

IMPACT OF CAR FEATURES

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CONTENT



PROJECT DESCRIPTION

Project Purpose:

- Assist a car manufacturer in optimizing pricing and product development decisions.
- Maximize profitability while meeting consumer demand.
- Analyze a dataset containing car features, market categories, and pricing.

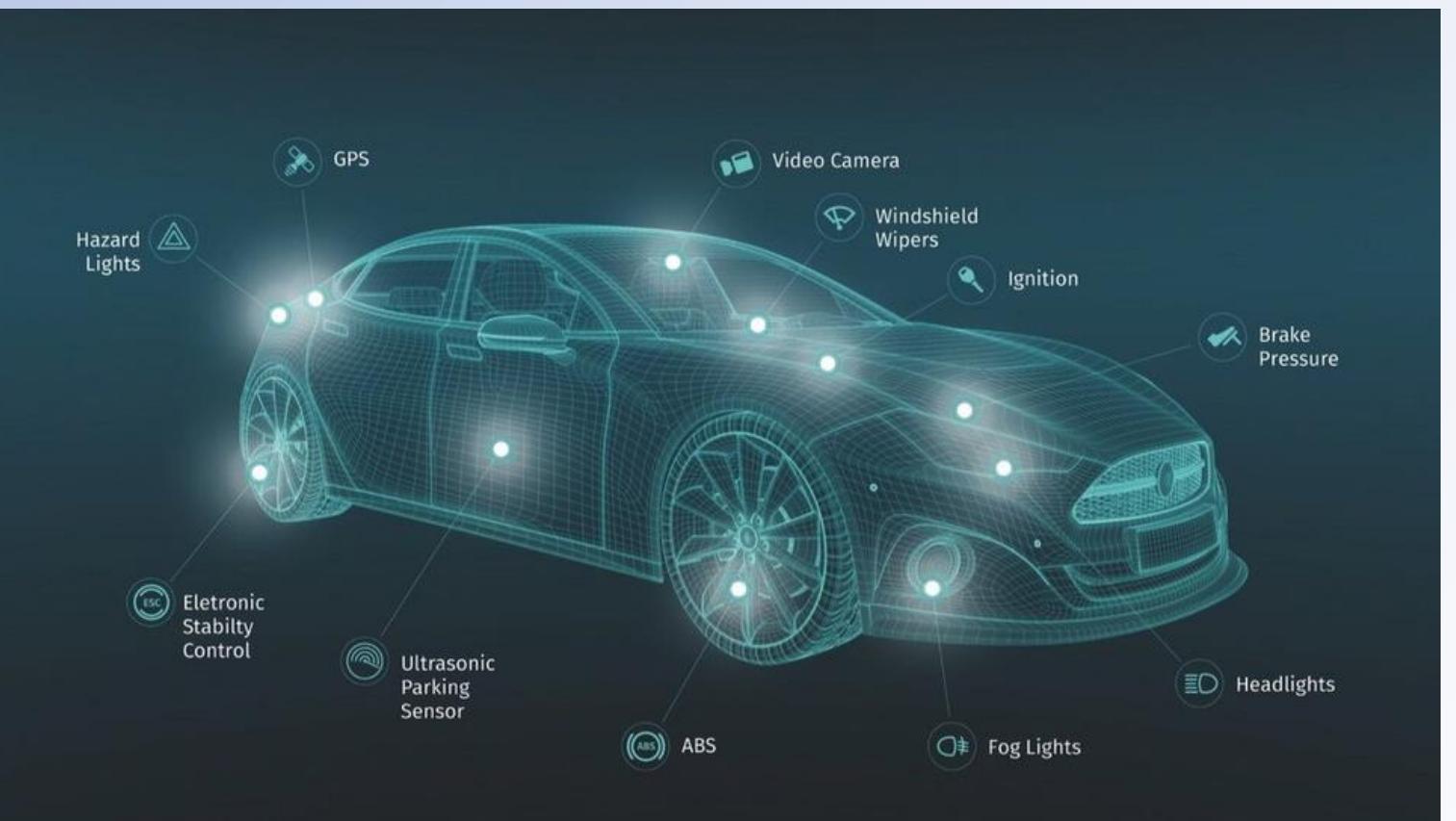
Business Problem:

- How can the car manufacturer optimize pricing and product development decisions?
- Improve competitiveness in the market and increase profitability.
- Meet consumer demand effectively.

Dataset Details:

- Contains information on over 11,000 car models and their specifications.
- Includes details such as make, model, year, fuel type, engine power, transmission, wheels, number of doors, market category, size, style, estimated miles per gallon, popularity, and manufacturer's suggested retail price (MSRP).
- Dataset was cleaned by removing blanks, correcting data inconsistencies, and standardizing the data format.

By analyzing this dataset, the project aims to identify popular and profitable features and categories among consumers, develop a pricing strategy that balances demand and profitability, and provide insights for future product development efforts.



APPROACH

Analytical Methods Used:

- Regression analysis: Used to determine the relationship between variables and identify significant predictors.
- Correlation analysis: Employed to examine the strength and direction of the relationship between two variables.
- Various types of charts: Included scatter plots, line charts, column charts, and bubble charts to visually represent the data and identify patterns and trends.

Software Used:

- Excel: Utilized for data cleaning, statistical analysis, and data visualization to fulfill the project objectives effectively.

Challenges and Limitations Encountered:

- Interpretation of results: Faced challenges in correctly interpreting the obtained results.
- Selection of appropriate chart types: Choosing the right chart type was crucial, as different chart types can provide different insights. Selecting the wrong type could lead to misinterpretation of the data.
- Creating bubble charts: Encountered challenges in creating bubble charts, especially when labeling the bubbles. Each brand being a separate data series required additional effort to set up the data accurately and ensure proper labeling.

Throughout the project, these analytical methods, along with Excel as the software, were used to analyze the data. However, challenges in result interpretation, chart selection, and bubble chart creation were experienced.

TECH-STACK USED

Excel



It is a widely adopted spreadsheet software developed by Microsoft, with a large user base across industries.

Charting and Visualization: Excel provides tools for creating charts and graphs to visualize data, making it easier to interpret and communicate insights.

User-Friendly Interface: Excel offers a user-friendly interface, making it accessible to users of different skill levels. Its familiar spreadsheet layout and extensive documentation contribute to its popularity.

Macros and Automation: Excel enables the creation of macros to automate repetitive tasks, saving time and increasing productivity.

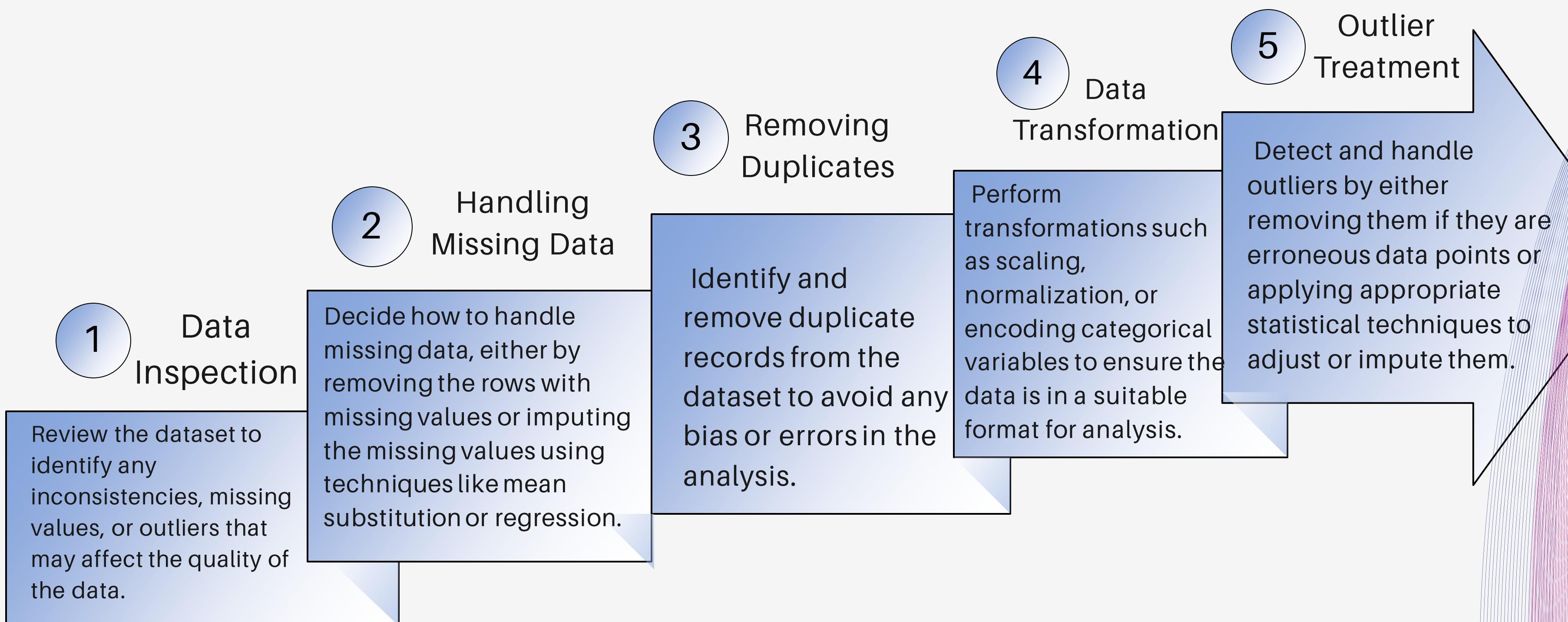
Data Organization and Analysis: Excel enables users to organize and analyze data effectively, offering features for data entry, sorting, filtering, and performing calculations.

Versatility: Excel is versatile, serving various purposes such as financial analysis, budgeting, project management, and data visualization, making it suitable for different tasks and industries.

Formula Functionality: Excel provides a wide range of built-in functions and formulas that allow users to perform complex calculations and automate tasks. These functions enable users to manipulate and analyze data efficiently.

