Project

Analyzing the Impact of Car Features on Price and Profitability

EXCEL SHEET LINK:

https://docs.google.com/spreadsheets/d/1N0rcJ6iiV2uZydHHGzTP1QdUy49DT5VO/edit?usp=sharing&ouid=116979978035038082971&rtpof=true&sd=true

VIDEO Presentation:

https://drive.google.com/file/d/1oD1IyKSrgM4X_b5BZ7xgfh1KYCU3rhER/view?usp=sharing

Final Project-3

Description:

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.

Tasks: Analysis

Before diving into the analysis of the given dataset, it is important to perform thorough data cleaning to ensure accurate and reliable results. You need to build an interactive dashboard in Excel from the tasks given below:

Insight Required: 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.

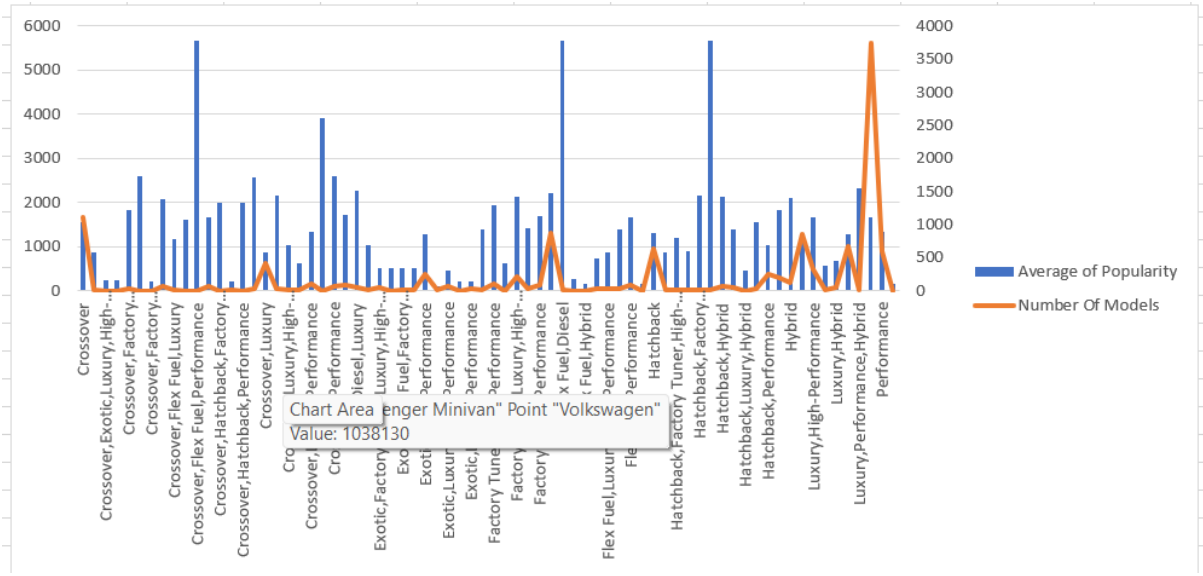
  Mainly, In the first process We have to clean the car data like Removing the Blank Cells.

  In task 1 We should create pivot table with market category, popularity and models and change them to Average.

