3, MONTH))
-

4. Conditional Functions

- **IF:** Performs conditional checks.
Sales Category = IF(Sales[SalesAmount] > 1000, "High", "Low")
 - **SWITCH:** Evaluates an expression against a list of possible values and returns a result.
Sales Category = SWITCH(TRUE(),
Sales[SalesAmount] > 1000, "High",
Sales[SalesAmount] > 500, "Medium",
"Low")
 - **IFERROR:** Returns a value if an error occurs.
Sales per Customer = IFERROR(SUM(Sales[SalesAmount])/COUNT(Sales[CustomerID]), 0)
-

5. Logical Functions

- **AND:** Checks whether both conditions are true.
High Sales & Loyal Customer = IF(AND(Sales[SalesAmount] > 1000, Sales[CustomerLoyalty] = "Yes"), 1, 0)
 - **OR:** Checks whether at least one condition is true.
Special Discount = IF(OR(Sales[CustomerLoyalty] = "Yes", Sales[SalesAmount] > 1000), 1, 0)
 - **NOT:** Reverses a logical condition.
Not Discounted = IF(NOT(Sales[Discounted] = "Yes"), 1, 0)
-

6. Aggregation Functions

- **MAX:** Returns the largest value in a column.
Max Sales = MAX(Sales[SalesAmount])
- **MIN:** Returns the smallest value in a column.
Min Sales = MIN(Sales[SalesAmount])
- **DISTINCTCOUNT:** Returns the number of distinct values in a column.
Unique Customers = DISTINCTCOUNT(Sales[CustomerID])

7. Text Functions

- **CONCATENATE:** Joins two text strings into one.
 - `Full Name = CONCATENATE(Customer[FirstName], " " & Customer[LastName])`
 - **LEFT:** Extracts a specified number of characters from the beginning of a text string.
 - `First 3 Characters = LEFT(Customer[CustomerName], 3)`
 - **SEARCH:** Finds the position of a substring within a string.
 - `Find "Inc" = SEARCH("Inc", Customer[CompanyName], 1, 0)`
-

8. Relationship Functions

- **RELATED:** Returns a related value from another table.
 - `Product Price = RELATED(Product[Price])`
 - **RELATEDTABLE:** Returns a table that contains rows related to the current row.
 - `Orders = COUNTROWS(RELATEDTABLE(Orders))`
-

Data Model for Power BI



Data Modeling: A Brief Overview

Data Modeling is the process of designing and structuring data in a way that supports efficient data storage, retrieval, and analysis. In business intelligence (BI) tools like Power BI or Tableau, data modeling helps organize and define relationships between data sources to create meaningful reports and insights.

Key Components of Data Modeling:

1. **Tables:** Data is typically stored in tables, with rows representing records and columns representing attributes or fields.
2. **Relationships:** Data models establish relationships between tables using keys:
 - **Primary Key:** Unique identifier for records in a table (e.g., CustomerID).

- **Foreign Key:** A field in one table that references the primary key of another table (e.g., linking Orders to Customers).
- 3. **Schemas:**
 - **Star Schema:** A central fact table connected to dimension tables (e.g., sales data connected to date, customer, and product dimensions).
 - **Snowflake Schema:** A more normalized version of the star schema with dimension tables split into sub-dimensions.
- 4. **Measures:** Quantitative data, such as total sales or average order size, which are used for analysis.
- 5. **Calculated Columns/Measures:** Custom fields created using formulas (like DAX or SQL) for more complex analysis (e.g., profit margin, year-to-date sales).
- 6. **Normalization:** Organizing data to reduce redundancy, typically by splitting data into smaller tables and creating relationships.

Importance of Data Modeling:

- **Improves Performance:** Well-structured models improve query speed and data processing.
- **Consistency:** Ensures consistent data analysis across the organization.
- **Simplifies Reporting:** Data models help to define how data from various sources is used in reports and dashboards.

In short, data modeling is essential for organizing, structuring, and optimizing data to create accurate and insightful reports.

Usage of Power BI in Different Industries

1. **Healthcare:**
 - **Patient Care Analysis:** Monitor patient outcomes, track appointments, and analyze treatment effectiveness.
 - **Operational Efficiency:** Analyze hospital performance, resource allocation, and patient flow to optimize operations.
2. **Retail:**
 - **Sales & Inventory Management:** Analyze sales trends, stock levels, and customer purchasing behavior.
 - **Customer Insights:** Segment customers based on purchasing patterns and preferences to personalize marketing.
3. **Finance:**
 - **Financial Reporting:** Create dashboards for financial performance, including balance sheets, income statements, and cash flow.
 - **Risk Management:** Track and analyze risks, fraud detection, and investments.
4. **Manufacturing:**
 - **Production Monitoring:** Visualize production efficiency, machine performance, and downtime analysis.
 - **Supply Chain Management:** Monitor inventory, procurement, and logistics to ensure efficient operations.
5. **Education:**
 - **Student Performance:** Track student grades, attendance, and outcomes to improve educational strategies.
 - **Institutional Insights:** Analyze financial data, resource usage, and academic performance for better decision-making.
6. **Marketing & Sales:**
 - **Campaign Analysis:** Evaluate the effectiveness of marketing campaigns by tracking KPIs and ROI.
 - **Sales Forecasting:** Use historical data to predict future sales trends and optimize pricing strategies.
7. **Government:**

