

Analyzing the Impact of Car Features on Price and Profitability

Overview:

The automotive industry has been rapidly evolving over the past few decades, with a growing focus on fuel efficiency, environmental sustainability, and technological innovation. With increasing competition among manufacturers and a changing consumer landscape, it has become more important than ever to understand the factors that drive consumer demand for cars.

In recent years, there has been a growing trend towards electric and hybrid vehicles and increased interest in alternative fuel sources such as hydrogen and natural gas. At the same time, traditional gasoline-powered cars remain dominant in the market, with varying fuel types and grades available to consumers.

For the given dataset, as a Data Analyst, the client has asked How can a car manufacturer optimize pricing and product development decisions to maximize profitability while meeting consumer demand?

This problem could be approached by analyzing the relationship between a car's features, market category, and pricing, and identifying which features and categories are most popular among consumers and most profitable for the manufacturer. By using data analysis techniques such as regression analysis and market segmentation, the manufacturer could develop a pricing strategy that balances consumer demand with profitability, and identify which product features to focus on in future

product development efforts. This could help the manufacturer improve its competitiveness in the market and increase its profitability over time.

Approach:

The approach that I used during the completion of this project is first I downloaded the data sets then with the help of the knowledge that I gained regarding different functions used in excel and the various tools that it provides I answered different questions and created various graphs for the same.

Tech-Stack:

I used Microsoft excel (2016) for the commencement of this project. I used various tools such as filters, charts, formulas that this version of excel supports to complete my project.

I used MS WORD to make my presentation.

Insights and results:

Here is a brief overview of the dataset:

- **Number of observations:** 11,159
- **Number of variables:** 16

so in order to complete the tasks given to me the first thing I did is cleaned my data by

1.removing duplicates

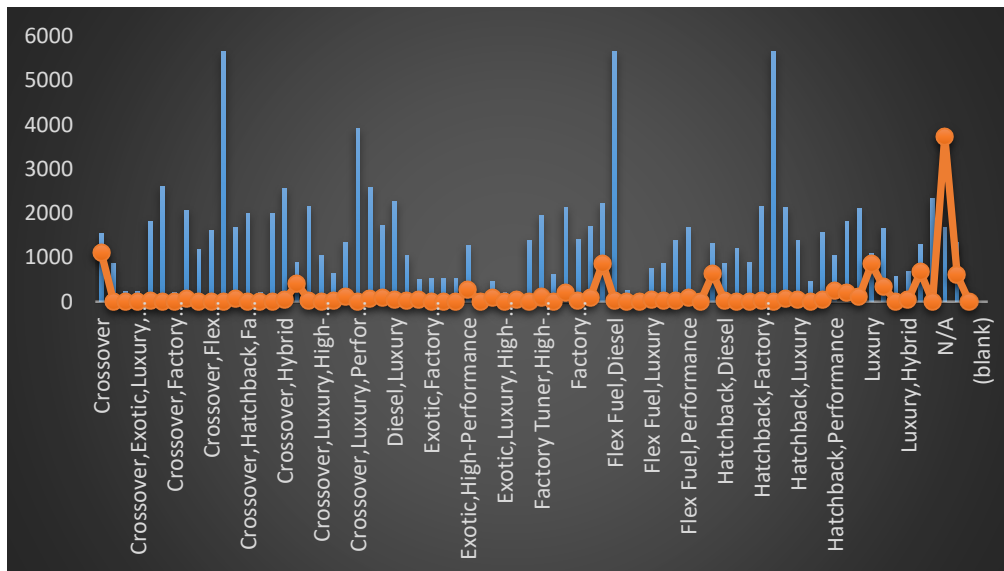
2.resizing the columns

3.eleminating blank columns and replacing it with appropriate values

now coming to the task assigned:

