

# Impact of Car Features on Price and Profitability

## Project Description

This project will go through to do analysis on Impact of Car Features on Price and Profitability.

## Project Approach

In order to find the insights, Excel is used. Using Excel, we performed Data Cleaning and transformation first like understanding data columns, checking for missing data, checking and removing outliers, etc. After that, we did an Exploratory analysis to find the insights and also built dashboards to answer the questions given by the client.

## Tech Stack Used

Microsoft Excel 2021, Microsoft Word 2021, and Google Drive.

## Project Analysis

### 1.Cleaning the data

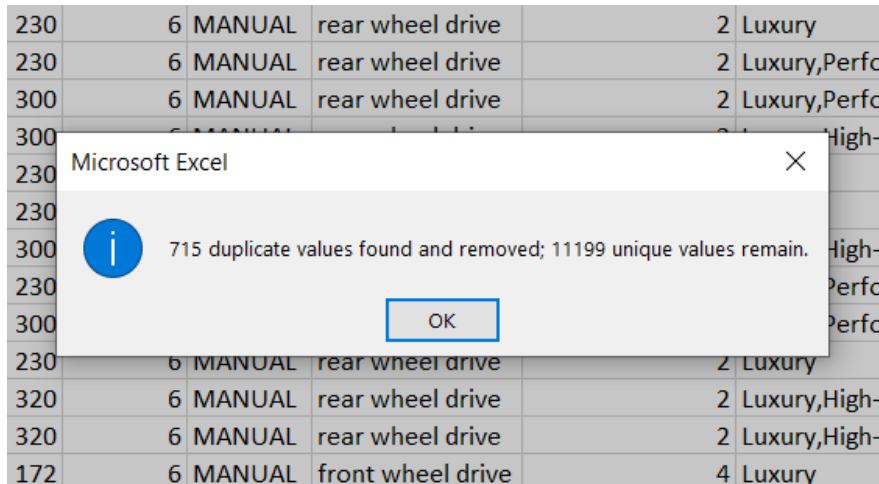
At first, removed all the rows which were empty. Found out the number of blank cells in the particular column. After that, we find the percentage of the null values.

To find the blank values we used COUNTBLANK function in Excel.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	
1	Percentage of Null Values	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
2	Number of Null Values	0	0	0	3	69	30	0	0	6	0	0	0	0	0	0	0	
3		Make	Model	Year	Engine Fuel Type	Engine HP	Engine Cyl	Transmissi	Driven_Wheels	Number of C	Market Category	Vehicle Size	Vehicle Style	highway MPG	city mpg	Popularity	MSRP	
4	Total Rows:	BMW	1 Series M	2011	premium unlea	335	6	MANUAL	rear wheel drive	2	Factory Tuner,Luxury,High-Performance	Compact	Coupe	26	19	3916	46135	
5		11914	BMW	1 Series	2011	premium unlea	300	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Convertible	28	19	3916	40650
6	BMW		1 Series	2011	premium unlea	300	6	MANUAL	rear wheel drive	2	Luxury,High-Performance	Compact	Coupe	28	20	3916	36350	
7	BMW		1 Series	2011	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Coupe	28	18	3916	29450	
8	BMW		1 Series	2011	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury	Compact	Convertible	28	18	3916	34500	
9	BMW		1 Series	2012	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Coupe	28	18	3916	31200	
10	BMW		1 Series	2012	premium unlea	300	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Convertible	26	17	3916	44100	
11	BMW		1 Series	2012	premium unlea	300	6	MANUAL	rear wheel drive	2	Luxury,High-Performance	Compact	Coupe	28	20	3916	39300	
12	BMW		1 Series	2012	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury	Compact	Convertible	28	18	3916	36900	
13	BMW		1 Series	2013	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury	Compact	Convertible	27	18	3916	37200	
14	BMW		1 Series	2013	premium unlea	300	6	MANUAL	rear wheel drive	2	Luxury,High-Performance	Compact	Coupe	28	20	3916	39600	
15	BMW	1 Series	2013	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Coupe	28	19	3916	31500		
16	BMW	1 Series	2013	premium unlea	300	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Convertible	28	19	3916	44400		
17	BMW	1 Series	2013	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury	Compact	Convertible	28	19	3916	37200		
18	BMW	1 Series	2013	premium unlea	230	6	MANUAL	rear wheel drive	2	Luxury,Performance	Compact	Coupe	28	19	3916	31500		
19	BMW	1 Series	2013	premium unlea	320	6	MANUAL	rear wheel drive	2	Luxury,High-Performance	Compact	Convertible	25	18	3916	48250		
20	BMW	1 Series	2013	premium unlea	320	6	MANUAL	rear wheel drive	2	Luxury,High-Performance	Compact	Coupe	28	20	3916	43550		
21		Audi	100	1992	regular unlea	172	6	MANUAL	front wheel drive	4	Luxury	Midsize	Sedan	24	17	3105	2000	
22		Audi	100	1992	regular unlea	172	6	MANUAL	front wheel drive	4	Luxury	Midsize	Sedan	24	17	3105	2000	
23		Audi	100	1992	regular unlea	172	6	AUTOMAT	all wheel drive	4	Luxury	Midsize	Wagon	20	16	3105	2000	
24		Audi	100	1992	regular unlea	172	6	MANUAL	front wheel drive	4	Luxury	Midsize	Sedan	24	17	3105	2000	
25		Audi	100	1992	regular unlea	172	6	MANUAL	all wheel drive	4	Luxury	Midsize	Sedan	21	16	3105	2000	
26		Audi	100	1993	regular unlea	172	6	MANUAL	front wheel drive	4	Luxury	Midsize	Sedan	24	17	3105	2000	
27		Audi	100	1993	regular unlea	172	6	AUTOMAT	all wheel drive	4	Luxury	Midsize	Wagon	20	16	3105	2000	
28		Audi	100	1993	regular unlea	172	6	MANUAL	front wheel drive	4	Luxury	Midsize	Sedan	24	17	3105	2000	
29		Audi	100	1993	regular unlea	172	6	MANUAL	front wheel drive	4	Luxury	Midsize	Sedan	24	17	3105	2000	
30		Audi	100	1993	regular unlea	172	6	MANUAL	all wheel drive	4	Luxury	Midsize	Sedan	24	16	3105	2000	