- **Public Health Analysis:** Track public health statistics, disease outbreaks, and vaccination programs.
- **Budget Monitoring:** Analyze government spending, budgets, and resource allocation. Power BI helps industries to visualize data, track performance, and make data-driven decisions, leading to improved efficiency, profitability, and strategic planning.



Project Report: American Coffee Taste Analysis in Power BI

Github Link- <https://github.com/Somnath342000/Power-BI-American-Coffee-Taste-Analysis-Project.git>

Project Overview: This project presents a market survey research related to the beverage industry, specifically focused on understanding the coffee consumption behavior of American customers. The goal of the project is to use data visualization in Power BI to analyze customer preferences, behaviors, and attitudes toward various coffee types and purchasing habits. The insights gained from this study can aid beverage businesses in making data-driven decisions, optimizing their product offerings, and effectively planning marketing strategies.

Objectives of the Project:

1. **Analyze Coffee Consumption Patterns:** To identify the preferences of American consumers regarding coffee, including taste, coffee types, and purchasing habits.
2. **Understand Consumer Preferences:** The project aims to identify the most popular coffee types and flavors, the frequency of coffee consumption, and the typical budget consumers are willing to spend on coffee.
3. **Assist in Business Planning:** The insights from the analysis will be useful for beverage businesses in determining customer demand, refining product offerings, and developing targeted marketing campaigns.
4. **Optimize Supply and Demand:** The data analysis can help businesses forecast demand more accurately, potentially reducing over-supply and shortages, which can lead to better resource allocation and cost efficiency.

Data Collection and Methodology:

- **Data Source:** The data was collected via a customer survey, with questions focusing on coffee preferences, frequency of consumption, coffee types, price range willingness, and general attitudes toward coffee.

- **Survey Distribution:** The survey was distributed across a broad demographic of coffee consumers in the United States, ensuring diversity in the dataset.
- **Analysis Tool:** Power BI was used to process the collected data and visualize key findings through interactive dashboards and charts.



Key Insights and Findings:

1. **Coffee Taste Preference:**
 - 98% of the participants indicated that they like coffee, showing a strong preference for coffee as a beverage in the American market.
2. **Favorite Coffee Types:**
 - **Latte** emerged as the most favored coffee type, with 37% of respondents selecting it as their preferred choice, highlighting its popularity among coffee drinkers.
3. **Consumption Locations:**
 - The majority of coffee consumers (79%) prefer to drink coffee at home, suggesting a potential focus for businesses on at-home brewing solutions or retailing coffee beans.
4. **Preferred Coffee Flavors:**
 - **Chocolate** flavor ranked the highest, with 22.43% of respondents choosing it as their favorite flavor, indicating a market trend toward flavored coffees.
5. **Average Coffee Consumption:**
 - On average, each person consumes 2 cups of coffee per day, demonstrating a moderate level of daily consumption, which could inform marketing campaigns targeting regular coffee drinkers.
6. **Price Willingness:**
 - Approximately 25% of respondents are willing to spend between \$8-\$10 per cup of coffee, which suggests a market segment that values premium coffee experiences and could be targeted with high-quality or specialty products.

Power BI Dashboards and Visualizations:

The data was analyzed and visualized using Power BI, which enabled the creation of interactive dashboards that provided insights into the coffee consumption behavior of the target audience. Key features of the dashboards included:

