Analysis of Automobile Sales with Using Tableau Dashboards

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Abstract—**This project looks at automobile sales data and global economic indicators to understand what affects sales performance, customer behavior, and profitability. Using Tableau, we explored questions like how CO2 emissions relate to urbanization, how gasoline prices impact sales, and how GDP and unemployment rates connect with tax revenue and sales. By analyzing patterns and trends, we found important insights into market dynamics and how economic conditions influence sales.**

Keywords—Automobile Sales, Economic Indicators, Tableau Visualization, Data Analysis, Market Trends

I. INTRODUCTION

The analysis combines two datasets: (1) the Automobile Sales Dataset, which includes 20 variables and 2,747 records about customer orders, product lines, and sales performance, and (2) the Global Country Dataset, which has 14 variables and 195 records covering economic and demographic information. The goal of this study is to identify patterns in automobile sales, understand customer behavior, and explore how these are connected to economic conditions around the world.

II. DATA PREPROCESSING

A. Cleaning

Try to remove duplicates from the dataset in Excel

B. Data Type Correction

Ensured categorical and numerical fields were appropriately typed.

C. Merging

Union the datasets in Tableau

III. EXPLORATORY DATA ANALYSIS

A. Key Variables Analyzed

Automobile Dataset: Sales, Deal Size, Product Line, and Order Status.

Global Dataset: GDP, Unemployment Rate, CPI, Gasoline Price, and CO2 Emissions.

B. Descriptive Statistics

Automobile Sales Dataset
Numerical Descriptive Statistics:
Sales:

Count: 2,747

Mean: $3,553

Min: $482 - Max: $14,082

Std Dev: $1,839

Quantity Ordered:

Mean: 35.1

Min: 6 - Max: 97

Std Dev: 9.76

Price Each:

Mean: $101.10

Min: $26.88 - Max: $252.87

Categorical Descriptive Statistics:
Product Line:

Most Common: Motorcycles

Number of Categories: 6

Country:

Unique Values: Multiple countries represented.

World Dataset
Numerical Descriptive Statistics:
GDP:

Mean: Varies widely by country.

Median: Approx. $15 billion.

Population:Range: Small nations with fewer than 100,000 people to countries with populations exceeding 1 billion.

CO2 Emission:

Range: Low-emission countries to industrialized high-emission nations.

Gasoline Price:

Mean: $1.12

Range: $0.28 to $3.87

CPI:

Mean: 120.45

Range: 40.5 to 330.8

Categorical Descriptive Statistics:
Country:

Total: 195 unique countries.

A. CO2 Emissions and Urbanization

Question: *Do countries with higher CO2 emissions also have higher urban population percentages?*

Visualization: Heatmap showing CO2 emissions by Country and Geographic Map displaying urban population

Findings: Countries with higher CO2 emissions usually have larger urban populations. For example, industrialized countries like the United States, China, and India tend to have both high emissions and a significant number of people living in cities.

Conclusion: *T*here is a clear connection between urbanization and CO2 emissions, but factors like industrial activities and government policies also play an important role in influencing emission levels.

