An Empirical Study to Find Customer Behaviour for Buying Electric Vehicle With Special Reference To Hyderabad

Submitted by:

Vsyaraju. Ruthvik Raju-MBA Student, vysyarajuruthvikraju08@gmail.comWoxsen University, Hyderabad

G.Tarun sai venkatesh -MBA Student, saitarunvenkatesh12345@gmail.com,Woxsen University, Hyderabad

Maloth.Swathi-MBA Student, Malothswathi03@gmail.com, Woxsen University, Hyderabad

Submitted to:

Dr. Subhadarshini Khatua-Assistant Professor, Woxsen University, Hyderabad

Abstract

Concerns about the state of the environment in the modern day are directly driving an upsurge in the production and distribution of electric automobiles. In 2018, a significant infrastructural change took place in how manufacturers in India perceived electric vehicles. As a result, this thesis aims to investigate the factors that influence the level of commercial success achieved by electric cars in Hyderabad, as well as the customers' intentions towards the purchase of electric vehicles. This research will use a variety of research approaches in order to comprehend the client purchase intention about electric automobiles. First, we will carry out the research using the quantitative approach, and then we will go on to the qualitative investigation. The information will first be gathered by means of questionnaires that will be administered with the assistance of Google Forms, and after that, it will be analysed with the assistance of an appropriate statistical test. The research findings will make it possible for us to understand the existing climate of consumer purchase intentions toward electric vehicles in Hyderabad and reach a conclusion based on that understanding. The existing body of literature on the topic of electric autos in Hyderabad will be the focus of this study, and the major purpose of this research will be to give fresh material relevant to the field.

Keywords - Electric Vehicle, Survey, Questionnaire, Consumer buying behaviour.

1. Introduction

Many businesses in India are worried about the significant rise in urban air pollution. One-quarter of the world's most polluted cities are in India, where 25 of the 100 most populated cities are situated. While many factors may contribute to air pollution in urban areas, the distribution of different mobility options is crucial. Even while transportation accounts for a relatively modest share of the business as a whole, its emissions have a substantial impact. There is solid evidence that air pollution is harmful to human health and the economy. As a result, manufacturing facilities are thinking about methods to lessen their environmental footprint (Swaroop et al., 2022). A number of countries have effectively revised their strategies for exploring and developing cutting-edge technologies to include electric vehicles as a transportation choice. Most crucially, municipal authorities have begun to see electric cars as a viable tool in the fight against smog and other types of urban air pollution. Problem-solving and best-practice strategies with international examples.

As the number of cars on the road is expected to rise to about 2 billion by 2019, there will be an increased demand for vehicles that run on fuels other than gasoline and diesel (Irfan and Ahmad, 2021). In addition to the political and price instability that comes with a country's reliance on imported crude oil, the world's oil reserves are quickly running out. Furthermore, the toxic exhaust from ICEs is harmful to both human and environmental health. The Electric Vehicle Initiative will help get more than 50 million EVs on the highways of the globe by the year 2025. One expert estimates that by 2025, one out of every six new cars sold worldwide will be an electric vehicle. This is a very notable and quick transition toward electric vehicles (Goel, Sharma and Rathore, 2021). This trend has been fuelled by the fact that diesel automobiles in Europe are now outdated due to advancements in battery technology and regulatory moves in China and Europe. India is one of the most polluted countries in the world; thus, the government is trying to find solutions to make life better for its people despite this. In the not-too-distant future, we might make a move to electric vehicles (Bhalla, Ali, and Nazneen, 2018). Officials have the greatest esteem for this mode of transportation because of its numerous benefits, which are increasingly being recognised by the public. Knowing which elements are important drivers and/or hurdles to the widespread adoption of electric vehicles (EVs) and how much-anticipated adoption changes when varied proportions of these features are present is helpful for governments throughout the globe (Neumann et al., 2010). Even more importantly, those in charge of the electricity grid must understand what is prompting the dramatic increase in the popularity of electric vehicles (EVs). With this information, grid operators may better anticipate when it will be necessary to update

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essential infrastructure. Last but not least, electric vehicle producers stand to gain a better grasp of the influence of different aspects, as this will enable them to prioritise the development of the most critical features to aid universal adoption.

1.1 Background

Hybrid automobiles are gaining appeal in a country where subway commutes and bicycle commuting are commonplace. Those who are able to visit Hyderabad or another large city in India are capitalising on the situation. In other cases, costs related to the purchase of new electric cars have been eliminated or significantly reduced in certain regions (Claas et al., 2011). When it comes to getting about town, city dwellers have their pick of a wide variety of two-wheelers, four-wheelers, and even a whole fleet of vehicles. Electronic gadgets need a strong blend of air and electricity to push them. The automotive industry is on edge due to a tough announcement made by India's Minister of Road Transport and Highways in response to the Society of Indian Automobile Manufacturers (SIAM) annual report (Winter, Kunze, Lex-Balducci, 2010). Hearing people's perspectives on the breadth of required assistance and essential approach instruments will be required for developing a strategy.