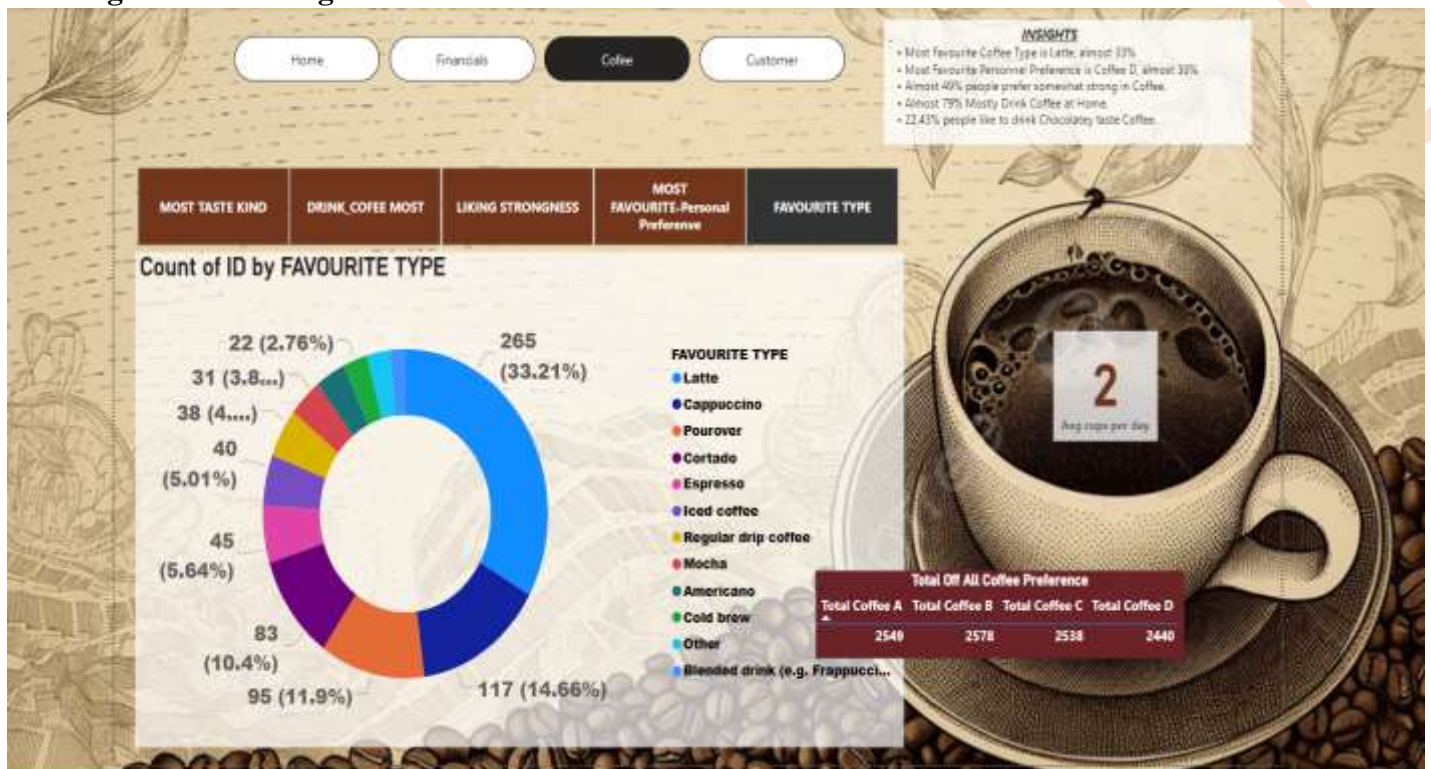
- **Bar and Pie Charts:** To display the distribution of coffee types, flavors, and price preferences.

- **KPIs and Indicators:** To highlight the most important statistics, such as the percentage of people who drink coffee at home or the average number of cups consumed per person.

Business Insights and Recommendations:

Based on the analysis, the following insights can be used to drive business decisions:

1. Targeted Marketing for Lattes:



- Since **Latte** is the most popular coffee type, businesses should consider developing targeted marketing campaigns that emphasize this coffee type. Promotions and advertisements could focus on latte variations to attract customers.
- Flavored Coffee Options:**
 - The popularity of **chocolate** as a flavor can encourage businesses to expand their range of flavored coffee products or introduce limited-edition chocolate-flavored options to cater to this taste preference.
 - Home Brewing Products:**
 - With 79% of consumers drinking coffee at home, there is a clear demand for coffee machines, beans, and accessories. Beverage businesses can capitalize on this by offering home brewing kits, subscription services for coffee delivery, or specialty home-brewed coffee beans.
 - Premium Coffee Offerings:**
 - Since 25% of respondents are willing to pay \$8-\$10 per cup, there is an opportunity for businesses to introduce premium coffee options or specialty products targeted at coffee enthusiasts willing to pay more for quality.
 - Consumption Frequency:**
 - As people consume an average of 2 cups per day, businesses could promote products in bulk or subscription-based models for regular consumers, providing cost-effective solutions for customers who drink coffee frequently.
 - Reducing Supply Chain Risks:**
 - By understanding demand and consumer behavior, businesses can optimize their supply chain to avoid overstocking or understocking, ensuring better resource management and cost control.

Conclusion:

This **American Coffee Taste Analysis** project provides valuable insights into the coffee consumption habits of U.S. consumers. By leveraging Power BI for data visualization and analysis, businesses can better understand customer preferences, optimize product offerings, and refine marketing strategies. These insights also help forecast demand more accurately, reduce supply chain inefficiencies, and ultimately increase profitability for beverage businesses.

Thank You



Github Link- <https://github.com/Somnath342000/Power-BI-American-Coffee-Taste-Analysis-Project.git>