Market Category	Average of Popularity	Number Of Models
Crossover	1545.263063	1110
Crossover,Diesel	873	7
Crossover,Exotic,Luxury,High-Performance	238	1
Crossover,Exotic,Luxury,Performance	238	1
Crossover,Factory Tuner,Luxury,High-Performance	1823.461538	26
Crossover,Factory Tuner,Luxury,Performance	2607.4	5
Crossover,Factory Tuner,Performance	210	4
Crossover,Flex Fuel	2073.75	64
Crossover,Flex Fuel,Luxury	1173.2	10
Crossover,Flex Fuel,Luxury,Performance	1624	6
Crossover,Flex Fuel,Performance	5657	6
Crossover,Hatchback	1675.694444	72
Crossover,Hatchback,Factory Tuner,Performance	2009	6
Crossover,Hatchback,Luxury	204	7
Crossover,Hatchback,Performance	2009	6
Crossover,Hybrid	2563.380952	42
Crossover,Luxury	884.5487805	410
Crossover,Luxury,Diesel	2149.411765	34
Crossover,Luxury,High-Performance	1037.222222	9
Crossover,Luxury,Hybrid	630.9166667	24
Crossover,Luxury,Performance	1344.849558	113
Crossover,Luxury,Performance,Hybrid	3916	2
Crossover,Performance	2585.956522	69
Diesel	1730.904762	84
Diesel,Luxury	2275	51
Exotic,Factory Tuner,High-Performance	1046.380952	21
Exotic,Factory Tuner,Luxury,High-Performance	517.5384615	52

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

  With the help of Task 1a we can insert the combo chart.

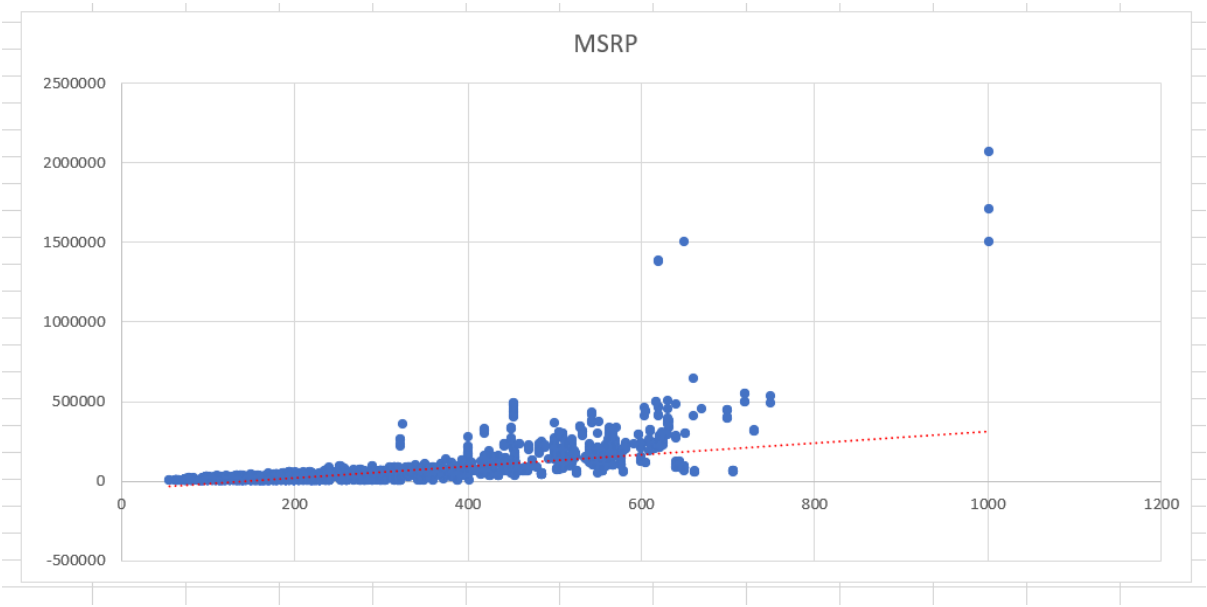


Insight Required: What is the relationship between a car's engine power and its price?

- **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.

  By taking Engine Hp and MSRP from data we can make an scatter chart.

  From Scatter chart Low MSRP has a low Engine Hp.



Insight Required: Which car features are most important in determining a car's price?

- **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.

