AN ANALYTICAL STUDY ON CUSTOMERS BUYING BEHAVIOUR TOWARDS ELECTRIC CARS IN MUMBAI REGION

Mr. Davender Duggal, Research Scholar
Bharati Vidyapeeth (Deemed to be University) ,Pune
dduggal1970@gmail.com

Prof. Dr. Mahesh V. Shitole, Professor,
Bharati Vidyapeeth (Deemed to be University),
Institute of Management and Entrepreneurship Development, Pune.
mahesh.shitole20@gmail.com

ABSTRACT
Given the current situation, the government's increases in fuel prices, as well as the significant environmental damage caused by fuel-based vehicles, it is clear that these factors must be taken into consideration. We may observe these indirect effects on nature, which cause a-climatic shifts among other things.
The best way to solve the issue is to turn on an electric vehicle. But choosing the right car is crucial because the producers of electric cars have only just begun to provide a limited selection. Before purchasing an electric vehicle in particular, customers take into account a number of considerations. Therefore, this study examines the variables that influence consumer choices for electric vehicles. Although switching to electric cars instead of conventional ones is the best option currently on the market. There is insufficient infrastructure and facilities in India for electric vehicles. The offerings are also constrained and quantifiable.
Additionally, businesses are promoting their electric vehicles and taking all reasonable steps to help and support them. Even if the number of owners of electric cars is growing steadily and day by day, some still hesitate to purchase one. Because every consumer has different needs, this evolution cannot be realised without proper infrastructure and other conditions.
Keywords: Electric car, Battery operated car, EV, Electronic, Consumer purchase decision making.

Introduction

Day by day population growth creates a challenge for expanding transportation options. In general, a household with disposable income and the means to do so has an automobile. People increasingly choose having their own private vehicle over using public transportation, thanks in part to the pandemic. Additionally, many people buy cars only for fun and collection purposes to uphold their social class standard.

The growth in cars is having some very evident negative effects, including greenhouse gasses, more pollution, higher fuel prices, and global warming. Therefore, buying an electric automobile instead of a fuel-based car is an alternative to reduce this issue.

This study is being conducted to learn how individuals feel about purchasing electric vehicles. However, it is difficult for a nation like India to choose electric vehicles with ease, though this idea of electric vehicles can be implemented with some refinement. There are still some people who believe that gasoline-powered vehicles are the finest. The machine's scream and engine surge make them feel physically alive. Many individuals believe that electric vehicles are impractical and cannot fully replace vehicles powered by fuel. However, for the time being, that can also be considered due to the lack of charging stations and the proper services, among other things. However, this evolution will happen gradually because it is necessary for the time being. Humans and technology are both changing. Due to resource constraints, fuel-based vehicles have no place in the future; instead, electric vehicles are the way of the future.

Review of Literature

According to author Agrawal, (2020) European drivers toward electric vehicles, CO2 emissions from consumer vehicles are increasing daily because there is no way to lower them. The only alternative is the development of electric vehicles. This study makes it possible to learn how people feel about electric cars. It investigates the elements that set new cars apart from standard vehicles that customers value when purchasing one. For car drivers, cost and range are less important than performance. This study demonstrates that car owners should think seriously about switching to electric vehicles.

Trivedi. (2020) says that investigating the factors influencing consumer purchase intention for electric cars: an emerging market perspective. The said research explores factors influencing Indian consumers' attitude towards brand of electric cars and brand love and buying of electric cars. Brand love affects more than brand attitude in the final purchase decision of a car. The relationship between brand love and attitude is also established here.

It is difficult to forecast the sales of electric vehicles because they haven't yet attained their right market share on a global scale. This study includes every aspect that is essential for forecasting the sales of electric vehicles in India.

Bimbraw (2015) investigated Autonomous cars: Past, Present and future a review of the developments in the last century, the present scenario and the expected future of autonomous vehicle technology. The said research paper helps in understanding the trends in autonomous vehicle technology in past, present and future. As per the era the cars have evolved according to the needs and went up-to the luxurious feel which human beings can ever imagine. Various features have been introduced. And it is predicted that most of the autonomous vehicles will be launched in the next decade. The future is an ambitious era and safe and comfortable transport.

