

ANALYZING THE IMPACT OF CAR FEATURES



Hello!

I AM PREETY MOHANTA

I am here to give presentations Analyzing the Impact of Car Features on Price and Profitability

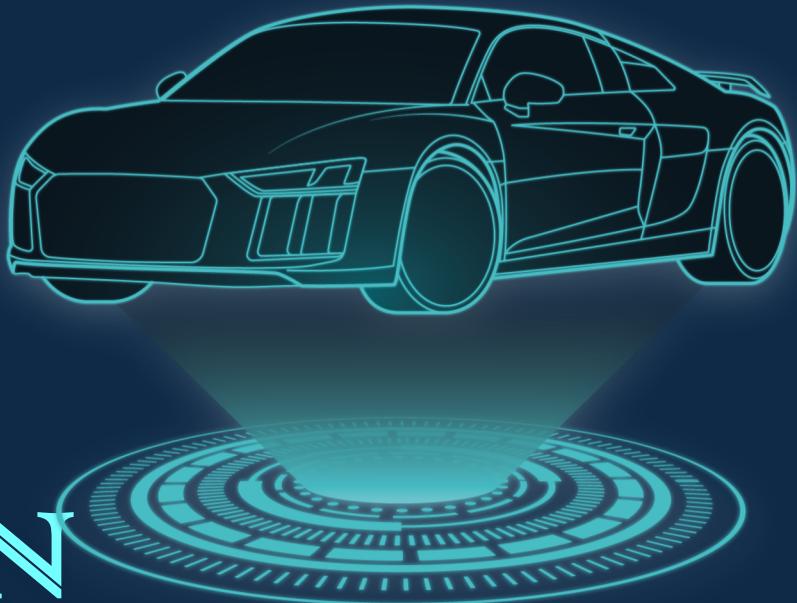


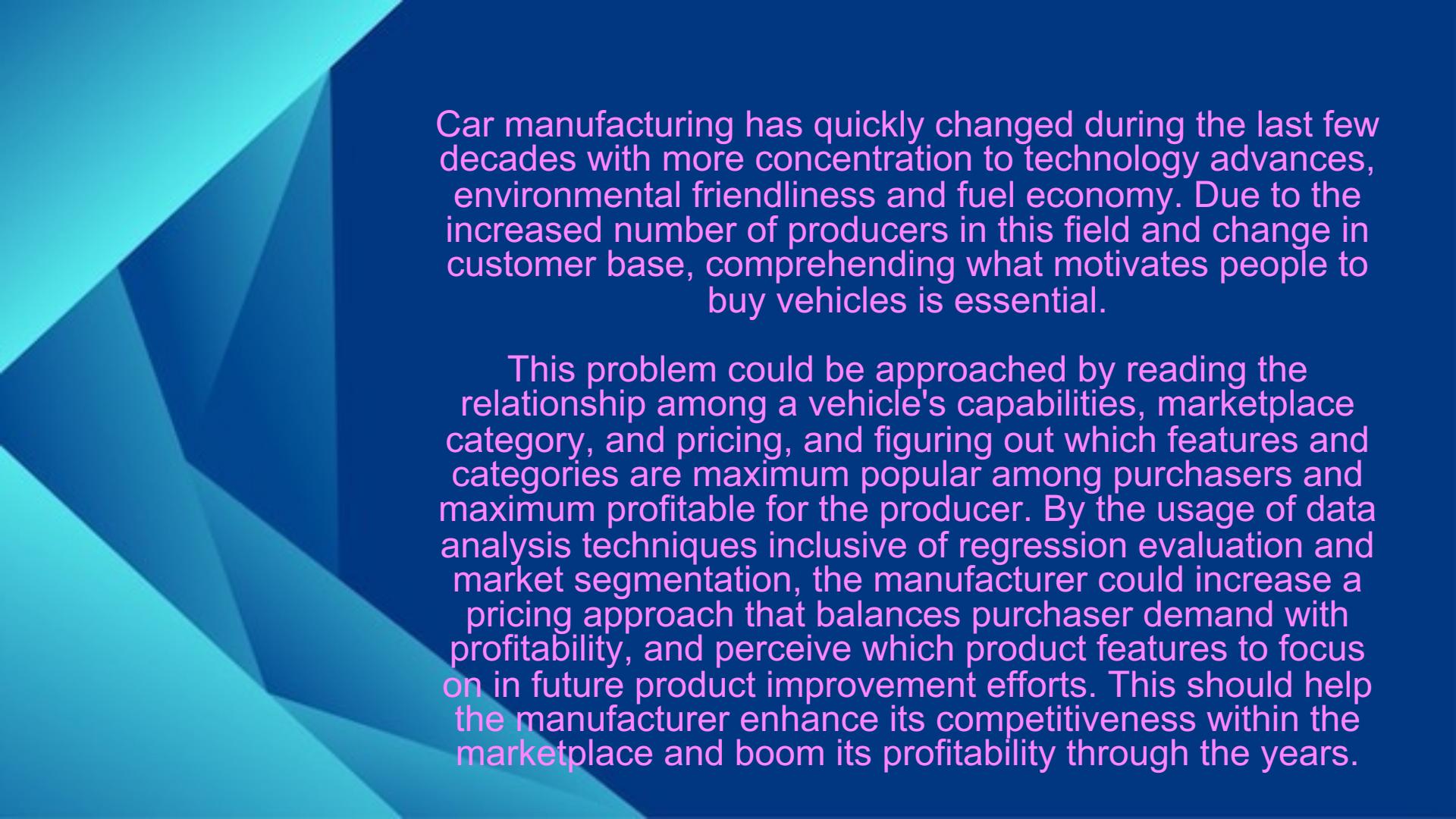
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01

PROJECT DESCRIPTION





Car manufacturing has quickly changed during the last few decades with more concentration to technology advances, environmental friendliness and fuel economy. Due to the increased number of producers in this field and change in customer base, comprehending what motivates people to buy vehicles is essential.

This problem could be approached by reading the relationship among a vehicle's capabilities, marketplace category, and pricing, and figuring out which features and categories are maximum popular among purchasers and maximum profitable for the producer. By the usage of data analysis techniques inclusive of regression evaluation and market segmentation, the manufacturer could increase a pricing approach that balances purchaser demand with profitability, and perceive which product features to focus on in future product improvement efforts. This should help the manufacturer enhance its competitiveness within the marketplace and boom its profitability through the years.



APPROACH

The image shows a 3D perspective of a puzzle piece assembly. The word "APPROACH" is formed by the letters in the center of five interlocking puzzle pieces. The letters are rendered in a bold, sans-serif font. The top row contains the letters "A", "P", and "R". The bottom row contains the letters "O", "O", and "A". The letter "P" is orange, while the other letters are red. The puzzle pieces are white with grey shadows, set against a dark grey background.