After using the formula, we found the data to be mostly in good shape as there were hardly any null values in the column.

Next, we removed all the duplicate values in the dataset. Here, is the excel result for that.



The screenshot shows a Microsoft Excel window with a data table. A notification box is overlaid on the table, stating: "715 duplicate values found and removed; 11199 unique values remain." The table has 5 columns. The first column contains numerical values (e.g., 230, 300, 320, 172). The second column contains the number 6. The third column contains the word "MANUAL". The fourth column contains drive types (e.g., "rear wheel drive", "front wheel drive"). The fifth column contains market categories (e.g., "Luxury", "Luxury,Perfo", "High-").

230	6	MANUAL	rear wheel drive	2	Luxury
230	6	MANUAL	rear wheel drive	2	Luxury,Perfo
300	6	MANUAL	rear wheel drive	2	Luxury,Perfo
300	6	MANUAL	rear wheel drive	2	Luxury,Perfo
230	6	MANUAL	rear wheel drive	2	Luxury,Perfo
230	6	MANUAL	rear wheel drive	2	Luxury,Perfo
300	6	MANUAL	rear wheel drive	2	Luxury,Perfo
230	6	MANUAL	rear wheel drive	2	Luxury,Perfo
300	6	MANUAL	rear wheel drive	2	Luxury,Perfo
230	6	MANUAL	rear wheel drive	2	Luxury,Perfo
300	6	MANUAL	rear wheel drive	2	Luxury,Perfo
230	6	MANUAL	rear wheel drive	2	Luxury,Perfo
320	6	MANUAL	rear wheel drive	2	Luxury,High-
320	6	MANUAL	rear wheel drive	2	Luxury,High-
172	6	MANUAL	front wheel drive	4	Luxury

Formatted Model Column to Text.