Country-CO2 emission
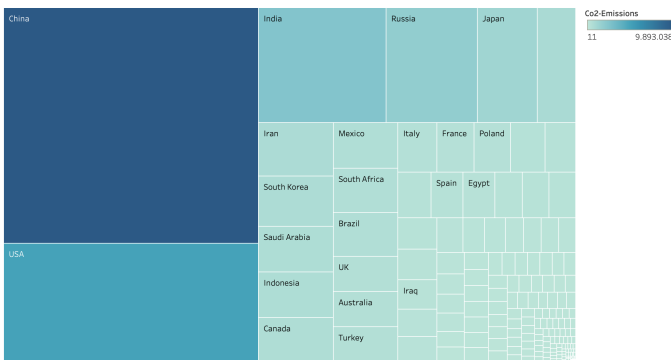
Country. Color shows sum of Co2-Emissions. Size shows sum of Co2-Emissions. The marks are labeled by Country. The data is filtered on Action (Country), which keeps 195 members. The view is filtered on sum of Co2-Emissions, which keeps non-Null values only.
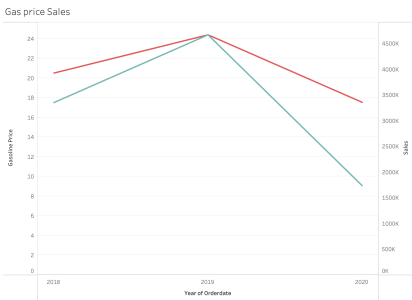
Country Population
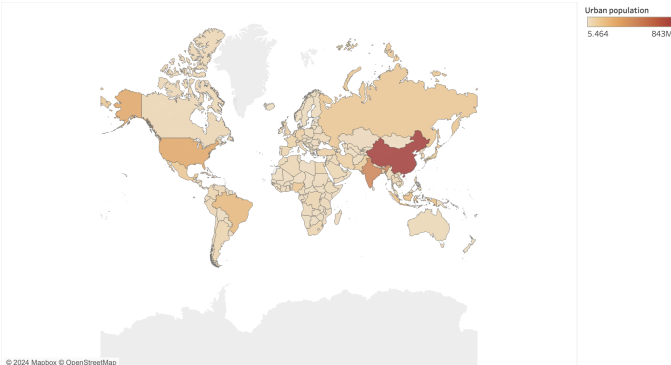
Map based on Longitude (generated) and Latitude (generated). Color shows sum of Urban population. Details are shown for Country. The data is filtered on Action (Country), which keeps 195 members. The view is filtered on Latitude (generated) and Longitude (generated). The Latitude (generated) filter keeps non-Null values only. The Longitude (generated) filter keeps non-Null values only.

B. Impact of Fuel Costs on Automobile Sales

Question: *Is there a relationship between gasoline price and sales volume in different countries?*

Visualization: Dual Axis Chart for gasoline price and sales volume trends over the years based on order dates. Scatter Plot shows Gasoline price vs. sales volume to visualize correlation. Geographic Map shows gasoline prices and sales distribution by country. Bar chart shows Sales volume by country.

Findings: Countries with lower gasoline prices generally have higher sales volumes, but the relationship varies based on income levels, regional preferences, and economic conditions.

Gas price Sales

The trends of Gasoline Price and Sales for Orderdate Year. Color shows details about Gasoline Price and Sales. The data is filtered on Action (Country,Gasoline Price) and Action (Country1,Gasoline Price). The Action (Country,Gasoline Price) filter keeps 195 members. The Action (Country1,Gasoline Price) filter keeps 109 members. The view is filtered on Orderdate Year, which keeps non-Null values only.

Gas/Sales

Sum of Gasoline Price vs. sum of Sales. Details are shown for Country1. The data is filtered on Action (Country,Gasoline Price) and Action (Country1,Gasoline Price). The Action (Country,Gasoline Price) filter keeps 195 members. The Action (Country1,Gasoline Price) filter keeps 109 members. The view is filtered on sum of Sales, which keeps non-Null values only.
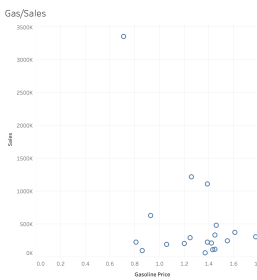
Gas Price Map

Map based on Longitude (generated) and Latitude (generated). Size shows details about Gasoline Price. Details are shown for Country1. The data is filtered on Action (Country) and Country. The Action (Country) filter keeps 195 members. The Country filter keeps 195 of 195 members. The view is filtered on Gasoline Price, which excludes Null and 0.