HERE ARE THE STEPS WE WILL FOLLOW FOR EXECUTING OUR PROJECT:

- Download the data set
- Then clean the data by removing unwanted information, duplicate, handle the missing data.
- After cleaning the data convert the data types and make it ready to use.
- Now understand the data and use the excel and perform the tasks
- With the help of excel we will Create a combo chart, regression analysis, correlation coefficient And at the end we get insight from it.

TASKS



TASKS: ANALYSIS

TASK 1

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

TASK 2

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

TASK 3

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

TASK 4

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

TASK 5

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

DASHBOARD: ANALYSIS

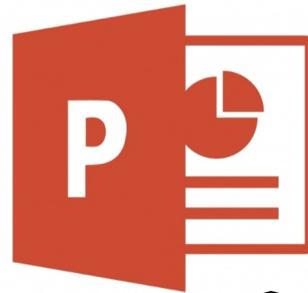
- 01** How does the distribution of car prices vary by brand and body style?
- 02** Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?
- 03** How do the different feature such as transmission type affect the MSRP, and how does this vary by body style?
- 04** How does the fuel efficiency of cars vary across different body styles and model years?
- 05** How does the car's horsepower, MPG, and price vary across different Brands?

TECH STACK USED





EXCEL



POWERPOINT



LOOM

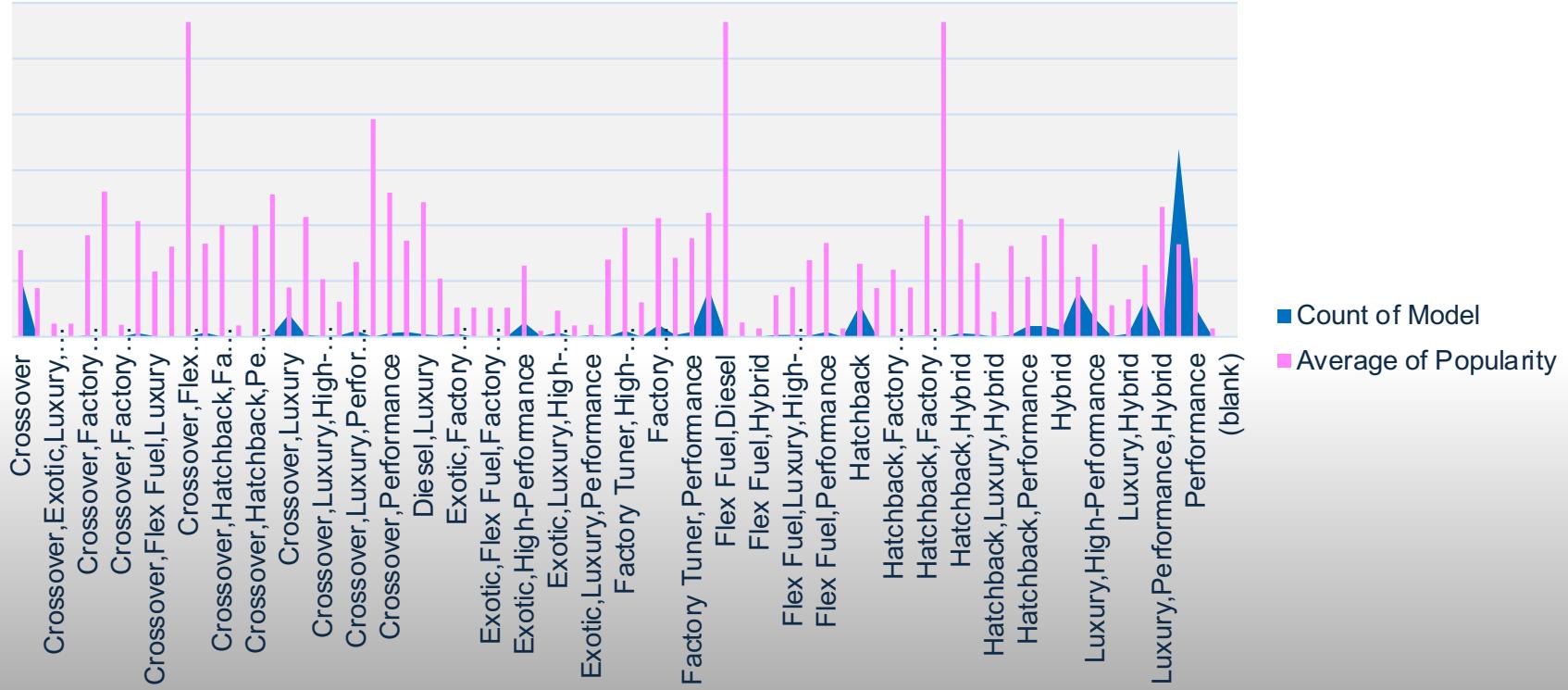
A hand is shown from the bottom center, pointing its index finger towards a bright, glowing blue rectangular area. This area contains the word "INSIGHT" in large, white, sans-serif capital letters. The background is a dark blue gradient with radial light rays emanating from behind the glowing screen, creating a futuristic and dynamic feel.