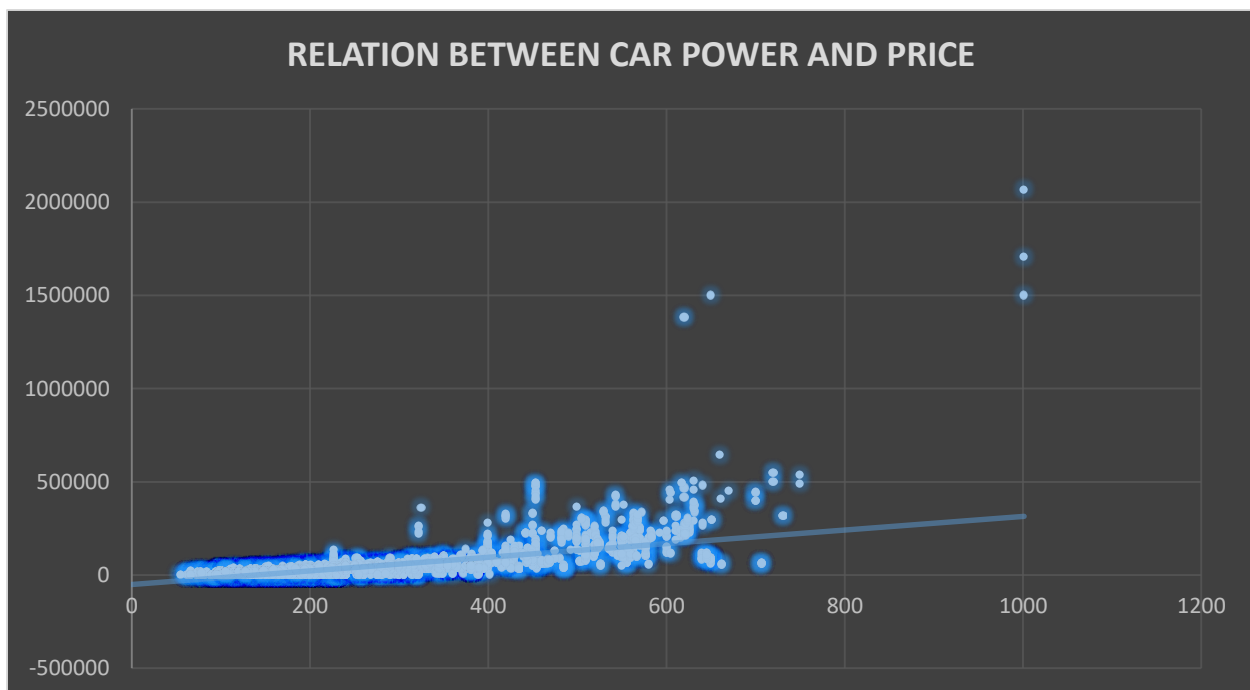
Task 1.A: Create a pivot table that shows the number of car models in each market category and their corresponding popularity scores.

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



Highest manufacturing of car is in the category of crossover

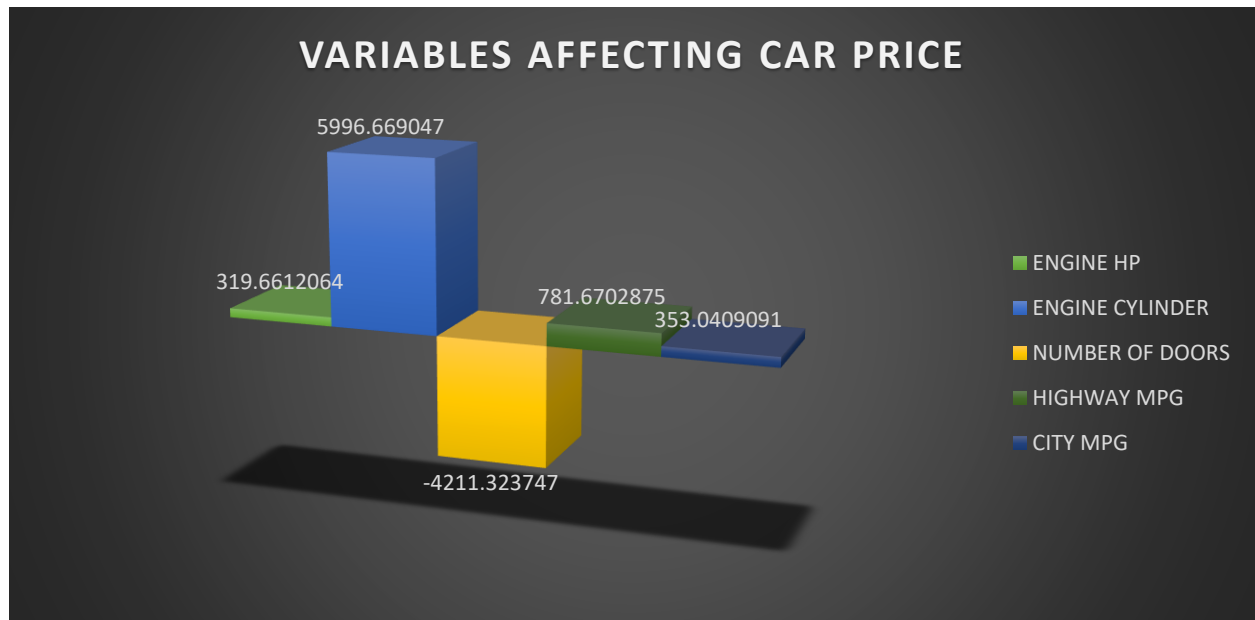
- **Task 2:** Create a scatter chart that plots engine power on the x-axis and price on the y-axis. Add a trendline to the chart to visualize the relationship between these variables.



