Major Research Project on

CONSUMER PERCEPTION TOWARDS ELECTRIC CARS IN INDIA

Submitted By

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CERTIFICATE FROM THE INSTITUTION

This is to certify that Mr. Prashant Singh roll no. 2K21/DMBA/88 has submitted the major research project report CONSUMER PERCEPTION TOWARDS ELECTRIC CARS IN INDIA in partial fulfilment of Master of Business Administration (MBA) program from Delhi School of Management, Delhi Technological University, New Delhi during the academic year 2021-23.

Signature of the Guide
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DECLARATION

I, Prashant Singh, hereby, declare that the presented major research project report titled "CONSUMER PERCEPTION TOWARDS ELECTRIC CARS IN INDIA" is uniquely prepared by me.

I also confirm that the report is only prepared for my academic requirement, not for any other purpose. It might not be used in the interest of any party.

…………………………….

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I, Prashant Singh would like to convey my gratitude to the Head of Department (HOD), Dr. Archana Singh of Delhi School of Management, Delhi Technological University for emphasizing the major research project and giving me the platform to conduct such research work.

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I have deeply grateful to all respected individuals who agreed to be a part of this research project and were instrumental in providing all the required data that was necessary to make this research project a success. I am highly indebted to their valuable contribution to my research.

I extend my warm gratitude and regards to everyone who helped me during the study.

EXECUTIVE SUMMARY

The purpose of this study is to investigate how Indian customers view electric vehicles, including their views, preferences, and adoption difficulties. To collect data from 101 respondents from the same region, the study used a quantitative research methodology and an online survey.

The results show that the biggest obstacles to the uptake of electric cars in India are cost, range anxiety, and a lack of charging infrastructure. When it comes to environmental advantages, cheap maintenance costs, and technological improvements, consumers have a favourable opinion of electric vehicles.

The most popular brand of electric vehicle among survey participants was Tata Motors, followed by MG Motors. In order to increase the adoption of electric vehicles in India, the study emphasizes the significance of accessible pricing, range, and charging infrastructure, as well as establishing brand awareness and confidence. The study's conclusions imply that in order to boost adoption rates in India, electric car makers and marketers should concentrate on removing major adoption barriers, highlighting the advantages of electric vehicles, and establishing a trusted brand name. Future studies can be done to learn more about how consumers behave and what they desire in electric vehicles, as well as how government laws and incentives affect the uptake of these vehicles.

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CHAPTER-1

1. Introduction

In order to better understand how Indian consumers feel about electric vehicles, a project has been created. Electric vehicles have become a feasible substitute for conventional petrol and diesel cars as the globe moves towards sustainable and ecologically friendly ways of transportation. India offers a considerable possibility for the adoption of electric cars due to its big population and expanding economy.

However, the uptake of electric vehicles in India continues to be very low despite government incentives and attempts by automakers. The purpose of this study is to investigate the causes of this and the attitudes and perceptions of Indian consumers towards electric vehicles.

The study seeks to pinpoint the major elements that affect the uptake of electric vehicles in India by analyzing consumer preferences, worries, and awareness. The results of this study may help regulators, automakers, and other transportation industry stakeholders in India create strategies that will effectively promote electric vehicles and broaden Indian customers' acceptance of them. The automotive sector is not an exception to the global trend towards environmentally friendly and sustainable solutions. Electric vehicles have become a potential means of reducing carbon emissions and halting climate change. The government has set a goal for all-electric vehicles to be on Indian roads by 2030, and the country's auto sector has begun concentrating on this goal as well. However, the adoption of electric vehicles in India has been delayed because of a number of issues, including expensive costs, a short range, a lack of infrastructure for charging, and a lack of customer awareness. Therefore, it is essential to comprehend how Indian consumers feel about electric automobiles in order to hasten the adoption of these cars. This initiative aims to examine Indian consumers' attitudes toward electric vehicles. The goal of this study is to comprehend the degree of familiarity, attitudes, and preferences of Indian customers with regard to electric vehicles. The study will also determine the causes and adoption hurdles that affect a consumer's choice to purchase an electric vehicle. The results of this study will be useful in helping automakers and policymakers create policies that would encourage the adoption of electric vehicles in India. This study will be carried out utilizing a thorough examination of the available literature, a survey of Indian customers, and data analysis with statistical software.

- Electric cars are considered a promising solution to reduce India's high levels of air pollution and dependence on imported oil, as well as to meet its commitments to reduce greenhouse gas emissions under the Paris Agreement.

- Despite the potential advantages of electric vehicles, their high initial cost, constrained range, lack of infrastructure for charging, and other issues have prevented their widespread use in India.

- The National Electric Mobility Mission Plan (NEMMP), which seeks to achieve 100% electric vehicle sales by 2030, and the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) scheme, which provides subsidies for the purchase of electric cars, are just a few of the initiatives the Indian government has launched to promote electric mobility.

- A few automakers have also released electric vehicles in India, including the Hyundai Kona Electric, MG ZS EV, and Tata Nexon EV. These vehicles, though, are still specialized goods that haven't quite caught on with Indian consumers.

- In order to create successful regulations and initiatives to encourage the use of electric vehicles, it is therefore imperative to overcome the knowledge gap in Indian consumers' perceptions of electric automobiles.

1.1. Research Problem for the Project

Electric vehicle adoption in India is very modest, despite the potential advantages. This can be ascribed to a number of things, including high initial costs, a short driving range, a lack of infrastructure for charging, and low public knowledge and acceptability. Therefore, determining the elements that affect Indian consumers' perceptions of electric automobiles and developing measures to encourage their adoption constitute the research challenge. The widely-used theoretical framework for researching the acceptance of new technologies is the Technology Acceptance Model (TAM). It asserts that the desire to adopt new technology is influenced by two key variables: perceived utility and perceived ease of use. The degree to which new technology is thought to increase productivity or improve quality of life is referred to as perceived utility. The degree to which new technology is regarded as being simple to use and comprehend is referred to as perceived ease of use. The TAM may be used to understand the variables influencing the desire to adopt electric vehicles in the context of electric vehicles in India.

The process of innovation and choice:

Another theoretical framework that clarifies how people accept new inventions is the innovation-decision process. Five stages—knowledge, persuasion, choice, execution, and confirmation—are said to make up the adoption process. According to the Innovation-Decision Process, consumers in India who want to buy electric cars must first become aware of them, then be convinced of their advantages, decide to buy one, actually make the purchase, and finally confirm their choice. Understanding the hurdles that each stage poses is essential to fostering the adoption of electric vehicles in India.

The initiative specifically attempts to respond to the following research queries:

1. How do conventional petrol and diesel cars compare to electric vehicles in terms of consumer attitudes and perceptions in India?
2. What elements, such as price, range, infrastructure for charging, and environmental concerns, affect Indian consumers' decision to purchase electric vehicles?
3. What obstacles need to be removed for electric vehicle adoption to become widely accepted in India?
4. What can be done to encourage the use of electric vehicles in India and how effective are the policies and tactics that can be used?
5. What are the effects of consumer perception of electric automobiles on India's transportation industry, the environment, and society at large?

1.2. Objective

- To assess Indian consumers' present level of knowledge and comprehension about electric vehicles.
- To determine the critical elements—such as price, range, infrastructure for charging, performance, and environmental impact—that affect how Indian consumers perceive and embrace electric vehicles.
- To investigate how Indian consumers feel about various types of electric automobiles, including battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs), and what they prefer.