INSIGHT

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

Row Labels		Count of Model	Average of Popularity									
	Crossover	1075	1556.17	Crossover,Hybrid	42	2563.38	Exotic,Performance	10	1391.00	Hatchback,Flex Fuel	7	5657.00
	Crossover,Diesel	7	873.00	Crossover,Luxury	406	889.21	Factory Tuner,High-Performance	104	1966.44	Hatchback,Hybrid	64	2111.16
Crossover,Exotic,Luxury,High-Performance		1	238.00	Crossover,Luxury,Diesel	34	2149.41	Factory Tuner,Luxury	2	617.00	Hatchback,Luxury	45	1323.13
Crossover,Exotic,Luxury,Performance		1	238.00	Crossover,Luxury,High-Performance	9	1037.22	Factory Tuner,Luxury,High-Performance	215	2133.37	Hatchback,Luxury,Hybrid	3	454.00
Crossover,Factory,Tuner,Luxury,High-Performance		26	1823.46	Crossover,Luxury,Hybrid	24	630.92	Factory Tuner,Luxury,Performance	31	1413.42	Hatchback,Luxury,Performance	36	1632.25
Crossover,Factory,Tuner,Luxury,Performance		5	2607.40	Crossover,Luxury,Performance	112	1349.09	Factory Tuner,Performance	84	1774.05	Hatchback,Performance	198	1073.66
Crossover,Factory,Tuner,Performance		4	210.00	Crossover,Luxury,Performance,Hybrid	2	3916.00	Flex Fuel	855	2225.71	High-Performance	198	1823.38
Crossover,Flex Fuel		64	2073.75	Crossover,Performance	69	2585.96	Flex Fuel,Diesel	16	5657.00	Hybrid	121	2116.59
Crossover,Flex Fuel,Luxury		10	1173.20	Diesel	84	1730.90	Flex Fuel,Factory Tuner,Luxury,High-Performance	1	258.00	Luxury	819	1079.21
Crossover,Flex Fuel,Luxury,Performance		6	1624.00	Diesel,Luxury	47	2416.11	Flex Fuel,Hybrid	2	155.00	Luxury,High-Performance	334	1668.02
Crossover,Flex Fuel,Performance		6	5657.00	Exotic,Factory Tuner,High-Performance	21	1046.38	Flex Fuel,Luxury	39	746.54	Luxury,High-Performance,Hybrid	12	568.83
Crossover,Hatchback		72	1675.69	Exotic,Factory Tuner,Luxury,High-Performance	51	523.02	Flex Fuel,Luxury,High-Performance	32	898.31	Luxury,Hybrid	52	673.63
Crossover,Hatchback,Factory Tuner,Performance		6	2009.00	Exotic,Factory Tuner,Luxury,Performance	3	520.00	Flex Fuel,Luxury,Performance	28	1380.07	Luxury,Performance	659	1293.06
Crossover,Hatchback,Luxury		7	204.00	Exotic,Flex Fuel,Factory Tuner,Luxury,High-Performance	13	520.00	Flex Fuel,Performance	87	1680.47	Luxury,Performance,Hybrid	11	2333.18
Crossover,Hatchback,Performance		6	2009.00	Exotic,Flex Fuel,Luxury,High-Performance	11	520.00	Flex Fuel,Performance,Hybrid	2	155.00	N/A	3376	1664.83
				Exotic,High-Performance	254	1280.05	Hatchback	574	1308.65	Performance	520	1415.21
				Exotic,Luxury	12	112.67	Hatchback,Diesel	14	873.00	Performance,Hybrid	1	155.00
				Exotic,Luxury,High-Performance	77	473.03	Hatchback,Factory Tuner,High-Performance	13	1205.15	(blank)		
				Exotic,Luxury,High-Performance,Hybrid	1	204.00	Hatchback,Factory Tuner,Luxury,Performance	9	886.89	Grand Total	11199	1558.48
				Exotic,Luxury,Performance	36	217.03	Hatchback,Factory Tuner,Performance	21	2173.71			

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



The table lists the cars as well as popular car counts and averages. Notably, "Flex Fuel, Diesel" and "Crossover, Flex Fuel, Performance" are quite popular despite limited models, indicating a preference for more fuel-efficient performance vehicles in more models in the "Crossover" and "N/A" categories but declining popularity , indicating market saturation. Luxury combined with performance is more popular than luxury alone, reflecting consumer preferences. Hybrid models show a mixed popularity, generally well accepted but variable depending on the segment. This data guides manufacturers and retailers in product development and strategy, highlighting the requirement for differentiation and performance in certain segments.

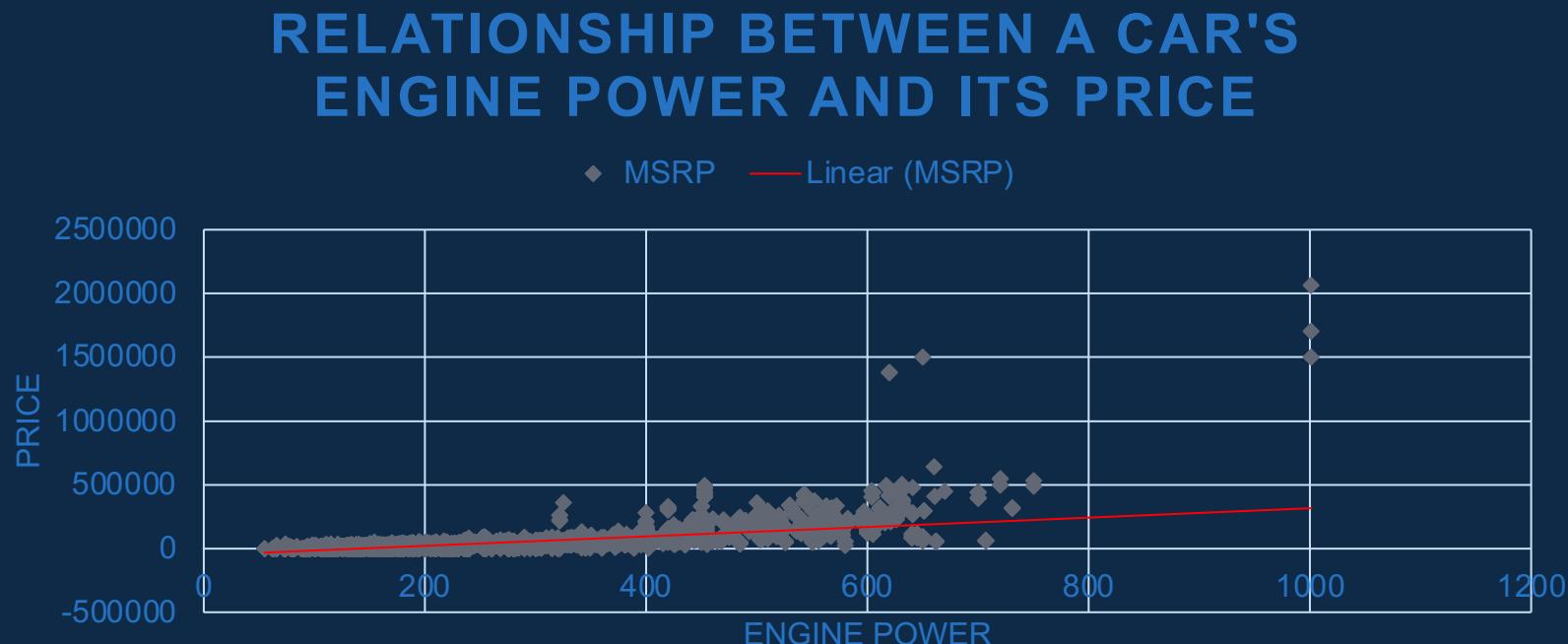
Popular Categories: "Flex Fuel, Diesel" and "Crossover, Flex Fuel, Performance" are highly popular despite fewer models, showing a preference for fuel-efficient and performance vehicles.

Market Saturation: High model counts but moderate popularity in categories like "Crossover" and "N/A" suggest oversaturation, indicating a need for differentiation or innovation.

Luxury Market: Luxury combined with performance is more popular than luxury alone, highlighting consumer preference for performance features.

Hybrid Trends: Hybrid models are well-received overall, but their popularity varies widely based on additional features and classifications.

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.