2. Literature Reviews

The authors of this paper by Munshi, Dhar, and Painuly (2022) argue that there is a large growth in the sales of electric cars globally and that this is leading to a revolutionary shift in the usage of vehicle technology in many countries. The government of Hyderabad is attempting to hasten the widespread adoption of electric vehicles by offering a variety of financial and regulatory incentives, with the hope that this will happen in the medium to long term. However, in order to facilitate the spread of electric vehicles, it is necessary to analyse customer behaviour. By analysing the behaviours of people who could one-day purchase electric vehicles, this research contributes to our knowledge of the characteristics essential to promote demand for EVs in Hyderabad. The city of Hyderabad, located in India, was used as a case study. We employed personal interviews, and discrete choice models were applied to analyse respondents' expressed preferences about a variety of hypothetical situations. Based on the study's findings, it seems that the working people in Hyderabad, with both middle and high incomes, are open to purchasing electric vehicles. However, it was shown that this initial enthusiasm was mainly due to a lack of understanding about the operating cost and specification of EVs among middle-income individuals. Once these were learned, the majority of respondents showed a high level of sensitivity and reassessed their decision. Additionally, it was shown that financial and legislative incentives had a beneficial influence on EV adoption, highlighting the significance of these factors. The estimations derived from this research thus give insights that may be used for the formulation of market strategies and regulatory responses.

According to the findings of this research conducted by Jaiswal et al. (2021), the researchers state that the use of electric vehicles has received popularity as an alternative fuel vehicle to reduce greenhouse gas emissions and energy costs. This empirical research aims to analyse the impact that knowledge about electric vehicles plays in forecasting the intention of consumers to adopt them either directly or indirectly against the background of a market that is now evolving. The research looked at an expanded version of a model called the "Technology Acceptance Model". In light of the results, several implications are presented for promoting the use of electric cars against the background of growing markets for automobiles. Concerning these cognitive phenomena of knowledge, only a small amount of research has been done to investigate the impact of consumers' subjective knowledge in the adoption of electric cars by consumers, especially in developing countries like India. Therefore, the purpose of this

research is to investigate how the level of information that customers have about electric vehicles influences their choice to purchase one in the near future of the Indian zero-emission mobility industry.

2.1 Research Gap

More effort, rather than merely intervention, is needed to facilitate the mainstream adoption of EVs as demand grows. Don't forget to think about the space that exists between your best intentions and your actual actions. The greatest unanswered question in the existing research is customers' knowledge and skill in assessing the relative worth of EVs' monetary advantages and costs. Future research on consumer education strategies might help policymakers, and marketing professionals better understand the value and cost of electric vehicles.

2.2 Research Question

- What technology solutions and improvements may be employed to further the notion of electric vehicle management and sharing in Hyderabad?
- What technical advances and solutions may be used to further the E-mobility idea in Hyderabad?
- What technical breakthroughs and solutions may be employed to develop the idea of the EV charging station?

2.3 Importance of the Study

The findings of the study are likely to have implications for marketing communication and consumer behaviour in addition to their conceptual significance. The results of this study are meant to provide a theoretical framework for future academic investigations while also offering practical advice that businesses and professionals can utilise to improve their client acquisition and retention strategies.

2.4 Research Objectives

- To find consumer behaviour for buying an electric vehicle with context to Hyderabad.
- Determine the level of customer knowledge about electric vehicles.
- Learn about the several government-sponsored electric transportation initiatives in Hyderabad.

3. Research Methodology

This section will provide an overview of the approach used in assessing user attitudes and perceptions with regard to EVs and will go further into the analysis of data gathered from the assessment tool.

3.1 Research Method & Design

This study's foundational data came from a survey sent to customers who had utilised vehicle services. A simple random sample method is utilised to accomplish this data collection objective. To better understand how buyers of electric vehicles think about and make choices about their purchases in connection to different demographic variables, this study takes a descriptive and exploratory research technique, using a survey as its major data-gathering instrument. That's why we're investigating the potential of the electric vehicle market.

3.2 Research Approach

Conducting research requires the development of novel approaches and strategies, the use of specialised methodologies and techniques, and the use of appropriate software for data collection, analysis, and presentation. While the majority of this study is descriptive, it includes some qualitative aspects as a consequence of the wide range of online and offline resources used to compile the data. Surveys will be sent to the staff via Google Forms, other social media, and professional networking sites like LinkedIn.

3.2.1 Collection of Primary Data

The basic data is collected using non-probabilistic convenience sampling, and then the descriptive analysis is conducted. Due to the potential for bias, we were careful to employ closed-ended questions in our research exclusively. The poll was open to consumers from all across the globe. Professionals on LinkedIn cast the bulk of votes, but the poll link was also shared on other social media sites.

3.2.2 Collection of Secondary Data

The primary goal of gathering secondary information is to learn more about the central theme of the situation at hand. The project's content will come from various sources, including books, websites, article databases, and articles from archive periodicals. Emerald, ScienceDirect, IEEE, Frontiers, and Wiley Online Library were used, among others, as sources for these results.

3.2.3 Analysis of Primary and Secondary Data

Since this study will focus on qualitative characteristics, the researchers will use a descriptive approach to collect and analyse their data.

If it is feasible for the research case studies, non-probabilistic convenience sampling might be employed to produce the required databases. We conducted a qualitative study to determine what factors contribute to successful business risk management. To analyse and get insight from your data, you utilise Excel's "Data add-in." Statistics are analysed using Microsoft Excel. Ratings will be assigned using the Likert scale, which will also serve as the backbone of the survey's questions. This will give us a sense of how seriously people take little particulars.