Bimbraw (2015) reviews the advancements over the course of the last century, the current situation, and the anticipated future of autonomous vehicle technology in his research work, Autonomous cars: Past, Present, and Future. The research paper aids in comprehending past, present, and future tendencies in autonomous vehicle technology. According to the time, cars have evolved to meet necessities and have reached the highest level of luxury a person can conceive of. Many new features have been added. Most autonomous vehicles are expected to be introduced within the next ten years. Future transportation will be secure and comfortable.

The price of electric vehicles, their acceptance by consumers, and their impact on the profitability of businesses that sell electric vehicles are the primary problems of electric vehicles, according to the author Soulopoulos, (2017). in his study paper on when they will be less expensive than conventional automobiles. For the foreseeable future, both the price for end users to purchase battery-operated automobiles and the cost of manufacturing them may be higher than for regular conventional cars.

Research Gap

The respondents to this survey will include those who now possess electric cars, those who are considering purchasing an electric vehicle as their first vehicle, and those who currently own fuel-based vehicles who are considering purchasing an electric vehicle as a secondary vehicle in Mumbai. Since there are now only a few companies producing electric automobiles, after-sale service is one of the main problems.

Before purchasing an automobile, most individuals prioritize upkeep. Battery guarantee is also very important because batteries are the lifeblood and heart of electric vehicles. If manufacturers are unable to offer appropriate battery warranties, then their products are useless. People have been compelled to use their personal vehicles due to the global epidemic and the skyrocketing cost of gasoline.

The speed at which an electric car charges is particularly important because it might negatively affect the customer's experience if it takes too long. A decent charging standard and battery life should coexist in harmony.

Assistance and failure. What support the consumers will receive if an electric car gets into a challenging scenario in the middle of the road is also a concern.

Objectives

Factors influencing how customers see buying electric cars.

Research Methodology

The goal is to understand what influences consumers when they are considering purchasing an electric vehicle. This study takes into account a wide range of variables, including battery warranty, monthly driving distance, breakdown, convenience, environmental friendliness, pricing, comparison to conventional cars, etc. the important distinctions between the independent and dependent variables. It is a descriptive research technique. We created a structured questionnaire and used a google survey form to collect responses from a total of 150 respondents (both consumers who now own electric cars and those who are interested in purchasing one).

In this study, a conceptual attempt has been made to comprehend the influences on consumers' decisions to buy electric cars. We have used descriptive statistics to perform crosstabs with Chi square and Phi. We have contrasted the dependent variables with each of the independent factors separately. Our understanding of the framed hypothesis is gained using tests. Additionally, we learned the means of all the dependent variables through descriptive statistics, as well as what influences electric car buying decisions the most.

Research method used for this study is quantitative. Researchers identified descriptive research design suitable for the study. The sample size selected for the study is 150. SPSS 21 is used for statistical analysis.

Data analysis using SPSS
The Reliability Test

onbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.636	.546	23

Table 1 Reliability Statistics
Reliability Statistics

Since the Cronbach's Alpha value is more than 0.5 i.e., 0.636 and Cronbach's Alpha based on standardized items is 0.546. So, it shows that, the data is significant.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
65.43	46.314	6.805	23

Table 2 Scale Statistics
Scale Statistics

From the above table we can infer that the mean of our study is 65.43, where variance is found out to be 46.314, standard deviation of our study is 6.805.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig
Between People		300.036	149	2.014		
Within People	Between Items	4677.283	22	212.604	290.295	.000
	Residual	2400.717	3278	.732		
	Total	7078.000	3300	2.145		
Total		7378.036	3449	2.139		

Grand Mean = 2.84

Table 3 ANOVA
ANOVA Table
From above this ANOVA table, we can infer that the F value is 290.295 and sig is 0.000 and the grand mean is 2.84.

Hypothesis Testing –
Hypothesis 1 –
Ho1 - There is no significant impact of Monthly driving Mileage and power and torque on consumers perception towards buying electric cars.
Ha1 - There is a significant impact of Monthly driving Mileage and power and torque on consumers' perception towards buying electric cars.

What is your monthly driving mileage? * Will electric cars provide more power and torque than conventional cars?

