STATISTICS PROJECT

THE ADOPTION OF ELECTRIC VEHICLES (EV) BY THE CUSTOMERS AND THE BEHAVIOR TOWARDS PURCHASE OF IT

ABSTRACT

Nearly 80 percent of the global auto market is pushing toward a phase-out of petroleum cars and the adoption of electric vehicles. If that comes to be, demand for gasoline and diesel would drop dramatically. This study surveyed the adoption of electric vehicles. An interview was conducted with several respondents. The data was analyzed statistically, and the three main factors discovered were Lack of Support Systems, High costs associated with the Electric Vehicle, and Safety. Research done displayed that the Lack of support systems was the main factor affecting electric vehicle adoption and by following the recommendations such as developing charging infrastructures, EV adoption can become a success provided these factors are taken care of.

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The Adoption of Electric Vehicles (EV) by the customers and the behavior towards purchase of it

1.Introduction:

Electric Vehicle (EV) is an alternative fuel vehicle that relies on electricity as an energy resource. As such a large share of the automobile market will mean that there is a robust energy mix driving the cars of the future. EV is environment friendly, with zero tailpipe emissions, but it relies on various sources of electricity generation. For EV to be 'green', the electricity should be generated from renewable energy sources. Most today's vehicles, power generators, and plant machinery use internal combustion engines. Due to the vast utilization of internal combustion engines in the modern world, there are growing concerns over the impact of exhaust emissions from internal combustion engines on human health and the welfare of the environment. These vehicles are powered by the burning of fossil fuels.

To reduce the greenhouse gases on the environment nearly 80 percent of the global auto market is pushing toward a phaseout of petroleum cars and the adoption of electric vehicles. In July 2018, the UK government unveiled plans to halt the production of new petrol and diesel cars from 2040. Scotland's target is eight years ahead of the rest of the UK. France has also said it will ban sales of petrol and diesel cars by 2040. Meanwhile, Norway, which has the highest per capita number of all-electric cars in the world, wants to do it by 2025. Other countries such as the Netherlands and Germany are looking at similar initiatives. India, which is facing an air pollution crisis, says it wants to sell only electric cars within the next 13 years. Oslo proposed making its center car-free by 2019-six years before a country-wide ban goes into effect. And the mayors of Paris, Mexico City, Madrid, and Athens have committed to stopping the use of diesel vehicles to improve air quality. When Paris banned cars with even-numbered plates for a day in 2014, pollution dropped by up to 30%. This study carried out primary research on the adoption of electric vehicles. Even though electric vehicles require the burning of gasoline to produce the electricity needed to drive them, they are emissions-free and alternative energy can also be utilized to power the vehicle.

2.Understanding the Data:

EVs are 100% Eco-friendly since they are driven by electrical motors. They produce no toxic harmful gases onto the environment making it a great alternative to the Gasoline/Diesel powered automobiles. The modern-day EV has key advantages over the conventional gas/diesel powered vehicles, which include smoother and quieter operation, low operating costs, faster acceleration, and the ability to refuel at your own home.

However, several obstacles counteract the advantages of the EV that make the gasoline/diesel vehicle the most prevalent option between the two. Barriers to the implementation of EVs include Vehicle cost, limited Driving range, lengthy battery charging time and the need for a charging infrastructure at home, the workplace, and public areas.

We have collected data from 145 respondents. The data was collected to understand the customer awareness and behavior towards the purchase of electric vehicles. The survey was conducted on a wide age group. The dataset has 145 x 22 columns which needs to be analyzed consisting of different parameters. We have used a Likert scale to understand customer behavior. Our questionnaire was segmented into 2 parts:

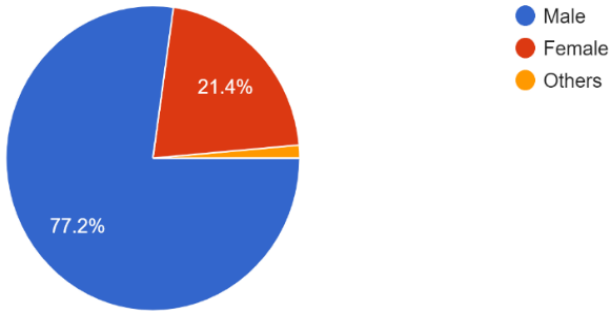
1) Demographics
    a) The identification data, educational background, income level, and awareness about the electric vehicles was gathered.
2) Understanding the customers
    a) The data collected was to understand the customers behavior to accept the Electric Vehicles. Various factors which we thought most affected towards the acceptance was put through as questions. The respondents were asked to fill a Likert Scale questionnaire depending on their understanding and likeness about E-vehicles.
    b) As the data collected is a primary one, the discretion is that the acceptance may vary for various region.