3.2.4 Sample

Participants in this research are from many different countries and regions. The article's principal methodology consists of periodic surveys, from which data are collected using a random sample technique. Only 120 people out of a possible 184 responded to the poll. Overall, this is a tremendous result, equivalent to a response rate of 65.21% of the population.

4. Analysis of Study

In this part, we will review the results of our survey. In all, around 120 answers were collected and analysed for this study. These comments illustrate the breadth of factors at play for EV buyers. The demographic information provided by respondents is shown in the table below. Throughout the survey, participants were given a series of questions designed to elicit certain replies. The findings from this phase are included in the development of a working research hypothesis and the strategy for deducing answers to the study's research questions. You can discover specifics about the poll's questions and respondents in the tables that follow.

4.1 Demographic Result

Table 4.1.1 Data description - Gender demographic details

Characteristic	Frequency	Percent (%)
Gender		
Male	70	58
Female	50	42
Other	0	0
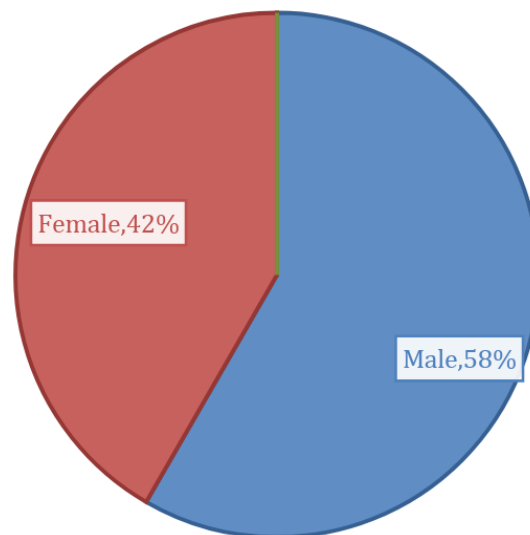
Table 4.1.2 Data description - Age demographic details

Characteristic	Frequency	Percent (%)
Age (Years)		
Below 25	29	24
25-35	60	50
35-45	15	12
45-55	9	8
Above 55	7	6
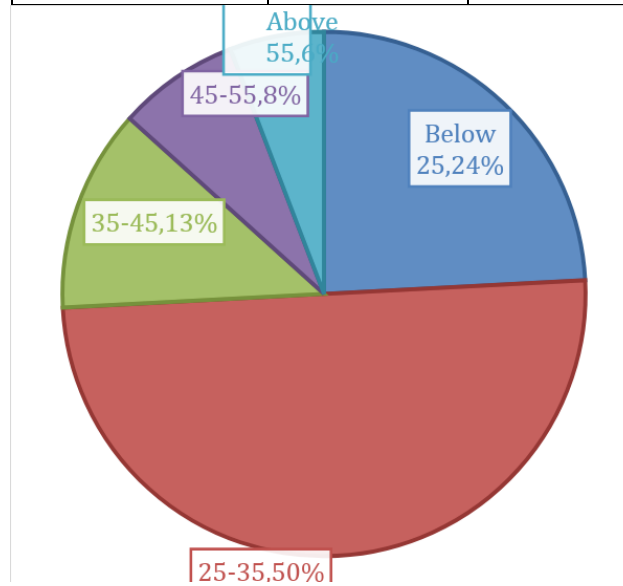
Table 4.1.3 Data description - Education demographic details

Characteristic	Frequency	Percent (%)
Education		
Middle school or below	0	0
High School	1	1
Undergraduate	5	4
Graduate and above	114	95

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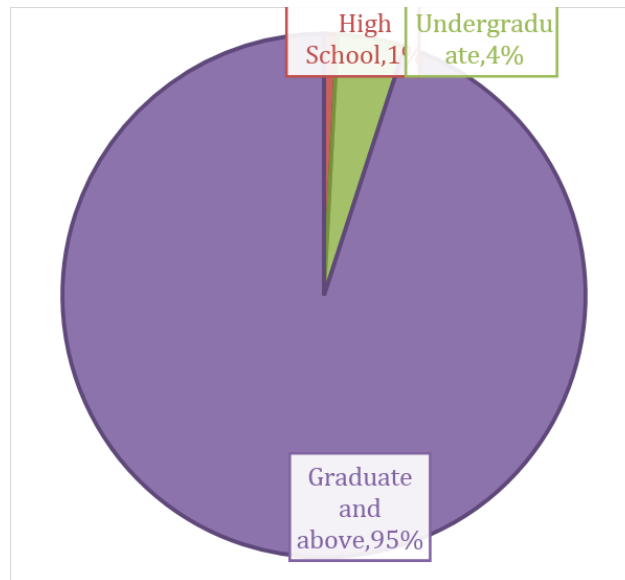
Table 4.1.4 Data description - Occupation demographic details