			Will electric cars provide more power and torque than conventional cars?		
			Yes	No	Total
What is your monthly driving mileage?	Below 500 km	Count	18	23	41
		Expected Count	22.1	18.9	41.0
	500 km - 1500 km	Count	28	21	49
		Expected Count	26.5	22.5	49.0
	1501 km - 3000 km	Count	19	15	34
		Expected Count	18.4	15.6	34.0
	3001 km - 5000 km	Count	8	9	17
		Expected Count	9.2	7.8	17.0
	5000 km & Above	Count	8	1	9
		Expected Count	4.9	4.1	9.0
Total		Count	81	69	150
		Expected Count	81.0	69.0	150.0

Table 4 Cross Tabulation
Cross Tabulation

Hypothesis 2 –
Ho2 - There is no significant relationship between types of batteries and capacity and warranty of battery on consumers' perception towards buying electric cars.
Ha2 - There is a significant relationship between types of batteries and capacity and warranty of battery on consumers' perception towards buying electric cars.

			Does type of battery and its capacity impact your decision of buying an electric car?		
			Yes	No	Total
On a scale of 1 to 5, below mentioned points make significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [Warranty of Battery]	Very Low	Count	1	1	2
		Expected Count	1.3	.7	2.0
	Low	Count	0	1	1
		Expected Count	.6	.4	1.0
	Neutral	Count	16	19	35
		Expected Count	21.9	13.1	35.0
	High	Count	32	23	55
		Expected Count	34.5	20.5	55.0
	Very High	Count	45	12	57
		Expected Count	35.7	21.3	57.0
Total		Count	94	56	150
		Expected Count	94.0	56.0	150.0

Table 5 On a scale of 1 to 5, below mentioned points make a significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [Warranty of Battery] * Does the type of battery and its capacity impact your decision of buying an electric car? Cross Tabulation
Crosstabulation

Hypothesis 3 –
H0 - There is no significant impact of charging specification and Infrastructure on consumer perception towards

buying electric cars.
H3 - There is a significant impact of charging specification and Infrastructure on consumer perception towards buying electric cars.

Do you agree with the following parameters? (5- Strongly Agree, 4- Agree, 3- Neutral, 2- Disagree, 1- Strongly Disagree) [Whether maintenance infrastructure is well developed?] * Would you like to have charging specifications such as Super-Fast charging at your home also than only in selected showrooms?

			Would you like to have charging specification such as Super-Fast charging at your home also than only in selected showrooms?		
			Yes	No	Total
Do you agree with the following parameters? (5- Strongly Agree, 4- Agree, 3- Neutral, 2- Disagree, 1- Strongly Disagree) [Whether maintenance infrastructure is well developed?]	Strongly Disagree	Count	9	2	11
		Expected Count	9.0	2.0	11.0
	Disagree	Count	16	5	21
		Expected Count	17.2	3.8	21.0
	Neutral	Count	26	8	34
		Expected Count	27.9	6.1	34.0
	Agree	Count	36	6	42
		Expected Count	34.4	7.6	42.0
	Strongly Agree	Count	36	6	42
		Expected Count	34.4	7.6	42.0
Total		Count	123	27	150
		Expected Count	123.0	27.0	150.0

Table 6 Cross tabulation
Cross Tabulation

Hypothesis 4 –
H0 - There is no significant relationship between environment friendly and price on consumer perception towards electric cars.
H4 - There is significant relationship between environment friendly and price on consumer perception towards electric cars.

On a scale of 1 to 5, below mentioned points make significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [Environmental Friendly] * Do you agree with the following parameters? (5- Strongly Agree, 4- Agree, 3- Neutral, 2- Disagree, 1- Strongly Disagree) [Can electric cars save money?]