Sales By Country
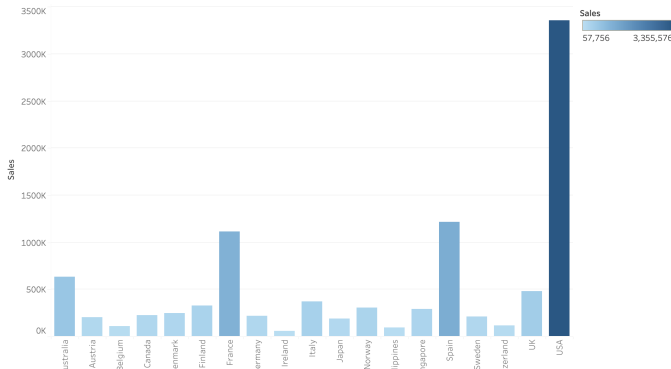
Sum of Sales for each Country1. Color shows sum of Sales. The data is filtered on Action (Country,Gasoline Price) and Action (Country1,Gasoline Price). The Action (Country,Gasoline Price) filter keeps 195 members. The Action (Country1,Gasoline Price) filter keeps 109 members.

C. Profitability by Product Line

Question: *Which product lines generate the highest revenue, and how does this vary by deal size?*

Visualization: Stacked bar chart shows sales by Productline and Dealsize, Pie Chart for specific Productline sales by country

Findings: Motorcycles and Classic Cars consistently generate the highest revenue across all deal sizes. Classic Cars dominates large deal sizes, while Motorcycles perform well in both medium and small deals.

Conclusion: Classic Cars and Motorcycles drive profitability, with large deals contributing the most to overall revenue. Regional preferences and deal sizes highlight opportunities for targeted marketing.
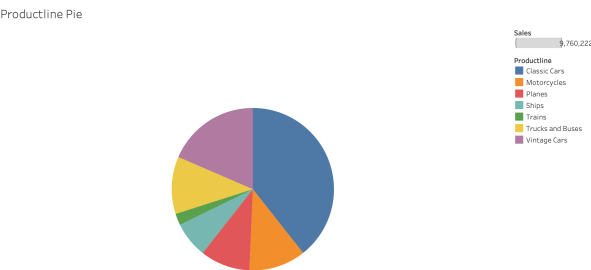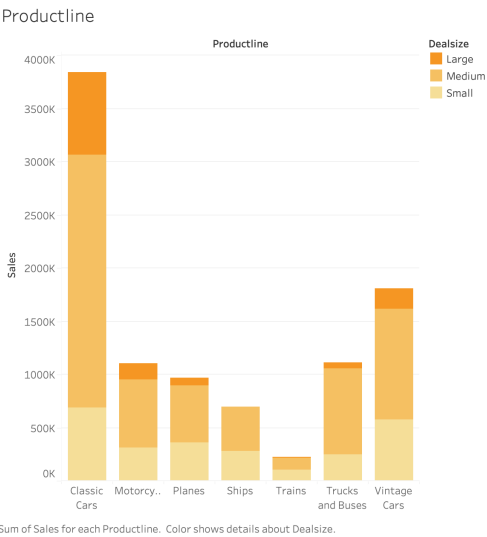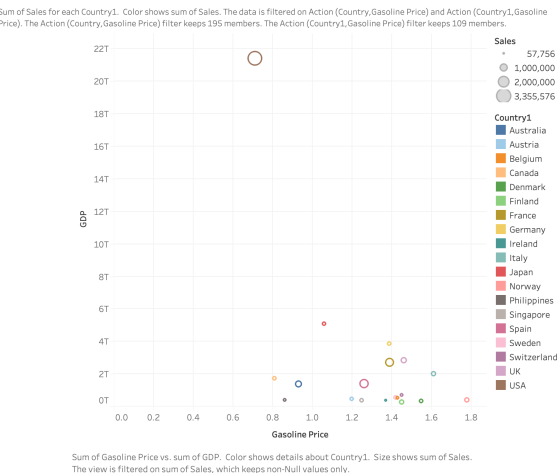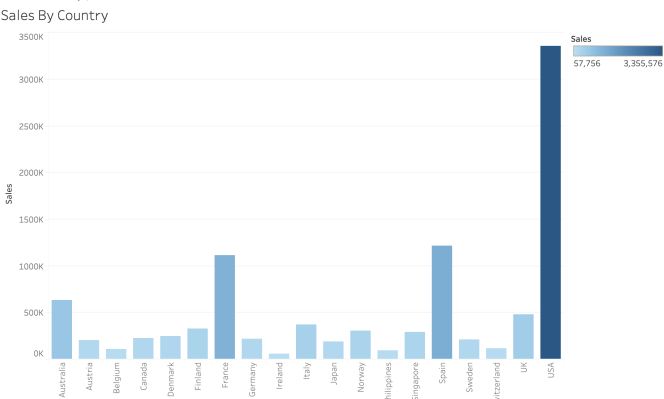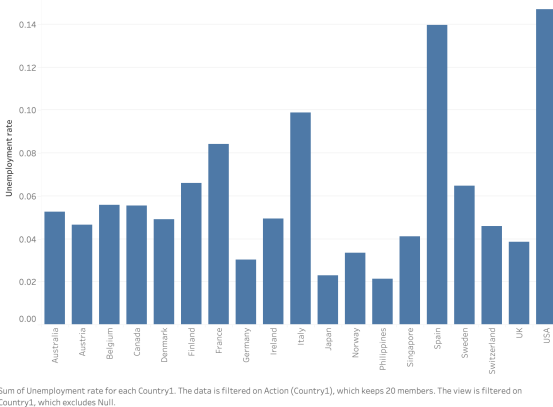
D. Sales and Economic Factors

