

Chapter-14

FACTORS INFLUENCING PURCHASE INTENTION OF ELECTRIC VEHICLE

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ABSTRACT

Rising pollution and climate change is a concerning problem these days with urbanization and industrial development . Diesel and petrol driven cars is found to be one of the most top contributor of carbon emission in the environment. Therefore electric vehicle is the only alternative that can be suggested to reduce the pollution caused by gasoline powered automobiles. Government and Car manufacturing companies are trying their best to implement electric vehicle use by the common households, but there are a number of factors that affect the purchase decision of the customers . Such factors have been studied in these paper. A primary research has been done with the help of a offline survey to find out the most important factors to the people while purchasing a vehicle to analyse that what is stopping them from buying an electric vehicle .

Keywords: *Pollution, Electric Vehicle, Customers, Environment, Automobiles, Households*

INTRODUCTION

One of the major source of carbon emission is the vehicles run on fuels. Reducing personal mobility by conventional diesel and gasoline automobiles in favour of bicycle and public transit appears to be a simple way to lessen the environmental effect of transportation (Avci et al , 2015). Most customers, on the other hand, are hesitant to abandon their automobile as their principal mode of transportation, owing to strong sentiments of convenience and freedom associated with car use. As a result, encouraging the adoption of alternatives to traditional gasoline and diesel automobiles is critical (Liao et al , 2017). Different countries have already utilised a variety of policy measures to encourage the purchase and use of environmentally friendly vehicles (EFVs) and/or discourage the use of conventionally powered cars (Krishnan, 2021). Several governments have already enacted early plans to promote electric cars (EVs), with the goal of ultimately replacing internal combustion engine vehicles, which emit substantial pollution but still there are a lot of factors that are influencing the adoption of electric vehicle by the common people (Rezvani et al ,2015). This paper discusses about all those factors that are impacting the purchasing decision of electric vehicles. The factors that have been studies in the paper and been evaluated are cost , availability , mechanism and technology , government regulation , environment , social and individual perspectives etc . Further each section is studied and analysed in detail . There are different cost that are taken into account while purchasing a new vehicle , such as purchasing cost , maintenance cost , fuel or charging cost , spare parts costs etc . Availability of fuel or charging station , service station , spare parts , are some of the other availability factors that may contribute to the influence on the purchasing decision of any consumer . Knowledge about a certain type of vehicle , safety concerns and

performance are some more elements that may affect consumer's buying intentions . Subjective norms and personal image are also important to the consumer's while purchasing a new vehicle. All these factors have been studied and analysed by surveys to come to a conclusion that what are the most important and crucial elements among all these that are affecting the purchasing decision of the customers the most.

OBJECTIVE OF THE RESEARCH

- TO understand and analyse the different factors that influence and affect the decision of the consumers while buying any type of vehicle.
- TO understand that what are the factors that are discouraging or encouraging the people to adopt to an electric vehicle.
- A comparative study has been done between petrol , diesel and electric vehicle to compare and analyse that what are the most desirable factors are to the consumers in different type of vehicles .

LITERATURE REVIEW

Navalagund et al (2020) discusses about the rising environmental concerns bringing the need to shift to other modes of transportation .There is a major concern of natural environment degradation, which is taking deadly proportions as pollutions of all kinds and the destruction of natural resources abound. As a result, there is a growing concern for the environment, as well as consumer acceptance of responsible behaviour to combat environmental degradation. With increased concern for the environment and long-term growth, there is a need to investigate alternate ways of transportation.

Bhalla et al (2018) talks about different factors that impacts the consumer's decision while purchasing a new vehicle. Environmental concerns Costs Trust Technological advances Infrastructure Characteristics Social acceptance Personal perceptions influence car buying decisions. Research shows that consumer confidence in technology is a major determinant of environmental concerns while energy purchases affect infrastructure or social acceptance rates.