## Project Insights

**Insight 1-** How does the popularity of a car model vary across different market categories?

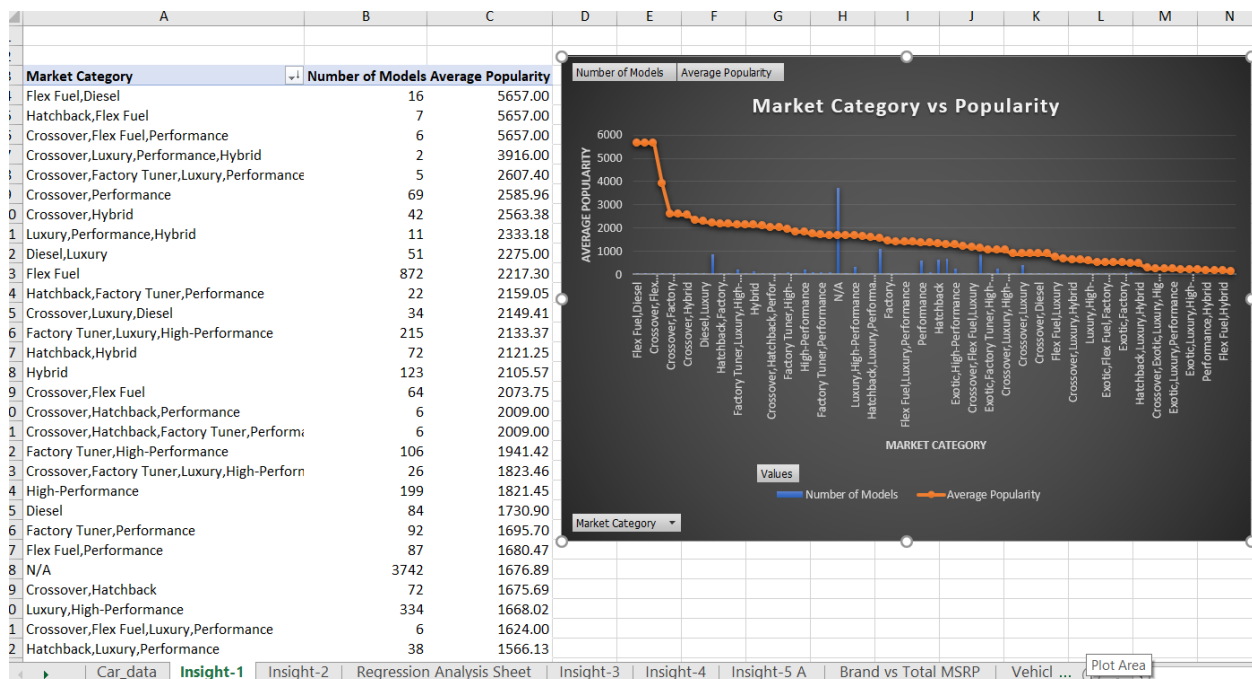
Task 1. A: Create a pivot table that shows the number of car models in each market category and their corresponding popularity scores.

Task 1. B: Created a combo chart that visualizes the relationship between market category and popularity.

### Result-

**Most Popular market Category** – Flex Fuel, Diesel | Hatchback, Flex Fuel | Crossover, Flex Fuel, Performance

**Least Popular Market Category** – Exotic, Luxury | Flex Fuel, Hybrid

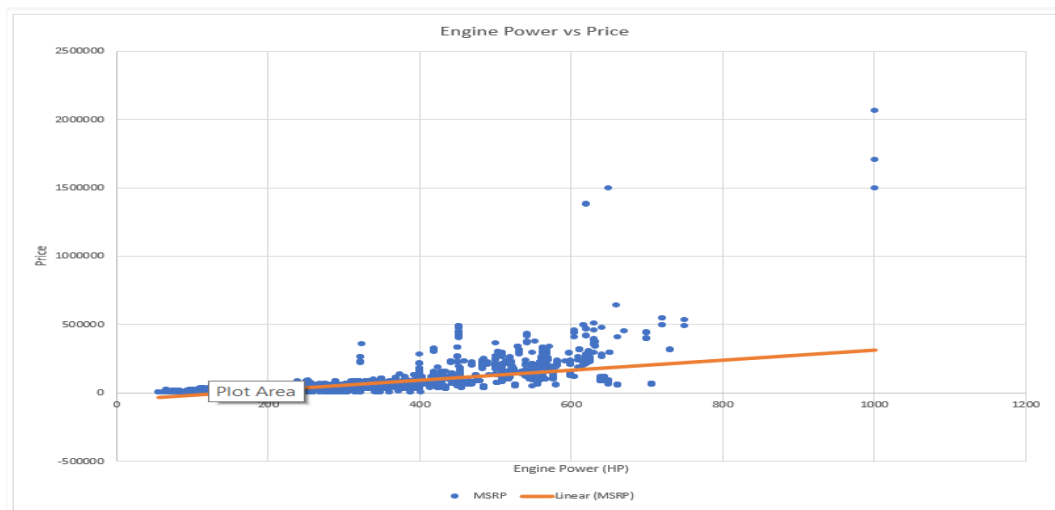


**Insight 2-** What is the relationship between a car's engine power and its price?

Task 2: Created a scatter chart that plots engine power on the x-axis and price on the y-axis. Added a trendline to the chart to visualize the relationship between these variables.