3.Exploratory Analysis:

As we have a primary dataset, and all our parameters are categorical. We will consider the count of respondents for maximum columns. The frequency of respondents agreeing or disagreeing to a particular question. Mostly this will b done by visualization, where we are using tableau to plot the graphs.

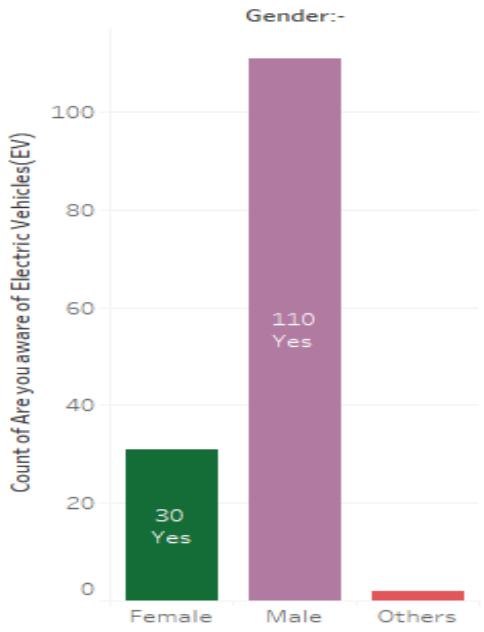
3.1 Gender:

- The pie chart shows the gender distribution of our data collected. Out of 145 respondents, we have 77.2% male, 21. 4% female.

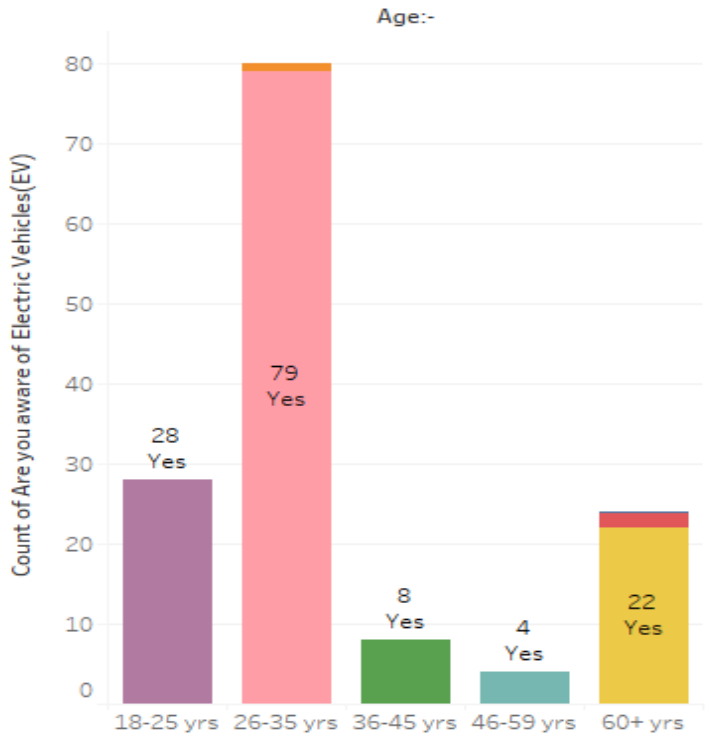


3.2 Awareness of Electric Vehicles:

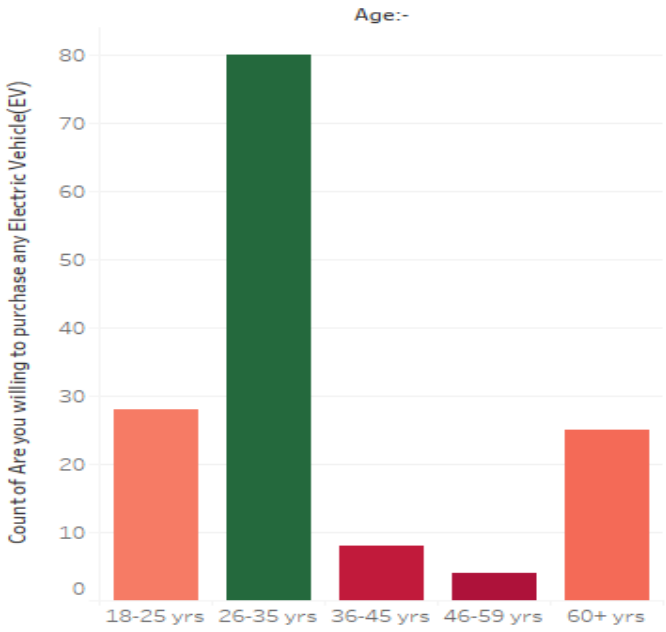
- To check the awareness of Electric vehicles considering gender we selected a bar chart to show the count of male and female who are aware of electric vehicles