Characteristic	Frequency	Percent (%)
Occupation		
Business	13	11
Salaried	60	50
Professional	12	10
Other	35	29
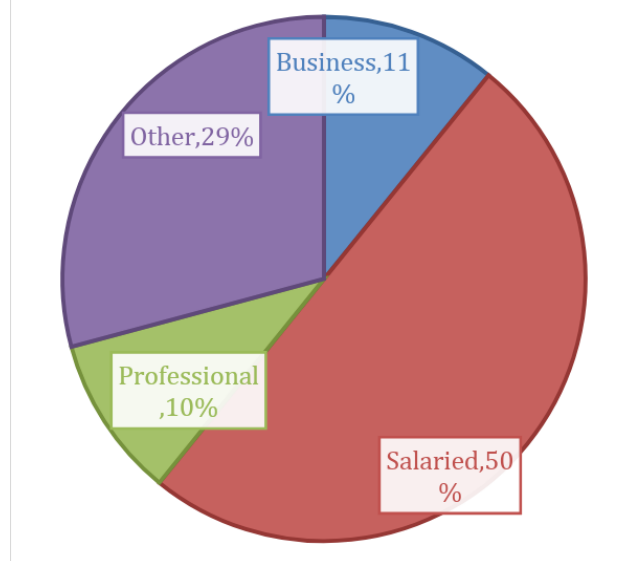
4.2 Survey Questions

Table 4.2.1 On a daily basis, how would you state the traveling distance of your vehicle?

Characteristic	Frequency	Percent (%)
Short Distance Trip (less than 10 km)	56	47
Medium Distance Trip (upto 100 km)	59	49
Long Distance Trip (upto 160 km)	5	4
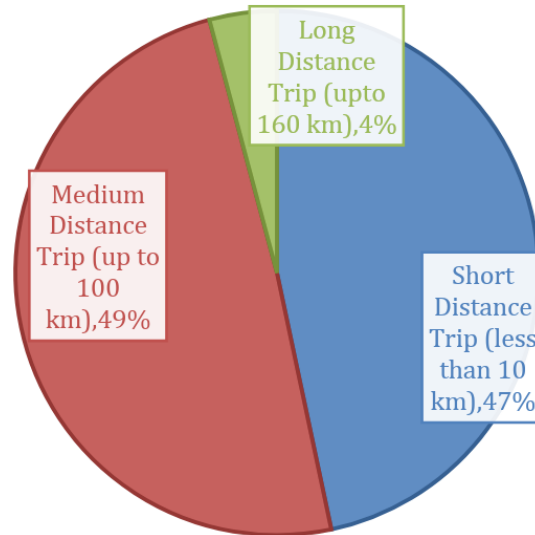
Table 4.2.2 Are you aware of the price of an EV?
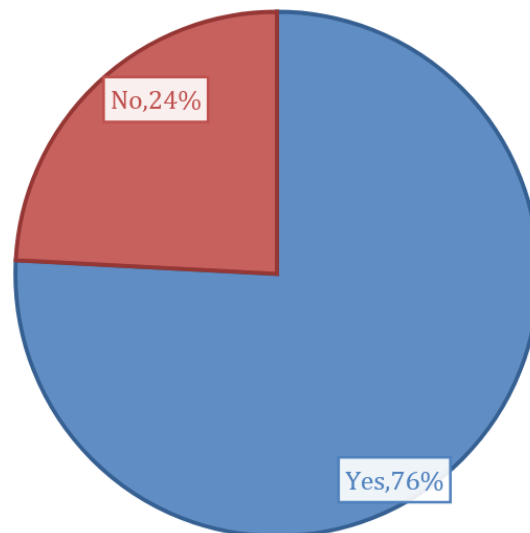
Characteristic	Frequency	Percent (%)
Yes	91	76
No	29	24

Table 4.2.3 Are you aware of the traveling distance of an EV?

Characteristic	Frequency	Percent (%)
Strongly Agree	21	17
Agree	16	13
Neutral	39	33
Disagree	18	15
Strongly Disagree	26	22
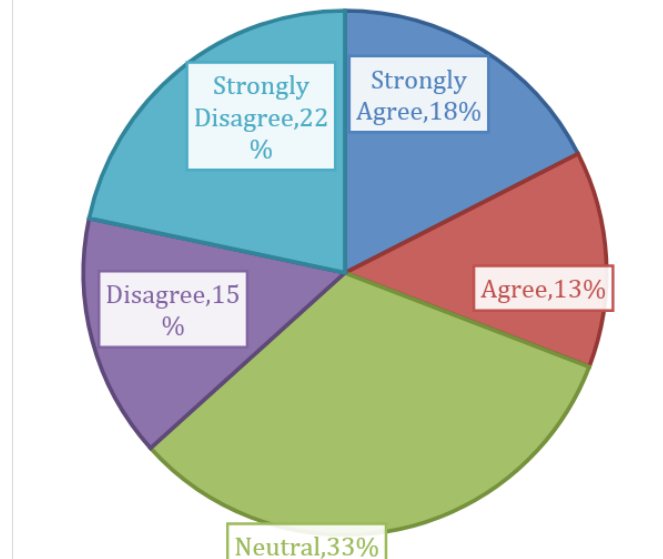
Table 4.2.4 Is the cost of an EV, a barrier in buying an EV.

