An Analytical Study on Customer Satisfaction Towards Electric Four-Wheelers using Artificial Intelligence in Valapad Area in Thrissur District

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Abstract

The rapid growth of electric vehicles (EVs) in India has been fueled by rising fuel prices, government incentives, and increasing environmental awareness. Electric four-wheelers, in particular, have become a sustainable option compared to traditional fuel-based vehicles because of their lower emissions and reduced operating costs. However, customer satisfaction and affordability are still important factors affecting their widespread use. This study examines customer perception, awareness, and satisfaction regarding electric four-wheelers in Valapad area in Thrissur District. The research uses a descriptive study that includes both primary and secondary data. Primary data were collected from 30 respondents using a structured questionnaire, while secondary data came from books, journals, and websites. The study examines demographic characteristics, sources of awareness, usage patterns, brand preferences, and factors that influence the purchase and satisfaction of electric four-wheelers. Additionally, Artificial Intelligence (AI) techniques are conceptually incorporated to improve data analysis and help identify what drives satisfaction, predict consumer behaviour, and analyse customer feedback. The findings show that most respondents prefer electric four-wheelers for their eco-friendly nature, cost-effectiveness, and lower maintenance. Tata Motors is the most favoured brand, and many users are satisfied with the cost difference between electric and fuel-based vehicles. However, challenges like limited charging infrastructure and battery-related issues still impact customer experience. The study concludes that although customer awareness and acceptance of electric four-wheelers are growing, improvements in charging infrastructure, battery safety, and service support are crucial. The use of Artificial Intelligence can also help EV manufacturers and

policymakers make informed decisions to boost customer satisfaction and promote sustainable mobility in India.

Keywords: Electric Four-Wheelers, Customer Satisfaction, Artificial Intelligence, Sustainable Mobility.

1. Introduction

In the age of digital technology, Artificial Intelligence (AI) is a game changer in various domains including automobile. Incorporation of AI for electric vehicles (EVs) has played a transformative role in enhancing the vehicle efficiency, safety, performance and customer satisfaction. Artificial intelligence now allows electric four-wheelers to understand the way users drive, maintain battery health and optimise energy consumption while intelligently assisting the user.

An electric 4-wheeler is an automobile, which functions on the rechargeable batteries and the electric motors instead of a conventional fuel engine. Artificial intelligence enabled technologies from machine learning, predictive analytics and smart sensors have transformed electric four wheelers into intelligent transport systems. These vehicles contribute to sustainable environmental transport in terms of reducing carbon pollution and dependence on fossil fuels.

The market for electric four-wheelers is growing in India with increasing fuel cost, incentives by government, environment conservation and technological innovation. AI helps fuel this growth by making it easier to plan the charging infrastructure, optimize battery performance and understand customer preferences. As visitor-ship is on the rise in Valapad, besides customer satisfaction towards AI Electric four-wheeler would be relevant.

2. Significance of Study

The research work enables the customers to understand the importance and advantages of Artificial Intelligence in the context of electric four-wheelers. The research work emphasizes the positive impact of Artificial Intelligence on the battery performance, safety measures, efficiency, and customer satisfaction associated with the usage of electrical four-wheelers. The results obtained from the research can be used by the manufacturers of the electrical four-wheelers to improve the AI-based attributes in their products.

3. Review of Literature

Li et al., (2018) applied artificial intelligence and machine learning techniques to analyse customer feedback and online reviews. The study used sentiment analysis to evaluate customer satisfaction and found that AI-based methods provide deeper insights compared to traditional statistical techniques. The research highlighted the effectiveness of AI in understanding customer emotions and opinions.

Zhao et al., (2020) conducted a study on automobile customer satisfaction using artificial intelligence-based sentiment analysis. The research analysed vehicle reviews and identified that factors such as performance, comfort, battery efficiency, price, and service quality significantly affect customer satisfaction. The study confirmed that AI models effectively classify customer sentiments.

Gandomi and Haider (2015) explored the role of big data analytics and artificial intelligence in consumer behaviour studies. The research concluded that AI techniques such as neural networks and clustering models are useful in analysing complex customer satisfaction data and uncovering hidden patterns.

Singh et al., (2022) investigated customer satisfaction towards electric four-wheelers using predictive analytics. The study found that artificial intelligence models outperform traditional analytical methods in identifying key satisfaction drivers such as battery life, charging infrastructure, maintenance cost, and driving comfort.

Aneesh Rajendran et al., (2021) focused on the role of energy efficiency and renewable energy integration in the transportation sector. The study highlighted that electric vehicles contribute significantly to reducing carbon emissions and dependency on fossil fuels. The research emphasized that customer satisfaction towards EVs is strongly linked with energy efficiency, sustainability, and long-term operational cost savings.