- To evaluate the efficacy of the FAME plan and NEMMP, among other policies and incentives, in boosting the use of electric vehicles in India.
- To suggest and assess potential policy interventions and tactics, such as financial incentives, public awareness campaigns, and infrastructural expenditures, that could enhance the adoption of electric vehicles in India.
- To examine the effects that consumer perceptions of electric automobiles may have on the Indian transportation industry, the environment, and society at large, including their potential to lower greenhouse gas emissions, improve air quality, and increase energy security.

The primary objective of this study is to provide insight into Indian consumer attitudes towards EVs and to educate policymakers, and automakers on how to promote EV use and build a more efficient and sustainable transport system. , and to provide recommendations to other interested parties. By fulfilling these goals, this study hopes to offer insightful information to automakers and policymakers so they may create policies that will effectively encourage the adoption of electric vehicles in India. The research intends to add to the body of knowledge on consumer behavior and the uptake of innovative technology in developing economies.

The accomplishment of these goals would aid in understanding the difficulties associated with the adoption of electric vehicles in India and give a complete picture of consumers' attitudes and behaviors about electric vehicles in the nation. Additionally, it will aid in identifying the gaps and chances for additional study and action. The accomplishment of these goals will result in a thorough understanding of the Indian electric car ecosystem and the variables affecting the uptake of electric vehicles. To encourage the usage of electric vehicles and to make sure they fulfill Indian customers' requirements and expectations, this information may be utilized to build targeted initiatives and legislation.

1.3. Scope and Limitations of the Study

The study's focus includes Indian customers' perceptions of electric vehicles as well as their awareness and adoption of these vehicles. The study will explore a variety of elements, including price, range, infrastructure for charging, performance, and environmental effect, that affect how consumers in India perceive and embrace electric vehicles. The study will also assess the current incentives and policies in place in India to encourage the use of electric vehicles and will make suggestions for future policy changes and adoption-boosting tactics. Surveys, interviews, and focus groups with customers and other stakeholders in the Indian

electric vehicle ecosystem will be used to perform the study. In order to offer a thorough picture of the present situation of the electric car market in India and the regulatory environment, the research will also analyze secondary data from government papers, industry publications, and academic literature. Battery-electric vehicles will be the main subject of the study; fuel cell and plug-in hybrid electric vehicles will not be discussed. The study will concentrate on customer perceptions of battery-electric vehicles. The technical components of electric vehicles, such as battery technology, electric motor technology, or charging infrastructure design, will also not be included in the research. The study will offer information on the variables affecting the uptake of electric vehicles in India and make recommendations for promotion tactics. The research will not, however, offer a quantitative estimate of the market size or potential for electric automobiles in India.

However, there are certain limitations to the study that need to be considered, including:

- The survey will concentrate on how Indian consumers view electric vehicles; it won't cover other stakeholders' points of view, such as those of politicians, automakers, or providers of the infrastructure needed for charging.
- India's entire nation will not be covered by the study; it will only focus on a small portion of it.
- Self-reported consumer data, which may be biased or affected by social desirability effects, will be the primary source of the study's findings.
- The study could be unable to adequately represent the dynamic nature of the Indian transportation industry and the quick changes in technology, regulation, and customer behavior.
- The economic and long-term viability of electric vehicles in India will not be assessed by the study.

Despite these limitations, the study will provide valuable insights into consumer perception towards electric cars in India and offer recommendations for promoting their adoption, which can contribute to the development of a more sustainable and efficient transportation system in India.

CHAPTER-2

2. LITERATURE REVIEW

Due to their potential to lower greenhouse gas emissions, improve air quality, and increase energy security, electric cars are growing in popularity as an alternative to conventional petrol and diesel vehicles. But there hasn't been much of an uptake of electric vehicles in India, mostly because of things like high upfront costs, a short range, a lack of infrastructure for charging, and poor customer knowledge and acceptability.

To better understand how Indian consumers feel about electric cars, several studies have been done. According to a survey by Ramanathan et al. (2017), Indian customers had a low level of knowledge and understanding about electric automobiles, with the majority of them believing that they were expensive and had a short range. The study also showed that Indian consumers were worried about the accessibility of charging infrastructure and the calibre of the after-sales experience.

Another study by Singh and Choudhary (2019) looked into other factors influencing the propensity to buy electric cars in India. The survey discovered that the most important elements influencing consumers' decisions to buy an electric car were price, driving range, and charging infrastructure. The report also made the case for the importance of government policies and incentives, such as tax breaks and subsidies, in encouraging the use of electric vehicles in India.

The factors that influence Indian customers' acceptance of electric vehicles were examined in Joshi et al.'s (2020) study, which also included personal values, attitudes, and beliefs. The survey found that social pressure and environmental concerns had the biggest beneficial effects on consumers' inclinations to purchase electric vehicles. The report also suggested that programs and initiatives to increase public awareness could encourage Indian consumers to purchase electric automobiles.

Research on the acceptability of electric cars by Indian consumers was carried out by Kumar et al. in 2021. According to the report, buyers were worried about price, range anxiety, and a lack of infrastructure for charging. According to the study, people were more inclined to purchase electric vehicles if they had access to information and education about them as well as if the government offered incentives and regulations to encourage their purchase.

In Tamil Nadu, India, Raja and Venkatesan (2021) performed a survey to see how people felt about electric vehicles. According to the research, customers expressed mixed feelings about

electric vehicles in general and were concerned about their high price and short range. According to the survey, customers were more inclined to purchase electric vehicles if they had access to a charging infrastructure, believed that such vehicles were environmentally good, and were offered government incentives to encourage such purchases.

Other studies have looked into how well government programs and incentives have worked to promote the adoption of electric cars in India. Mukherjee and Bala (2019) did a study to evaluate the impact of the FAME program the adoption of electric vehicles in India. The plan, according to the research, had a favorable influence on the sales of electric vehicles in India, but the effect was only moderate due to the scarcity of charging facilities and the high initial cost of electric vehicles.

Overall, the research indicates that pricing, driving range, charging infrastructure, and environmental concerns all have an impact on how Indian consumers perceive electric automobiles. According to the literature, infrastructural improvements, public awareness efforts, and government policies and incentives could all be vital in boosting the use of electric vehicles in India. The available research indicates that although Indian customers have a favourable view of electric vehicles, pricing worries, range anxiety, and a shortage of charging stations pose substantial obstacles to their uptake. The research also stresses the significance of government incentives and legislation, consumer education, and consumer awareness in fostering the adoption of electric vehicles in India. Literature also suggests that status and environmental concern are social and cultural elements that affect how consumers see electric automobiles.

2.1. Definition and characteristics of Electric cars

Electric cars, commonly referred to as electric vehicles (EVs), are motorized automobiles that use rechargeable batteries to power their electric motors rather than typical petrol or diesel engines. Battery electric cars (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs) are some of the various forms of EVs. Due to worries about air pollution and climate change, electric vehicles have become more and more popular in recent years. Compared to conventional petrol or diesel vehicles, EVs create zero or very little emissions, making them a more ecologically responsible choice. Electric motors are also far more energy-efficient than combustion engines and require less energy to run. Beyond reducing your influence on the environment, driving an EV has a number of other advantages. For instance, because electricity is less expensive than gasoline, EVs often have lower operational

expenses than gasoline-powered cars. Additionally, because electric motors have fewer moving parts and don't create engine noise or vibrations, they are often considerably quieter and smoother to drive than conventional cars. Even while an EV may initially cost more than a gasoline-powered car of similar size, the price is coming down as technology advances and manufacturing levels rise. Many governments and utilities also provide incentives and rebates for buying EVs, which can help defray the cost. The ownership of an EV is not without its difficulties, though. Range anxiety, or the worry that you won't have enough power when you need it, is a problem. Although this is changing as battery technology advances, electric vehicles usually have a shorter range than gasoline-powered cars. Those who do not have access to charging stations at home or at work may also be concerned about the infrastructure for charging electric vehicles.