The chart provided shows the relationship between a car's engine capacity (measured in horsepower) and its price (MSRP). Highlights from the program include:

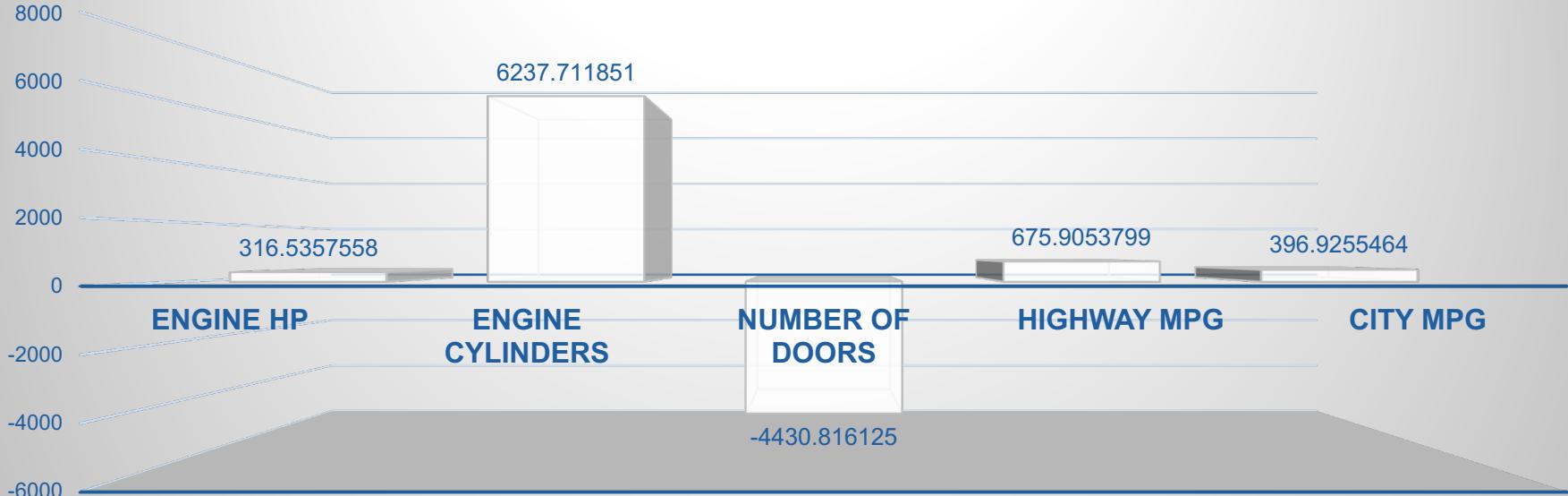
- The trend: There is a positive correlation between engine power and price, which means that cars with more powerful engines are generally more expensive.
- Data breadth: Most car engines are less than 600 HP, and prices vary widely. There are a few outliers with very expensive and powerful engines.
- Linear fit: The linear regression line shows that price has increased slightly with increasing engine capacity, indicating that while engine capacity is a driver of price, other variables also play an important role

This study supports the finding that engine power is positively related to car price, although the effect is small.

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								
ANOVA								
	df	SS	MS	F	Significance F			
Regression	5	1.92457E+13	3.84914E+12	1860.55881	0			
Residual	11193	2.31562E+13	2068810918					
Total	11198	4.24019E+13						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-84129.12408	3498.74137	-24.0455396	1.3014E-124	-90987.27276	-77270.97539	-90987.27276	-77270.97539
Engine HP	316.5357558	6.220108207	50.8891076	0	304.3432493	328.7282624	304.3432493	328.7282624
Engine Cylinders	6237.711851	438.5030711	14.22501292	1.59642E-45	5378.168678	7097.255025	5378.168678	7097.255025
Number of Doors	-4430.816125	498.7944259	-8.8830506	7.49703E-19	-5408.540962	-3453.091288	-5408.540962	-3453.091288
highway MPG	675.9053799	107.8809666	6.265288507	3.85803E-10	464.4397039	887.371056	464.4397039	887.371056
city mpg	396.9255464	101.5773573	3.907618362	9.37591E-05	197.8160537	596.0350391	197.8160537	596.0350391

Coefficient Values For Each Variable



The bar chart shows the coefficient values of the variables, which appear to be from a regression analysis of vehicle characteristics. Here is a summary of the impact of each change.

Engine cylinders have the highest positive coefficient (6237.711851), indicating a strong positive effect on the dependent variable.

The gate number has a significant negative coefficient (-4430.816125), indicating a large negative impact.

Highway MPG and City MPG have small positive effects (675.9053799 and 396.9255464, respectively), indicating a moderate positive effect.

The positive coefficient of engine HP (316.5357558) is small, indicating a slightly positive effect.

In summary:

More engine cylinders increase the dependent variable significantly.

Increasing the number of gates significantly reduces the dependent variable.

Higher highway and city MPG, as well as higher engine HP, positively but not significantly affect the dependent variable.