Question: *Is there a correlation between sales performance and economic indicators?*

Visualization: *Scatter plot shows comparing Gasoline Price and GDP for each country, Bar chart shows sales by country and map shows unemployment rate by country*

Findings: Countries with higher GDP, like the United States and Germany, tend to have higher sales volumes, showing a positive link between economic strength and sales performance. Gasoline prices don't seem to have a strong direct impact on sales, as high-income countries maintain steady sales even with higher fuel costs. On the other hand, countries with lower unemployment rates usually see higher sales, likely due to stronger purchasing power and better economic stability.

Conclusion: Sales performance is more influenced by GDP and unemployment rates than gasoline prices, emphasizing how important economic stability is for a strong market.

Productline

Sum of Sales for each Productline. Color shows details about Dealsize.

Productline Pie

Productline (color) and sum of Sales (size). The data is filtered on Country1, which keeps 19 of 19 members.

Sum of Unemployment rate for each Country1. The data is filtered on Action (Country1), which keeps 20 members. The view is filtered on Country1, which excludes Null.

Sales By Country

Sum of Sales for each Country1. Color shows sum of Sales. The data is filtered on Action (Country,Gasoline Price) and Action (Country1,Gasoline Price). The Action (Country,Gasoline Price) filter keeps 195 members. The Action (Country1,Gasoline Price) filter keeps 109 members.

Sum of Gasoline Price vs. sum of GDP. Color shows details about Country1. Size shows sum of Sales. The view is filtered on sum of Sales, which keeps non-Null values only.

E. Tax Revenue and Economic Indicators

Question: *How do tax revenue percentages correlate with GDP and unemployment rates?*

Visualization: *GDP for Heat Map, Countries Tax Revenue for Table and Unemployment Rate for Bar Chart*

Findings: Countries with higher GDP, like Germany and the United States, usually have higher tax revenue percentages, which reflects strong economic activity and effective tax collection. Similarly, countries with low unemployment rates tend to show higher tax revenues because stable employment ensures consistent tax contributions.

Conclusion:Tax revenue tends to increase with higher GDP and decrease with higher unemployment rates, showing how economic stability plays a key role in a country's financial health.

Tax revenue

Country1	
Australia	0.2300
Austria	0.2540
Belgium	0.2400
Canada	0.1280
Denmark	0.3240
Finland	0.2080
France	0.2420
Germany	0.1150
Ireland	0.1830
Italy	0.2430
Japan	0.1190
Norway	0.2390
Philippines	0.1400
Singapore	0.1310
Spain	0.1420
Sweden	0.2790
Switzerland	0.1010
UK	0.2550
USA	0.0960

Sum of Tax revenue (%) broken down by Country1. The data is filtered on Action (Country1), which keeps 20 members. The view is filtered on Country1, which excludes Null.