Characteristic	Frequency	Percent (%)
Strongly Agree	24	20
Agree	34	28
Neutral	30	25
Disagree	13	11
Strongly Disagree	19	16
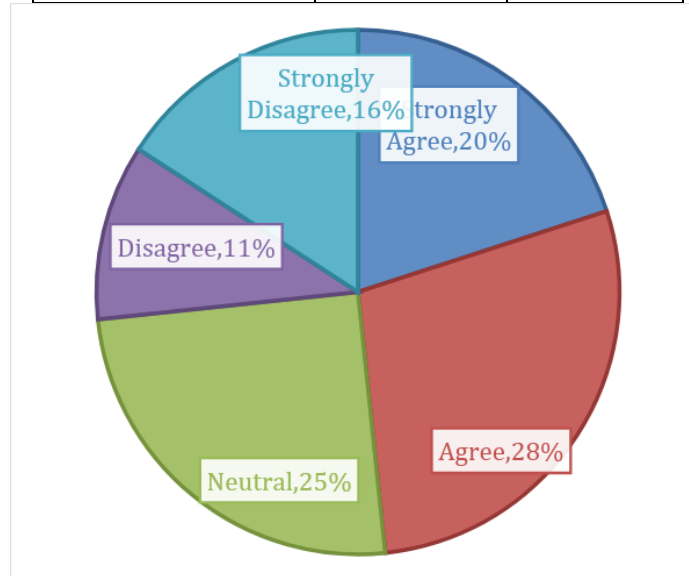
Table 4.2.5 Do you think brands impact the purchasing habit of a buyer.

Characteristic	Frequency	Percent (%)
Strongly Agree	40	33
Agree	31	26
Neutral	24	20
Disagree	7	6
Strongly Disagree	18	15

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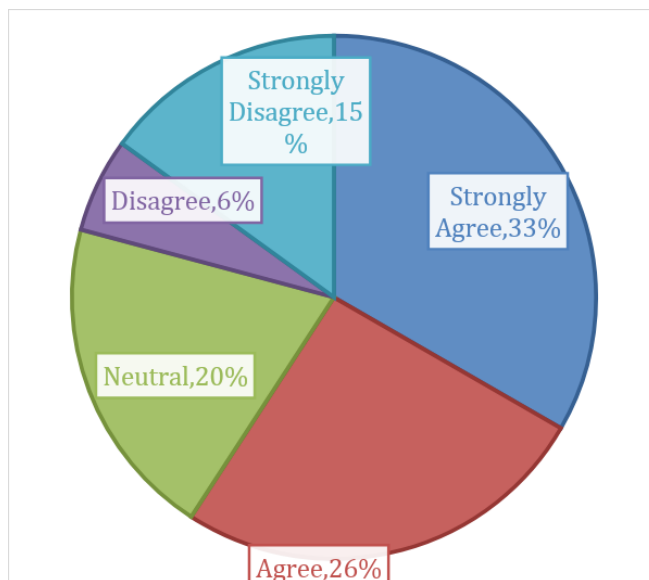**Table 4.2.6** Would you buy an EV from a new entrant, if adequate customer support is provided?

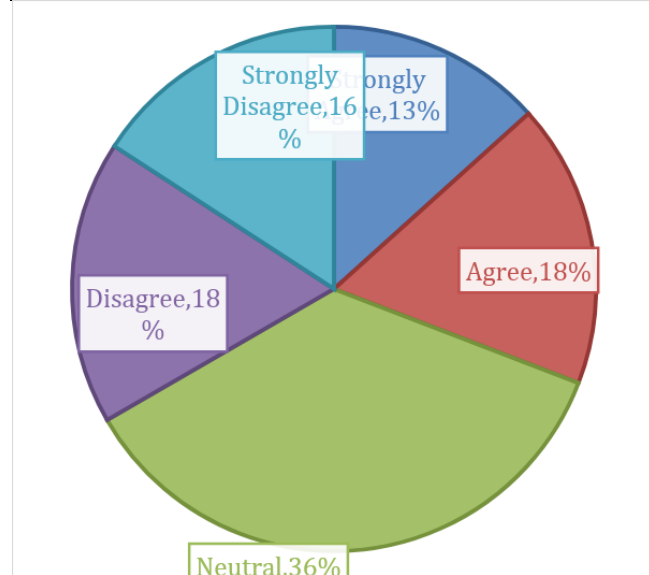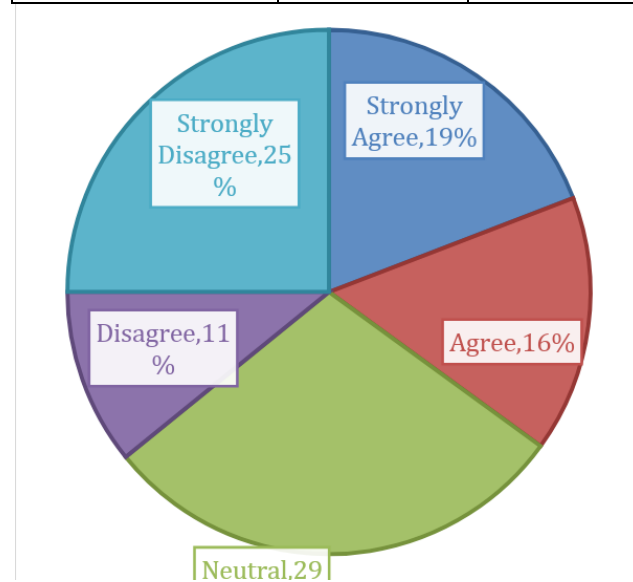| Characteristic	Frequency	Percent (%)
Strongly Agree	16	13
Agree	21	17
Neutral	43	36
Disagree	21	18
Strongly Disagree	19	16

Table 4.2.7 Are you aware of the perks and facilities government is providing on EVs and their owners?