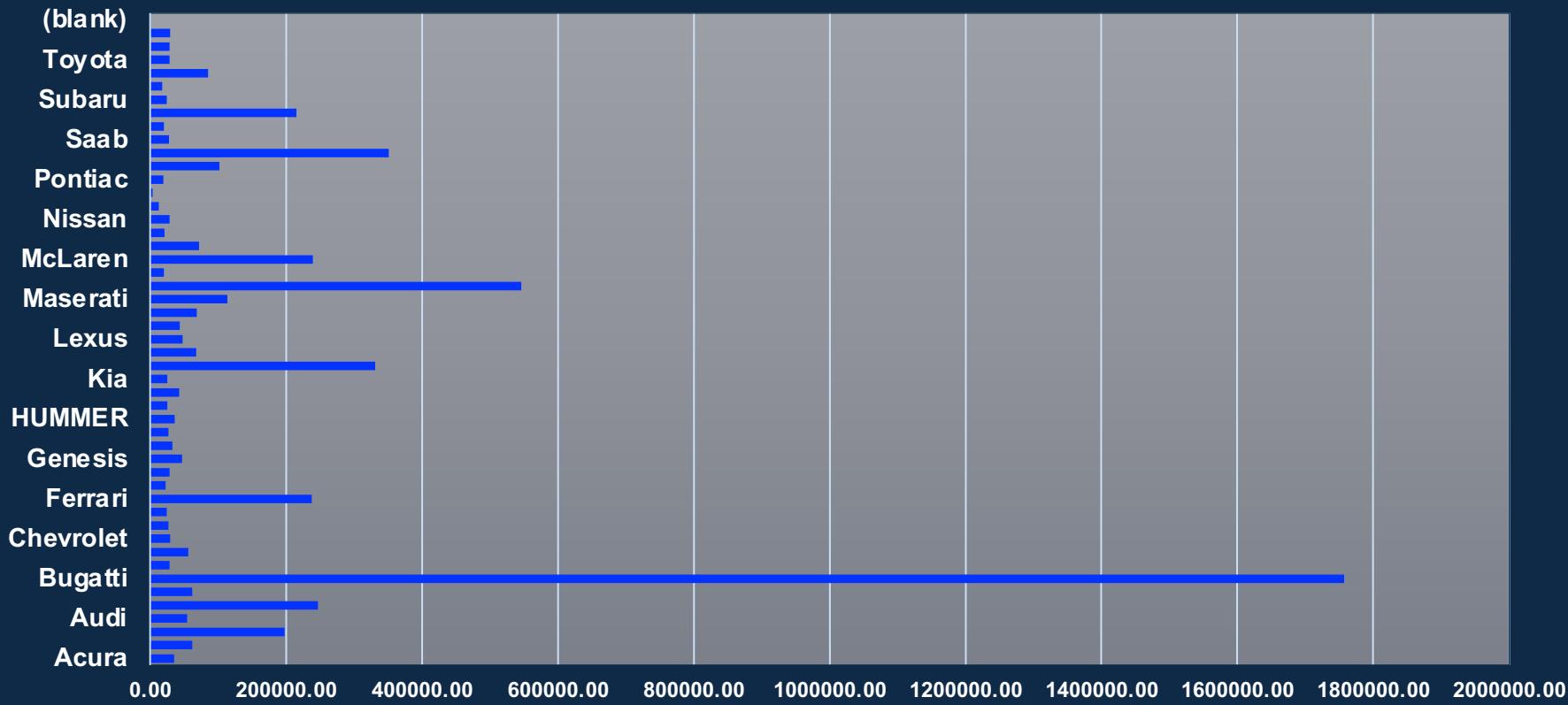
Task 4.A: Create a pivot table that shows the average price of cars for each manufacturer.

Row Labels	Average of MSRP
Acura	35087.49
Alfa Romeo	61600.00
Aston Martin	198123.46
Audi	54574.12
Bentley	247169.32
BMW	62162.56
Bugatti	1757223.67
Buick	29034.19
Cadillac	56368.27
Chevrolet	29074.73
Chrysler	26722.96
Dodge	24857.05
Ferrari	238218.84
FIAT	22670.24
Ford	28511.31
Genesis	46616.67
GMC	32444.09
Honda	26655.15
HUMMER	36464.41
Hyundai	24926.26
Infiniti	42640.27
Kia	25513.76
Lamborghini	331567.31
Land Rover	68067.09

Lexus	47549.07
Lincoln	43860.83
Lotus	68377.14
Maserati	113684.49
Maybach	546221.88
Mazda	20416.62
McLaren	239805.00
Mercedes-Benz	72069.53
Mitsubishi	21340.56
Nissan	28921.15
Oldsmobile	12843.80
Plymouth	3296.87
Pontiac	19800.04
Porsche	101622.40
Rolls-Royce	351130.65
Saab	27879.81
Scion	19932.50
Spyker	214990.00
Subaru	24240.67
Suzuki	18026.42
Tesla	85255.56
Toyota	28846.56
Volkswagen	28978.52
Volvo	29724.68
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Grand Total	41925.93

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

Relationship Between Manufacturer And Average Price



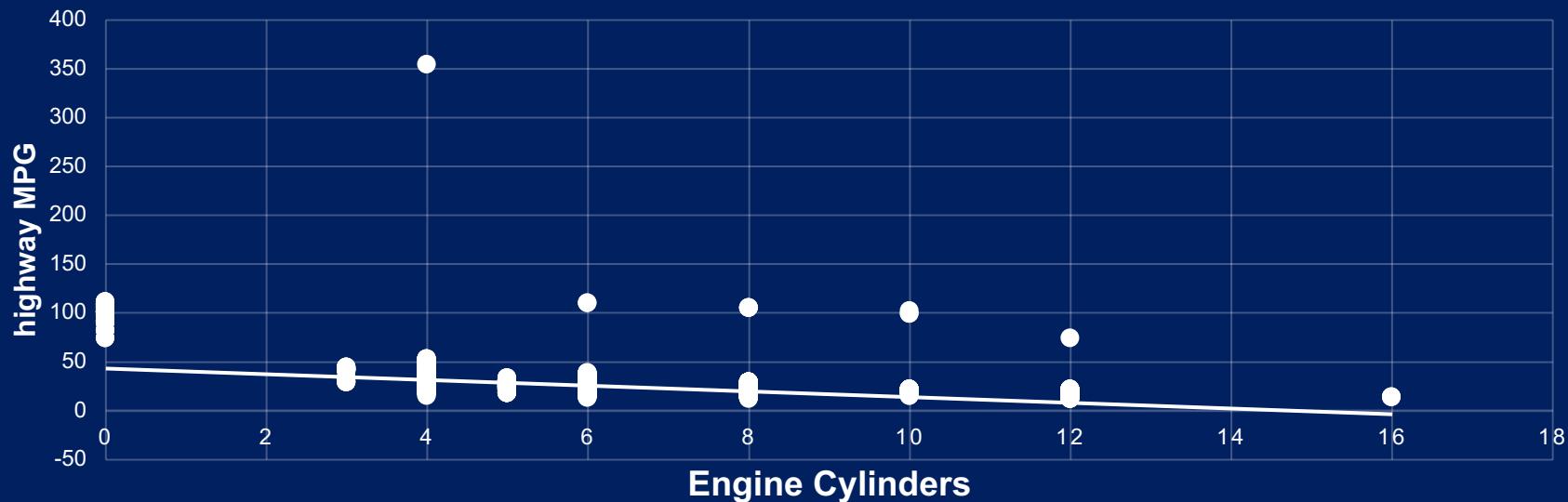
The average MSRP (Manufacturer's Suggested Retail Price) varies substantially amongst extraordinary vehicle manufacturers, reflecting elements like logo prestige, overall performance, luxurious, and goal marketplace. Here are some insights:

- **Luxury Brands:** Brands like Bugatti, Rolls-Royce, Lamborghini, and Aston Martin have extraordinarily high average MSRPs (over \$198,000), indicating their attention on luxurious and overall performance.
- **Premium Brands:** Brands like BMW, Mercedes-Benz, and Audi have common MSRPs starting from approximately \$fifty four,000 to \$seventy two,000, positioning them as top rate however extra reachable than extremely-luxury manufacturers.
- **Mainstream Brands:** Brands like Ford, Chevrolet, and Honda have average MSRPs around \$26,000 to \$29,000, catering to the mass market with a balance of affordability and functions.
- **Economy Brands:** Brands like Mitsubishi and Suzuki have common MSRPs underneath \$22,000, focused on price range-conscious consumers.
- **High-Performance Exotic Brands:** Ferrari and McLaren have average MSRPs over \$230,000, highlighting their attention on high-performance sports vehicles.
- **Electric Vehicle (EV) Brands:** Tesla has an average MSRP of \$eighty five,256, reflecting the high price of electrical car technology and its top class positioning in the EV marketplace.