Collaboration and Sharing: Excel facilitates collaboration among users, allowing multiple individuals to work on the same spreadsheet simultaneously and share files securely.

CLEANING THE DATA



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Make	Model	Year	Engine Fue	Engine HP	Engine Cyl	Transmissi	Driven_Wl	Number of	Market Ca	Vehicle Siz	Vehicle Sty	highway M	city mpg	Popularity	MSRP							
2	BMW	1 Series M	2011	premium u	335	6	MANUAL	rear wheel	2	Factory Tu	Compact	Coupe	26	19	3916	46135							
3	BMW	1 Series	2011	premium u	300	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Convertibl	28	19	3916	40650							
4	BMW	1 Series	2011	premium u	300	6	MANUAL	rear wheel	2	Luxury,Hig	Compact	Coupe	28	20	3916	36350							
5	BMW	1 Series	2011	premium u	230	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Coupe	28	18	3916	29450							
6	BMW	1 Series	2011	premium u	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertibl	28	18	3916	34500							
7	BMW	1 Series	2012	premium u	230	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Coupe	28	18	3916	31200							
8	BMW	1 Series	2012	premium u	300	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Convertibl	28	17	3916	44100							
9	BMW	1 Series	2012	premium u	300	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Convertibl	28	17	3916	44400							
10	BMW	1 Series	2012	premium u	230	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Convertibl	28	19	3916	44400							
11	BMW	1 Series	2013	premium u	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertibl	28	19	3916	37200							
12	BMW	1 Series	2013	premium u	320	6	MANUAL	rear wheel	2	Luxury,Hig	Compact	Convertibl	25	18	3916	48250							
13	BMW	1 Series	2013	premium u	320	6	MANUAL	rear wheel	2	Luxury,Hig	Compact	Coupe	28	20	3916	43550							
14	BMW	1 Series	2013	premium u	300	6	MANUAL	rear wheel	2	Luxury,Per	Compact	Convertibl	28	19	3916	44400							
15	BMW	1 Series	2013	premium u	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertibl	28	19	3916	37200							
16	BMW	1 Series	2013	premium u	320	6	MANUAL	rear wheel	2	Luxury,Hig	Compact	Convertibl	25	18	3916	48250							
17	BMW	1 Series	2013	premium u	320	6	MANUAL	rear wheel	2	Luxury,Hig	Compact	Coupe	28	20	3916	43550							
18	Audi	100	1992	regular unl	172	6	MANUAL	front wheel	4	Luxury	Midsize	Sedan	24	17	3105	2000							
19	Audi	100	1992	regular unl	172	6	AUTOMAT	all wheel d	4	Luxury	Midsize	Wagon	20	16	3105	2000							
20	Audi	100	1992	regular unl	172	6	MANUAL	all wheel d	4	Luxury	Midsize	Sedan	21	16	3105	2000							
21	Audi	100	1993	regular unl	172	6	MANUAL	front wheel	4	Luxury	Midsize	Sedan	24	17	3105	2000							
22	Audi	100	1993	regular unl	172	6	AUTOMAT	all wheel d	4	Luxury	Midsize	Wagon	20	16	3105	2000							
23	Audi	100	1993	regular unl	172	6	MANUAL	all wheel d	4	Luxury	Midsize	Sedan	21	16	3105	2000							
24	Audi	100	1994	regular unl	172	6	AUTOMAT	front wheel	4	Luxury	Midsize	Wagon	21	16	3105	2000							
25	Audi	100	1994	regular unl	172	6	MANUAL	all wheel d	4	Luxury	Midsize	Sedan	22	16	3105	2000							
26	Audi	100	1994	regular unl	172	6	MANUAL	front wheel	4	Luxury	Midsize	Sedan	22	17	3105	2000							
27	Audi	100	1994	regular unl	172	6	AUTOMAT	all wheel d	4	Luxury	Midsize	Wagon	21	16	3105	2000							
28	Audi	100	1994	regular unl	172	6	AUTOMAT	all wheel d	4	Luxury	Midsize	Wagon	21	16	3105	2000							

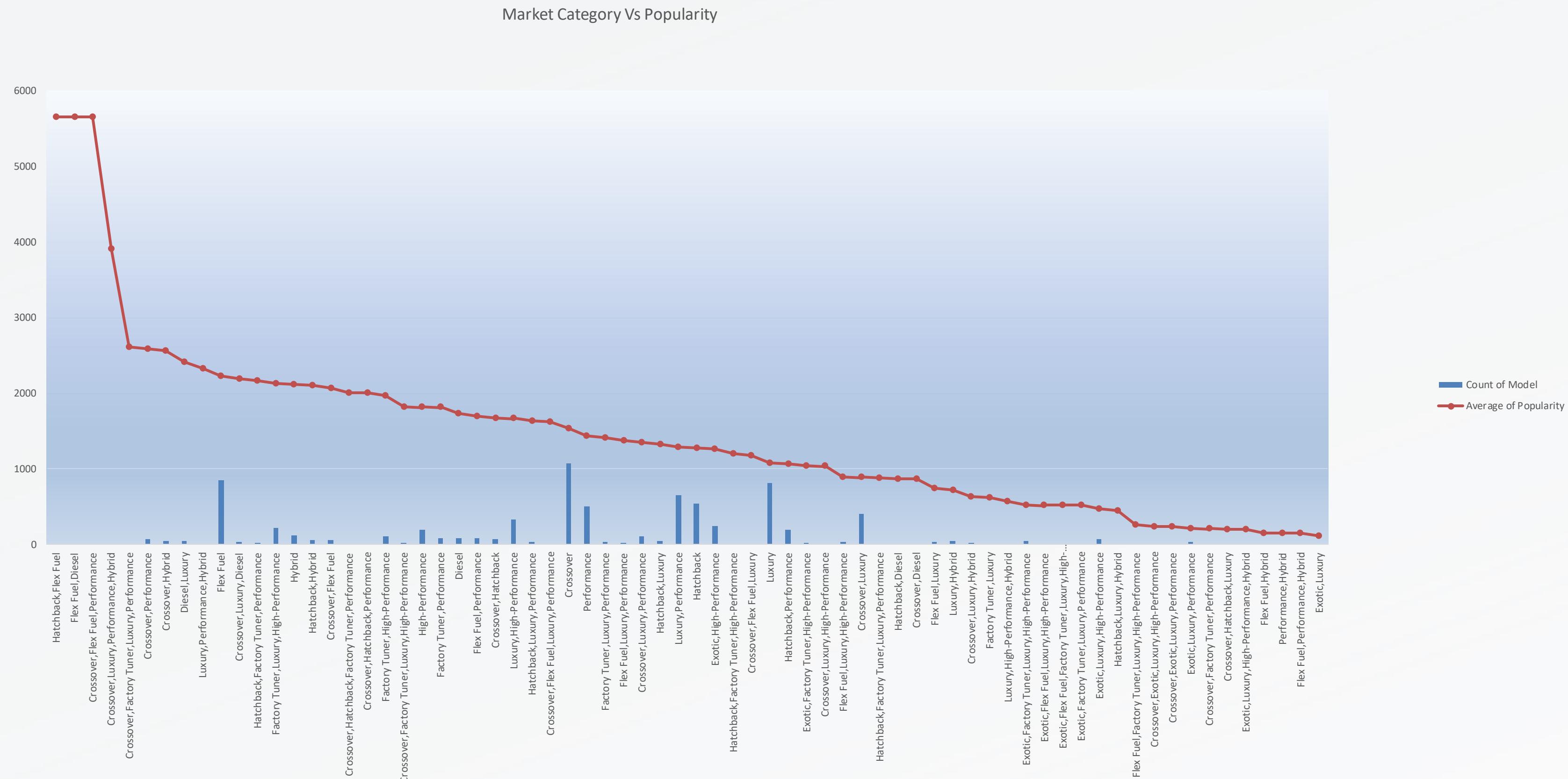
Microsoft Excel

i 714 duplicate values found and removed; 11200 unique values remain. Note that counts may include empty cells, spaces, etc.

OK

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Make	Model	Year	Engine Fue	Engine HP	Engine Cyl	Transmissi	Driven_Wl	Number of	Market Ca	Vehicle Siz	Vehicle Sty	highway M	city mpg	Popularity	MSRP							
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9	BMW	1 Series	2012	premium u	300	6	MANUAL	rear wheel	2	Luxury,Hig	Compact	Coupe	28	20	3916	39300							
10	BMW	1 Series	2012	regular unl	172	6	MANUAL	front wheel	2	Luxury	Compact	Convertibl	28	18	3916	36900							
11	BMW	1 Series	2013	regular unl	172	6	MANUAL	front wheel	2	Luxury	Compact	Convertibl	27	18	3916	37200							
12	BMW	1 Series	2013	regular unl	172	6	MANUAL	front wheel	2	Luxury,Hig	Compact	Coupe	28	20	3916	39600							
13	BMW	1 Series	2013	regular unl	172	6	MANUAL	front wheel	2	Luxury,Per	Compact	Coupe	28	19	3916	31500							

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



It is evident that the market categories listed below are highly favored:

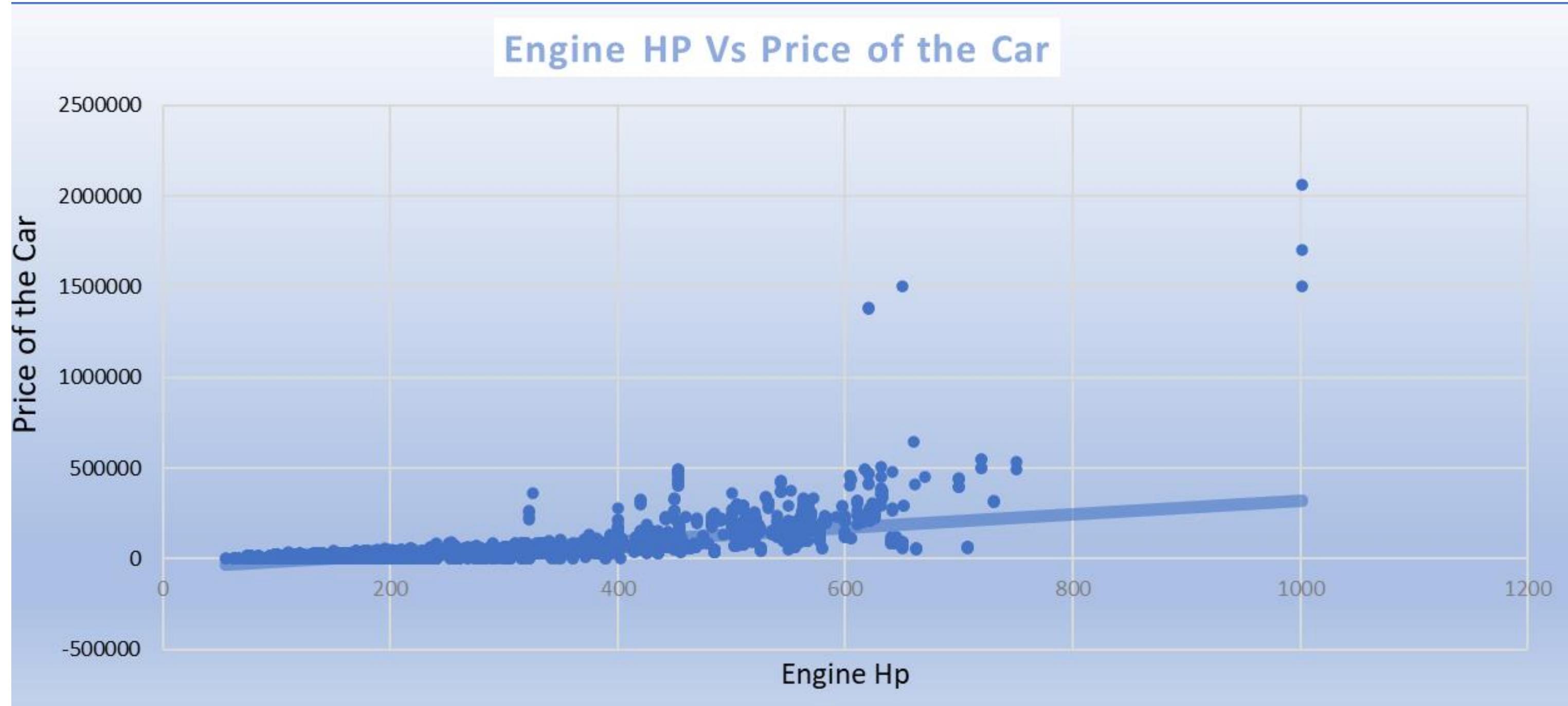
- Hatchback vehicles with Flex fuel
- Diesel vehicles with flex fuel
- Performance, Crossover, and Flex Fuel vehicles

On the other hand, the market categories of Exotic and Luxury are not as popular among consumers.

Furthermore, there is a noticeable disparity in the number of vehicles between the medium-popular market category and the most popular market category, with a higher count in the former and a lower count in the latter.



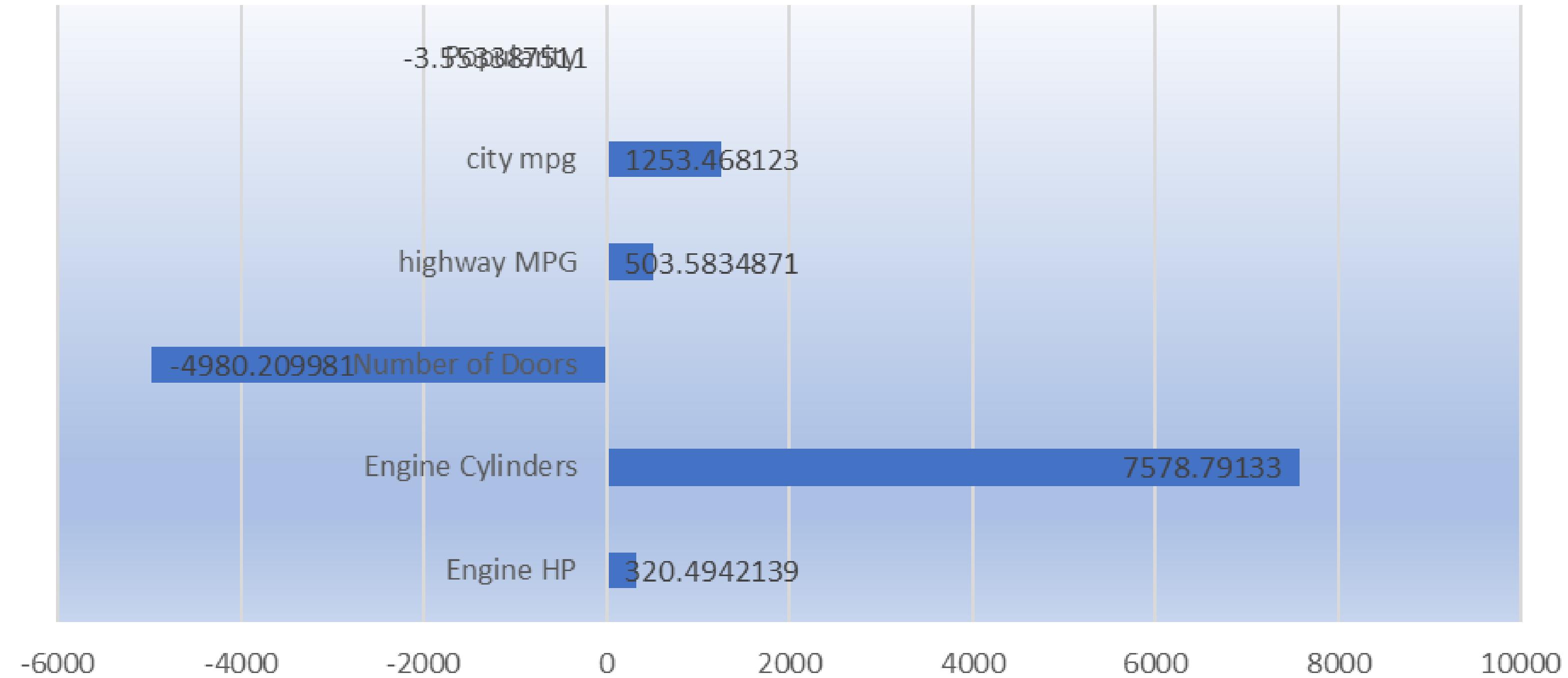
Task 2:Relationship between car's Engine power and its price



By examining the scatter plot, it is evident that there is a strong linear relationship. This indicates that as the horsepower of the engine increases, the price of the car also tends to increase. The presence of a linear trendline further confirms this linear association.

Task 3 - Analysis of Regression in Relation to Car Price

Regression Coeficient WRT MSRP

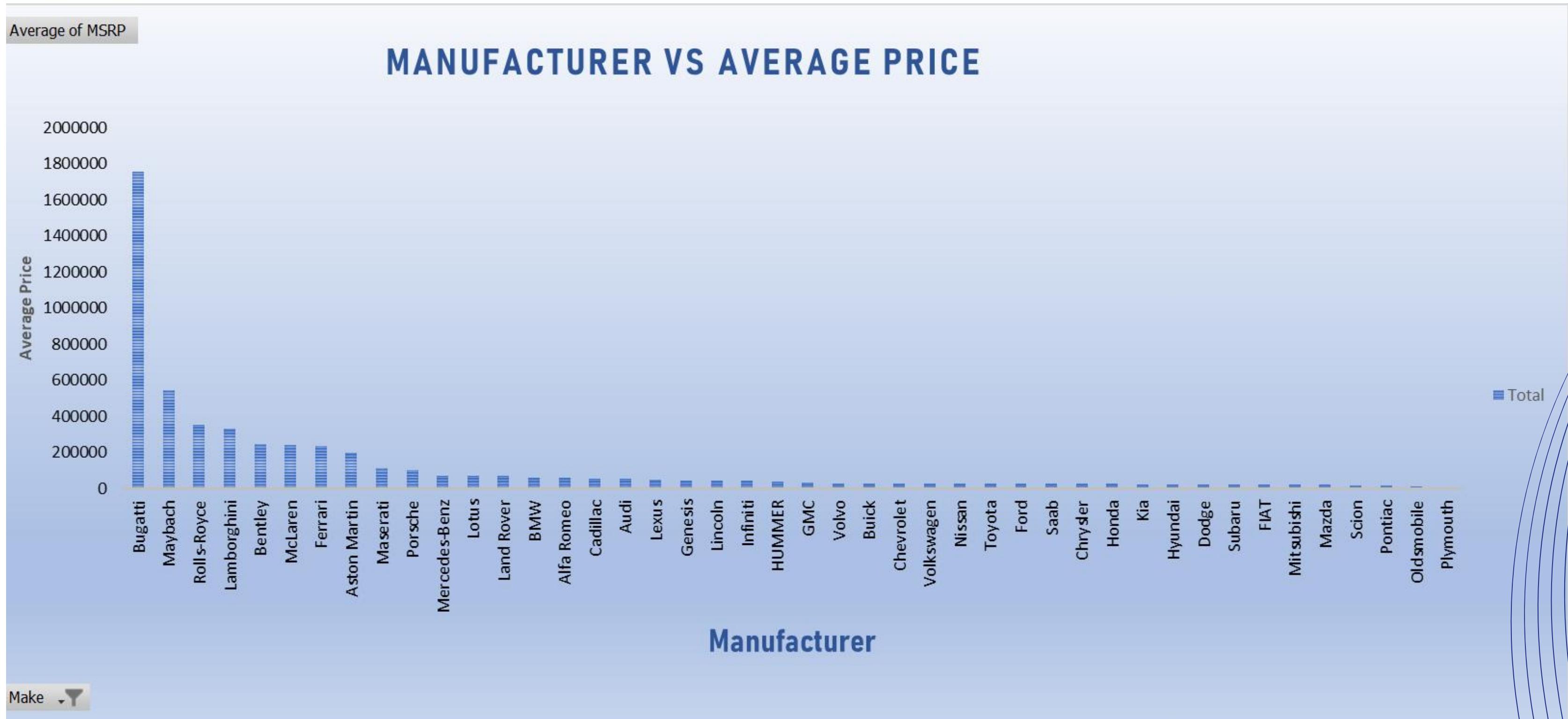


In the regression analysis considering multiple variables, it is evident that the number of engine cylinders has a significant positive coefficient. This suggests a positive linear relationship, implying that increasing the number of engine cylinders will lead to an automatic increase in the price of the car.