**Result-**

The Price will increase with the increasing number of Engine Power

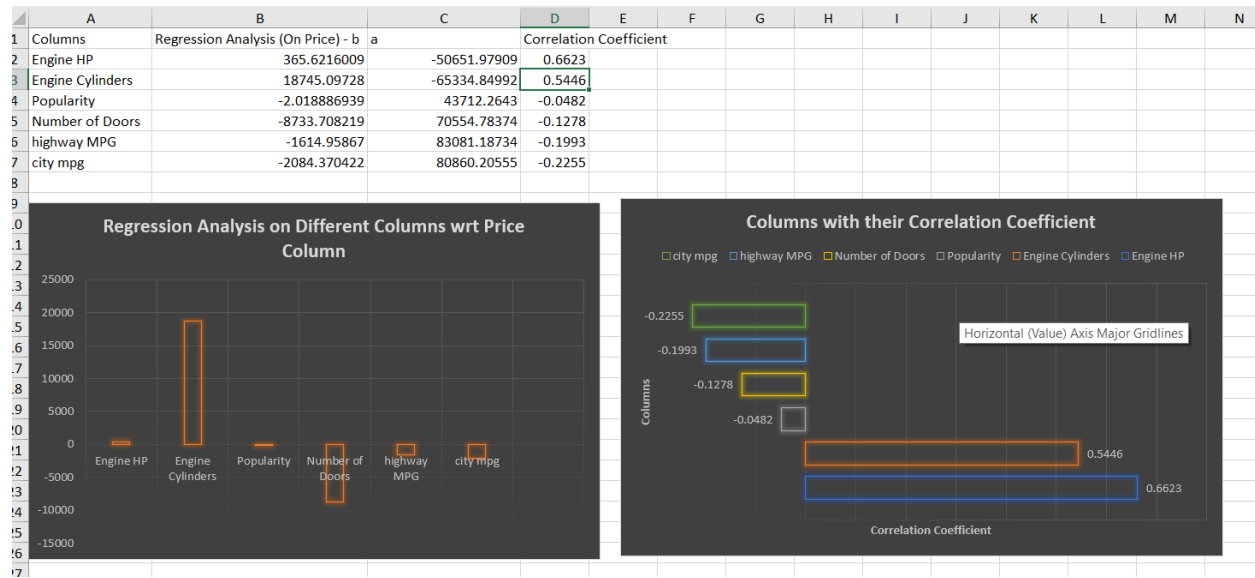


### Insight 3- Which car features are most important in determining a car's price?

Task 3: Used regression analysis to identify the variables that have the strongest relationship with a car's price. Then created a bar chart that shows the coefficient values for each variable to visualize their relative importance.

#### Result-

Engine Horse Power and Engine Cylinders are having a **positive** relationship with Price whereas Highway MPG, City MPG, Number of Doors, and Popularity is having a **negative** relationship with Price



### Insight 4- How does the average price of a car vary across different manufacturers?

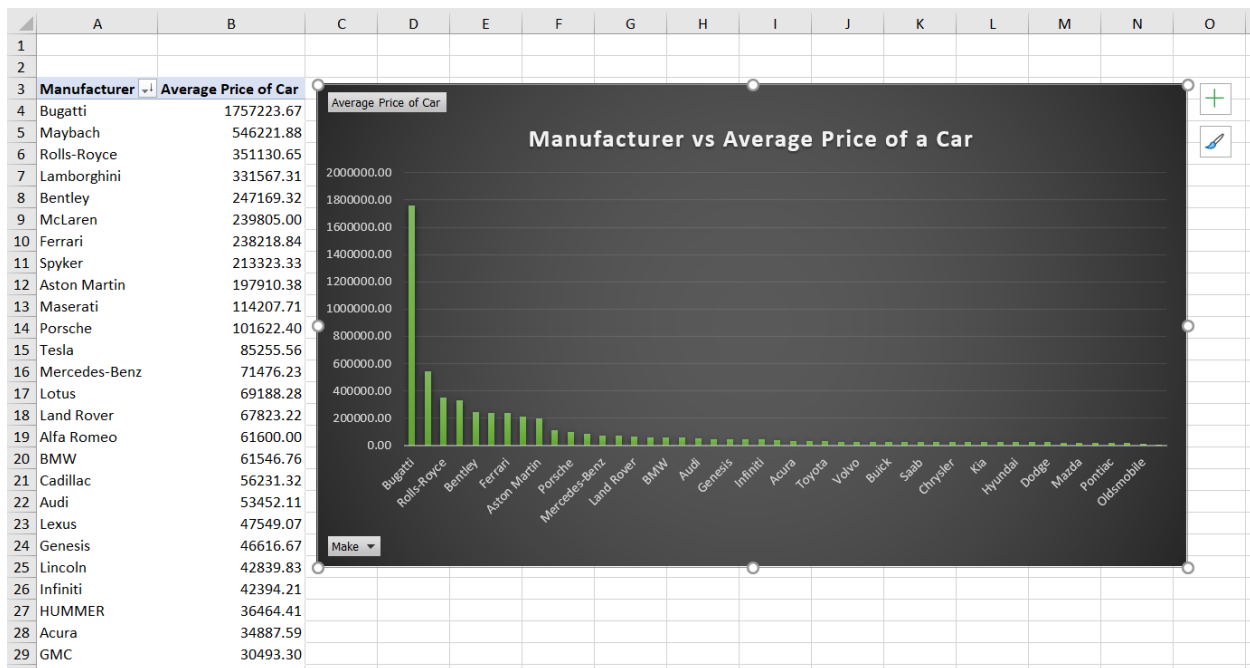
Task 4. A: Created a pivot table that shows the average price of cars for each manufacturer.