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Regression Statistics	
Multiple R	0.661827336
R Square	0.438015422
Adjusted R Square	0.437967837
Standard Error	45194.29489
Observations	11812

ANOVA

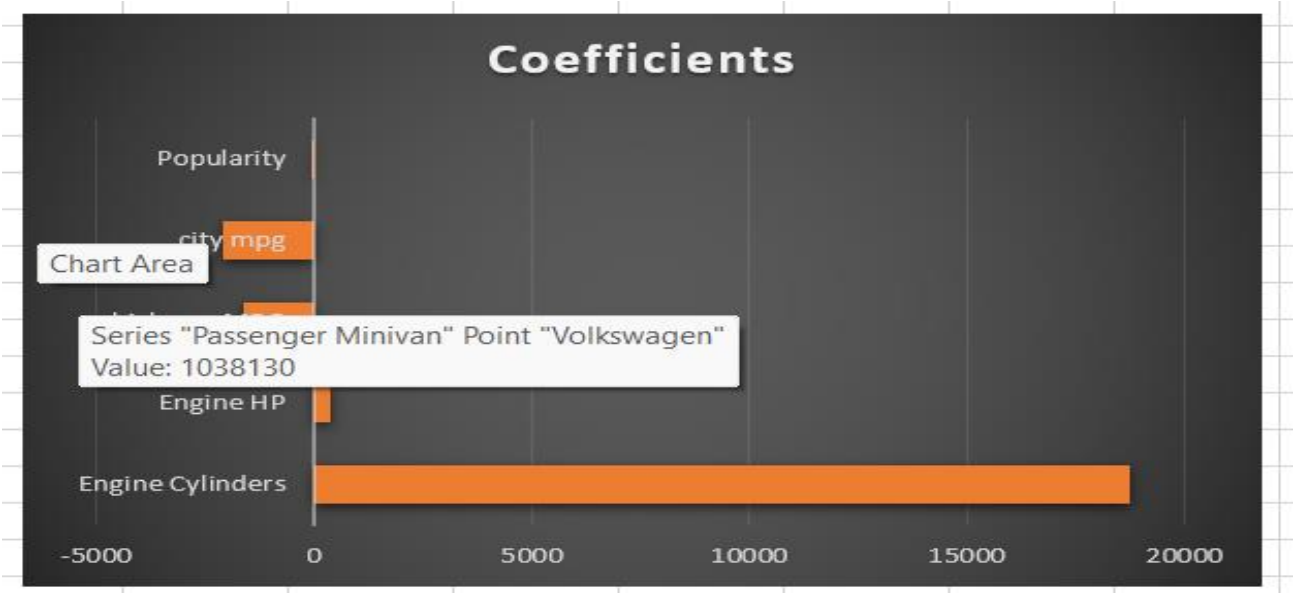
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.88011E+13	1.88011E+13	9204.811559	0
Residual	11810	2.41222E+13	2042524291		
Total	11811	4.29233E+13			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-50594.08409	1037.114028	-48.78353075	0	-52626.99858	-48561.1696	-52626.99858	-48561.1696
Engine HP	365.340201	3.80793926	95.94170917	0	357.8760122	372.8043898	357.8760122	372.8043898

The Above Process is a data Analysis Which we used Regression Method with Taking MSRP as Main Value and we done regression for the Below and their Coefficient also taken

	Coefficients
Engine Cylinders	18722.19809
Engine HP	365.340201
highway MPG	-1611.354697
city mpg	-2080.819338
Popularity	-2.03485311