Singh et al (2020) says in their paper, even though electric vehicles have been on the market for five years, they have yet to attract enough users.Perceived quality Expected benefits Considered difficult Considered value are the four drivers of perception. All of these factors were shown to have a substantial influence on EV buying intention.

India's road transport sector is on the verge of switching from Internal combustion engine (ICE) battery electric car (BEV). The Government of India (GoI) has launched a number of policy initiatives aimed at encouraging the use of electric cars (EVs). EVs, on the other hand, have a large initial investment but reduced operational expenses. As a result, the economics of EVs vs ICE cars are determined by how much they are used on a daily basis. The daily consumption, in turn, varies greatly depending on the situation. The TCO (total cost of ownership) of electric two-wheelers (e-2Ws) and electric three-wheelers (e-3Ws) is cheaper than the average daily vehicle consumption equivalent of ICE in Indian cities. Electric vehicles (e-cars) have a higher TCO per kilometer than their ICE counterparts in hatchbacks and sedans. Electric buses (electric buses) have a higher TCO per kilometer than diesel and CNG buses due to their high initial purchase price. To boost the economic feasibility of EVs, policymakers must investigate creative business models and strategies for high vehicle usage. Efficient charging infrastructure planning and quick charging choices would also aid in the rapid adoption of EVs in India. (Kumar , Chakrabarty ,2020).

Many events of the last decade have paved the way for electric vehicles to enter key markets in India that are still in their infancy. The charging infrastructure of this EV Boost Scheme can be considered as the backbone. The placement of a charging station and the technology available have a significant impact on its serviceability. Therefore how electric vehicles are charged and the location of charging stations need to be carefully monitored in order to better integrate them into the transportation sector. The process of choosing an EV charging technology is a lengthy one. It can be divided into decision dilemmas with many criteria and research capabilities at the same time. This can be achieved using a multidisciplinary decision-making (MCDM) approach. (Mall , Anbanandam , 2022).

Rodge and Joshi debates about the environmental factors related to the manufacturing of EVs. Electric vehicles, sometimes known as "Zero Emission Vehicles" [7], are designed to minimise air pollution by not using coal, petrol, or diesel as a fuel source. Electric vehicles (EVs) run on a battery that is charged at a charging station and then driven on the road without producing any pollution. As a result, it contributes to the reduction of pollutants. Commercial vehicles are more environmentally friendly than electric vehicles in terms of vehicle manufacture. Electric vehicles use two times the amount of energy that commercial vehicles do. Lithium ion batteries are utilised in electric vehicles. Lithium mining emits greenhouse gases, pollutes the environment, and has a negative influence on human health. Therefore pollution can only be decreased if renewable energy sources such as wind and solar energy are used to power the necessary electric vehicles for prosecution. (Rodge , Joshi , 2018).

Electric vehicles can only reduce pollution by generating more electricity from renewable sources and moving batteries away from the vehicles use area. As the use of electric vehicles increases so do the new industries that pollute the air. The Indian government has promised to convert 100% lightweight consumer cars into electric vehicles in New Delhi by 2030. This approach is based on vehicle grid interaction and shared mobility via an electric car fleet. To achieve 100% adoption of electric cars, various human behavioural changes are required. To reduce air pollution the Indian government needs to enact a law to increase the share of renewable energy in the EV mix to strengthen EV sales and avoid air pollution from battery production. The proposed measures to reduce air pollution through the adoption of electric vehicles can be applied to every market in the world. (Vidhi , Srivastava, 2018)

While maintaining economic revenues, the second life of batteries for electric cars is approaching reality. Typical electric cars reach the end of their life when batteries lose 20 to 30% of their capacity. However, battery technology is evolving rapidly and the next generation of electric cars has reached a range of between 300 and 400 km. (Casels al et 2017)