Fully electric vehicles without an internal combustion engine are known as battery electric vehicles (BEVs). They need to be charged using an outside power source, like a home outlet or a charging station. BEVs have the potential to be the most ecologically friendly and energy-efficient kind of electric vehicle.

Plug-in hybrid electric vehicles (PHEVs) are hybrids that can run on both petrol or diesel and electricity and can be charged from an external power source. PHEVs can only travel a certain distance on electric power before switching to an internal combustion engine.

Hybrid electric vehicles (HEVs) combine the power of an internal combustion engine (combustion engine) with an electric motor to increase fuel economy.

2.2. The characteristics of electric cars include:

- Environmental friendliness: When compared to conventional petrol and diesel vehicles, electric automobiles have the potential to dramatically reduce greenhouse gas emissions and enhance air quality.
- Energy efficiency: Electric cars use up to 60% of the electrical energy from the grid to power the vehicle, whereas regular petrol automobiles use just 20% of the energy in petrol. This makes electric cars more energy-efficient than conventional cars.
- Lower operating expenses: Because electric automobiles are dependent on electricity, they have lower running costs than conventional vehicles because they require less maintenance, have fewer moving parts, and use less fuel.

- Limited range: Despite improvements in battery technology and the expansion of the infrastructure for charging, the driving range of electric cars is still relatively short when compared to those of conventional vehicles.

- Higher initial expenses: Due to the price of the batteries and other components, electric automobiles often have higher initial prices than conventional vehicles. However, as technology develops and economies of scale are attained, this cost is anticipated to decline.

- Electrical energy from the battery is transformed into motion by an electric motor, which powers electric vehicles.

- Rechargeable batteries, used to power the electric motor of electric vehicles, provide their power.

- Plugging an electric vehicle into a charging station or a wall socket will allow it to be refueled. Additionally, some electric vehicles offer regenerative braking, which transforms the kinetic energy produced during braking into electrical energy that can be stored in the battery.

- The amount of distance an electric vehicle can drive on a single charge is referred to as its range. Depending on the brand and model as well as elements like driving style and temperature, the range of electric cars can vary significantly.

- No internal combustion engine means that electric vehicles have zero exhaust emissions. However, depending on where the power comes from and how it is utilised to charge the automobile, the emissions connected with its generation may change.

- A lower centre of gravity and a streamlined body to increase aerodynamics and economy are common aspects of electric cars' distinctive designs.

Electric cars have the potential to drastically cut greenhouse gas emissions, improve air quality, lower operating costs, and advance energy efficiency technologies. They represent the state-of-the-art and are fast advancing. Although the adoption of electric cars is currently constrained by issues like cost, range anxiety, and charging infrastructure, they represent a promising technology for lowering emissions and enhancing sustainability in the transportation industry. Electric cars are becoming more and more popular due to these traits, which make them a more environmentally friendly and effective form of transportation. Electric vehicles are becoming more accessible and economical as technology advances, and they are expected to play a bigger part in transportation in the future.

2.3. Overview of the Indian electric automotive industry

The Indian electric vehicle market is expanding rapidly but is still in the early stages of growth compared to other countries. By 2030, his 30% of all new cars sold in India should be electric, according to the government's ambitious target for electric vehicle deployment.

Tata Motors, Mahindra & Mahindra and MG Motors are his three big names in the Indian electric vehicle market. Several other foreign companies have also entered the country. Governments offer financial incentives, such as tax breaks and other financial incentives, to both manufacturers and consumers to encourage the use of electric vehicles. Lack of charging infrastructure is one of the biggest problems for the electric vehicle sector in India. The government has announced plans to install charging stations across the country, but infrastructure is still under construction and range concerns remain a major concern for potential EV owners.

Despite these obstacles, the Indian electric vehicle market is expected to grow rapidly in the coming years due to increasing environmental awareness, government support and technological advancements. According to many experts, the future of the Indian automotive industry will include a large number of electric vehicles.

2.4. Drivers and Barriers to electric car adoption in India

There are several drivers and barriers to electric car adoption in India. Some of the key drivers are:

• Government policies and incentives: To promote the use of electric vehicles, the Indian government has enacted a number of laws and programs. Subsidies, tax breaks, and other financial incentives are part of this for both consumers and manufacturers.

• Environmental Issues Demand for electric vehicles is driven by growing concerns about climate change and air pollution. These issues are of increasing concern. Electric vehicles emit fewer greenhouse gases and pollutants than conventional gasoline and diesel vehicles.

• Fuel cost savings: Electric vehicles run on electricity, which is cheaper than gasoline or diesel fuel, so they have lower running costs than conventional vehicles. • Technological advances:

Improvements in battery technology have made electric vehicles longer range, faster charging times, and more convenient for everyday use.

However, there are also some barriers to EV adoption in India, including:

• High acquisition cost: Electric vehicles tend to be more expensive than conventional vehicles, so the cost of adopting an electric vehicle can be a significant barrier for many.

• Lack of charging infrastructure: EV adoption in India is greatly hampered by a lack of charging infrastructure. Most charging stations are located in cities, but refueling conventional vehicles still takes much longer.

• Many consumers are concerned that the limited range of electric vehicles may make it difficult to travel long distances between charges.

 • Consumer ignorance: Many Indians are still unaware of the benefits of electric vehicles and there is a common misconception about how electric vehicles work and how they are maintained.

Overall, despite the many factors driving or hindering EV deployment in India, growing environmental concerns and government support are expected to fuel the industry's rapid expansion in the coming years. .

2.5. Previous studies on Consumer perception towards electric cars in India and Globally

Several studies have been conducted on consumer perception of electric cars in India and globally. Some of the key findings are:

- According to a 2020 Deloitte survey, 60% of Indian consumers are open to the idea of buying an electric car within the next five years. The study also discovered that environmental concerns and fuel cost savings were the top reasons influencing their choice to purchase an electric vehicle.

- According to a 2019 J.D. Power research, high costs, a shortage of charging stations, and a short driving range are the main issues Indian buyers have with electric vehicles.

- According to a 2021 Accenture global survey, 41% of consumers in India are willing to spend more for an electric vehicle than 36% of consumers worldwide. The study also

discovered that buyers in India are more interested in electric cars with greater range and quicker charging times.

- The adoption of electric vehicles was determined to be mostly influenced by customer awareness and education, according to a 2020 global assessment by McKinsey & Company. According to the survey, educating consumers about electric vehicles and their advantages could boost interest and demand.

Altogether, these studies show that despite the growing public interest and willingness to consider them, there are still significant barriers to EV adoption in India. These barriers include high cost, lack of charging infrastructure, and short range.

CHAPTER-3

3. RESEARCH METHODOLOGY

The research technique is descriptive. Using an online questionnaire, primary data from a sample group of 101 people is gathered. The hypothesis is examined using the Chi-square test.

Descriptive research aims to describe and explore a phenomenon or situation, without attempting to manipulate or control any variables. In this case, the research aims to describe and explore consumer perception towards electric cars in India, without attempting to manipulate any variables or test any hypotheses. The research methodology involves collecting data through surveys and focus group discussions, analyzing the data to identify patterns and themes, and drawing conclusions based on the findings. Therefore, it can be classified as descriptive research.

The following are the steps involved in the research methodology:

• literature review:

Reviewing the material that is already available on Indian consumers' impressions of electric vehicles is the first step. This will enable us to comprehend the present status of the field's research and spot any gaps or problems that require further investigation.

• Survey proposal:

The survey helps collect quantitative data from a representative sample of Indian consumers. The survey includes questions about consumer perceptions of electric vehicles, factors influencing purchasing decisions, and barriers to adoption.