Furthermore, there is a negative correlation between the MSRP (Manufacturer's Suggested Retail Price) and the variables of highway mileage, city mileage, and the number of doors. This negative correlation signifies that when one of these variables increases, the others tend to decrease.



Task 4 : Average Price of cars vary over different manufacturers



According to the graph, the manufacturer "Bugatti" has the highest average price, followed by "Maybach," "Rolls-Royce," and "Lamborghini."

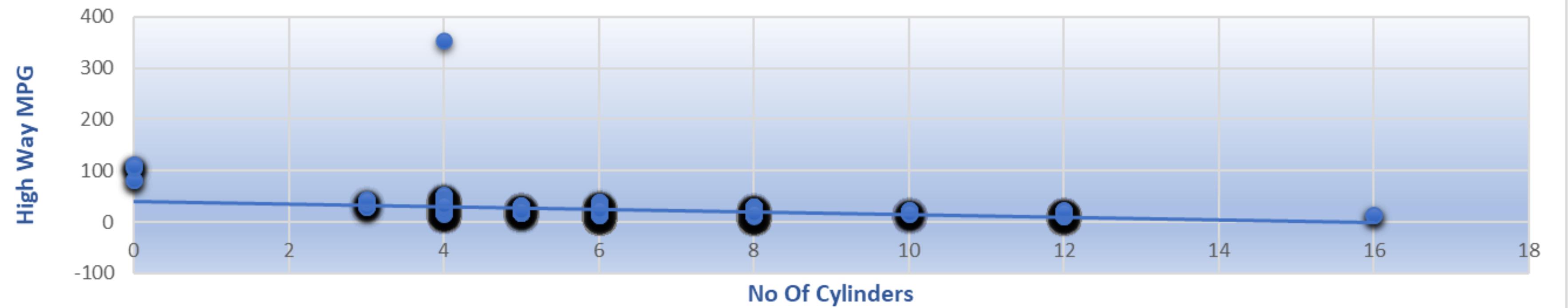
"Plymouth" is identified as the automaker with the lowest average cost.

The average cost for any manufacturer is recorded as "42797" rupees.



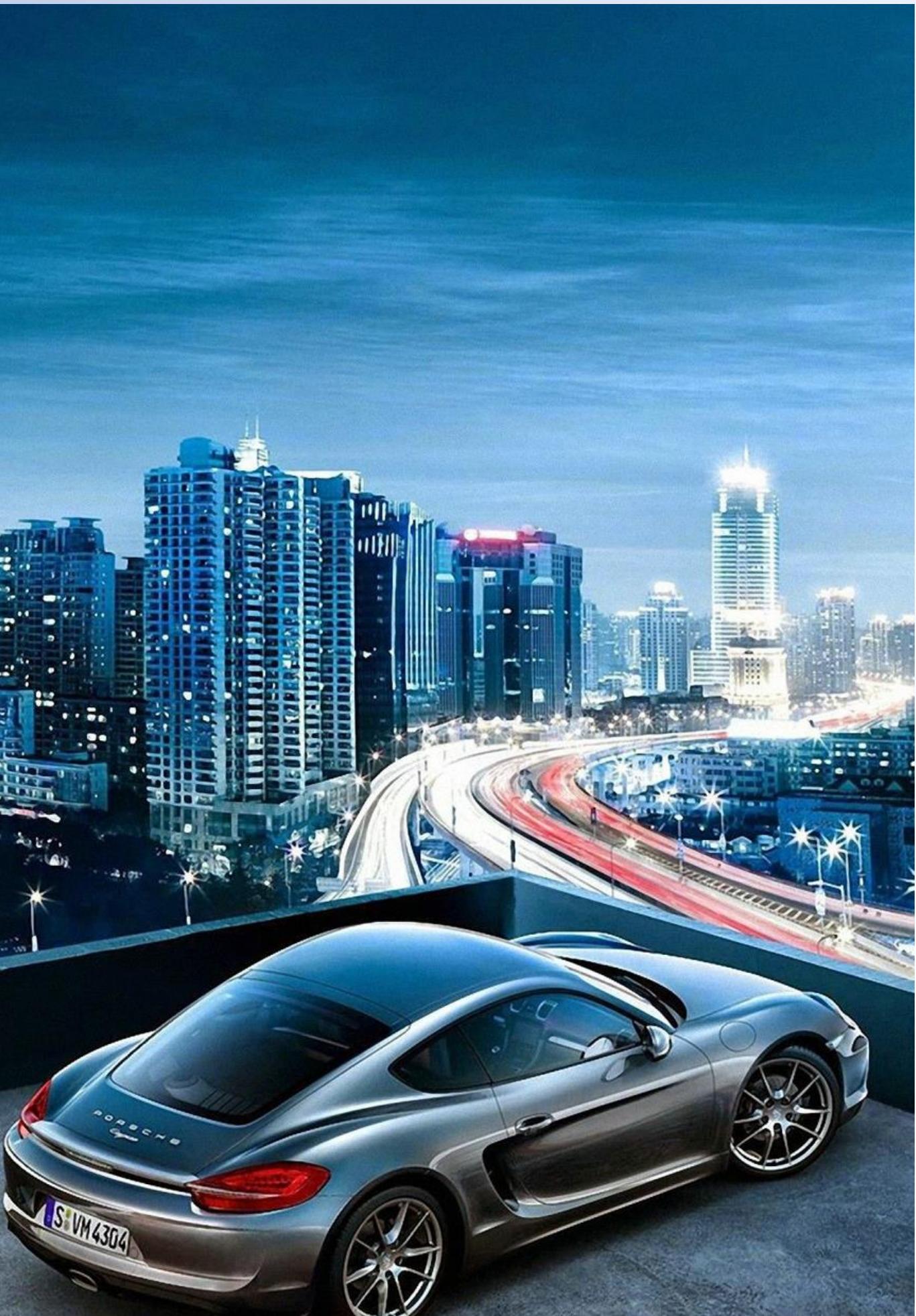
TASK 5 : RELATIONSHIP BETWEEN FUEL EFFICIENCY AND NUMBER OF CYLINDERS IN CAR'S ENGINE

No. Of Cylinders Vs Fuel Efficiency



Based on the provided chart, it is evident that as the number of cylinders in a car's engine increases, fuel efficiency decreases both on highways and in cities.

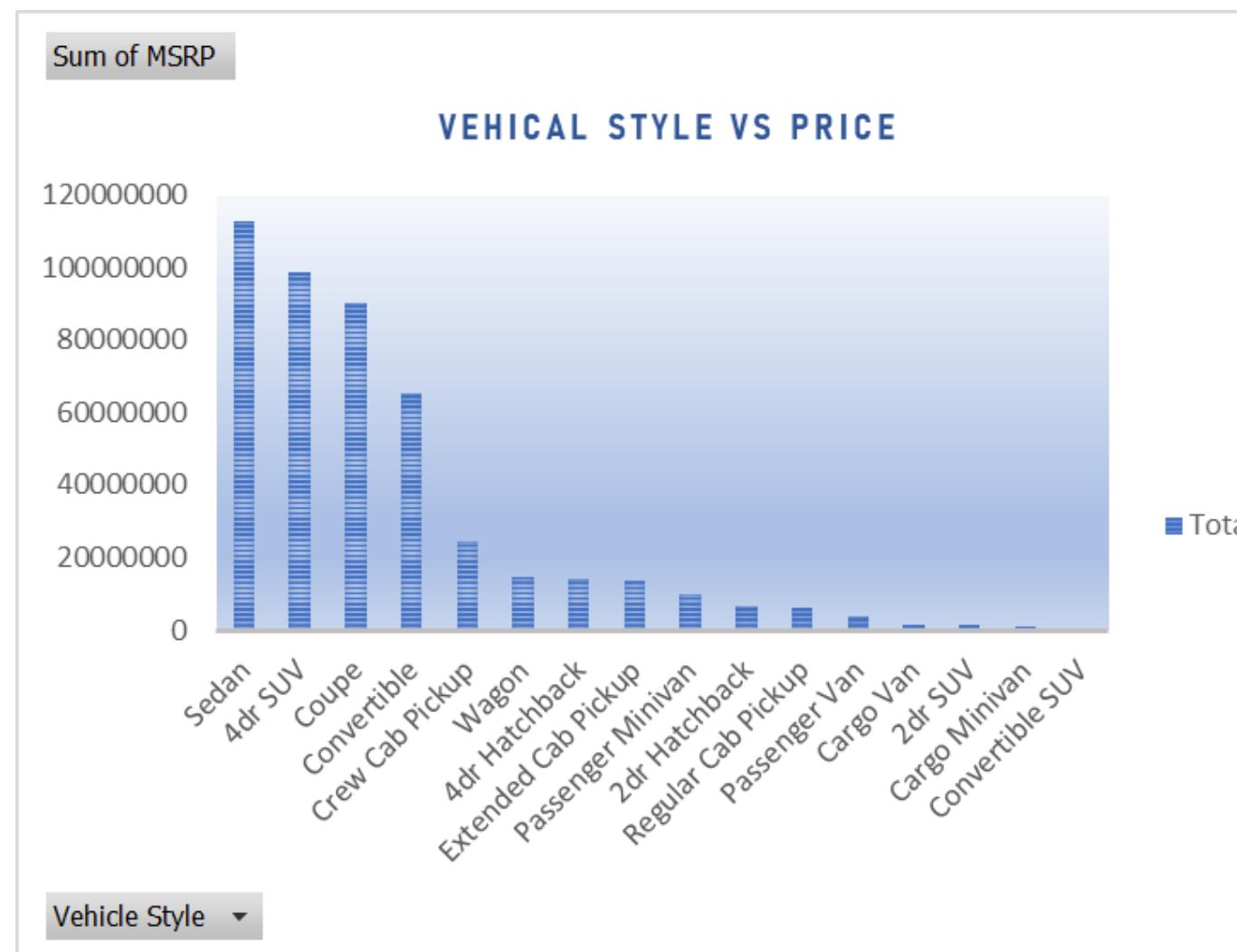
- This indicates a negative relationship between the number of cylinders and fuel efficiency.
- The trendline also displays a negative slope, indicating that an increase in one variable corresponds to a decrease in the other.
- This can be attributed to the fact that engines with more cylinders are typically larger, more powerful, and consume more gasoline.