Aman Rehman KP et al., (2024) analysed consumer perception and satisfaction towards electric vehicle adoption in Kerala, India. The study found that educated and young consumers show a higher level of satisfaction with electric vehicles due to environmental benefits, lower maintenance costs, and improved driving experience. The research also indicated growing acceptance of EV four-wheelers among urban consumers.

4. Theoretical Framework

The theoretical framework of this research work highlights the influence of Artificial Intelligence on customer satisfaction for electric four-wheelers. The proposed theoretical framework has been developed on the basis of AI attributes and their influence on customer usage experience and the level of customer satisfaction. The major function of artificial intelligence is to provide insight into customer behaviour and enhance the performance of the vehicle to achieve informed decision-making for customer satisfaction.

Artificial Intelligence is used in electric four-wheelers in battery management, smart charging optimization algorithms, predictive maintenance solutions, safety mechanisms, and also as a supportive system for navigation. Such AI-based applications assist in minimizing technical issues, enhancing energy efficiency, and improving overall performance in electric four-wheelers.

The AI system enhances customer satisfaction through reduced breakdowns, improved driving comfort, decreased vehicle maintenance, and improved safety. Customer engagement and satisfaction are further improved through personalized driving coaching and real-time information.

Artificial Intelligence serves as a catalyst in distributing electric vehicles faster through matching innovative technology with consumer demands and environmental requirements.

5. Objectives of the Study

- Assess customer awareness of AI in electricfour-wheelers.
- Identify reasons for satisfaction anddissatisfaction.
- Examine AI's impact on battery performance,safety, and cost.
- Measure customer acceptance of AI-enabledEVs.

6. Methodology

Profile of the Study

- Topic: Customer satisfaction of AI-enabled electric four-wheelers.
- Location: Valapad,Thrissur District, Kerala.
- Respondents: Users of electric four-wheelers.

- Sample Size: 30 respondents.
- Focus Areas:
    1. AI-driven battery management
    2. Smart charging systems
    3. Safety features
    4. Customer experience and satisfaction

7. Data Analysis and Interpretation

The respondents for the proposed study were users of electric four-wheelers in the Thrissur District. The primary data was collected from the respondents through a structured questionnaire survey with a total of 30 respondents. The data collected includes personal details of the respondents such as gender, age and usage pattern of electric four-wheelers,preference, satisfaction, reasons and willingness to suggest EV four wheelers.

The data collected was categorized and presented in a tabulated form with the aid of percentage analysis and graphs for simplicity and clarity. The proposed study has utilized basic statistical concepts for the analysis and interpretation of customer perception, level of satisfaction, and intention for recommendation for electric four-wheelers.

Interpretation

Table 7.1: Table showing the gender of the respondents

Options	**No of Respondents**	**Percentage**
Male	14	46.7
Female	16	53.3
Total	**30**	**100**

Source: Primary data

The above table 4.1 shows that 53.3% of the respondents are female and 46.7% of the respondents are male.