We see a positive trend line which shows there is a positive relation between engine HP and MSRP.

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

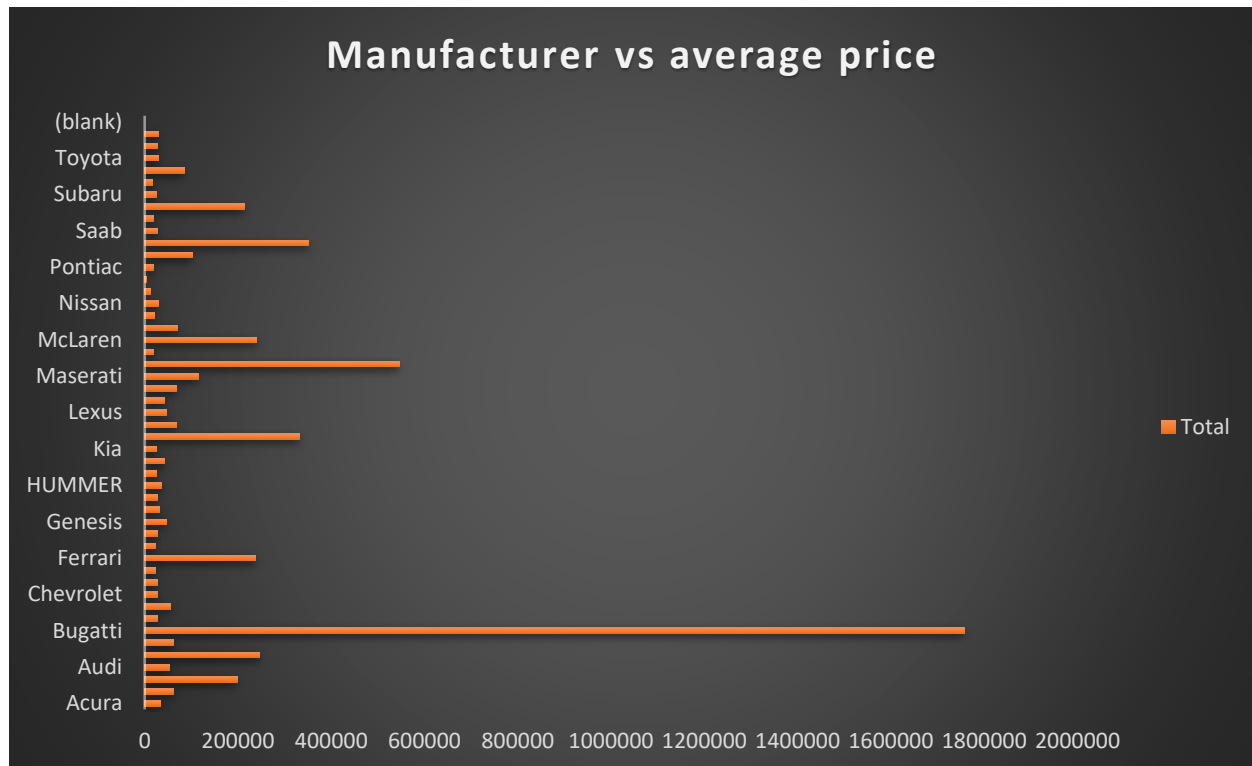
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.676939837							
R Square	0.458247543							
Adjusted R Square	0.458020069							
Standard Error	44251.89306							
Observations	11914							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	1.97243E+13	3.94E+12	2014.504	0			
Residual	11908	2.33186E+13	1.96E+09					
Total	11913	4.30429E+13						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-86159.37802	3348.344452	-25.7319	3.8E-142	-92722.67967	-79596.07638	-92722.67967	-79596.1
ENGINE HP	319.6612064	5.922292939	53.97592	0	308.0525456	331.2698672	308.0525456	331.2699
ENGINE CYLINDER	5996.669047	424.2132522	14.13598	5.27E-45	5165.141832	6828.196262	5165.141832	6828.196
NUMBER OF DOORS	-4211.323747	465.2994835	-9.05078	1.64E-19	-5123.386681	-3299.260812	-5123.386681	-3299.26
HIGHWAY MPG	781.6702875	103.483112	7.553602	4.54E-14	578.8264973	984.5140777	578.8264973	984.5141
CITY MPG	353.0409091	98.05918858	3.600284	0.000319	160.8288941	545.252924	160.8288941	545.2529