Overall, the facts shows a clean relationship among logo positioning (luxurious, top rate, mainstream, economic system, excessive-performance, and electric powered) and the common MSRP, illustrating how brand identity and market goal impact pricing.

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.

RELATIONSHIP BETWEEN FUEL EFFICIENCY AND THE NUMBER OF CYLINDERS IN A CAR'S ENGINE

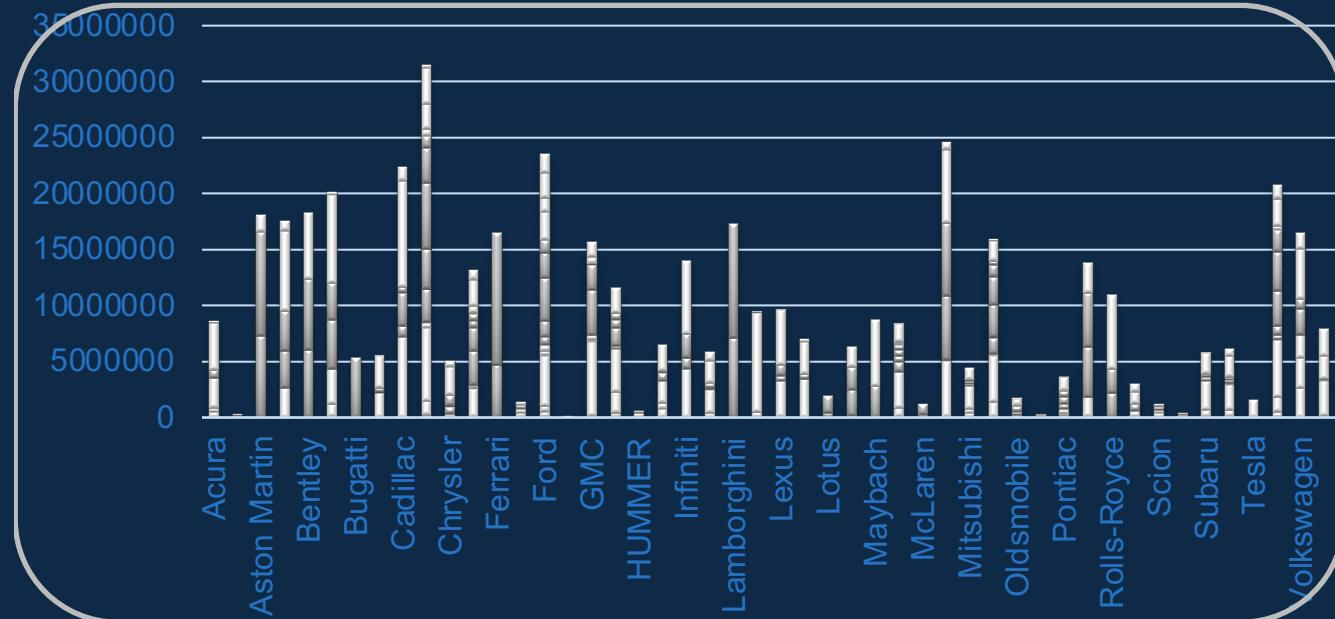


Task 5.B: Calculate the correlation coefficient between the number of cylinders and highway MPG to quantify the strength and direction of the relationship.

	Engine Cylinders	highway MPG
Engine Cylinders	1	
highway MPG	-0.585362361	1

In this case, a correlation coefficient of -0.585 indicates a strong negative downward correlation between engine cylinder and highway MPG. This means that as the number of cylinders in an engine increases, highway MPG decreases, and vice versa. This means that cars with more cylinders are generally less fuel efficient on the highway, while cars with fewer cylinders use more fuel. In this case, a correlation of -0.585 indicates a negative correlation a severe drop between engine cylinders and highway MPG. This means that as the number of cylinders in an engine increases, highway MPG decreases, and vice versa. This means that cars with more cylinders are generally more fuel efficient on the highway, while cars with fewer cylinders are less fuel efficient

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

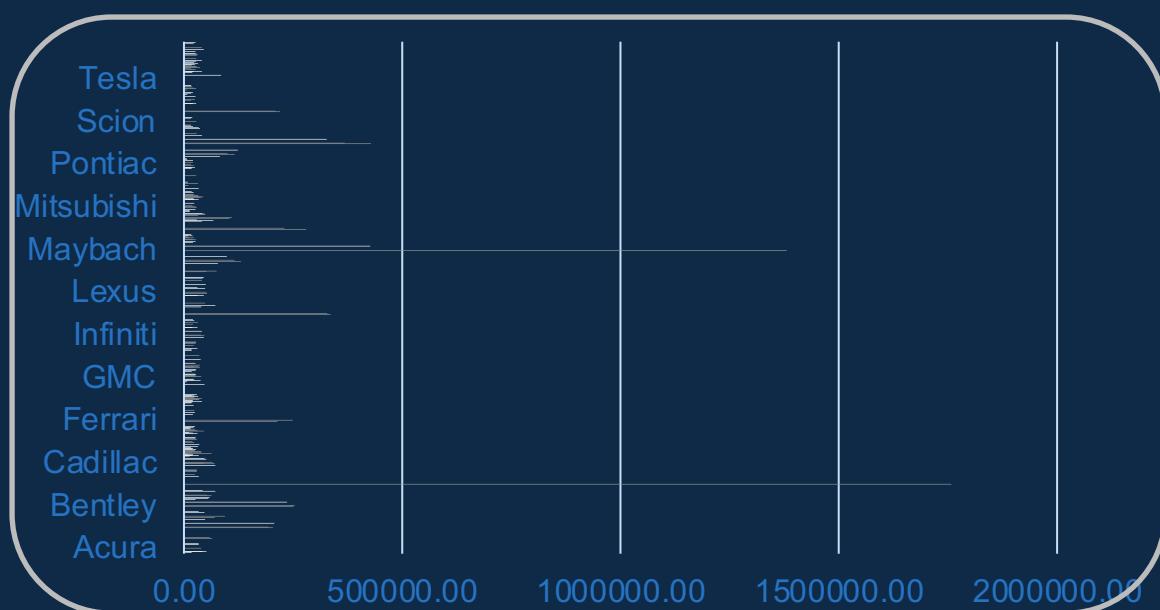


To understand the relationships among the data provided, which represents the aggregate of its suggested retail price (MSRP) for different vehicles in a fleet, we can examine a few key points:

- The sedan and 4dr SUV have the highest overall MSRPs, which means they dominate the market in terms of price and demand.
- Crew Cab pickups also feature all significant MSRPs, reflecting their popularity and affordability.
- Luxury brands (such as Rolls-Royce and Ferrari) focus on more expensive models such as convertibles and coupes.
- Mainstream brands (such as Toyota and Ford) offer a wide variety of vehicles, balanced with practical models such as SUVs and pickups with higher total total MSRPs.
- Market Segment: The market is dominated by utility, versatile vehicles (SUV, Pickup) and luxury luxury vehicles.