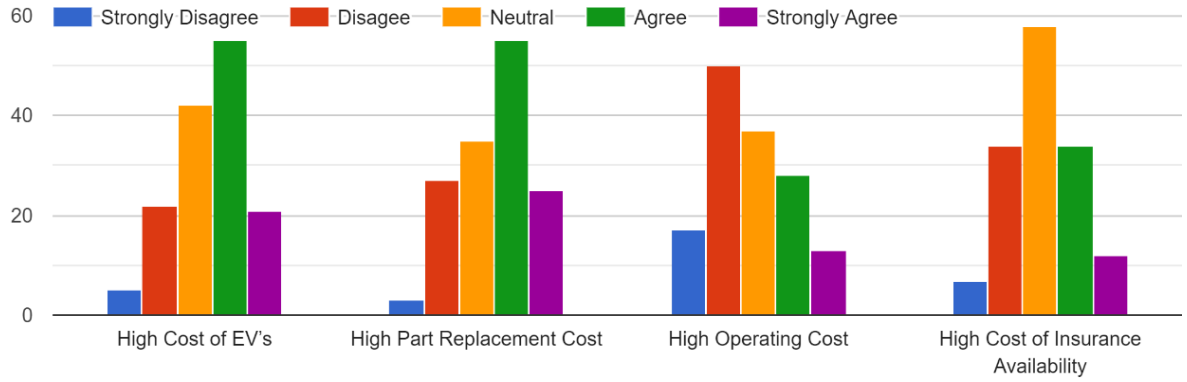
- From female respondents only 30 are aware electric vehicles while from male, 110 respondents are aware.
- From the age and awareness count plot we see that the age group of (26-35) are most aware while for the age group (46-59) is least.