The variable that impact the car the most is engine cylinder.

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

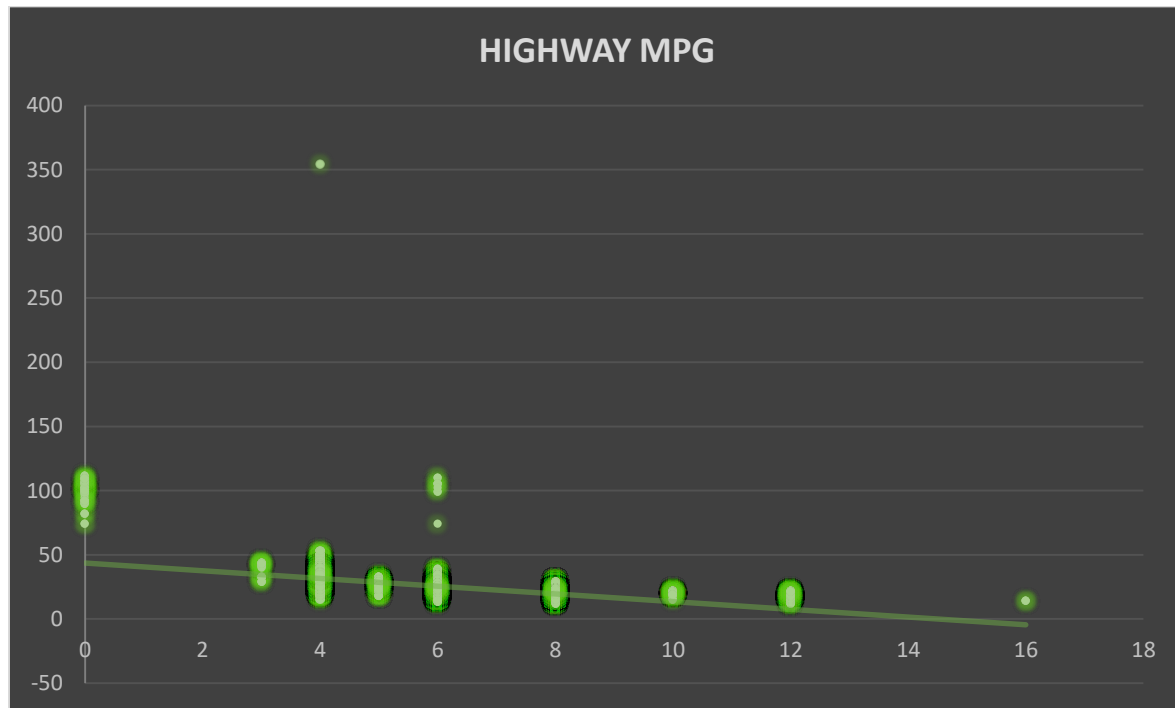
Task 4.B: Create a bar chart or a horizontal stacked bar chart that visualizes the relationship between manufacturer and average price.



We see Bugatti has highest price as we have earlier also seen that it has the highest HP.

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

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



CORRELATION	
COEFFICIENT	-0.60095

There is a negative trend line visible to us which shows a negative correlation between the variables.

Now for the Next portion of the Project, I created an Interactive Dashboard.

I have Used filters and slicers to make the chart interactive.

Task 1: How does the distribution of car prices vary by brand and body style?

- **Hints:** Stacked column chart to show the distribution of car prices by brand and body style. Use filters and slicers to make the chart interactive. Calculate the total MSRP for each brand and body style using SUMIF or Pivot Tables.

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

- **Hints:** Clustered column chart to compare the average MSRPs across different car brands and body styles. Calculate the average MSRP for each brand and body style using AVERAGEIF or Pivot Tables.

Task 3: How do the different feature such as transmission type affect the MSRP, and how does this vary by body style?