• Focus group discussion:

Focus group discussions are conducted with a small consumer sample to better understand consumer attitudes, beliefs and experiences regarding electric vehicles. These discussions are semi-structured and open-ended to allow participants to freely express their opinions and experiences.

• Data collection:

Data is collected through online surveys and face-to-face focus group discussions. Surveys are distributed through an online platform, and focus group discussions are held in convenient locations.

• Data analysis:

Data collected from surveys and focus group discussions are analyzed using statistical techniques and qualitative content analysis, respectively. The purpose of the analysis is to identify patterns, trends, and themes in data. • Results and conclusions:

Findings obtained from data analysis are used to draw conclusions regarding consumer perceptions of electric vehicles in India. The findings are presented in the form of a report with recommendations for policymakers and automakers to boost EV adoption in India.
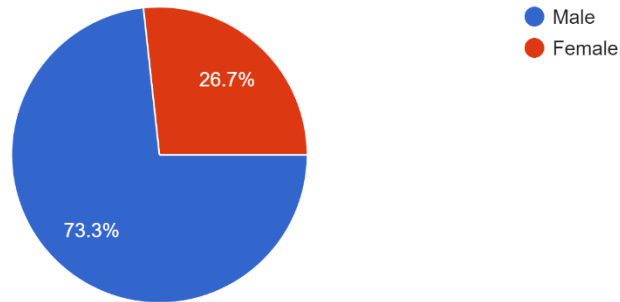
3.1.Data Analysis and Interpretation

The sample size is 101 out of which 73.3% are male and 26.7% are female.

28.7% of respondents fall under age group of 18-25 years, 44.6% in 25-30 years, 20.8% in 30-40 years, 5% in 40-50 years and 1% are 50 and above.

Gender
101 responses

- Male
- Female

26.7%

73.3%

Age
101 responses

- 18-25
- 25-30
- 30-40
- 40-50
- 50 and above

20.8%

44.6%

28.7%
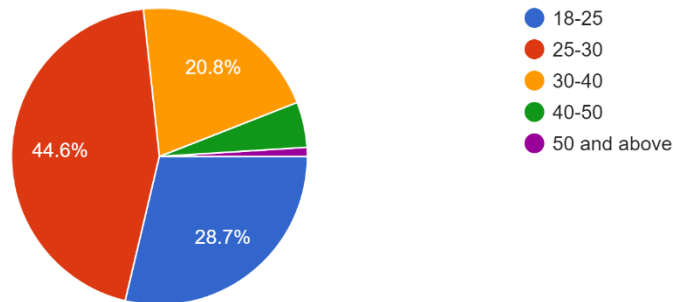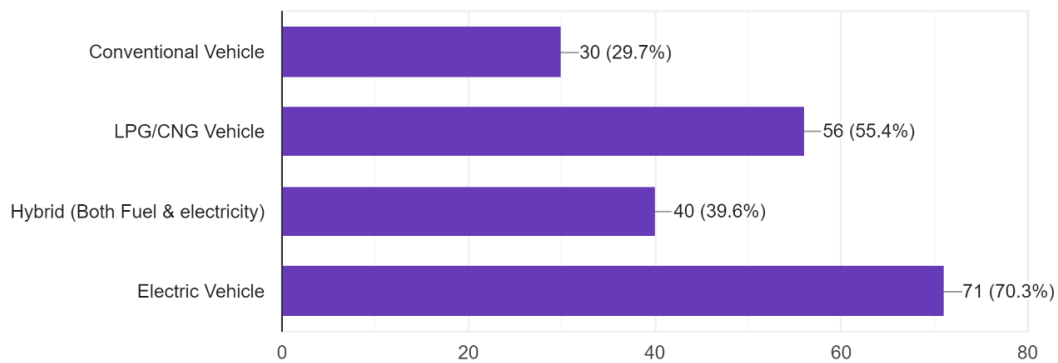
When asked regarding choice of vehicle, respondents majorly selected **Electric (70.3%)** and **LPG/CNG (55.4%)** vehicles.

Which of the following would you prefer?
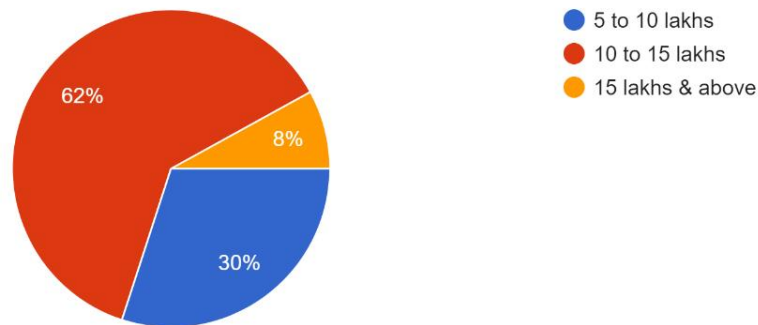101 responses

Category	Value
Conventional Vehicle	30 (29.7%)
LPG/CNG Vehicle	56 (55.4%)
Hybrid (Both Fuel & electricity)	40 (39.6%)
Electric Vehicle	71 (70.3%)

How much should be the cost of electric cars in the Indian Market?
100 responses

- ● 5 to 10 lakhs
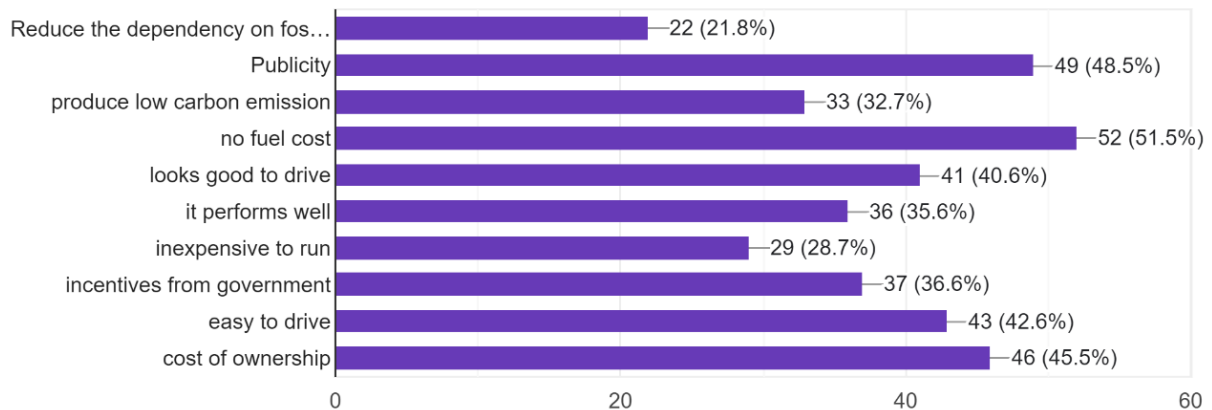- ● 10 to 15 lakhs
- ● 15 lakhs & above

62%

8%

30%

Cost being an important factor, the customer expects Electric Cars in **10-15 lakhs.**

Survey respondents show that they tend to think electric vehicles are expensive. Lack of knowledge about government incentives and subsidies, lack of electric vehicle models on the market, or the idea that electric vehicles are high-end products may contribute to this attitude.