Characteristic	Frequency	Percent (%)
Strongly Agree	23	19
Agree	19	16
Neutral	35	29
Disagree	13	11
Strongly Disagree	30	25

Table 4.2.8 Is unavailability of infrastructures a barrier for EV purchase in Hyderabad.

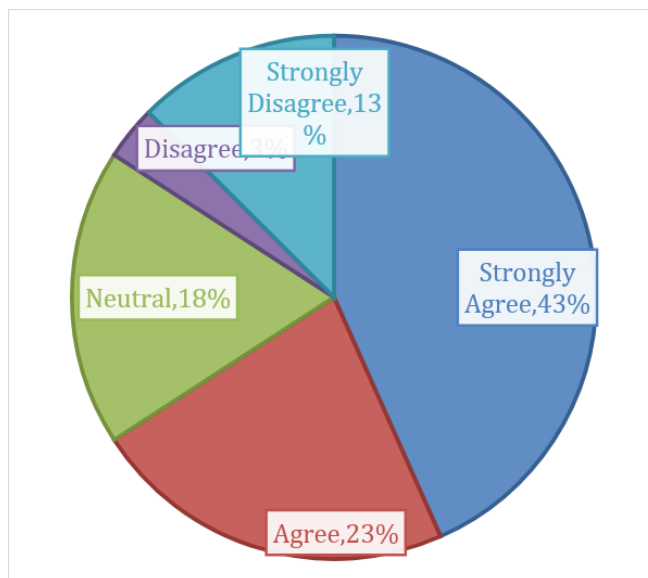| Characteristic	Frequency	Percent (%)
Strongly Agree	52	43
Agree	27	23
Neutral	22	18
Disagree	4	3
Strongly Disagree	15	13

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Table 4.2.9 Do you think the running cost of an EV is cheaper than that of available petrol/CNG/diesel variants?

Characteristic	Frequency	Percent (%)
Strongly Agree	37	31
Agree	16	13
Neutral	34	28
Disagree	13	11
Strongly Disagree	20	17
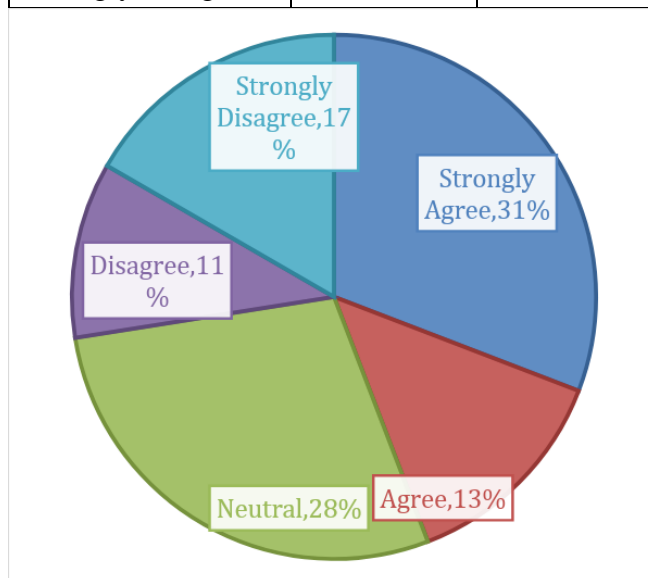
Table 4.2.10 Do you think it is your responsibility to reduce your personal environmental impact?

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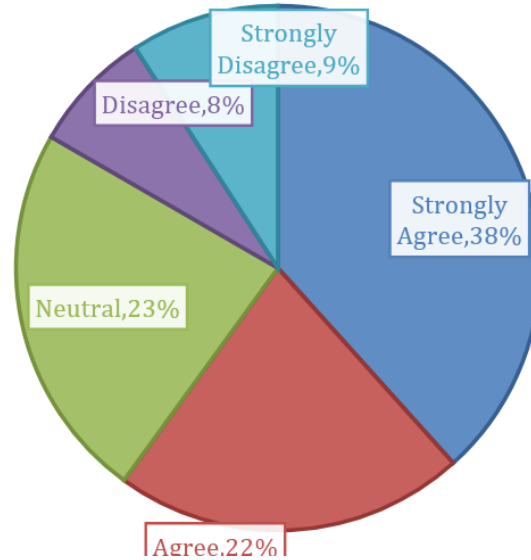| Characteristic	Frequency	Percent (%)
Strongly Agree	46	38
Agree	26	22
Neutral	28	23
Disagree	9	8
Strongly Disagree	11	9

Table 4.2.11 Do you think buying an EV could help you achieve your goal of reducing environment impact?