			Do you agree with the following parameters? (5- Strongly Agree, 4- Agree, 3- Neutral, 2- Disagree, 1- Strongly Disagree) [Can electric cars save money?]					
			Strongly Disagree	Disagree	Neutral	Agree	trongly Agree	Total
On a scale of 1 to 5, below mentioned points make significant impact	Very Low	Count	0	1	1	1	0	3
		Expected Count	.0	.1	.9	1.0	.9	3.0

on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [Environmental Friendly]	Low	Count	0	1	4	0	0	5
		Expected Count	.0	.2	1.5	1.7	1.5	5.0
	Neutral	Count	0	3	8	13	5	29
		Expected Count	.2	1.4	8.5	10.1	8.9	29.0
	High	Count	1	2	20	17	14	54
		Expected Count	.4	2.5	15.8	18.7	16.6	54.0
	Very High	Count	0	0	11	21	27	59
		Expected Count	.4	2.8	17.3	20.5	18.1	59.0
Total		Count	1	7	44	52	46	150
		Expected Count	1.0	7.0	44.0	52.0	46.0	150.0

Table 7 Crosstabulation
Cross Tabulation

Hypothesis 5 –
H0 - There is no significant impact of after sale services and maintenance cost on consumer perception towards buying electric cars.
H5 - There is a significant impact of after sale services and maintenance cost on consumer perception towards buying electric cars.

			On a scale of 1 to 5, below mentioned points make significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [After sale service]				
			Low	Neutral	High	Very High	Total
On a scale of 1 to 5, below mentioned points make significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [Maintenance cost]	Very Low	Count	1	0	0	0	1
		Expected Count	.0	.2	.3	.4	1.0
	Low	Count	0	4	0	0	4
		Expected Count	.1	.9	1.3	1.7	4.0
	Neutral	Count	2	12	12	10	36
		Expected Count	1.0	8.4	11.3	15.4	36.0
	High	Count	0	17	23	22	62
		Expected Count	1.7	14.5	19.4	26.5	62.0
	Very High	Count	1	2	12	32	47
		Expected Count	1.3	11.0	14.7	20.1	47.0
Total		Count	4	35	47	64	150
		Expected Count	4.0	35.0	47.0	64.0	150.0

Table 8 On a scale of 1 to 5, below mentioned points make a significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [Maintenance cost] * On a scale of 1 to 5, below mentioned points make a significant impact on your purchase decision of electric vehicle? (1 being the lowest and 5 being the highest) [After sale service] Cross Tabulation
Cross Tabulation

Hypothesis 6
H0 - There is no significant impact of breakdown and convenience on consumer perception towards buying electric cars.
H6 - There is a significant impact of breakdown and convenience on consumer perception towards buying electric cars.

Do you feel that electric cars are more convenient than fuel-based cars? (1 - Least Convenient, 2 - Slightly Convenient, 3 - Moderately Convenient, 4 - Convenient, 5 - Most Convenient) * Does electric cars breakdown more easily than conventional fuel-based cars?

			Does electric cars breakdown more ventional fuel-based cars?		
			Yes	No	Total
Do you feel that electric cars are more convenient than fuel- based cars? (1 - Least Convenient, 2 - Slightly Convenient, 3 - Moderately Convenient, 4 - Convenient, 5 - Most Convenient)	Slightly Convenient	Count	5	3	8
		Expected Count	5.1	2.9	8.0
	Moderately Convenient	Count	20	10	30
		Expected Count	19.0	11.0	30.0
	Convenient	Count	55	27	82
		Expected Count	51.9	30.1	82.0
	Most Convenient	Count	15	15	30
		Expected Count	19.0	11.0	30.0
Total		Count	95	55	150
		Expected Count	95.0	55.0	150.0

Table 9 Cross tabulation
Cross Tabulation

Results and Discussion
This study's goal is to clarify the variables that influence consumers' perceptions about buying electric cars. People take into account a variety of aspects when purchasing automobiles, especially electric ones, including the type of battery, its capacity, and its warranty, as well as after-sale services, maintenance costs, the car's pricing, the car's range, and many other things. Currently, the necessary infrastructure is insufficient, making it more challenging for consumers to acquire electric vehicles. However, given the modifications and alterations in customer perception of electric automobiles, consumers may choose electric cars in the upcoming years.
Additionally, people are being forced to switch to electric automobiles in order to be more environmentally and financially sustainable due to rising fuel prices, pollution levels, and prices of conventional cars. These vehicles offer the final users adequate power and torque. The government also offers road tax credits after purchasing these vehicles, which encourages users to choose electric vehicles. After considering everything, we may conclude that although this transformation is unavoidable, it will happen gradually.