Reasons for selecting an Electric Car?
101 responses

Reason	Count (%)
Reduce the dependency on fos…	22 (21.8%)
Publicity	49 (48.5%)
produce low carbon emission	33 (32.7%)
no fuel cost	52 (51.5%)
looks good to drive	41 (40.6%)
it performs well	36 (35.6%)
inexpensive to run	29 (28.7%)
incentives from government	37 (36.6%)
easy to drive	43 (42.6%)
cost of ownership	46 (45.5%)

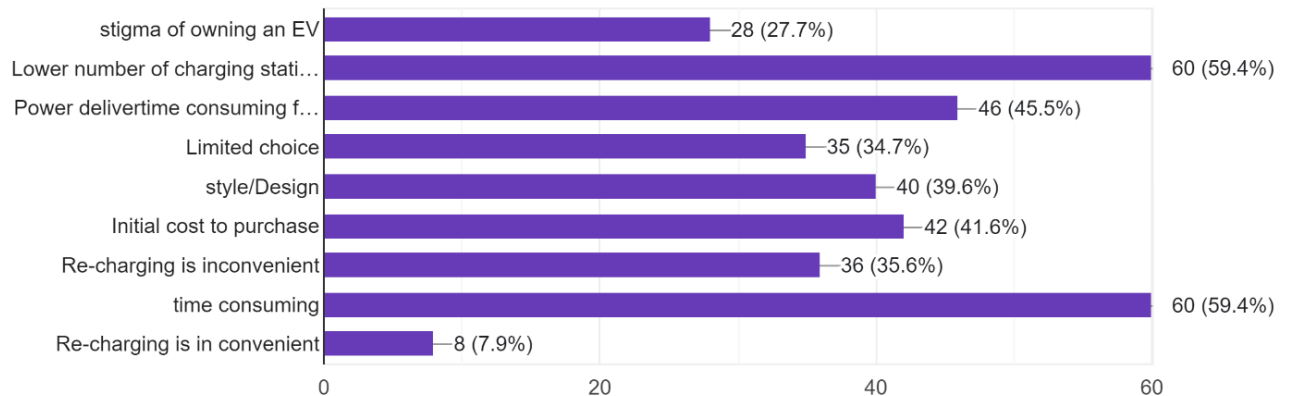**No Fuel Cost (51.5%)** being the reason for selecting an Electric Car shows that it is a significant factor for potential electric car buyers in India. Electric automobiles, in contrast to traditional petrol or diesel vehicles, run on battery power and don't require any fuel. Given the escalating cost of fuel in India, this can result in significant cost savings for car owners.

Drawbacks of an Electric Car?

101 responses

| Category	Value
stigma of owning an EV	28 (27.7%)
Lower number of charging stati…	60 (59.4%)
Power delivertime consuming f…	46 (45.5%)
Limited choice	35 (34.7%)
style/Design	40 (39.6%)
Initial cost to purchase	42 (41.6%)
Re-charging is inconvenient	36 (35.6%)
time consuming	60 (59.4%)
Re-charging is in convenient	8 (7.9%)

59.4% of respondents state a low number of charging stations is the biggest drawback, The broad adoption of electric vehicles depends on the availability of a dependable and convenient charging infrastructure, and fewer charging stations may have a substantial influence on sales of electric vehicles. The absence of a reliable charging infrastructure in India is a significant barrier to the commercial expansion of electric vehicles. In India, there were just 1,800 public charging stations as of December 2020, according to research by the Society of Manufacturers of Electric Vehicles (SMEV). This is much fewer than the expected demand for 4,80,000 charging stations by 2026.

The same **59.4% of** respondents states that recharging time is also a major drawback.

In summary, a lower number of charging stations can have a significant impact on electric car sales, and addressing this issue is crucial for the growth of the electric vehicle market in India.

Do you think it is too early for electric cars, that they are not reliable enough?
101 responses
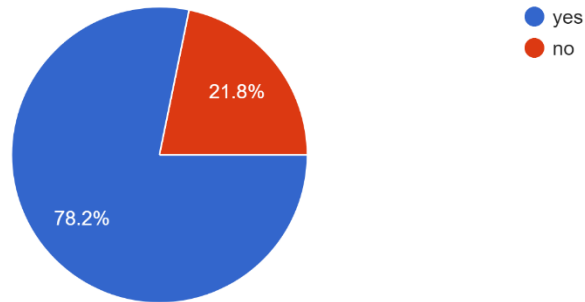
The majority of respondents believe that it is too soon for EVs to be introduced, given the infrastructure and development of electric vehicles in India.

Respondents were questioned regarding the numerous elements that affect a vehicle buyer's decision. The majority of respondents evaluate style, size, and brand as having a relatively strong influence, while they rate performance, fuel efficiency, pricing, technical features, and environmental friendliness as having a strong influence.
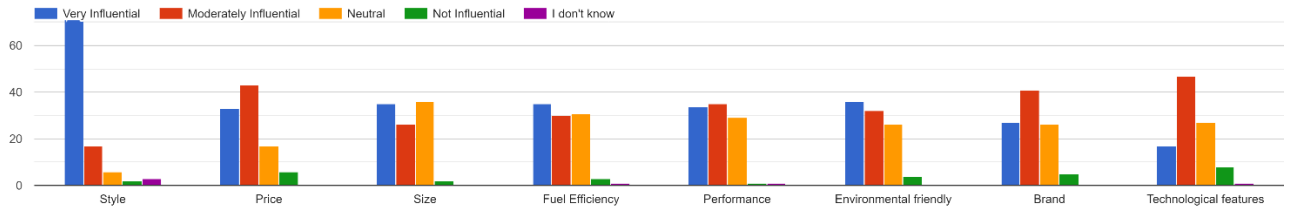
3.2. HYPOTHESIS TESTING

Test-1 Relationship between Choice of Car and Gender

H0:- There is no difference of gender on the choice of vehicle

H1:- There is significant difference of gender on the choice of vehicle

ACTUAL					
Count of Vehicle	Column Labels				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Male	12	15	18	29	74
Female	0	3	8	16	27
Grand total	**12**	**18**	**26**	**45**	**101**

Expected					
Count of Vehicle	Column Labels				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Male	11.65411611	12.942697298	16.26479128	27.24549728	74
Female	0.42156265	6.136165126	9.82647915	18.83124795	27
Grand total	**12**	**18**	**26**	**45**	**101**

P Value   0.000315765

P value is smaller than 0.05 thus we reject H0 & accept H1 i.e. there is a significant difference in gender on the choice of vehicle.

Test-2 Relationship between Choice of Vehicle and Income

H0:- There is no significant difference in the income group of people and their choice of vehicle.

H1:- There is a significant difference in the income group of people and their choice of vehicle.

ACTUAL					
Count of Vehicle	Column Labels				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Up to 5 lakh	2	6	15	6	29
5-10 lakhs	2	9	18	7	36
10-20 lakhs	1	6	9	5	21
20 lakhs and above	0	3	5	7	15
Grand Total	**5**	**24**	**47**	**25**	**101**

Expected					
Count of Vehicle	Column Labels				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Up to 5 lakh	1.23649254	6.36541876	14.6561479	5.33541258	29
5-10 lakhs	2.53987269	8.73214856	18.4364872	6.46245871	36
10-20 lakhs	1.16547926	5.69431961	9.76268812	6.66952486	21
20 lakhs and above	0.12468749	3.47916819	4.33654479	7.76325487	15
Grand Total	**5**	**24**	**47**	**25**	**101**

P Value	**0.53256638**

P value is greater than 0.05, we do not reject H0, but this does not necessarily imply that we should accept H0. We can conclude that H0 is true or false but our experiment and statistical test were not "strong" enough to lead to a p-value lower than 0.05.