Task 4. B: Created a bar chart that visualizes the relationship between the manufacturer and the average price.

#### Result-

**Highest Average Price of Cars Manufacturer** – Bugatti | Maybach | Rolls-Royce | Lamborghini

**Lowest Average Price of Cars Manufacturer**– Plymouth | Oldsmobile | Suzuki



**Insight 5-** What is the relationship between fuel efficiency and the number of cylinders in a car's engine?

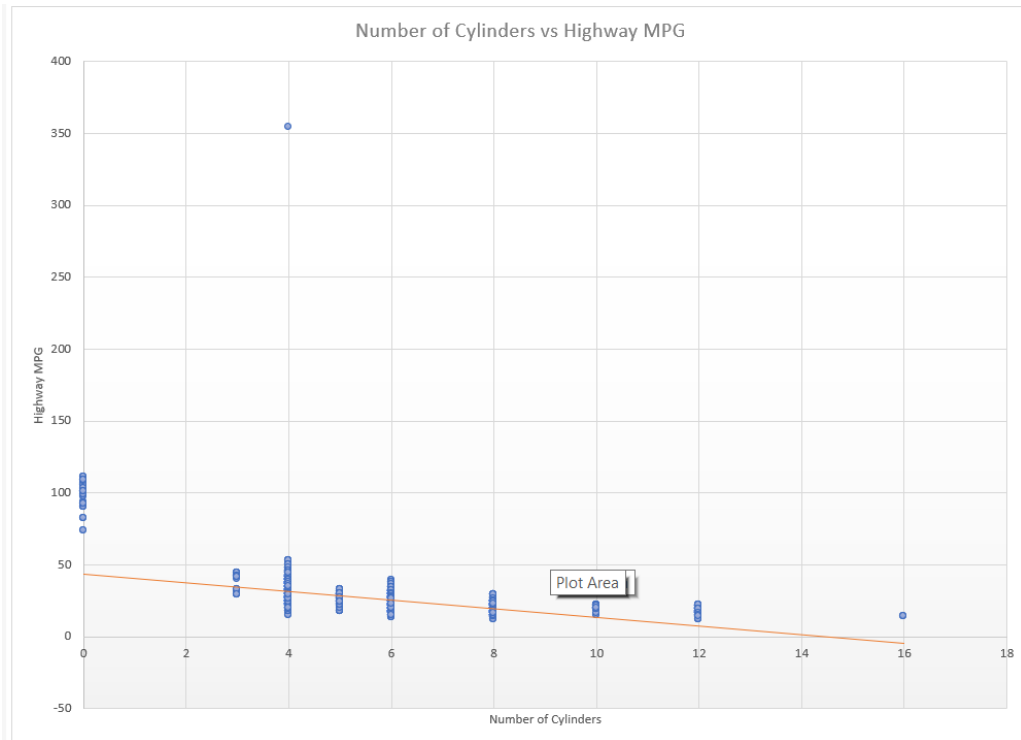
Task 5. A: Created a scatter plot with the number of cylinders on the x-axis and highway MPG on the y-axis. Then created a trendline on the scatter plot to visually estimate the slope of the relationship and assess its significance.

Task 5. B: Calculated the correlation coefficient between the number of cylinders and highway MPG to quantify the strength and direction of the relationship.

Insight-5 Task B	
Correlation coefficient between number of cylinders and highway mpg	
-0.620345938	

## Result-

The Trendline for the relationship between the number of Cylinders and Highway MPG is **negative** which means a **lesser number of cylinders will give more highway mpg**.