Characteristic	Frequency	Percent (%)
Strongly Agree	34	28
Agree	34	28
Neutral	27	23
Disagree	6	5
Strongly Disagree	19	16

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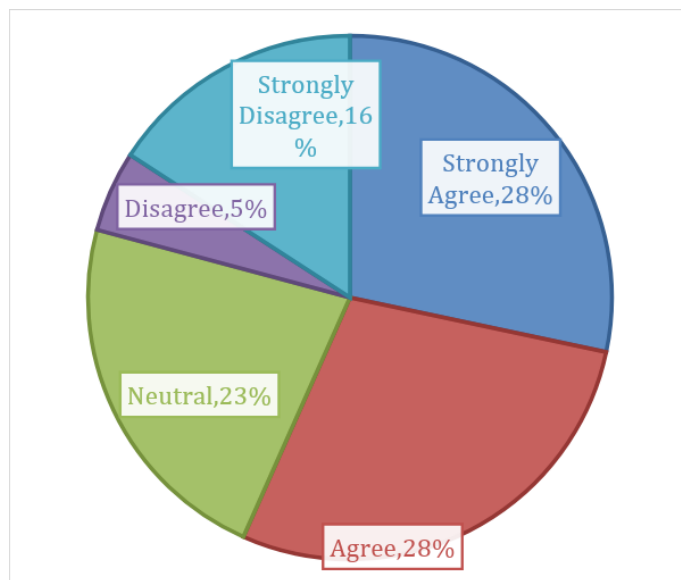
Table 4.2.12 Do you think you will buy the EV in the next few years.

Characteristic	Frequency	Percent (%)
Strongly Agree	26	22
Agree	26	22
Neutral	39	32
Disagree	16	13
Strongly Disagree	13	11

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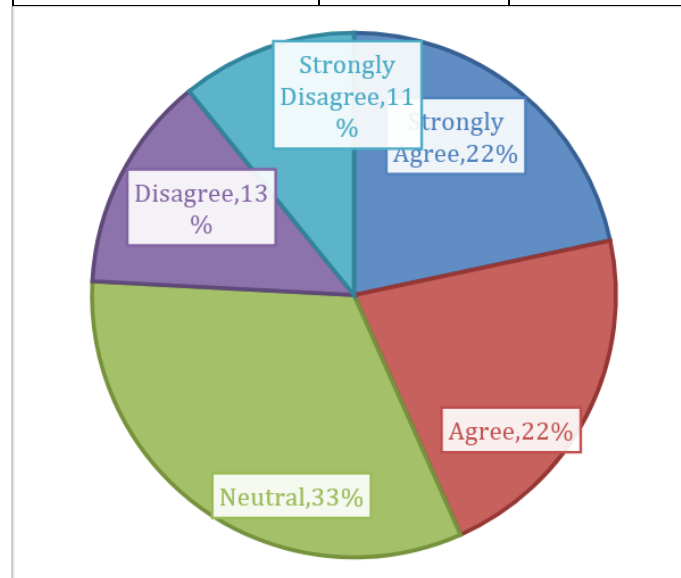
Table 4.2.13 Is it a wise idea to buy an electric vehicle?

Characteristic	Frequency	Percent (%)
Strongly Agree	27	22
Agree	27	23
Neutral	34	28
Disagree	12	10
Strongly Disagree	20	17
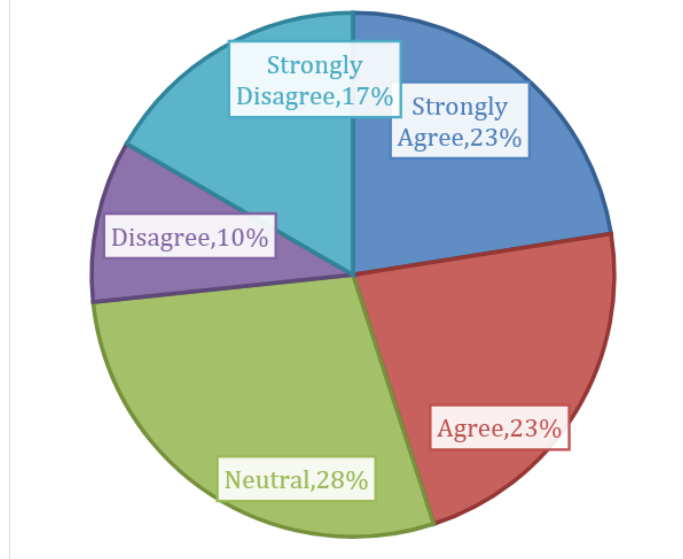
5. Results

In order to evaluate the hypotheses, T-test and One-Way ANOVA tests were performed. The results of the analyses are provided below. One-Way ANOVA tests were done in an attempt to determine the statistically significant value (Sig.) for this hypothesis.

Research Hypothesis: H1: The majority of consumers have favourable attitudes and sentiments towards the purchase and use of electric automobiles.

Null Hypothesis: Ha: The majority of consumers do not have favourable attitudes and sentiments towards the purchase and use of electric automobiles.

Analysis of Variance Results

F-statistic value = 4.74198

P-value = 0.03042

Data Summary				
Groups	**N**	**Mean**	**Std. Dev.**	**Std. Error**
Group 1	120	3.05	1.2357	0.1128
Group 2	120	2.7	1.2542	0.1145

ANOVA Summary					
Source	**Degrees of Freedom** DF	**Sum of Squares** SS	**Mean Square** MS	**F-Stat**	**P-Value**
Between Groups	1	7.35	7.35	4.742	0.0304
Within Groups	238	368.8967	1.55		
Total:	239	376.2467			

'Would you buy an EV from a new entrant if adequate customer support is provided?' A representation of the sentiments and attitudes of customers in Hyderabad about electric cars was chosen as Group 1 for this study and 'Do you think you will buy an EV in the next few years.' This indicates usage and purchase intents on the part of the customer were considered to be Group 2.