3.3. CHI-SQUARE TEST-1

Gender * Which of the following would you prefer? Crosstabulation

| | | | Which of the following would you prefer? | | | | Total |
			Conventional Vehicle	Electric Vehicle	Hybrid (Both Fuel & electricity)	LPG/CNG Vehicle	
Gender	Female	Count	8	0	4	15	27
		Expected Count	8.0	1.1	4.5	13.4	27.0
	Male	Count	22	4	13	35	74
		Expected Count	22.0	2.9	12.5	36.6	74.0
Total		Count	30	4	17	50	101
		Expected Count	30.0	4.0	17.0	50.0	101.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.821[a]	3	.610
Likelihood Ratio	2.846	3	.416
N of Valid Cases	101		

a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is 1.07.

We can see that the crucial value for a significance level of 0.05 is 3.84 by looking at a chi-square distribution table with one degree of freedom. The fact that 1.821 is smaller than 3.84 leads us to the conclusion that the outcome is not statistically significant.

This indicates that there is no evidence to support the notion that respondents' preferences for cars and their gender are significantly related. In other words, it doesn't seem as though gender has an impact on the respondents' favourite automobile type. The sample size (101 instances) may have an impact on this outcome, therefore it's crucial to keep that in mind. A higher sample size could provide a different conclusion.

Bar Chart
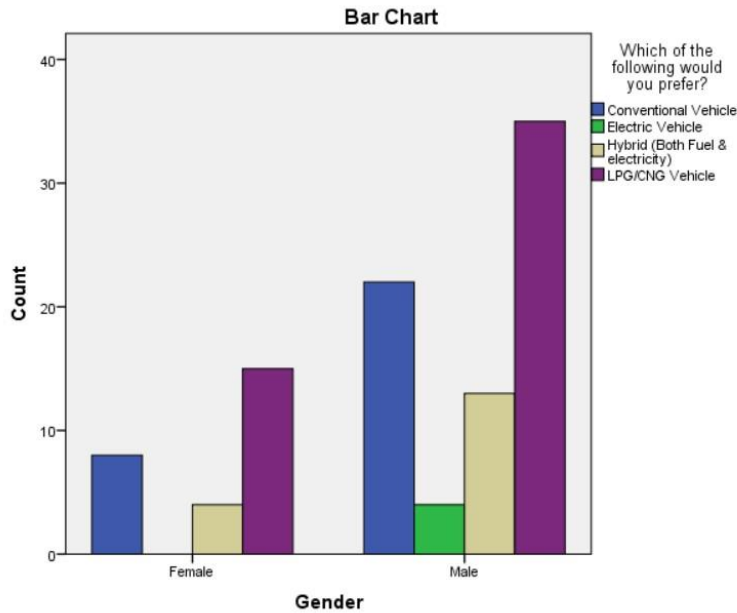
CHI-SQUARE TEST-2

Age * Which of the following would you prefer? Crosstabulation

| | | | Which of the following would you prefer? | | | | |
			Conventional Vehicle	Electric Vehicle	Hybrid (Both Fuel & electricity)	LPG/CNG Vehicle	Total
Age	18-25	Count	7	4	7	11	29
		Expected Count	8.6	1.1	4.9	14.4	29.0
	25-30	Count	14	0	8	23	45
		Expected Count	13.4	1.8	7.6	22.3	45.0
	30-40	Count	7	0	2	12	21
		Expected Count	6.2	.8	3.5	10.4	21.0
	40-50	Count	2	0	0	3	5
		Expected Count	1.5	.2	.8	2.5	5.0
	50 and above	Count	0	0	0	1	1
		Expected Count	.3	.0	.2	.5	1.0
Total		Count	30	4	17	50	101
		Expected Count	30.0	4.0	17.0	50.0	101.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.134[a]	12	.234
Likelihood Ratio	16.438	12	.172
N of Valid Cases	101		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .04.

The contingency table's minimum expected count of 0.04 suggests that the predicted count is extremely low for some of the cells. The validity of the results may be impacted, which might occasionally be a cause for worry.

Bar Chart

3.4. CORRELATION HEAT MAP

Corelation of the numeric features of electric vehicle
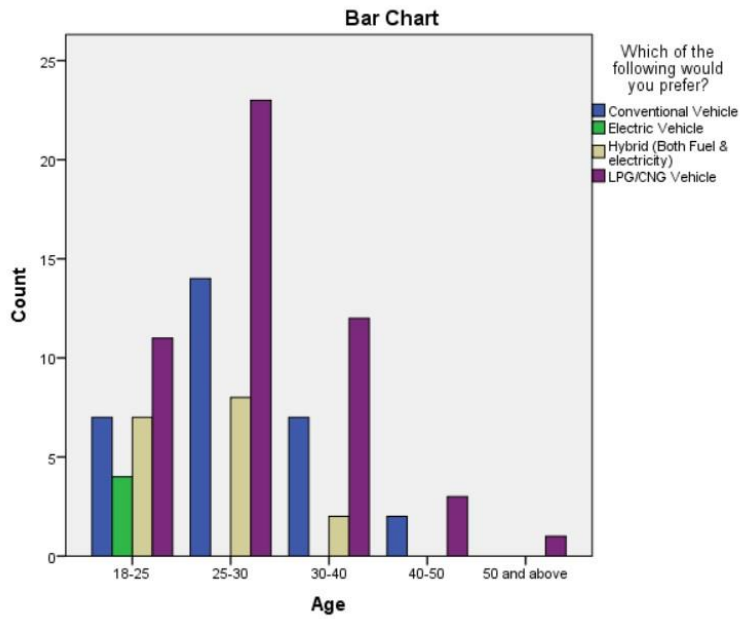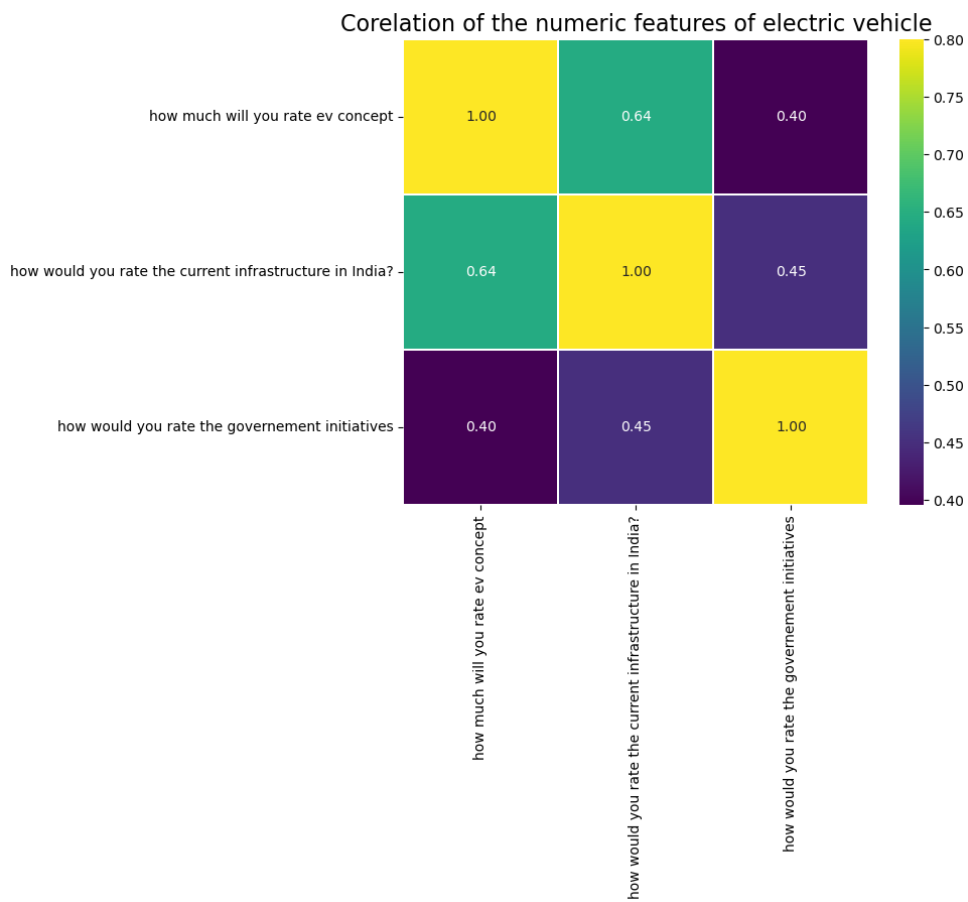
The relationship between variables in a dataset is graphically represented by a correlation heat map. Each cell in the heat map illustrates the correlation between two variables and is represented by a color-coded matrix.