Our findings demonstrate that before purchasing an electric vehicle, customers have various perceptions. According to their own usage and habits, a large number of respondents joined in and shared their opinions on the various factors. Although the environment is a huge problem nowadays, our study shows that the majority of individuals are still hesitant to purchase an electric automobile as of right now. According to the entire study, we received 150 responses, of which 46 people want to purchase electric vehicles as soon as possible, 52 people are still debating their options and planning to do so in the next five years, 36 people are going to purchase one in the next ten years, and 16 people out of 150 do not. Through this research, we have discovered that customers prioritize mileage when deciding whether to purchase an electric vehicle, regardless of their age or line of work. 110 respondents—out of 150—believe that an electric car's mileage will determine whether they purchase it.

Conclusion

The respondents from whom we collected the data are mostly in the 25–34 age group (54.7%), followed by the 35–44 age group (16.7%), the 45–54 age group (17.3%), and the 55+ age group (11.3%). 34.7% of those who responded to our survey said they would like to buy an electric car within the next five years, while 30.7% said they would like to buy an electric car as soon as possible. There were 24% and 10.7% of respondents who wanted to buy an electric automobile in the next ten years, respectively. People who are salaried make up 48% of replies, demonstrating that consumers with extra money are likely to buy electric cars.

Consumers are still hesitant to drive electric cars on long trips, as evidenced by the 27.3% of respondents who drive less than 500 km per month, 32.7% who drive between 500 and 1500 km, 22.7% who drive between 1500 and 3000 km, 11.3% who drive between 3001 and 5000 km, and 6% who drive more than 500 km per month. Driving range appears to be a key element, with 73.3% of respondents citing mileage as a critical consideration when purchasing an electric vehicle and 26.7% saying it had no bearing on their decision. 37.3% of respondents said they were not concerned about the battery's capacity, compared to 62.7% of respondents who were.

SUV is the preferred car type, with Hatchback, Sedan, and Sports receiving 32.7%, 26.7%, 28%, and 12.7% of the vote, respectively. 82% of individuals demand lightning-fast charging at home, while only 18% were unconcerned about it. Compared to 46% of respondents who disagree, 54% of respondents think electric automobiles will have higher torque and power. 63.3% of respondents believe that electric automobiles will break down quickly, whereas 36.7% believe the opposite.

When compared to conventional cars, we can observe that 20% of respondents find them to be the most convenient, followed by 54.7%, 20%, 20% medium handy, 5.3% slightly convenient, and 0% least convenient.

Future Scope

By analyzing the aforementioned findings, we can suggest that the electric car industry has to develop and mature significantly more in order to provide suitable infrastructure and service facilities. Although fewer people are choosing electric automobiles, those who do should be made aware of the advantages of these vehicles and how they can effectively replace conventional fuel-based vehicles. Governments should also support the use of electric vehicles.

Reference

Agrawal, S. (2020). Challenges to electric vehicle forecasting and implementation in India. International Conference of advanced research and innovation.

Bimbraw, K. (2015). Autonomous cars: Past, Present and future a review of the developments in the last century, the present scenario and the expected future of autonomous vehicle technology. International conference on informatics in control, automation and robotics (ICINCO).

C.Thiel. (2012). Attitude of european car drivers towards electric vehicles. Institute of energy and transport.

Goel, P. (2021). Government is tryig but consumers are not buying: A barrier analysis for electric vehicle sales in India. Sustainable production and consumption.

Jay.p.Trivedi. (2020). Investigating the factors infleuncing consumer purchase intentions for electric cars: an emerging market perspective. International Journal of economics and business research.

Krishna, M. (2020). The client perception of electric vehicles and its impact on sales. IJAR.

Kenneth lebeau, (2013), Consumer attitude towards battery electric vehicles – a large scale survey, International Journal of Electric and Hybrid vehicles 5 (1): 28-41.

Mishra, S. (2019). Is India ready for e-mobility? An exploratory study to understand e- vehicles purchase intentions. Theoretical economics letters.

Soulopoulos, N. (2017). When will electric vehicles be cheaper than conventional vehicles? Bloomberg New EnergyFinance.