Dashboard - 1

Total prices of the Car by brand and Vehicle style

Make	Sum of MSRP
Acura	120000000
Alfa Romeo	100000000
Aston Martin	90000000
Audi	80000000
Bentley	60000000
BMW	50000000
Bugatti	40000000
Buick	30000000
Cadillac	20000000
Chevrolet	18000000
Chrysler	15000000



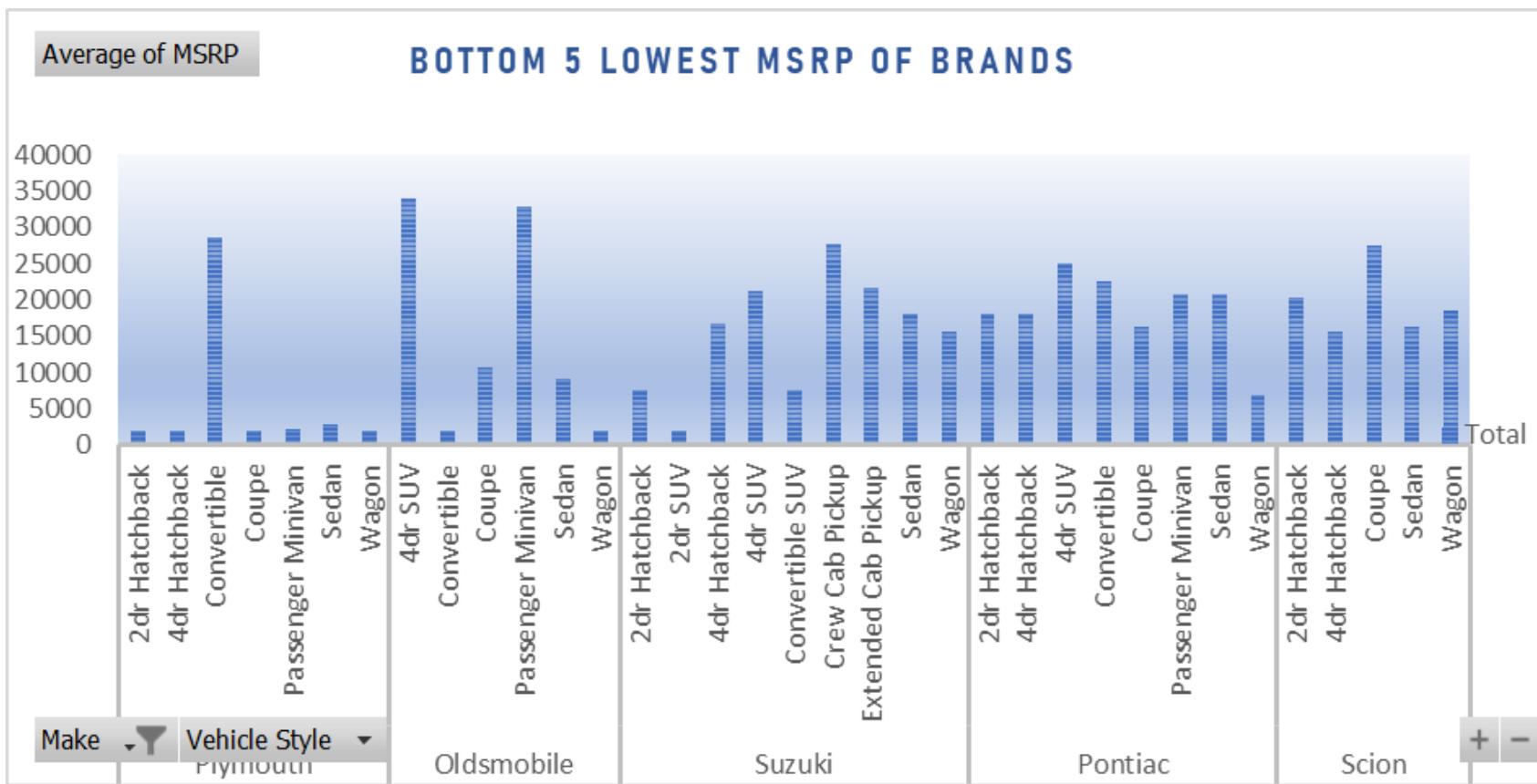
According to the dashboard analysis:
The image reveals that "Chevrolet" holds the highest Maximum Selling Retail Price (MSRP) among all manufacturers, followed by "Mercedes-Benz" in the second position.

Among various vehicle styles, the "Sedan" category exhibits the highest maximum selling retail price.



Dashboard - 2

Car brands' highest and lowest prices, as well as their body styles

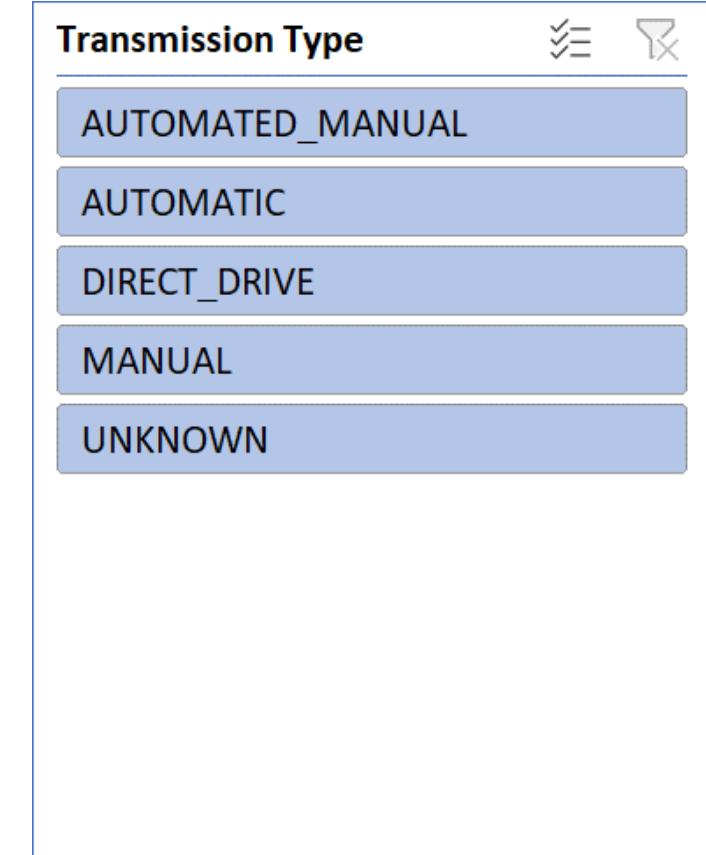
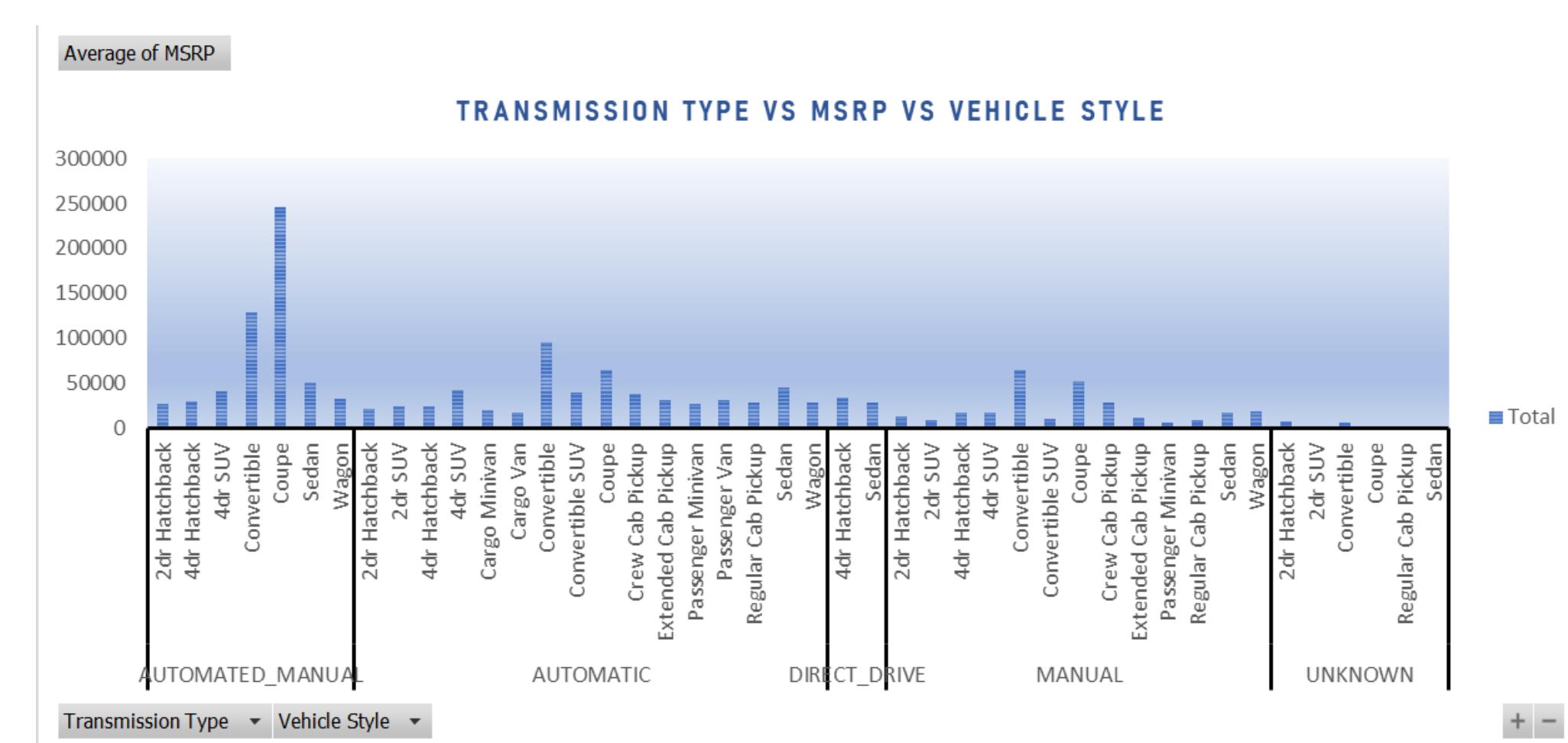
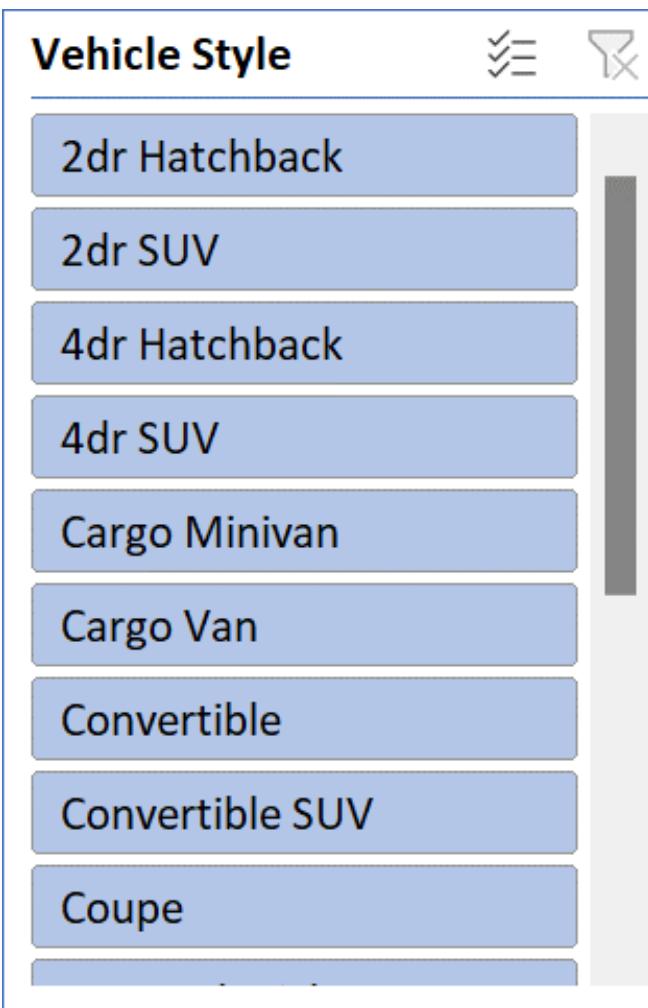