According to the heat map, there may be a significant positive association between income and a desire for electric vehicles, meaning that those who earn more are more inclined to do so. Additionally, it can reveal a link between age and preference for electric vehicles that is negative, meaning that younger individuals are more likely to favour electric vehicles.

3.5. BRAND PREFERENCE

Which car brand will you go for , if you buy an Electric Car?
101 responses
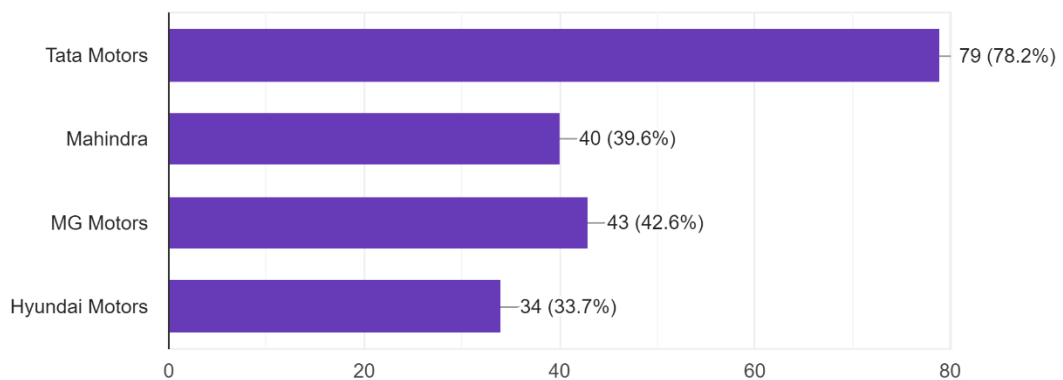
- One of India's top automakers, **Tata Motors (78.2 %),** has made significant recent investments in the development of electric car technology. The business has introduced many electric car models, including the Tata Tigor EV and the Tata Nexon EV, which have been well-received by both consumers and industry professionals.

Additionally, Tata Motors has built a solid brand name in India by concentrating on offering customers high-quality, reasonably priced vehicles. The firm's dedication to sustainability and electric mobility may also contribute to its appeal to responders who are enthusiastic about electric cars.

It is crucial to keep in mind, nevertheless, that each respondent's preference for Tata Motors may change based on their individual preferences, familiarity with various companies, and other aspects like price, features, and performance.

It would be helpful to further investigate the factors influencing respondents' preference for Tata Motors and gauge how they view other Indian producers of electric vehicles. With the use of this information, automakers can better understand consumer preferences and create marketing plans that would effectively encourage the use of electric vehicles in India.

- **MG Motors** is gaining popularity among Indian consumers, according to the **42.6%** of respondents who said they preferred the brand, despite the fact that it is a relative newcomer to the electric vehicle industry.

As I already indicated, MG Motors introduced the MG ZS EV, its first electric vehicle model, in India at the beginning of 2020. Customers and industry professionals have praised the MG ZS EV for its performance, features, and value for money. In addition, MG Motors has been actively pushing sustainability and electric mobility, which may have influenced respondents' preference for the brand.

It is important to remember that preferences for various automakers may also depend on elements like cost, effectiveness, features, and availability. It would therefore be beneficial to look into the factors that led to the respondents' preference for MG Motors and to gauge how they view other Indian producers of electric vehicles.

Additionally, there is a lot of room for new businesses and established players to gain market share because the Indian electric vehicle market is still in its early phases. Automobile producers may therefore encourage the adoption of electric vehicles in India by using the knowledge they have gathered about consumer preferences to create effective marketing campaigns and enhance their product lines.

Both the Tata Nexon EV and the MG ZS EV are fantastic electric vehicles with lots of features and advantages for buyers. The Tata Nexon EV has a price advantage over the MG ZS EV since it is less expensive. The MG ZS EV, however, has a more potent electric powertrain and a greater driving range.

The decision between electric vehicles from Tata Motors and MG Motors would ultimately be based on personal preferences, driving requirements, financial constraints, and availability. Customers are advised to test drive both vehicles and evaluate them in light of their unique demands before making a purchasing choice.

- With only **39.6%** of respondents indicating a preference for **Mahindra Motors (39.6 %)**, it's possible that the brand isn't as well-known among Indian consumers as Tata Motors and MG Motors when it comes to electric vehicles.

With a variety of electric vehicle models in its lineup, including the Mahindra e2oPlus and the Mahindra eVerito, Mahindra & Mahindra is a well-known automaker in India. Tata Motors and MG Motors, which have introduced well-known models like the Tata Nexon EV and the MG ZS EV, respectively, have been the company's main competitors in the electric car industry.

Mahindra Motors may not have received as much support from respondents for a variety of reasons, including pricing, performance, and feature considerations. The driving range, power, and features of Mahindra's electric car models, for instance, may not be as competitive as those of other brands, according to some customers. Customer opinions of the brand may also be influenced by the accessibility of charging infrastructure and post-purchase support.

It is important to keep in mind that the preference for different automakers may change depending on the sample size, demography, and other factors. Therefore, further study is necessary to comprehend the underlying causes of consumer preferences and to spot chances to increase the uptake of electric vehicles in India.

- **Hyundai Motors (33.7%)** may not be as well-liked by Indian consumers as Tata Motors and MG Motors when it comes to electric vehicles, according to the **33.7%** of respondents who said they preferred the brand.

With well-known vehicles like the Hyundai i20, Hyundai Creta, and Hyundai Verna, the South Korean multinational automaker Hyundai Motor Company has been doing business in India for a while. The Hyundai Kona Electric, a model of the company's electric vehicle line-up, was introduced in India in 2019.

The Hyundai Kona Electric has, however, encountered issues with pricing and availability in the Indian market, which may have influenced respondents' lesser preference for Hyundai Motors. Priced between Rs. 23 and 24 lakhs (ex-showroom), the Hyundai Kona Electric is much more expensive than some of the other electric vehicle models made available by rivals like Tata Motors and MG Motors. Customers' opinions of the brand may also be influenced by the accessibility of electric vehicle aftermarket services and charging infrastructure.

It is significant to note that consumer preferences for various automakers might change depending on a range of variables, including demographics, marketing tactics, and consumer preferences. Consequently, in order to comprehend, it is essential to carry out more investigation. Since many customers are still ignorant of the technology and choices available, brand preference for electric vehicles in India is still in its infancy. However, as more automakers release electric models and as the infrastructure for charging increases, it is anticipated that the market for electric cars will expand and more companies will enter the market.

CHAPTER-4

4. DISCUSSION AND IMPLICATIONS

4.1. Key Findings

- When consumers think about buying electric cars, price plays a big role. Many survey participants indicated a preference for electric vehicles with a price tag between Rs. 10 and Rs. 15 lakhs, citing the cost as a deterrent to adoption. This implies that in order to get more customers, automakers may need to concentrate on creating models of affordable electric cars.