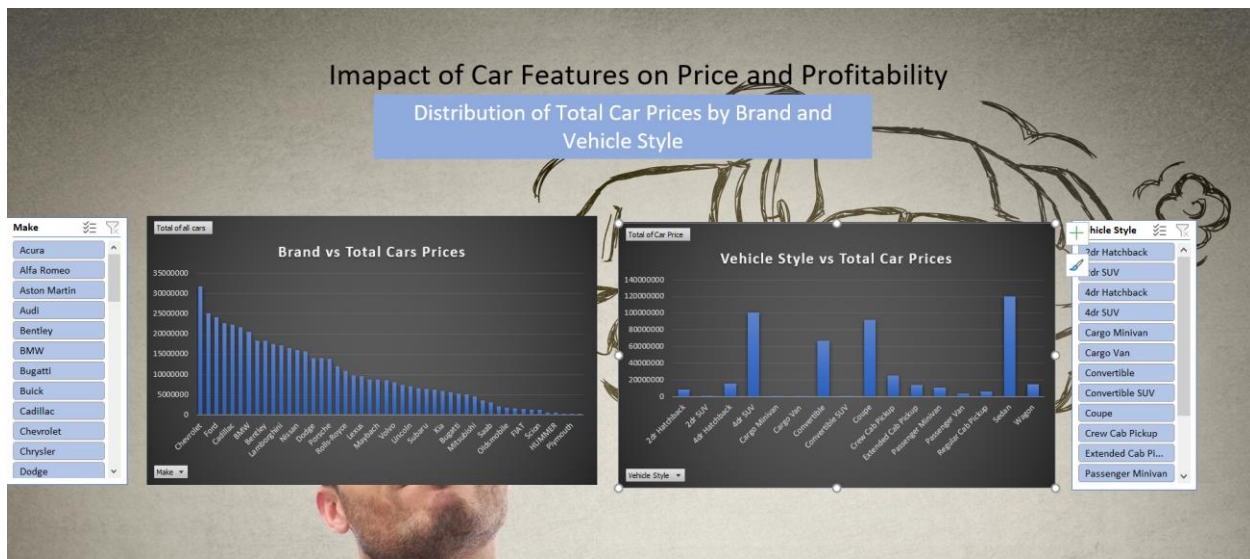
## WHY WE NEED TO ANALYS:

**QUESTION 1-** How does the distribution of car prices vary by brand and body style?

Stacked column chart to show the distribution of car prices by brand and body style. Used filters and slicers to make the chart interactive. Calculated the total MSRP for each brand and body style using Pivot Tables.

### Result-

**Chevrolet** Brand and **Sedan** Vehicle Types will likely have greater MSRP.



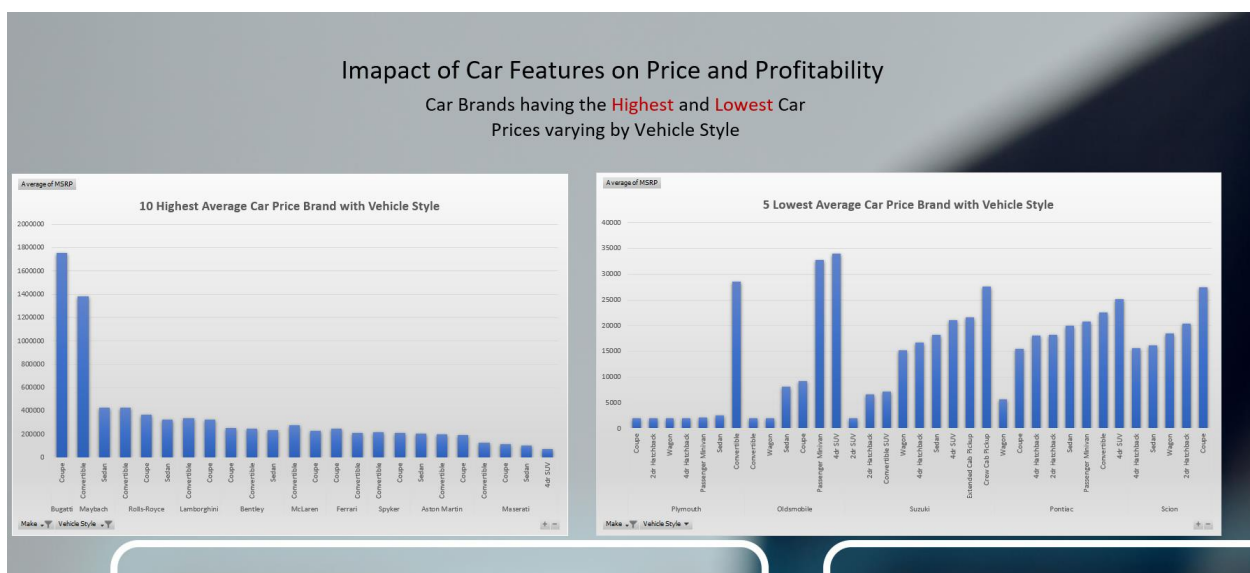
**QUESTION 2-** Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?