With the above data we have created a bar char

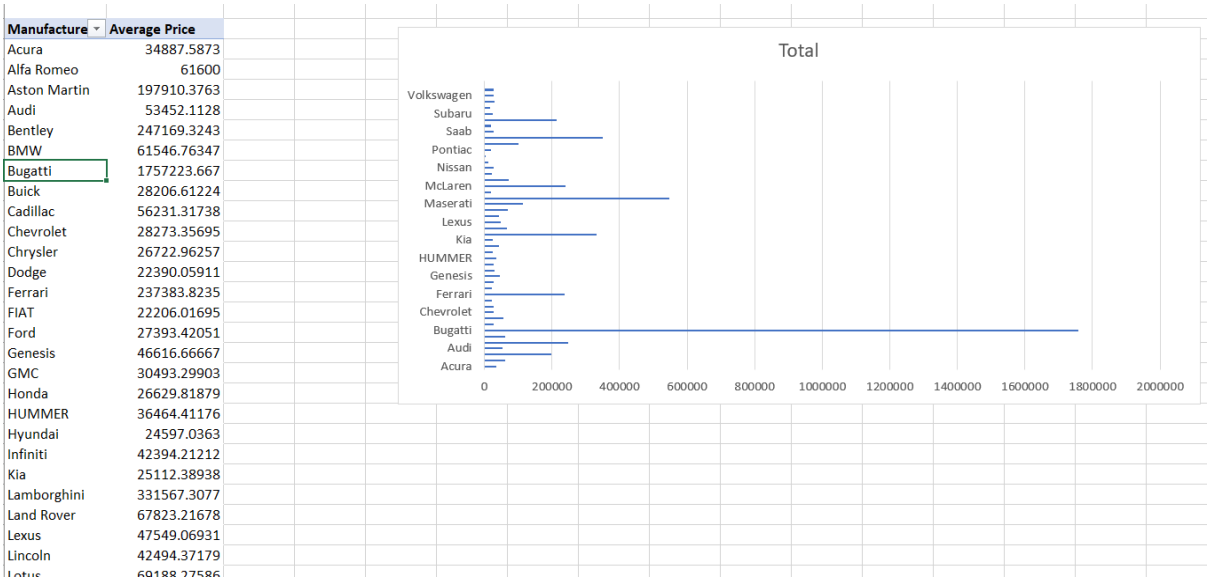


Insight Required: How does the average price of a car vary across different manufacturers?

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

From the dataset we should create a pivot table by using make and MSRP. And Making MSRP to average