Aspects such as social image, social impact, identification, embodiment of character, and a sense of societal belongingness are all examples of social values. Social values such as public image, social influence, sense of identity, and personality impact consumers' decisions regularly. These ideals are frequently reflected in the kind of purchases people make. Because a product is frequently regarded to reflect a purchaser's self-image and purchasers are motivated to show their views and personalities to society, social values play a crucial role in customers' purchasing decisions. Social values have also been discovered to have an important role in the adoption of green and innovative technology. With the environment degrading, it is everyone's societal obligation to reduce their carbon footprint. Because electric vehicles are promoted as a green invention, customers should be more willing to adopt them in order to meet their societal commitments and improve their public image. (Bhat et al , 2022)

RESEARCH METHODOLOGY

The primary data was collected via a self-structured questionnaire . A descriptive research has been done in this paper. To gather data for the study, an offline survey was designed and implemented. Convenience sampling procedures were applied, with the sample consisting of owners of gasoline-powered automobiles as well as electric vehicle owners, with the goal of gathering feedback on the perception and acceptance of impending electric vehicles. The survey was circulated among 22 Vehicle Users , 15 E-Vehicle users , 15 mechanical engineers and 10 automobile users . A total of

62 responses were collected and 7 variables were considered for collecting the data as shown in the diagram below.

Sampling: Convenience sampling is done to collect the data.

DATA COLLECTION

Primary data was collected through in physical offline surveys with a well-defined questionnaire. People were contacted in person and were given to fill the survey to record their responses.

FINDINGS

- Though the main concern of introducing electric vehicle to the consumers is environmental safety, to reduce the carbon emission produced by the fuel consumed vehicles, through the responses and the data collected it can be analysed that people are very less concerned about environment. The top factors that had the major number of responses were cost, availability, safety, subjective norms and technology
- Further, when choice between cost and availability was asked to made, the responses collected were majorly for availability. This suggests that even if the costs of the e-vehicles are made affordable, the availability plays a important role in the purchasing decisions of the customers.
- Cost and technology both had similar responses with a very little difference in responses. So a balance between technology and the costs should be there.
- The respondents chose cost over environment, which clearly shows how little the people care about the environment when it comes to the money they has to pay.
- Not much difference in responses came between cost and social/individual factors, which suggests that people are ready to pay extra for social norms or self-image.
- In comparison between availability and technology, again availability here had maximum responses.
- Respondents again didn't care much about environment when they were given a choice between environment and availability.
- Among different costs that are related to buying and using a vehicle, the most concerning cost to the respondents is found to be the purchase cost and the fuel/charging cost .

- Availability is a very prime concern for the respondents. From the data collected, with major number of responses leaning towards availability of fuel/charging station, it can be said that Availability of charging station is a concern that may be stopping the consumers from adopting an electric vehicle.
- Subjective norms was the maximum respondent's choice over self-image which indicates that people prioritize social acceptance more.
- 36 respondents chose perceived ease of use over subjective norms while the remaining 26 people leaned towards subjective norms
- Perceived usefulness mattered to the respondents more than that of subjective norms.
- When it comes to safety people gives a lot priority , the data collected says the same with major number of responses in favor of perceived safety when compared with subjective norms .
- Very little difference in responses was recorded between respondents preference over self-image and perceived ease of use.
- Again majority of the responses were found to be for perceived safety over self-image
- Respondents were found to prefer perceived usefulness over perceived ease of use and perceived safety over both perceived usefulness and perceived ease of use
- Safety is found to be playing a major role too while influencing the decision of the consumers.
- Respondent's preference of vehicle when purchase cost is concerned found to be in the order: petrol vehicle, diesel vehicle, electric vehicle
- Respondent's preference of vehicle when maintenance cost is concerned found to be in the order: electric vehicle, petrol vehicle, diesel vehicle
- Respondent's preference of vehicle when fuel/charging cost is concerned found to be in the order: electric vehicle, diesel vehicle, petrol vehicle
- Respondent's preference of vehicle when spare part's cost is concerned found to be in the order : electric vehicle, petrol vehicle, diesel vehicle