Clustered column chart to compare the average MSRPs across different car brands and body styles. Calculated the average MSRP for each brand and body style using Pivot Tables.

### Result-

The Highest Average Car Price Brand with Vehicle Style is **Bugatti's Coupe** and **Maybach's Convertible**.

The Lowest Average Car Price Brand with Vehicle Style is **Plymouth's Coupe & 2dr hatchback** and **Oldsmobile's Wagon & Convertible**.

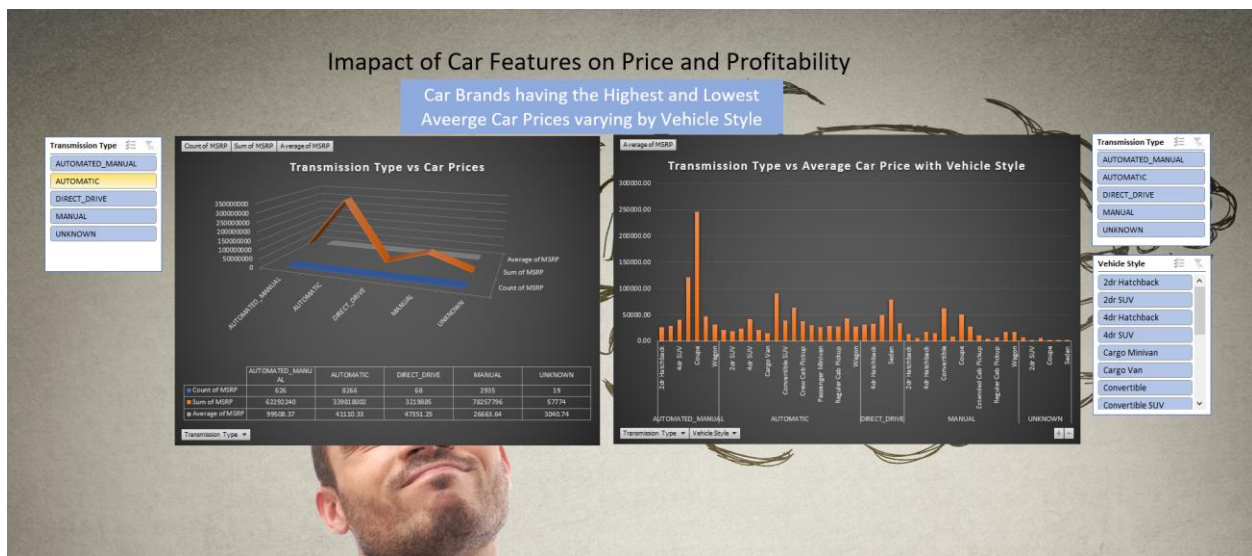


**QUESTION 3-** How do the different features such as transmission type affect the MSRP, and how does this vary by body style?

3-D line chart to visualize the relationship between MSRP and transmission type, with different symbols for each body style. Calculatde the average MSRP for each combination of transmission type and body style using Pivot Tables.

### Result-

Upon analysis, we found out that **Automated/Manual has the highest Average MSRP** while **Manual is having lowest Average MSRP**.



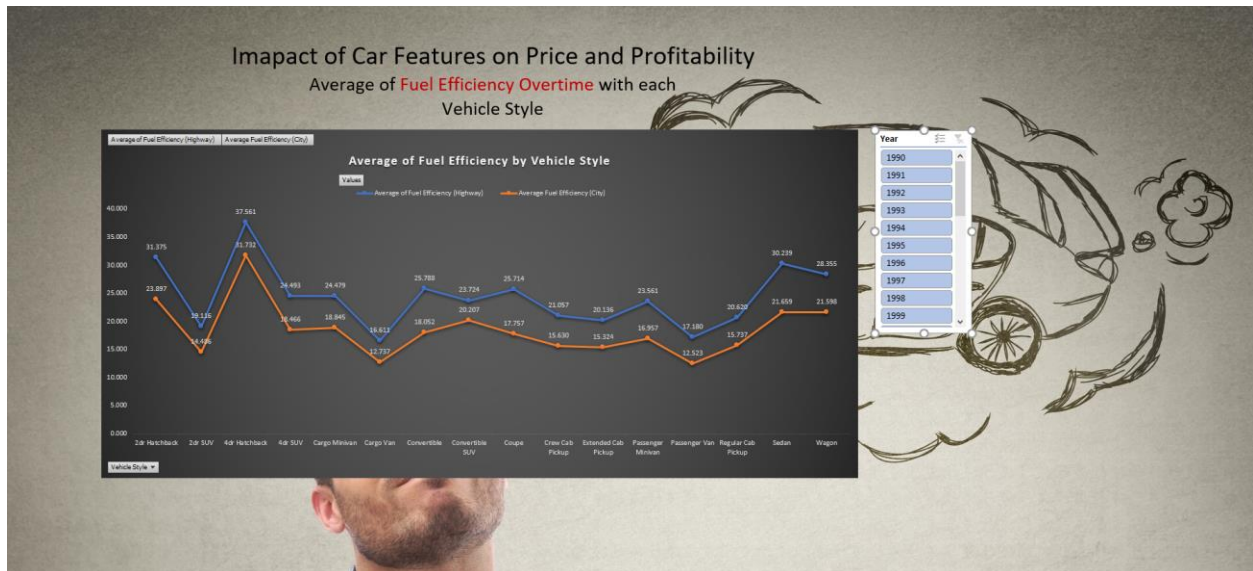
**QUESTION 4-** How does the fuel efficiency of cars vary across different body styles and model years?