According to the dashboard analysis:

- 1.Bugatti has the highest price tag among automobile brands mentioned in the dashboard, while Coupe is the most favored vehicle design.
- 2.Maybach ranks second in terms of brand popularity, followed by Convertible as the third most preferred car type.
- 3.The brand Plymouth offers the lowest sticker price for its 2dr Hatchback and 4dr Hatchback models.

Dashboard - 3

Variation of MSRP with Transmission Type along with Vehicle Style



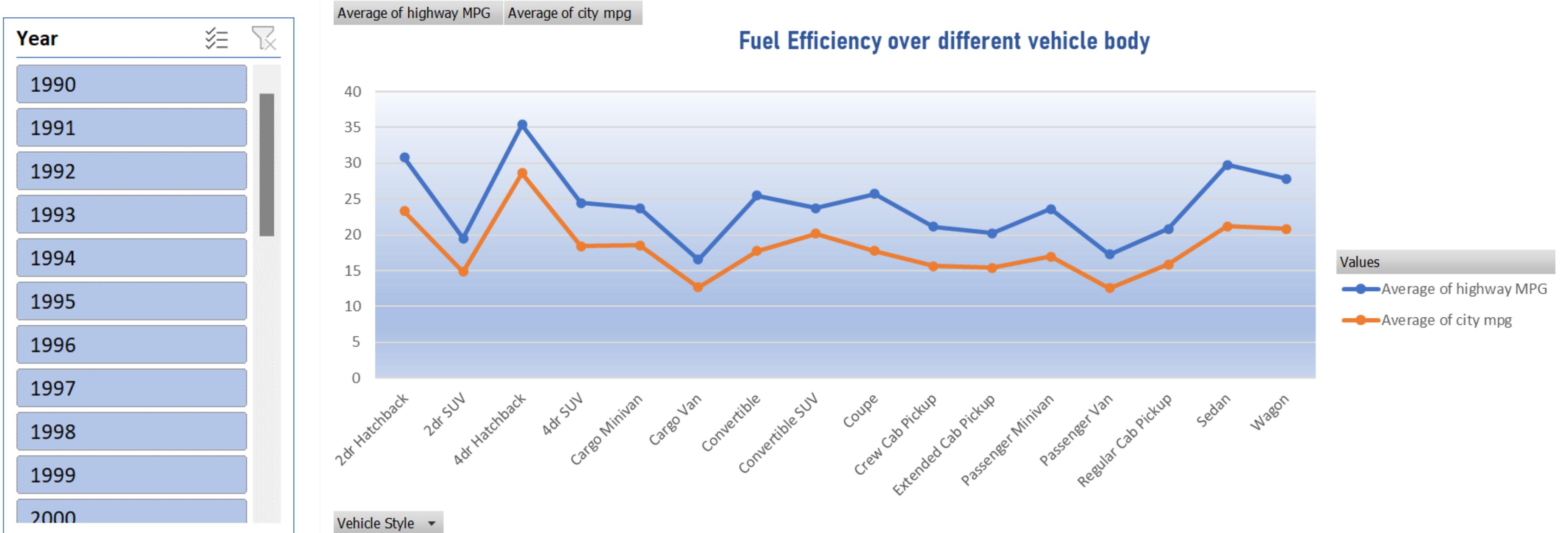
Among all gearbox types, "Automated_Manual" has the highest Maximum Selling Retail Price.

Within the "Automated_Manual" gearbox type, the "Coupe" vehicle form exhibits the highest MSRP, while cars with "Manual" transmissions have the lowest overall cost.



Dashboard - 4

Average Fuel Efficiency of different vehicle body over time



Analysis From the Dashboard

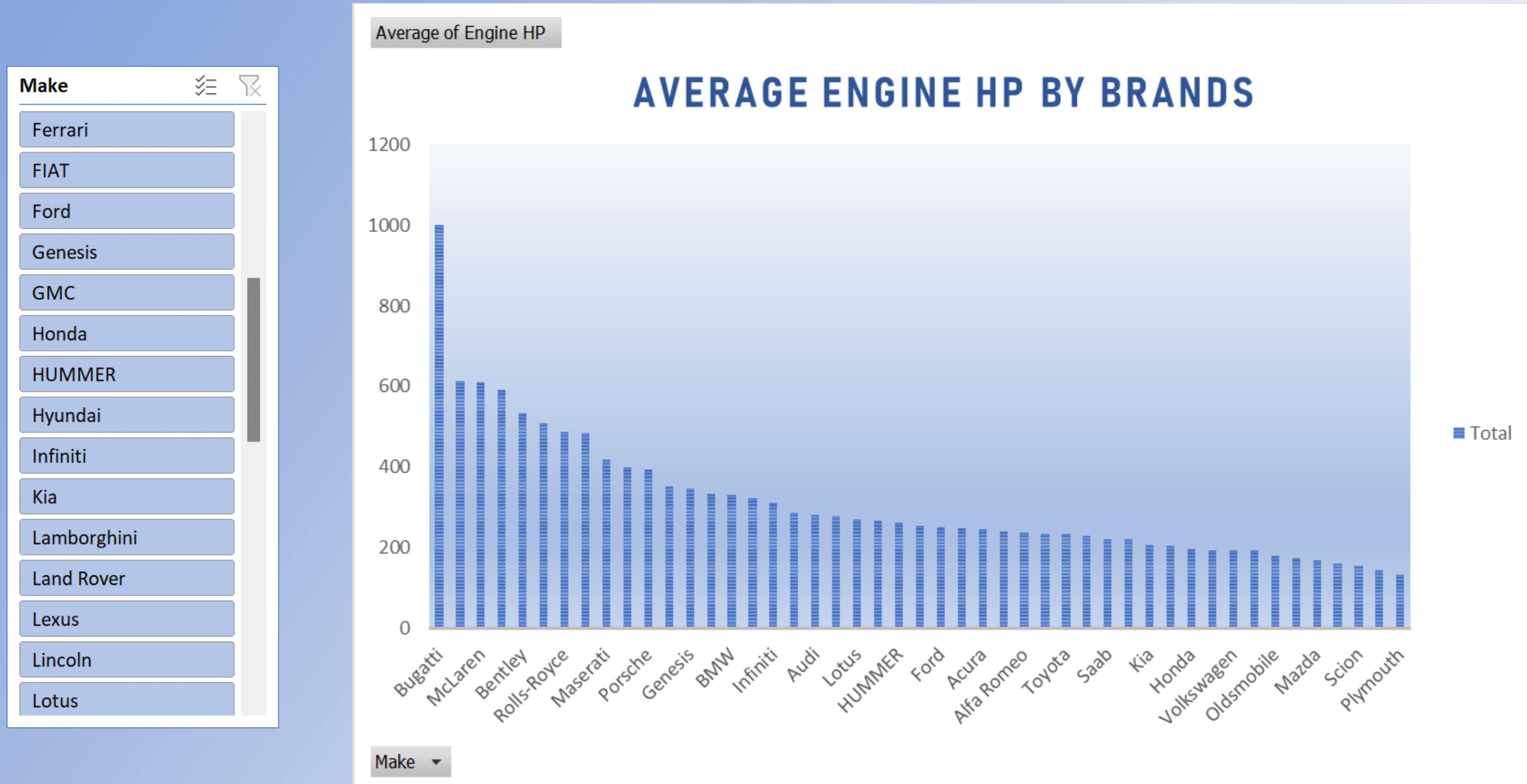
The "4dr Hatchback" vehicle model is identified as the most fuel-efficient, with an average of 35 miles per gallon on the highway and 28.6 miles per gallon in the city.