Graph 7.1: Classification of the respondents on the basis of gender

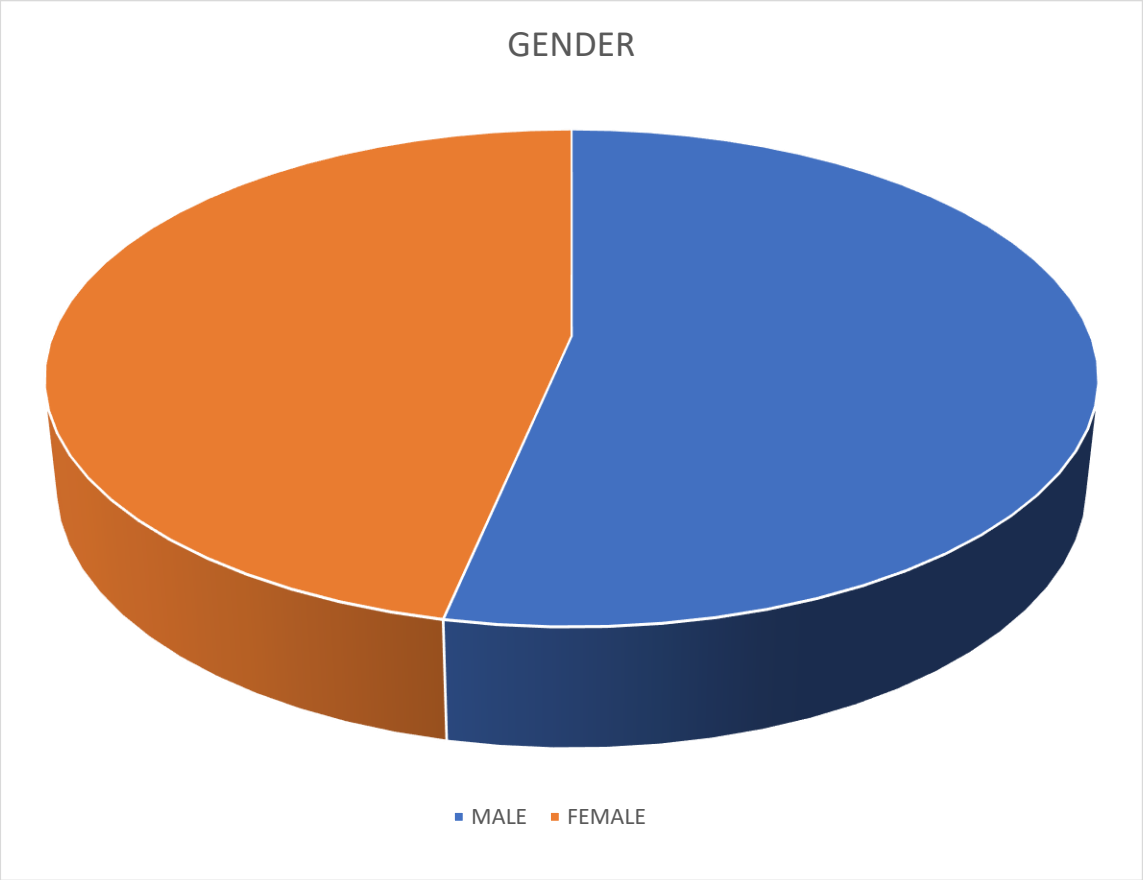


Table 7.2: Table showing the age of the respondents

Options	No of Respondents	Percentage
18 - 25	17	56.7
25 - 35	7	23.3
35 - 45	4	13.3
45 above	2	6.7
Total	**30**	**100**

Source: Primary Data

The above table 7.2 shows that 56.7% of the respondents are in the age 18- 25, 23.3% in the age 25-35, 13.3% in the age 35-45 and 6.7% in the age 45 and above.