3.3 Willingness to purchase Electric Vehicle:

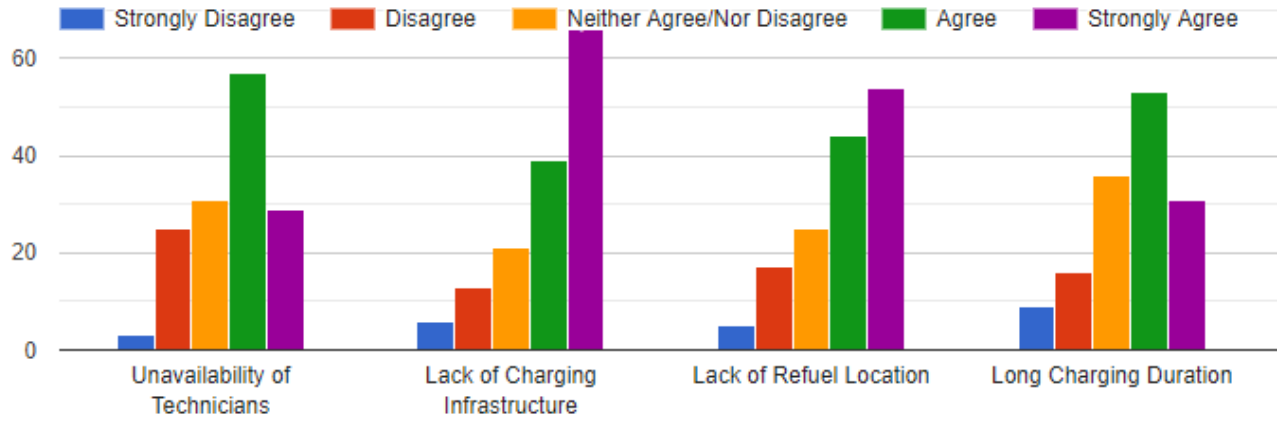


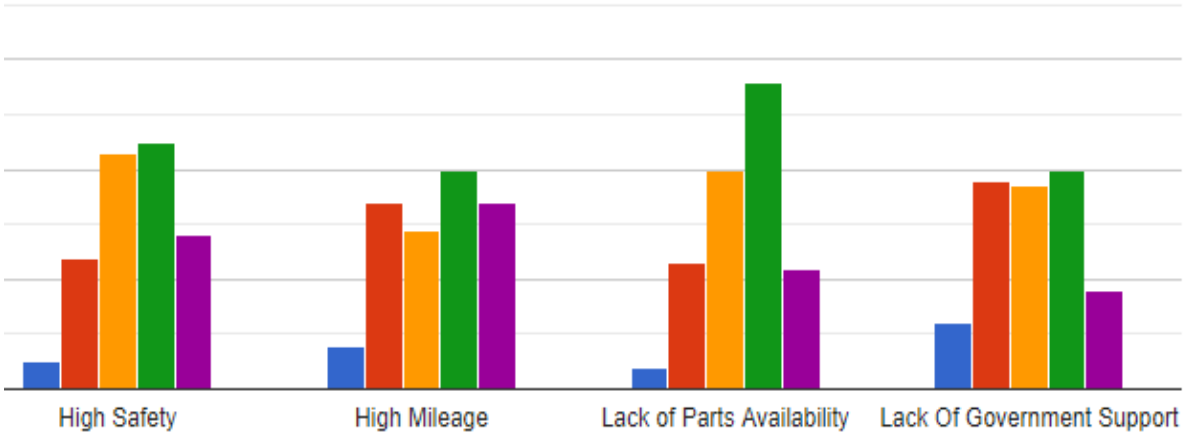
Count plot on Cost factor of Electric vehicles, we see most people agree to the fact that the overall cost and part replacement costs are high while they disagree that the operating costs are also high. This can also be considered as one of the factors affecting the adoption on Evs.



- As we saw in the awareness plot the age group of 26-35 is most aware we see the willingness to buy electric vehicle for the same age group is maximum while 46-59 age group has least.
- From the plot shown below for understanding the respondents on the cost of Electric vehicles, we can conclude that:
- Though maximum number of people agree that the overall cost and the part replacement cost of Electric vehicle are quite high, respondents disagree that the operating cost is high.

3.4 Factors affecting the adoption of Electric vehicle:





- After analyzing the above graph, its seem that 55+ respondent anticipated that the price of EV is quite high and some respondent is in neutral condition. The cost of the EVSE may vary between the minimum and maximum costs listed above. This cost can seem very high for first time users willing to purchase an electric vehicle. Businesses willing to install these systems may also become hesitant in purchasing it due to its high cost.
- While looking for parts replacement, the respondent are agree that the price will be high nearly 55+ respondent predicted that, With this in consideration, the replacement of the battery after 8 years would be added to the cost-analysis graph to determine the total operating costs of both vehicles for a period of 10 years.
- In the operating cost parameters, the respondents are disagreeing that the there is no high operating cost, and after analyzing the overall market, The comparison of both vehicles electric and non-electric that the NV200 Vanette EV has a lower operating cost as compared to the non-electric version of it.

4. Observations From the plots:

1. The aim of this study was to determine the main factors affecting electric vehicle adoption. This was done by utilizing the SPSS software for statistical analysis where Cross-tabulations were executed to determine traits affecting electric vehicle adoption. The analysis conducted displayed that no human factors such as age and gender influence the purchase decisions of an electric vehicle.

2. Currently there exists no charging infrastructure for the EV which is one of the major reasons of little adoption of the EV today. The government can provide incentives to put up new charging stations to attract people to use electric vehicles. The incentives offered by the government can include the removal of taxes on the vehicles which significantly reduces the total cost of the vehicle.

3. There is currently a lack of technicians available to service and maintain the EVs. Programs must be developed to educate technicians on the proper procedures and equipment to use when conducting service and repairs on these vehicles.

4. The main problem is not associated with the cost of the vehicle but rather the availability of proper infrastructure for charging, lack of availability of parts. While respondents do will to but electric vehicles, but various factors mentioned are affecting the adoption of the vehicles.

Lastly, we would like to thank Sayantani ma'am for giving us the opportunity to do this EDA, and share subject knowledge so we can do this project effectively. We would like to thank Praxis Business School for providing us such an opportunity to present our work with you all.