It was discovered that the value of Sig. or p was 0.03042. As $0.03042 < 0.05$, following the One-Way ANOVA tests, the Sig was found. Value is significantly lower than 0.05, which is the usual value to consider for the likelihood of the Research hypothesis being true.

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Hence, the Null hypothesis (Ha) is rejected and the Research hypothesis (H1) is confirmed, as a result, i.e., The majority of consumers in Hyderabad have favourable attitudes and sentiments towards the purchase and use of electric automobiles.

Research Hypothesis: H2: There is a strong correlation between the public's opinion of electric vehicles and their willingness to purchase them.

Null Hypothesis: Ha: There is no correlation between the public's opinion of electric vehicles and their willingness to purchase them.

An Unpaired t-test was conducted to evaluate the validity of this hypothesis. The results of the analyses are presented in the next sections. An unpaired t-test was carried out in an effort to evaluate the level of statistical significance (Sig.) associated with this hypothesis.

Unpaired *t* test results

P value and statistical significance:
The two-tailed P value equals 0.9237
By conventional criteria, this difference is considered to be not statistically significant.

Confidence interval:
The mean of Is the cost of an EV, a barrier in buying an EV? minus Is it a wise idea to buy an electric vehicle? equals -0.02
95% confidence interval of this difference: From -0.36 to 0.33

Intermediate values used in calculations:
t = 0.0959
df = 238
standard error of difference = 0.174

Review your data:

Group Mean SD SEM N	Is the cost of an EV, a barrier in buying an EV?	Is it a wise idea to buy an electric vehicle?
	2.74	2.76
	1.33	1.36
	0.12	0.12
	120	120

'Is the cost of an EV a barrier to buying an EV? This demonstrates the association between how the general population in Hyderabad feels about electric vehicles was considered Group 1 and 'Is it a wise

idea to buy an electric vehicle?' This demonstrated a link between the public's willingness to purchase electric vehicles and was chosen as Group 2 for this study.

It was discovered that the value of Sig. or p was 0.9237. As $0.9237 > 0.05$, following the Paired t-test, it was found that the Sig. value is significantly higher than 0.05, which is the usual value to consider for the likelihood of the Null hypothesis being true.

Hence, the Null hypothesis (Ha) is confirmed, as a result, i.e., There is no correlation between the public's opinion of electric vehicles and their willingness to purchase them.

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6. Conclusion

Based on the results of the research, electric car producers and the government of Hyderabad should put more effort into supporting the wider use of the technology. A greater emphasis on technology, the creation of high-capacity batteries, and the introduction of supplementary infrastructure might accomplish this. The results provide hopeful evidence that people are aware of the beneficial impacts they make on the environment. Over 90% fewer carbon emissions may be produced by electric cars than by traditional autos, making them a fantastic instrument for achieving environmental sustainability (Werther and Hoch, 2012). This is one of the most critical problems we face right now. Consequently, preserving the natural world for the benefit of future generations should be a top priority. However, manufacturers aren't the only ones responsible for piquing consumers' interest in EVs; policymakers may play a part, too (Frischknecht and Flury, 2011). There is a low degree of information about the government incentives available for the purchase of electric autos, regardless of the demographics of the potential purchasers. People are persuaded to feel that both the upfront cost and the ongoing maintenance expenditures are high (Labeye et al., 2013). Those who are willing to purchase electric vehicles recognise that they are expensive, but they do so in the hopes that their actions will help decrease the effect of electric cars on the environment and win greater societal acceptability. Since this is the case, they choose to use electric vehicles (Kley, Lerch and Dallinger, 2011). It's like how people tend to place a high value on their time while charging but place a low value on the infrastructure around charging stations and the range of their vehicles. More than half of those surveyed were considering making an EV purchase in the next year.

6.1 Future Research Directions

Future research is encouraged to apply a broad range of methods from this study to analyse and assess EVs in order to hasten their wider adoption. Future studies on electric vehicles may want to try out other methods and compare them to the ones employed here (Ehrler and Hebes, 2012). Given the specific nature of the question, we will focus only on issues related to EVs (Sourkounis and Broy, 2011). Future studies may wish to investigate whether or not the demand for a certain kind of energy vehicle is affected in the same way by the availability of cars that use various underlying principles (Schaumann, 2013). Vehicles that fall within this category include hybrids, electric vehicles, and fuel-cell electric vehicles. More so than investigating electric car technology, this study's primary focus is on satisfying consumer demand (Von Radecki, 2014). Thus, it is recommended that future studies

target coordinating the consumer market and the automotive industry. The development and production of electric vehicles inspired this idea. Due to time and resource restrictions, the investigation could only collect data from people living in China's coastal areas. Still, people from different parts of Mainland China may see the problems at hand differently owing to regional differences (Solar et al., 2013). Research in the future may also look at the situation in different regions to compile a list of recommendations for the government and electric vehicle producers to utilise in their push to increase sales of electric vehicles.

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