In summary, the records famous that the automobile marketplace is closely skewed towards realistic vehicle kinds like Sedans and 4dr SUVs, with tremendous contributions from luxurious vehicles in area of interest segments like Convertibles and Coupes. Mainstream manufacturers attention on numerous vehicle offerings to seize wide market segments, whilst luxury brands recognition on high-value segments to maximise profit in line with vehicle.

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



Key observations:

Highest MSRP:

Bugatti's convertibles have the highest MSRP of \$1,757,223.67.

The Maybach is followed by a convertible average MSRP of \$1,381,375.00.

Rolls-Royce convertibles exhibit premium value with an average MSRP of \$428,273.00.

Beauty and Sporting Goods:

Aston Martin, Ferrari, Lamborghini and McLaren have incredibly high MSRPs for available bodies, especially the convertible coupe.

Porsche has higher MSRPs, especially for Convertibles (\$115,502.21) and Coupes (\$99,136.10).

Key ingredients:

Chevrolet, Ford, Honda, Hyundai, Nissan, Toyota, and Volkswagen tend to have lower average MSRPs compared to luxury and sporty brands. For example, the Chevrolet has a grand total average MSRP of \$29,074.73, while the Ford has a grand total average of \$28,511.31.

Common Features:

Convertibles and coupes generally have higher MSRPs than other body types.

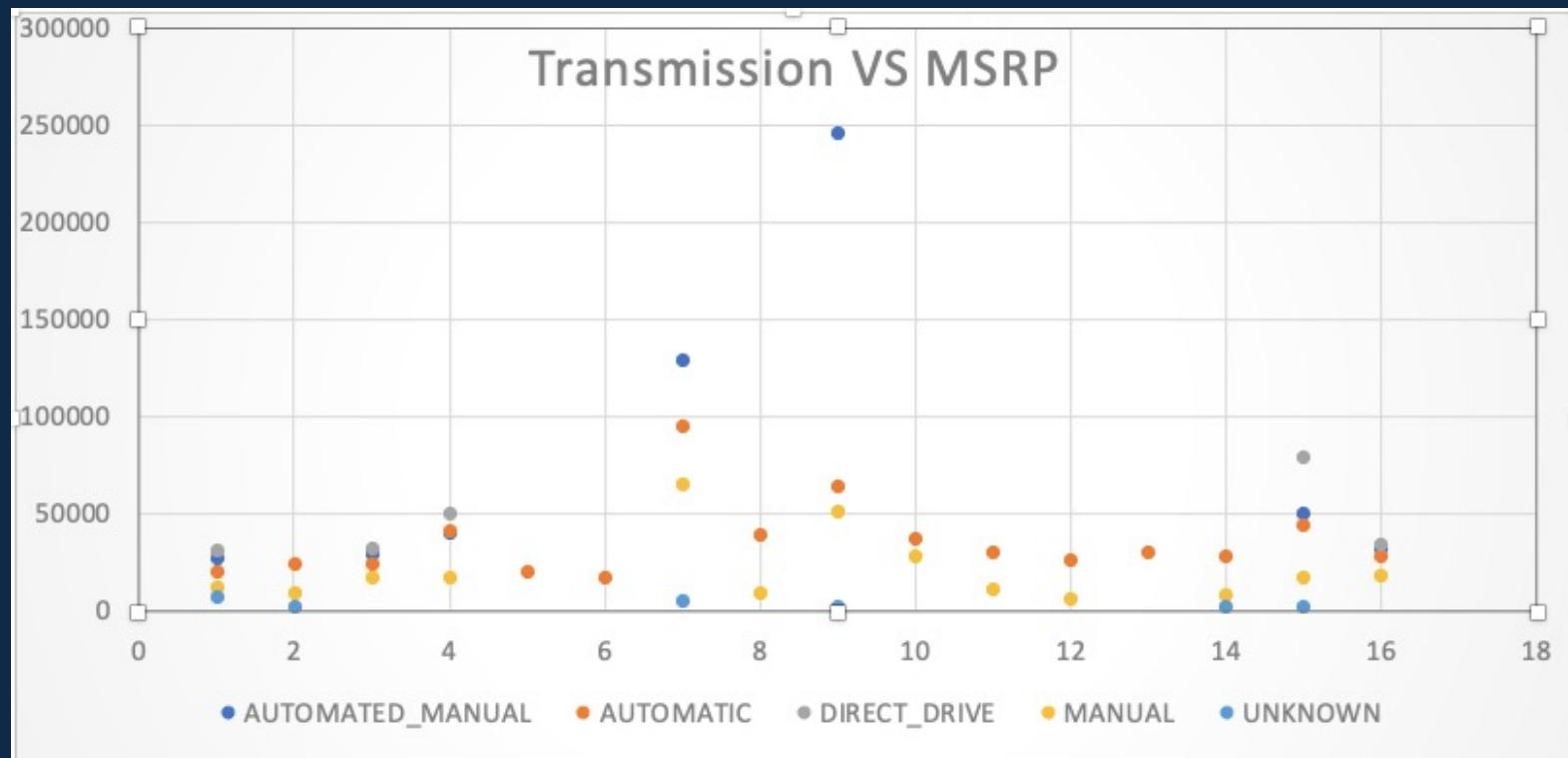
2dr Hatchbacks and Cargo Vans have the lowest MSRPs.

Offerings:

Brands like BMW and Mercedes-Benz offer multiple body styles, resulting in multiple average MSRPs.

Toyota and Honda offer diverse lineups but with more budget-friendly pricing.