- Respondent's preference of vehicle when availability of fuel/charging station is concerned found to be in the order : Petrol & diesel vehicle, electric vehicle
- Respondent's preference of vehicle when availability of service station is concerned found to be in the order : Petrol & diesel vehicle, electric vehicle
- Respondent's preference of vehicle when availability of fuel/charging station is concerned found to be in the order: Petrol & diesel vehicle, electric vehicle.
- Respondent's preference of vehicle when availability of spare parts is concerned found to be in the order : Petrol & diesel vehicle , electric vehicle
- Respondent's preference of vehicle when knowledge is concerned found to be in the order: diesel vehicle, petrol vehicle, electric vehicle.
- Respondent's preference of vehicle when safety is concerned found to be in the order: diesel vehicle, petrol vehicle, electric vehicle
- Respondent's preference of vehicle when performance is concerned found to be in the order: electric vehicle, diesel vehicle, petrol vehicle
- Respondent's preference of vehicle when environment safety is concerned found to be in the order: electric vehicle, petrol vehicle, diesel vehicle
- Respondent's preference of vehicle when government regulation is concerned found to be in the order : electric vehicle , petrol & diesel vehicle
- Respondent's preference of vehicle when subjective norms is concerned found to be in the order: electric vehicle, diesel vehicle, petrol vehicle

CONCLUSION

With rising in pollution and climate change, it has become a matter of concern to find a alternative to the conventional gasoline and diesel vehicles. So adaptation of electric vehicle by the common people is important to bring the change. But a number of factors is concerned by the people while choosing or buying a new vehicle. This paper studies about all the factors that affect the purchasing decision of a potential vehicle buyer. Through the data collected from the respondents, we came to the conclusion that for successful penetration of electric vehicle by the common people, the major factors the government or the car manufacturing companies should focus on are availability, cost and safety followed by technology and social or individual factors. We further compared each variables to understand the respondent's perspective more clearly. The respondents chose cost over environment and availability over cost. Though

cost had a little more responses but not much difference were found when compared with technology and social or individual factors. Majority of people chose availability over cost, technology and environment. When further costs were narrowed down the responses were in the order of purchase cost, fuel / charging cost, maintenance cost and spare parts cost. Majority of responses were recorded for availability of fuel / charging station when compared to availability of spare parts and service station. It could also be found through the study that subjective norms are important to people a little more than self-image but contradicts when compared to perceived ease of use and perceived usefulness. The paper also studied and compared different factors people chose while comparing those factors between petrol vehicles, diesel vehicle and electric vehicle. People chose electric vehicle when maintenance cost, charging cost, performance, environment safety, government regulation , and subjective norms is concerned . People chose diesel and petrol vehicle when availability of service station, fuel/charging station and spare parts is concerned. Respondents preferred petrol vehicle over diesel & electric vehicle when purchase cost and spare parts cost is concerned, while they chose diesel vehicle when knowledge and safety is concerned. Therefore from the study done in this paper it can be concluded that there are a number of factors people see while choosing the best convenient vehicle for themselves. All the factors are equally important, but in the present scenario the lack of infrastructure and availability is playing an important role that is discouraging the people from buying an electric vehicle while cost remaining a constant factor. So to increase the sell of electric vehicle among the customers a competitive strategy should be implied, so that people choose electric over the fuel run vehicles which are a concerned cause for increased pollution and in turn climate change. The paper shall further be continued and studied through ahp (analytic hierarchy process) method.

SUGGESTIONS

We know that the main objective of introducing electric vehicle to the people is to save the environment but from the study it can also be found that people doesn't care much of the environment when it comes to their own benefit, so the companies or the government should market the electric vehicles by giving a major focus on subjective norms and self-image of the customers through strategic advertisements.

To encourage the people, the government should come out with schemes providing incentives to the people , like easy low rate car loans, cheap insurances for electric vehicles etc.

Government should provide subsidies to the car manufacturing companies to build infrastructure and work on the availability, costs and all the other factor to compete with the fuel run vehicles.

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