Graph 7.2: Classification of the respondents on the basis of age

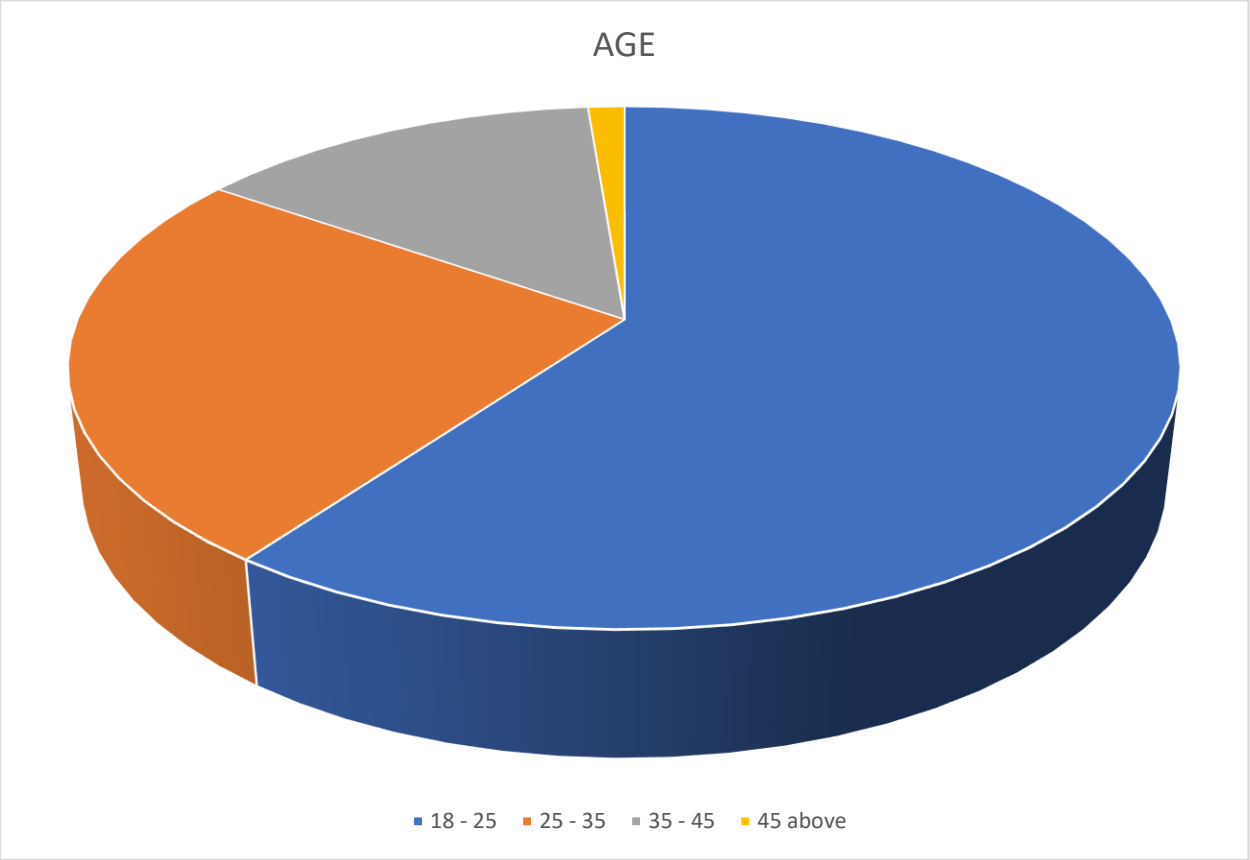


Table 7.3: Table showing whether the respondents are using EV four – wheelers

Options	**No of Respondents**	**Percentage**
YES	27	90
NO	3	10
Total	**30**	**100**

Source: Primary data

the above table reveals that 90% of the respondents are using EV four- wheelers and 10% of the respondents are not using EV four-wheelers.

Graph 7.3: Classification of the respondents on the basis of usage of EV four-wheelers

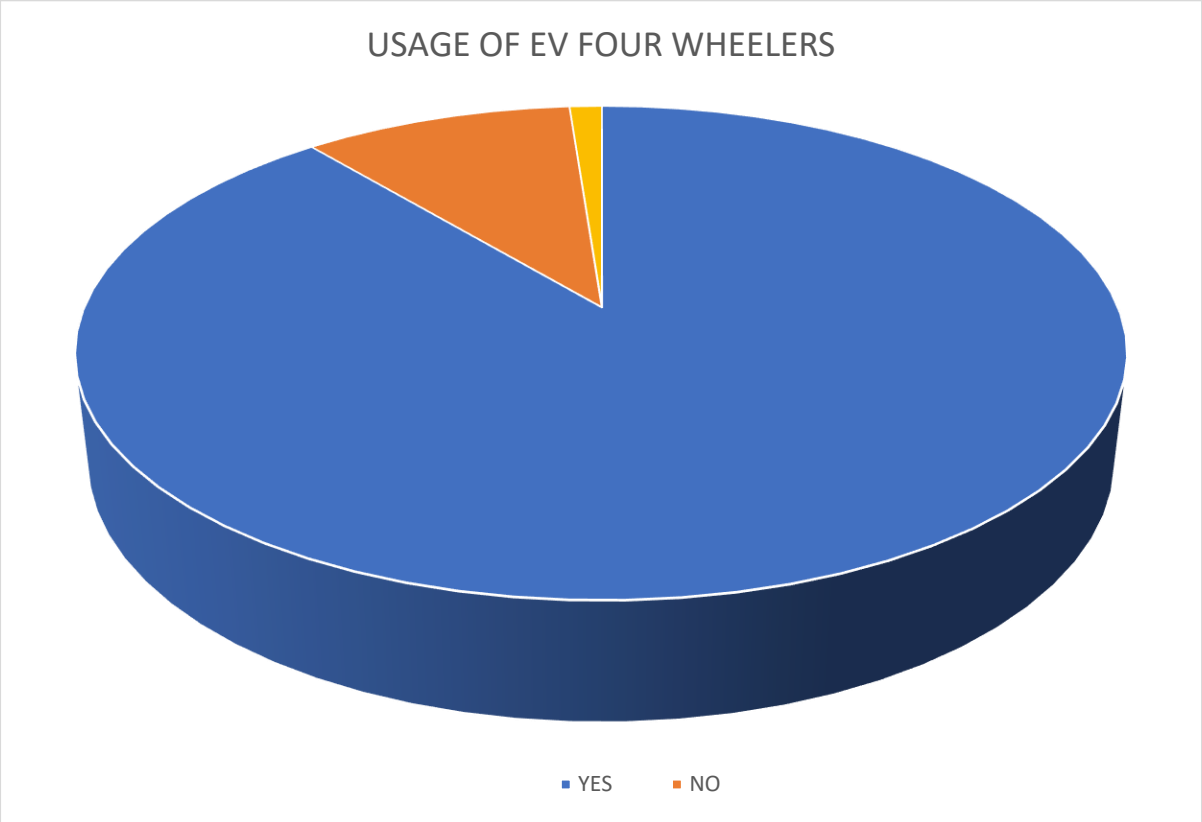


Table 7.4: Table showing the reasons for selecting the EV four-wheelers

Options	**No of Respondents**	**Percentage**
Eco friendly	18	60
Economical	8	26.7
Less maintenance	4	13.3
Other	0	0
Total	**30**	**100**