- A crucial element in the adoption of electric vehicles is the availability of charging infrastructure. There may be a need for more charging stations to be established in the respondents' areas if they listed the accessibility of charging infrastructure as a deciding factor in their choice to acquire an electric vehicle.

- Customers heavily weigh brand reputation while making purchasing decisions. The significant preference for Tata Motors and MG Motors implies that consumers may be more willing to trust reputable, well-known car brands when it comes to electric automobiles due to their reputation for quality and dependability.

- Customers also place a high value on safety and environmental impact. High safety ratings and the perception of being environmentally friendly may influence customers' decisions to purchase electric vehicles.

- These conclusions generally imply that in order to encourage the adoption of electric vehicles in India, automakers and decision-makers should concentrate on creating models of affordable electric vehicles and investing in charging infrastructure. To boost

consumer confidence, they'll also need to address issues with environmental impact, safety, and brand reputation.

- Concerning customers in India, particularly those in rural and semi-urban regions, there may be a lack of awareness and information regarding electric vehicles.

- Benefits allegedly received: Consumers who are aware of electric vehicles could believe that they are environmentally benign, low-maintenance, and ultimately more affordable. The adoption of electric vehicles might be hampered by worries about range anxiety and the availability of charging stations.

- Brand preference: When it comes to electric automobiles, consumers may favour well-known automakers like Tata Motors, Mahindra & Mahindra, and Hyundai. But brand preference may change when additional companies come into the market.

- Differences based on demographics: Based on criteria such as age, income, education, and region, there may be variations in how electric cars are seen and adopted.

- Government initiatives: The availability of government initiatives, such as subsidies, tax breaks, and exemptions, may have a favourable impact on how customers see and use electric vehicles.

- Infrastructure for charging: Accessibility to and availability of infrastructure for charging may play a significant role in India's decision to adopt electric vehicles. The lack of a trustworthy and extensive charging infrastructure can make people think less favourably of electric vehicles as a transportation alternative.

4.2. Implications for electric car manufacturers and marketers

The study's conclusions have a number of ramifications for those that produce and promote electric vehicles, including:

- When it comes to buying electric automobiles, price is a top concern for buyers. As a result, producers must concentrate on creating electric car models that are inexpensive and available to a larger spectrum of buyers.

- Adoption is also significantly hampered by range anxiety and a lack of charging infrastructure. The number of charging stations in strategic locations must also be increased. Manufacturers must spend in research and development to create technologies that can offer a greater range on a single charge.

- According to the poll, respondents picked Tata Motors as their preferred brand of electric vehicles. This indicates that Tata Motors has succeeded in becoming the market leader for electric vehicles in India.

- In terms of environmental advantages, cheap maintenance costs, and technological improvements, consumers have a favourable opinion of electric vehicles. To help consumers form a favourable opinion of electric automobiles, manufacturers should highlight these advantages in their marketing campaigns.

- Online research was shown to be the most significant information source for people thinking about buying electric cars. Manufacturers should therefore concentrate on developing a strong online presence and offering pertinent information on their websites and social media channels to inform consumers about electric automobiles.

- Overall, the results indicate that in order to enhance the adoption rates of electric cars, electric car makers and marketers should concentrate on addressing the main adoption hurdles, developing brand awareness and trust, and highlighting the benefits of electric automobiles.

4.3. Suggestions for Future Research

• Long-term studies can be conducted to monitor the evolution of consumer behaviour and acceptance of EVs in India.

• Comparative studies can be conducted to compare how EVs are seen and used in India.

• Qualitative research can be conducted to learn more about the factors that influence consumer attitudes and behavior toward electric vehicles.

• Government initiatives: Analysing the influence of government initiatives and incentives on Indian consumers' perceptions and adoption of electric vehicles will shed important light on the efficacy of present policies and the necessity of further policy revisions.

• Environmental impact: Researching how Indian customers perceive the environmental effects of electric cars will help researchers better understand how aware consumers are of the benefits of electric cars for the environment and how ready they are to pay more for such automobiles.

• Infrastructure for charging: Researching the impact of charging infrastructure on Indian consumers' perceptions and adoption of electric vehicles will provide possibilities and obstacles for the establishment of a reliable charging network.

5. CONCLUSION

The survey offers information about how Indian customers perceive electric vehicles. According to the research, there are considerable obstacles to the widespread use of electric vehicles, including cost, range anxiety, and a lack of adequate charging infrastructure. When it comes to environmental advantages, cheap maintenance costs, and technological improvements, consumers have a favourable opinion of electric vehicles.

According to respondents, Tata Motors and MG Motors were the two most popular brands of electric vehicles. The report emphasizes the significance of establishing brand recognition and trust in order to increase the adoption of electric vehicles in India. It also emphasizes the significance of cheap pricing, range, and charging infrastructure.

In order to boost adoption rates in India, electric car makers and marketers must concentrate on removing the main obstacles to adoption, emphasizing the benefits of electric automobiles, and establishing brand awareness and confidence. The study makes the case for more investigation on consumer preferences and behaviour with regard to electric vehicles, as well as the influence of incentives and policies from the public sector on their uptake.

6. REFERENCES

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EV Consumer perception

1. Gender

    Mark only one oval.

    ( ) Male

    ( ) Female

2. Age

    Mark only one oval.

    ( ) 18-25

    ( ) 25-30

    ( ) 30-40

    ( ) 40-50

    ( ) 50 and above

3. Which of the following would you prefer?

    Tick all that apply.

    [ ] Conventional Vehicle

    [ ] LPG/CNG Vehicle

    [ ] Hybrid (Both Fuel & electricity)

    [ ] Electric Vehicle

4. How much should be the cost of electric cars in the Indian Market?

    Mark only one oval.

    ( ) 5 to 10 lakhs

    ( ) 10 to 15 lakhs

    ( ) 15 lakhs & above

5.   Reasons for selecting an Electric Car?

Tick all that apply.

- [ ] Reduce the dependency on fossil fules
- [ ] Publicity
- [ ] produce low carbon emission
- [ ] no fuel cost
- [ ] looks good to drive
- [ ] it performs well
- [ ] inexpensive to run
- [ ] incentives from government
- [ ] easy to drive
- [ ] cost of ownership

6.   Drawbacks of an Electric Car?

Tick all that apply.

- [ ] stigma of owning an EV
- [ ] Lower number of charging stations
- [ ] Power delivertime consuming for rechargingy
- [ ] Limited choice
- [ ] style/Design
- [ ] Initial cost to purchase
- [ ] Re-charging is inconvenient
- [ ] time consuming

7.   Do you think it is too early for electric cars, that they are not reliable enough?

Mark only one oval.

- ( ) yes
- ( ) no

8. How influential are the following factors for you when purchasing an Electric Car

Mark only one oval per row.

	Very Influential	Moderately Influential	Neutral	Not Influential	I don't know
Style	⬭	⬭	⬭	⬭	⬭
Price	⬭	⬭	⬭	⬭	⬭
Size	⬭	⬭	⬭	⬭	⬭
Fuel Efficiency	⬭	⬭	⬭	⬭	⬭
Performance	⬭	⬭	⬭	⬭	⬭
Environmental friendly	⬭	⬭	⬭	⬭	⬭
Brand	⬭	⬭	⬭	⬭	⬭
Technological features	⬭	⬭	⬭	⬭	⬭

9. Which car brand will you go for , if you buy an Electric Car?

Tick all that apply.

☐ Tata Motors
☐ Mahindra
☐ MG Motors
☐ Hyundai Motors

10. Average annual income

Mark only one oval.

⬭ 0-5 lakhs

⬭ 5-10 lakhs

⬭ 10-15 lakhs

⬭ 15 lakhs or above

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