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



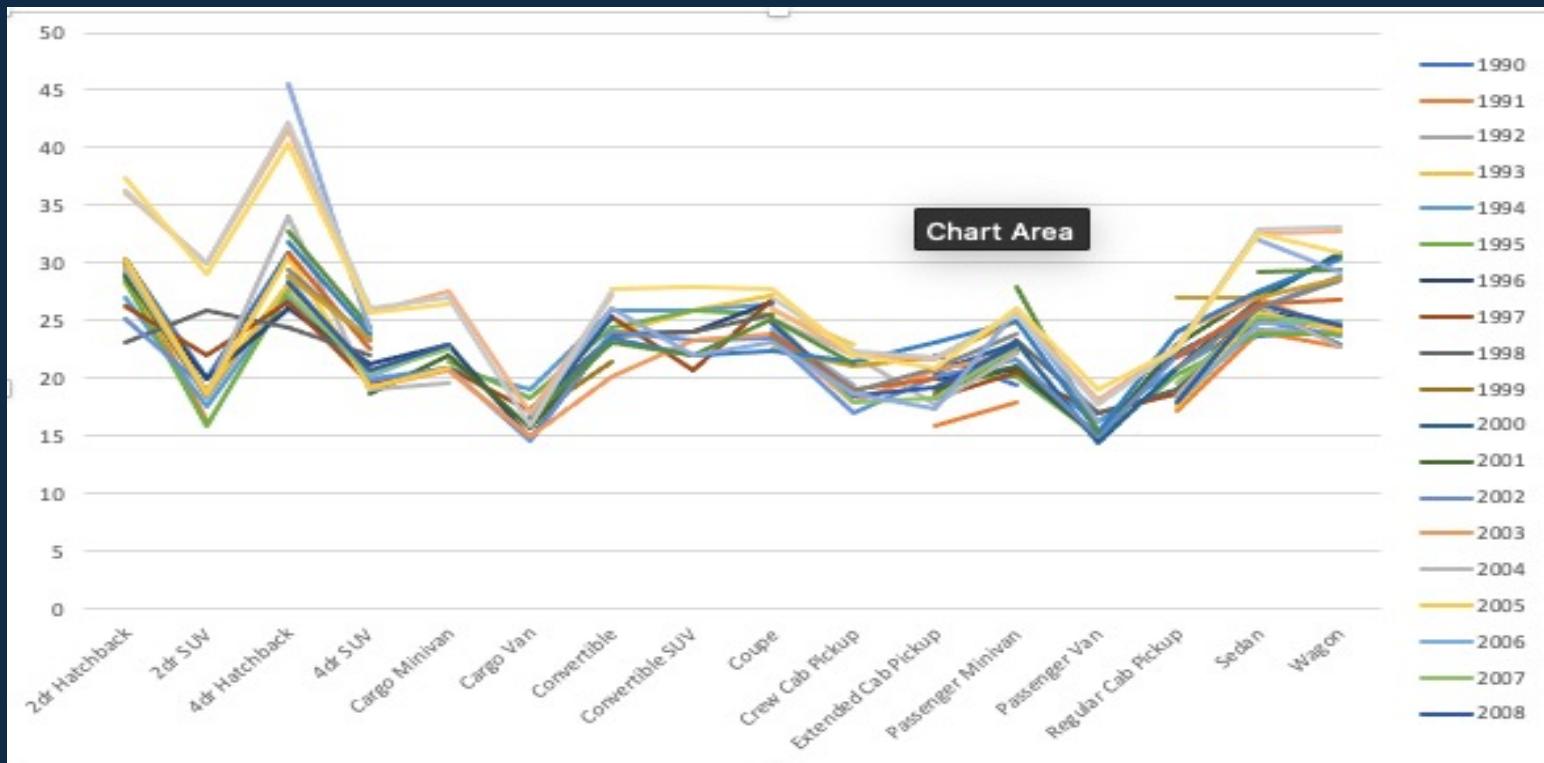
The scatter plot shows the MSRP of vehicles categorized by transmission type (Automated Manual, Automatic, Direct Drive, Manual, Unknown).

Highlights:

- Higher prices: Coupes and convertibles with automatic and manual transmissions have the highest MSRPs (\$245,977.43 and \$129,082.23, respectively).
- Lowest prices: The 2dr Hatchback with Manual transmission (\$7,361.50) and the 2dr SUV with Unknown transmission (\$2,371.00) have the lowest MSRPs.
- Transmission trends: Automatic manuals and automatic transmissions are associated with higher MSRPs, while manual transmissions tend to have lower MSRPs.
- Vehicle trends: Luxury sports cars (Coupes and Convertibles) are expensive, while economy cars (2dr Hatchbacks and 2dr SUVs) are cheaper

The article reveals how different types of transmissions and vehicles affect pricing in the automotive market.

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



The graphic shows the highway MPG of various vehicles from 1990 to 2017. Key findings include:

- Overall Improvements: Over time, fuel efficiency has improved in most vehicle models.
- 2dr Hatchback: Great improvement, peaking in 2017 at around 37.44 MPG.
- Sedan: Continues to rise, through 2017 at about 33 mpg.
- 4dr SUV: Improved to about 26 mpg in 2017 from about 19 mpg in the early 1990s.
- Convertible: Stable with a slight increase, as the 2017 at 27.8 mpg.
- Transportation and passenger vehicles: MPG decreases, by 2017 to 17 mpg.
- Commuter minivan: Big improvement, up to about 26 mpg.
- Pickup trucks: Downward trend, averaging around 22 mpg as of 2017.

Overall, the data highlight improvements in vehicle fuel efficiency throughout the automotive industry.

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



This chart allows us to visualize how these three components interact for each vehicle. Here is a summary of how the policy is defined.

X-axis (highway MPG): Indicates fuel economy. Higher values indicate better fuel efficiency.

Y-axis (MSRP): means average price. Higher prices mean more expensive cars.

Bubble Size (Engine HP): Indicates the power of the vehicle. Bigger bubbles mean more horsepower.

Highlights that stand out

- Bugatti: Very high MSRP (\$1,757,223.67), low MPG (14), very high HP (1001).
- Tesla: Very high mpg (98.94), extremely high MSRP (\$85,255.56), high HP (342).
- Ferrari and Lamborghini: Higher MSRP, lower MPG, higher HP.
- Luxury brands (e.g., Rolls-Royce, Bentley): High MSRP, low MPG, high HP.
- Economy brands (e.g., FIAT, Kia, Mazda): Lower MSRP, higher MPG, lower HP.

SUMMARY



The "Impact of Car Features" paper examines how various car features affect their price and profitability. Highlights include:

Objective: To understand consumer motivations by analyzing vehicle types, market categories, and prices using data analytics techniques.

Methodology: Data cleaning, regression analysis and chart creation in Excel.

Key findings:

- Popularity: The popularity of cars varies greatly from market to market.
- Engine Power vs. Engine Power Cost: More engine cylinders increase cost, while more doors lower it.
- Important Factors: Engine cylinders, highway MPG, and city MPG have a big impact on car prices.
- Product prices: Luxury brands like Bugatti and Rolls-Royce have the highest prices.
- Fuel Consumption: Increased engine output is generally associated with lower fuel efficiency.

Overall, the study helps manufacturers develop pricing strategies and focus on factors that enhance market competitiveness and profitability.

LINKS





Link for Excel



Link for Loom

THANK YOU