Line chart to show the trend of fuel efficiency (MPG) over time for each body style. Calculated the average MPG for each combination of body style and model year using Pivot Tables.

### Result-

**4dr Hatchback's fuel efficiency** is the **highest** whereas **Cargo Van and Passenger Van's fuel efficiency** is the **lowest**.



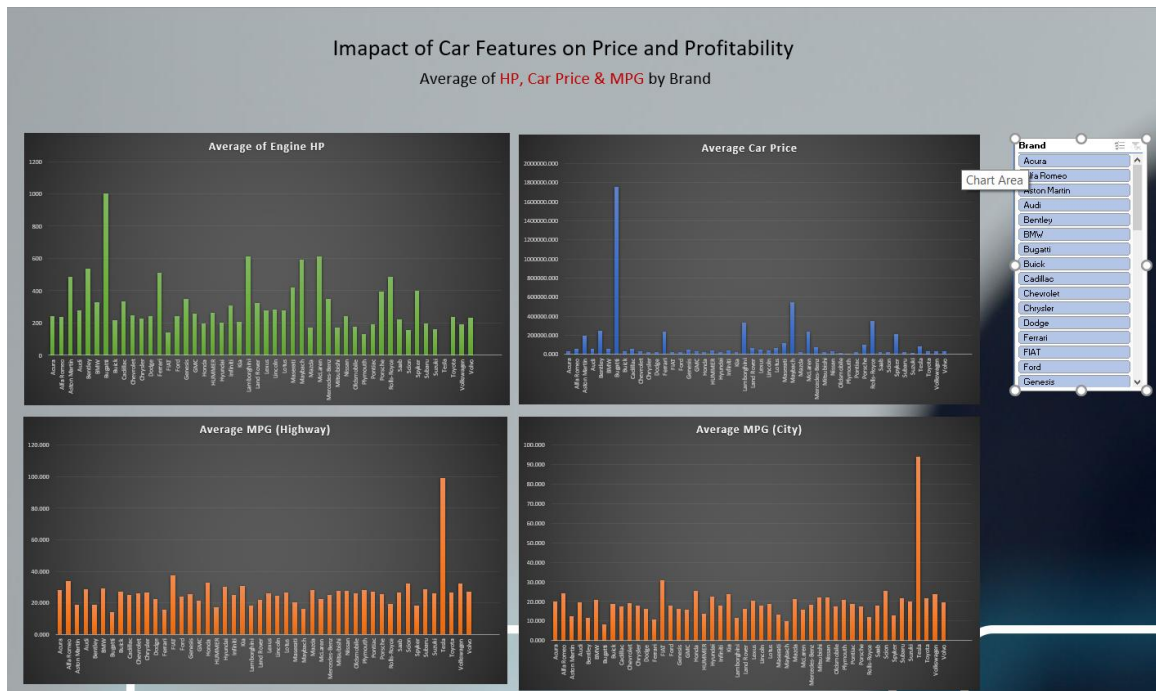


**QUESTION 5-** How do the car's horsepower, MPG, and price vary across different Brands?

Column Charts to visualize the relationship between horsepower, MPG, and price across different car brands. Assign different colors to each brand and label the bubbles with the car model name. Calculate the average horsepower, MPG, and MSRP for each car brand using AVERAGEIFS or Pivot Tables.

**Result-**

**Bugatti** is having the highest Engine HP and Car Price while **Tesla** is having the highest MPG (both on Highway and in City).



## Project Conclusion

While analysing the data set provided, several meaningful insights were discovered that could not have been discovered by manually searching the dataset for insights.

We could also leverage the Excel-2021 tool and got a little more experienced in using the tool and also injecting different formulas and pivot tables and graphs and dashboards to look for insights.