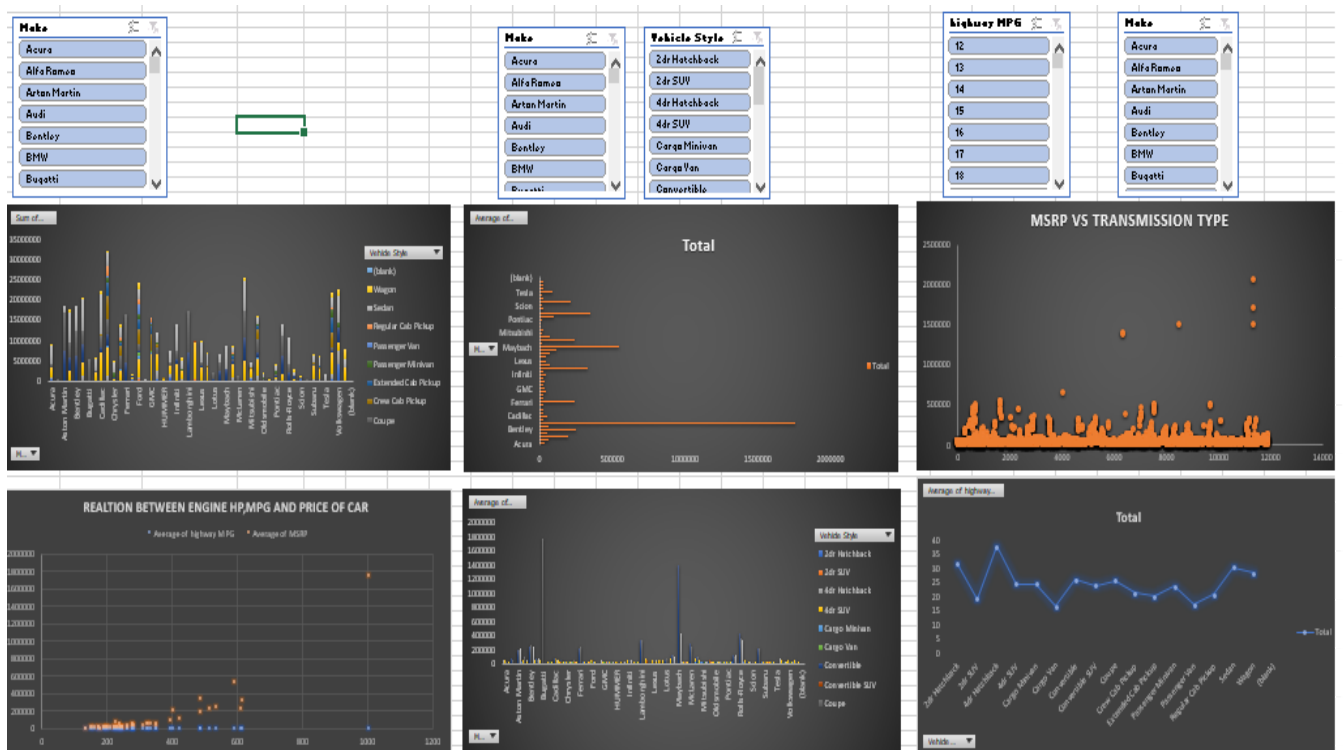
- **Hints:** Scatter plot chart to visualize the relationship between MSRP and transmission type, with different symbols for each body style. Calculate the average MSRP for each combination of transmission type and body style using AVERAGEIFS or Pivot Tables.

Task 4: How does the fuel efficiency of cars vary across different body styles and model years?

- **Hints:** Line chart to show the trend of fuel efficiency (MPG) over time for each body style. Calculate the average MPG for each combination of body style and model year using AVERAGEIFS or Pivot Tables.

Task 5: How does the car's horsepower, MPG, and price vary across different Brands?

- **Hints:** Bubble chart 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:

This project help me put my knowledge to use.

I was able to analyse car demand due to various factors and know how it affects a company's manufacturing.

I gained knowledge about data imbalance and dashboard and slicers used in dashboards

It helped me deepen my knowledge on excel and data analysis.

Hyperlink to excel file (refer the same folder where this file is present for the excel file if it does not open using the hyperlink)

[..\Documents\car analysis.xlsx](#)

Hyper link to the video solution: (refer the same folder where this file is present for the video if it does not open using the hyperlink)

[..\Documents\InShot_20240803_161555236.mp4](#)