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

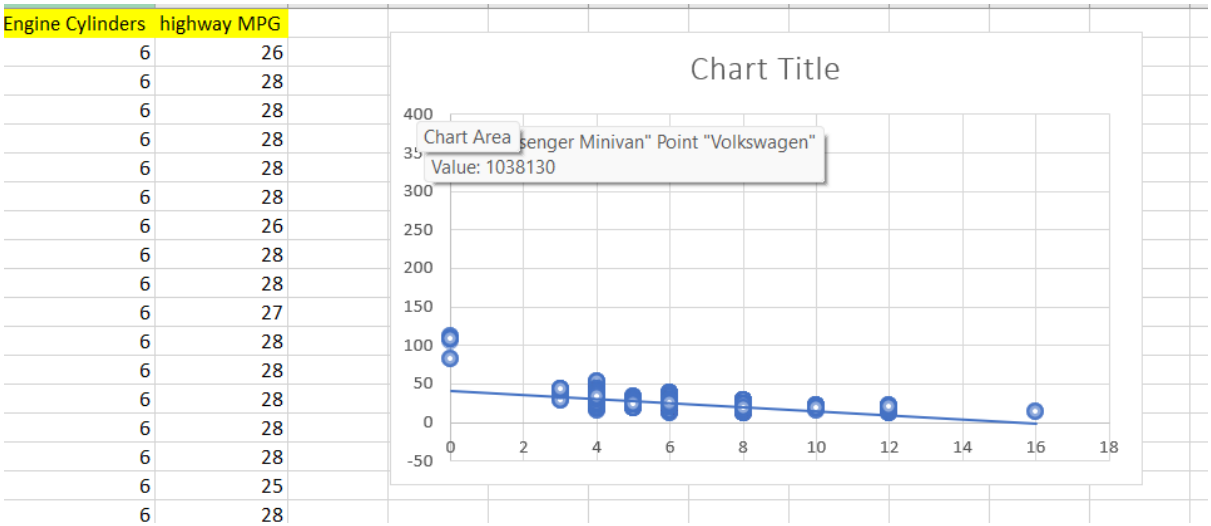


Manufacture	Average Price
Acura	34887.5873
Alfa Romeo	61600
Aston Martin	197910.3763
Audi	53452.1128
Bentley	247169.3243
BMW	61546.76347
Bugatti	1757223.667
Buick	28206.61224
Cadillac	56231.31738
Chevrolet	28273.35695
Chrysler	26722.96257
Dodge	22390.05911
Ferrari	237383.8235
FIAT	22206.01695
Ford	27393.42051
Genesis	46616.66667
GMC	30493.29903
Honda	26629.81879
HUMMER	36464.41176
Hyundai	24597.0363
Infiniti	42394.21212
Kia	25112.38938
Lamborghini	331567.3077
Land Rover	67823.21678
Lexus	47549.06931
Lincoln	42494.37179
Lotus	69188.27586

Insight Required: What is the relationship between fuel efficiency and the number of cylinders in a car's engine?

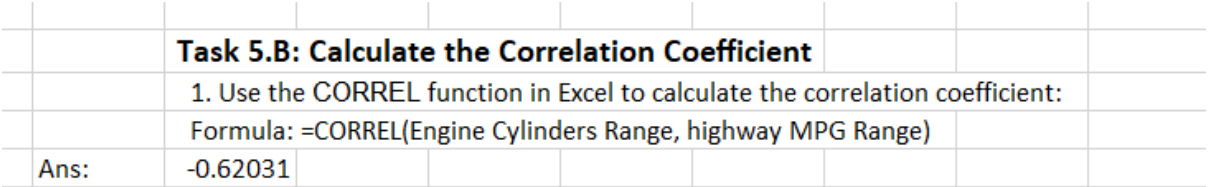
- **Task 5.A:** Create a scatter plot with the number of cylinders on the x-axis and highway MPG on the y-axis. Then create a trendline on the scatter plot to visually estimate the slope of the relationship and assess its significance.

From the data we have to take Engine cylinder and Highway MPG and then we have to create Scatter plot



Engine Cylinders	highway MPG
6	26
6	28
6	28
6	28
6	28
6	28
6	26
6	28
6	28
6	27
6	28
6	28
6	28
6	28
6	28
6	25
6	28

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



	Task 5.B: Calculate the Correlation Coefficient
	1. Use the CORREL function in Excel to calculate the correlation coefficient:
	Formula: =CORREL(Engine Cylinders Range, highway MPG Range)
Ans:	-0.62031

Building the Dashboard:

Now for the Next portion of the Project, you need to create the Interactive Dashboard.

Use filters and slicers to make the chart interactive. The client has requested these questions given below:

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.

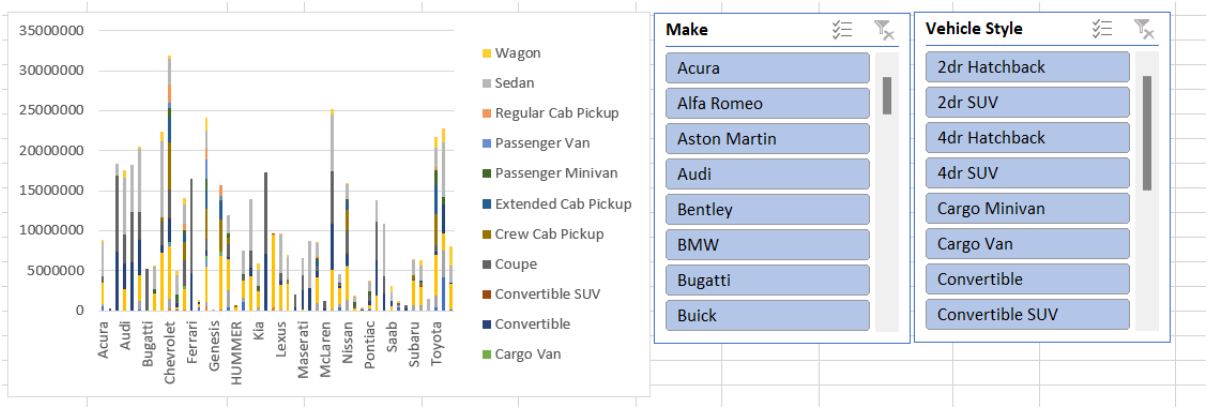
Task 4: How does the fuel efficiency of cars vary across different body styles and model years?