On the other hand, the "cargo van" is the least fuel-efficient vehicle type, with an average of 12 mpg in cities and 16 mpg on the highway.



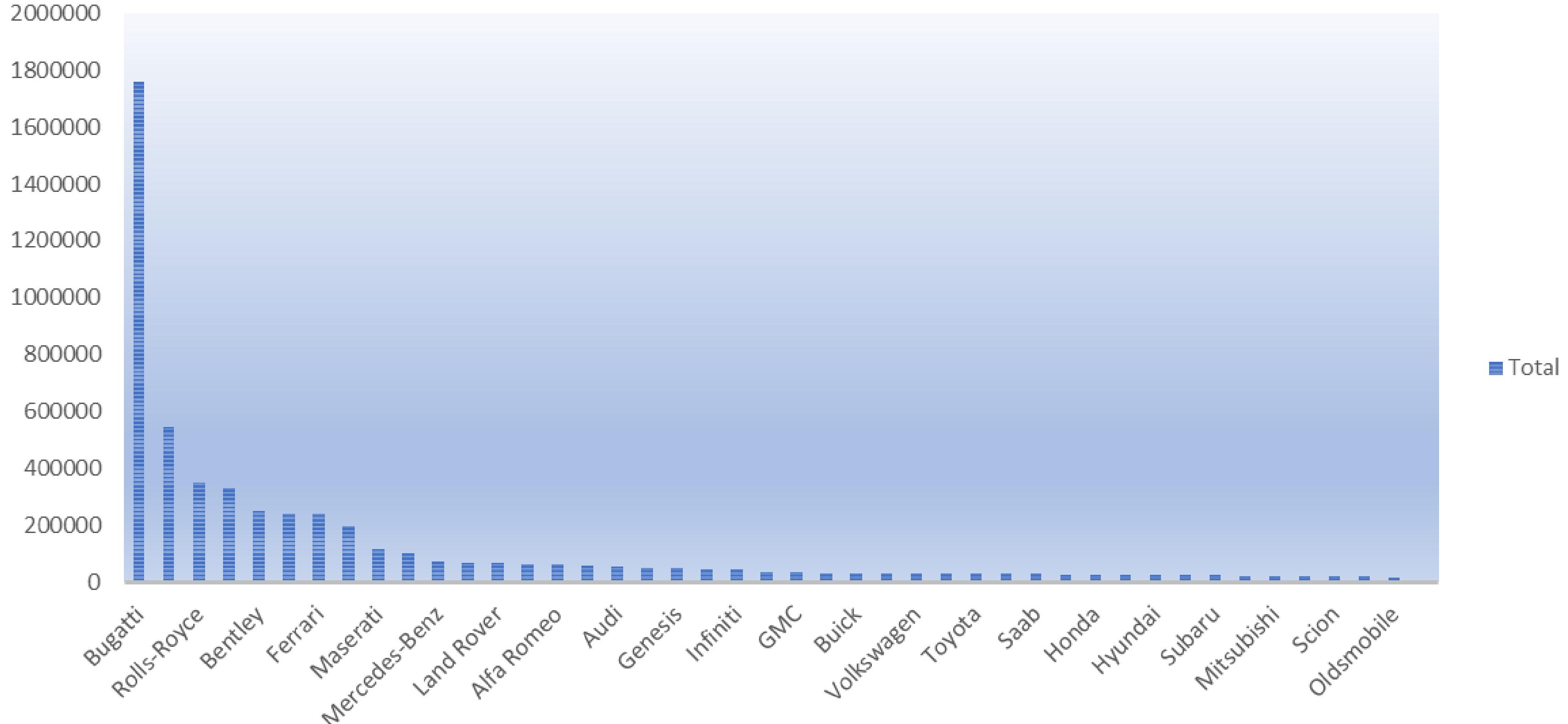
Dashboard - 5

Average Engine HP,MSRP,MPG Of different brands



Average of MSRP

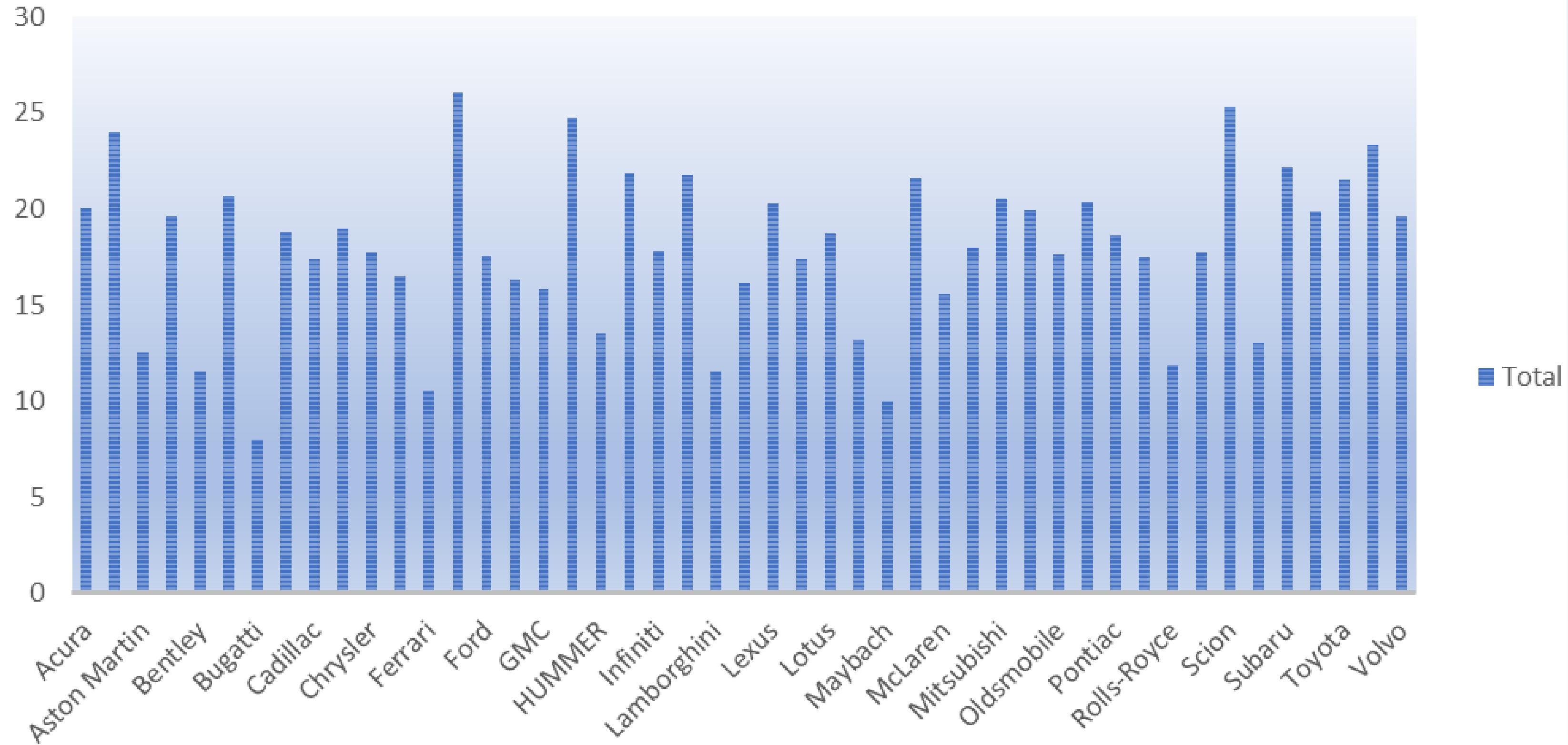
AVERAGE MSRP BY BRANDS



Make ▼

Average of city mpg

AVERAGE HIGHWAY MPG BY BRAND

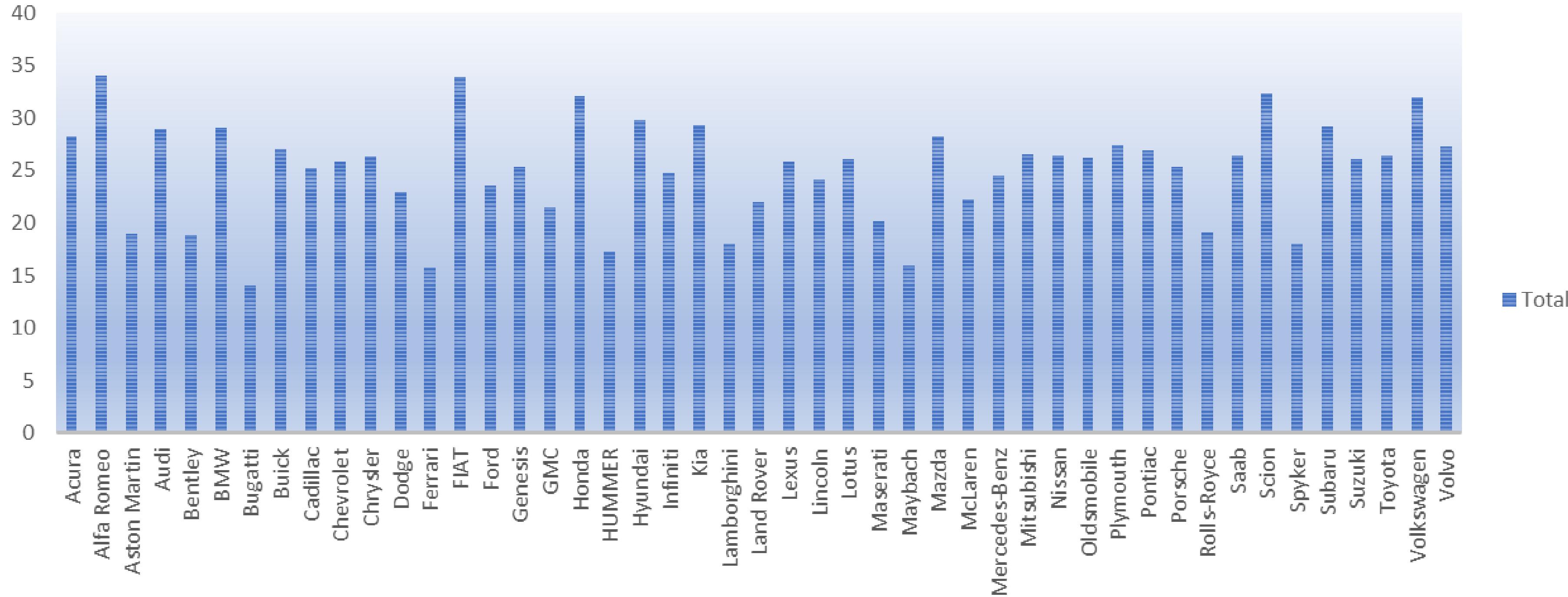


Make ▾

Make ▾

Average of highway MPG

AVERAGE CITY MPG BY BRAND



INSIGHTS FROM THE Dashboard

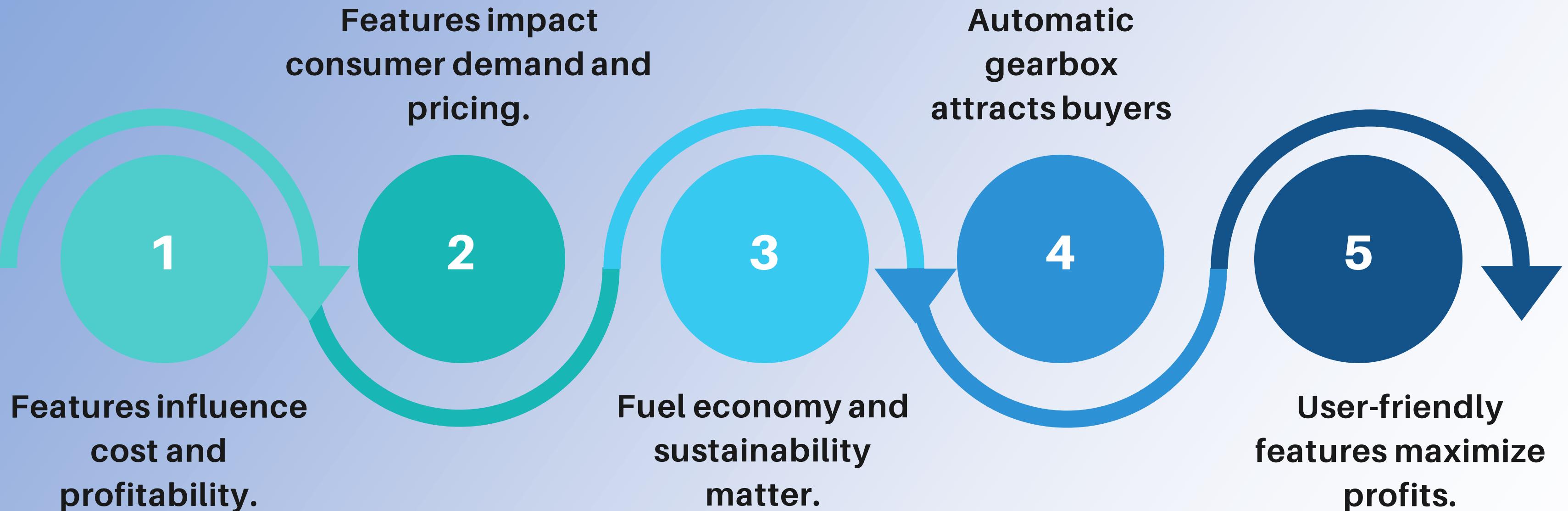
- According to the data, "Bugatti" has the highest average price, amounting to 1.7 billion dollars, as well as the highest engine horsepower, which is 1001.
- "Lamborghini" takes the second position in terms of engine horsepower, with a value of 614 horsepower.
- In regard to fuel economy, "Alfa Romeo" and "FIAT" demonstrate the best performance on highways, while "FIAT" and "Scion" exhibit the best fuel economy in cities.



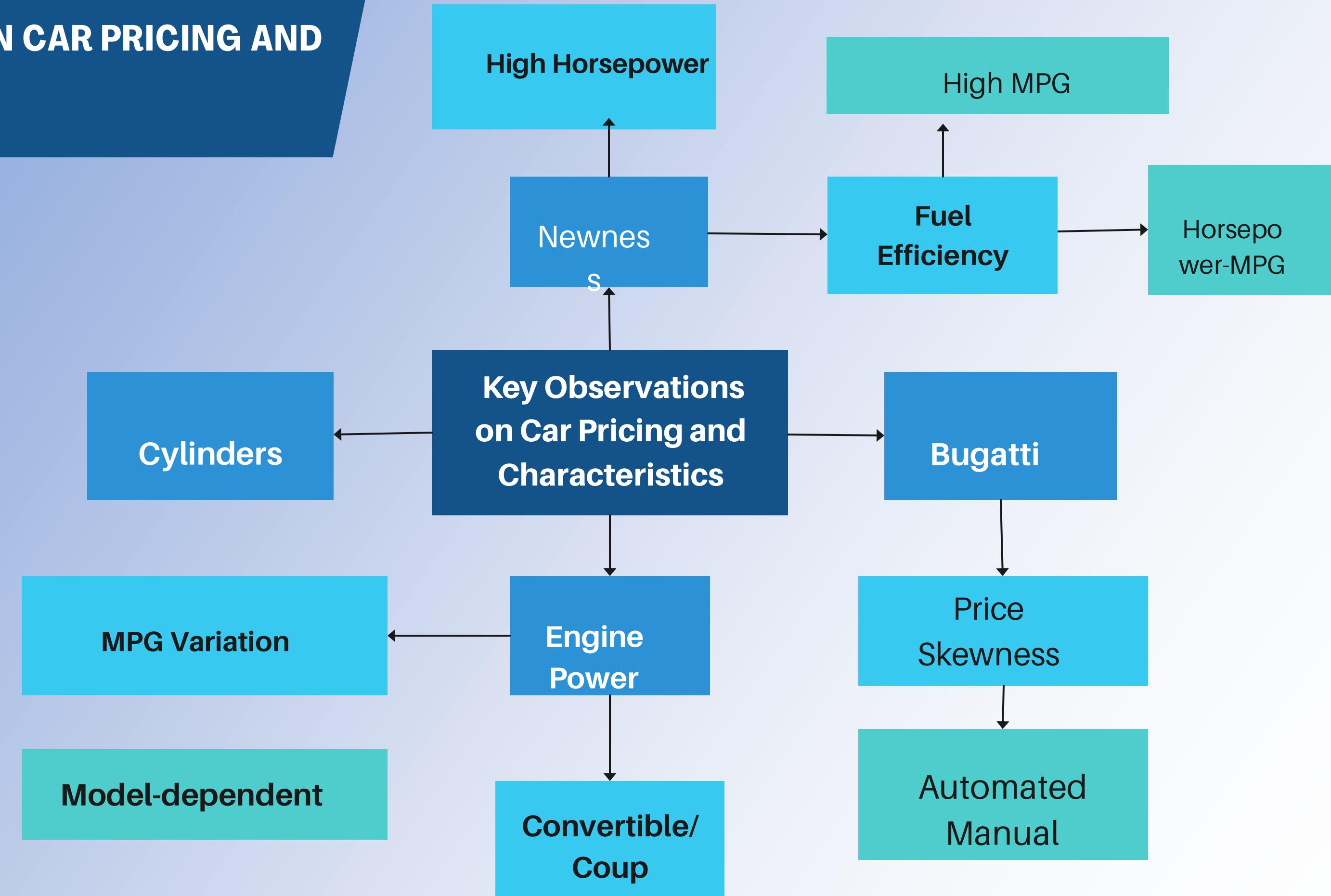
INSIGHTS

- 1 • "BUGATTI" BRAND VEHICLES ARE THE MOST EXPENSIVE AMONG ALL THE BRANDS.
- 2 VEHICLES UNDER THE "PLYMOUTH" BRAND ARE THE LEAST EXPENSIVE.
- 3 AUTOMOBILES WITH MANUAL TRANSMISSIONS ARE CHEAPER COMPARED TO THOSE WITH AUTOMATED MANUAL TRANSMISSIONS.
- 4 THE "Crossover" style is the most popular vehicle type in terms of sales.
- 5 The efficiency of the engine cylinders decreases as the car becomes more expensive..

The features of cars can have significant effects on both their cost and profitability. Here are some key factors:



KEY OBSERVATIONS ON CAR PRICING AND CHARACTERISTICS



RESULT

Automotive features have a significant impact on price and profitability in the current market. **1**

There is a notable relationship between pricing and attributes such as engine horsepower, where higher horsepower often corresponds to higher automobile prices. **2**

Regression analysis proves valuable in identifying relationships between variables in the data **3**

The study highlights the importance of understanding how different features influence pricing **4** and profitability in the automotive industry.

The case study provides valuable insights into the interplay between car features, pricing strategies, **5** and overall profitability in the market.

Link to Excel Workbook



<https://docs.google.com/spreadsheets/d/1-qObVqrwmQj59VWFtbw8MPcqbwDqnkq3/edit?usp=sharing&ouid=104534447542850029529&rtpof=true&sd=true>

THANK YOU

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