GDP

Country1. Color shows sum of GDP. Size shows sum of GDP. The marks are labeled by Country1. The view is filtered on Country1, which excludes Null.

Sum of Unemployment rate for each Country1. The data is filtered on Action (Country1), which keeps 20 members. The view is filtered on Country1, which excludes Null.

VI. REFERENCES
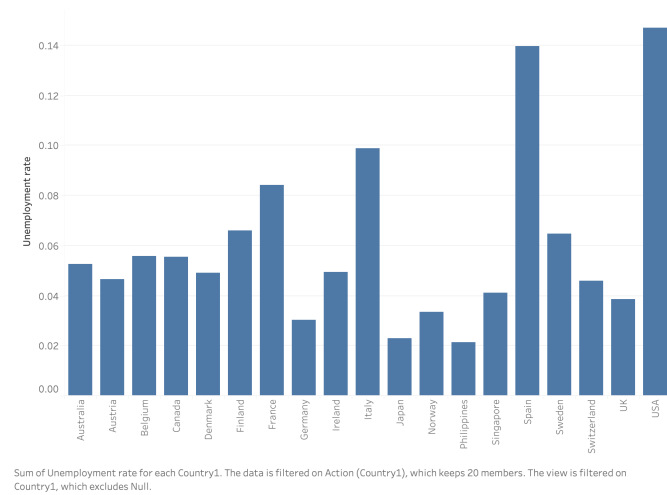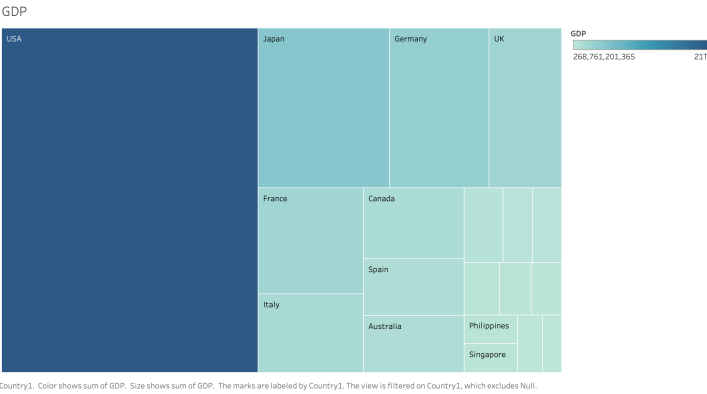
Automobile Sales Dataset: autosave.xlsx

Global Country Information Dataset: world-data-2023.xlsx

https://github.com/Zireaelst/Stat112

V. CONCLUSION AND DISCUSSION

Key Findings:

Economic factors like GDP and unemployment rates play a significant role in shaping sales performance.

Customer preferences vary across regions, with the United States leading in large orders.

Motorcycles emerge as the most profitable product line, showing consistent success globally.

High gasoline prices tend to reduce sales volumes, especially in developing countries.

Conclusion: This study provides a detailed analysis of automobile sales data and its relationship with global economic indicators. It highlights the significant influence of GDP and unemployment rates on sales, with high-GDP countries showing stable sales volumes even when gasoline prices vary. Product lines like Classic Cars and Motorcycles drive revenue, particularly through large deals and regional demand patterns. Additionally, the study reveals a connection between CO_2 emissions and urbanization, as industrial activities in urbanized areas contribute to higher emission levels.

Discussion: These findings show how critical it is for companies to align their sales strategies with regional economic conditions. Focusing on profitable product lines like Motorcycles and tailoring marketing efforts to account for fuel costs can help businesses perform better in key markets. While gasoline prices have a limited direct effect on overall sales, factors like GDP and unemployment rates heavily influence market trends and consumer purchasing power.

Profitability also varies across product lines, with larger deals making a greater impact on revenue. This presents an opportunity for businesses to prioritize high-performing products and target markets with favorable economic conditions. Additionally, the study underscores the need for environmental sustainability. Urbanization is closely linked to increased CO_2 emissions, and policymakers can use these findings to develop strategies that balance urban growth with sustainable practices, such as encouraging fuel-efficient vehicles in high-emission areas.