- **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.

From Task 1 to Task 5 We have Created different pivot tables and create chart with respect to the task and they are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Wagon
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4dr SUV
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Cargo Van
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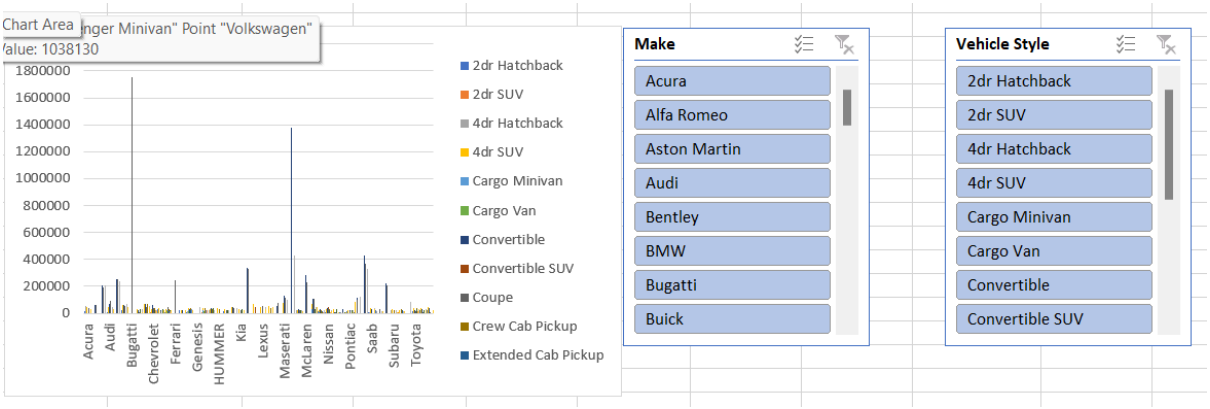
Convertible SUV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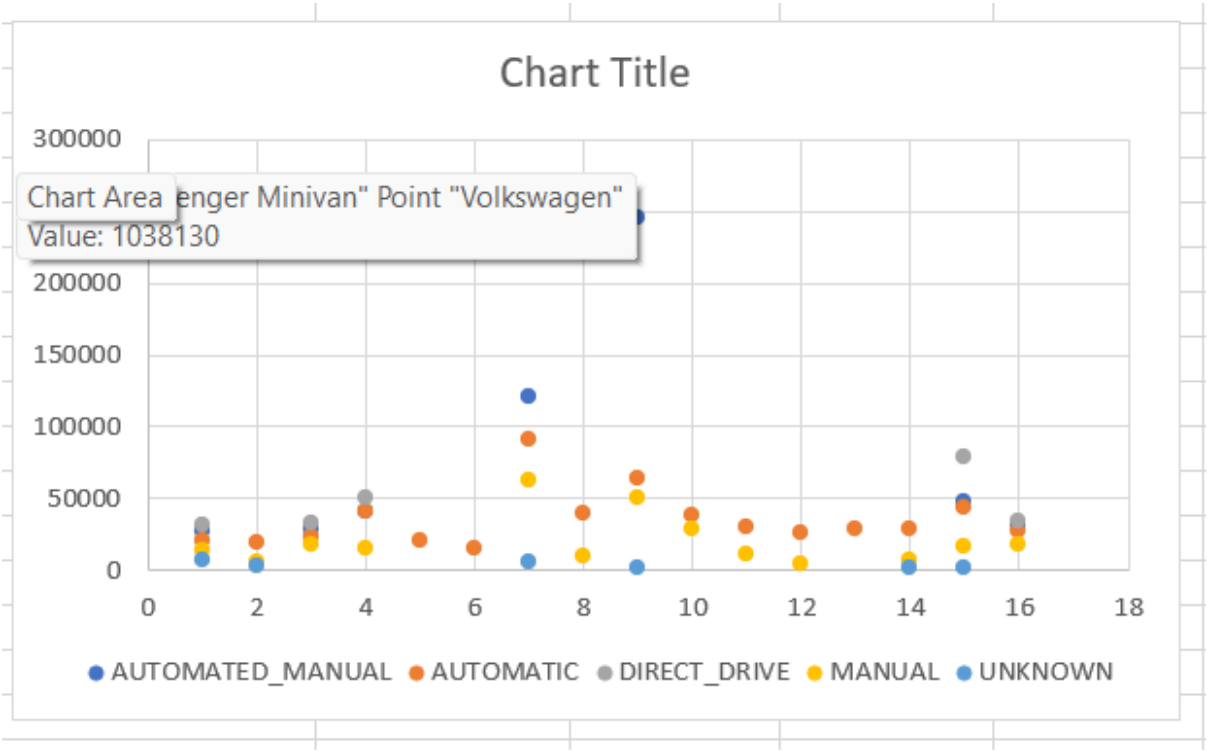
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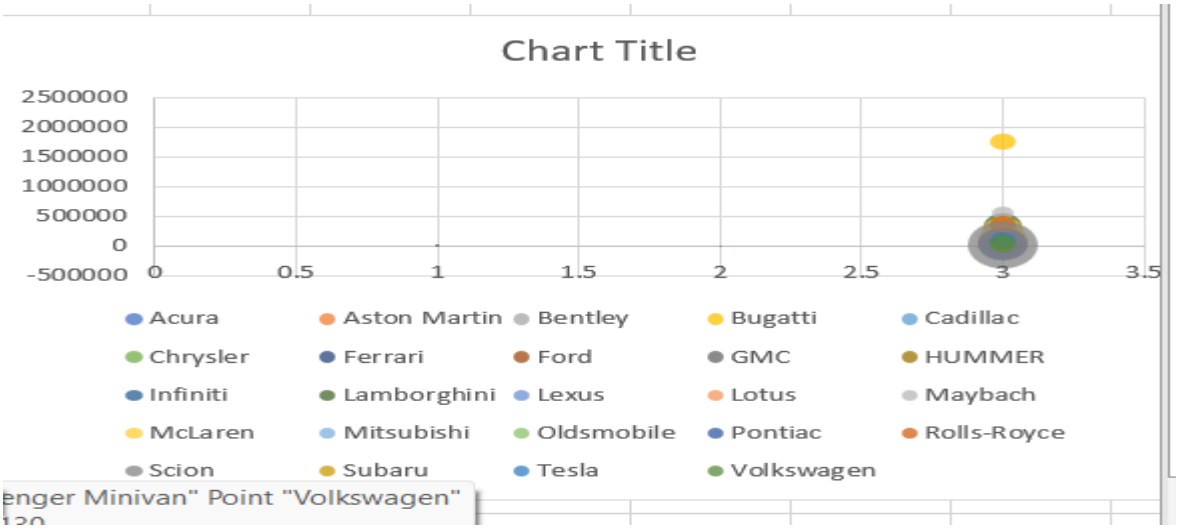
8130
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pickup
Passenger Minivan
Passenger Van
Regular Cab Pickup
Sedan
Wagon
Average of highway MPG
Average of city mpg
Year
1990
1991
1992
1993
1994
1995
1996
1997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Aston Martin
Bentley
Bugatti
Cadillac
Chrysler
Ferrari
Ford
GMC
HUMMER
Infiniti
Lamborghini
Lexus
Lotus
Maybach
McLaren
Mitsubishi
Oldsmobile
Pontiac
Rolls-Royce
Scion
Subaru
Tesla
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DASHBOARD:

Analyzing the Impact of Car Features on Price and Profitability