Source: Primary data

The above table shows that 60% of respondents choose EVs because they are eco-friendly, 26.7% choose it because they are economical and 13.3% cited less maintenance as their reason to choose EVs.

Graph 7.4: Classification of the respondents on the basis of reasons for selecting EV four-wheelers

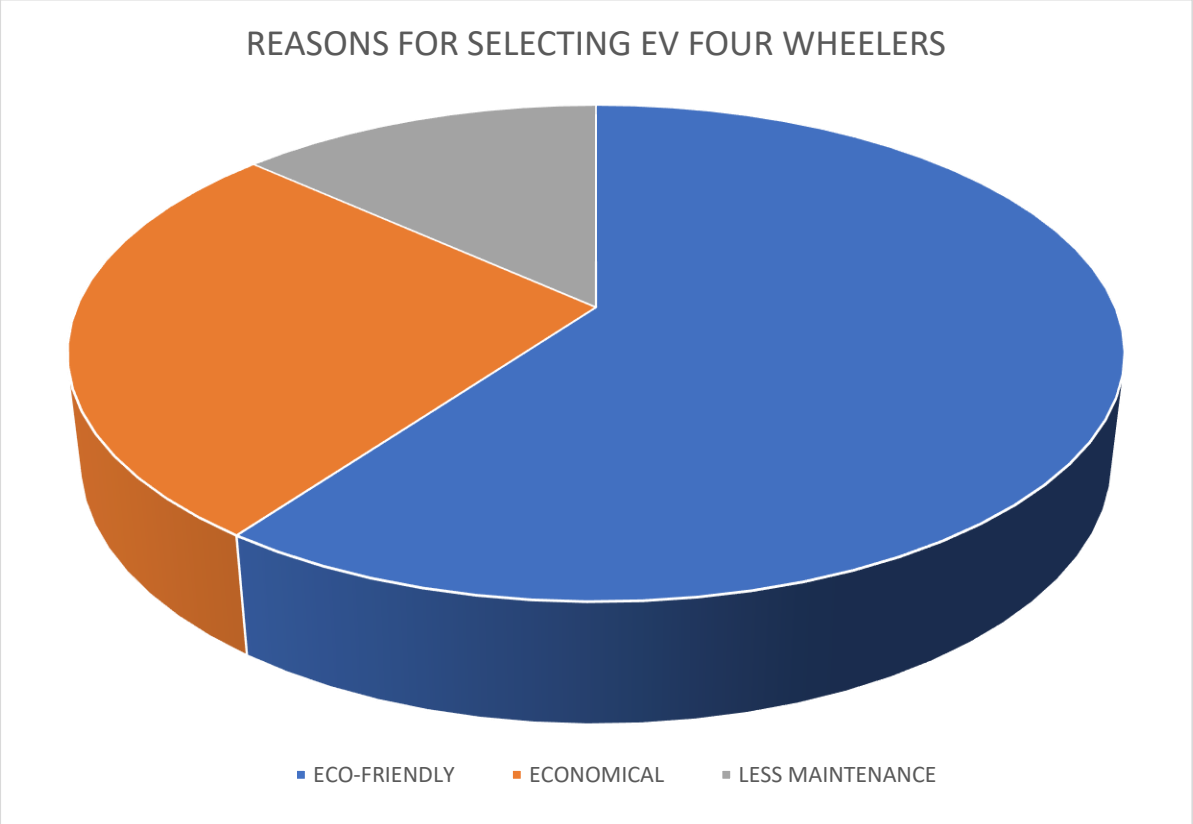


Table 7.5: Table showing which EV four-wheeler selling company the respondents prefer

Options	**No of Respondents**	**Percentage**
Tata Motors	21	70
MG	1	3.3
BYD	3	10
Mahindra& Mahindra	3	10
Hyundai	2	6.7
Others	0	0
Total	**30**	**100**

Source: Primary data

the above table shows that 70% of respondents prefer Tata Motors, 10% prefers BYD, another 10% prefers Mahindra & Mahindra.

Graph 7.5: Classification of the respondents on the basis of their preference on companies selling EV four-wheelers

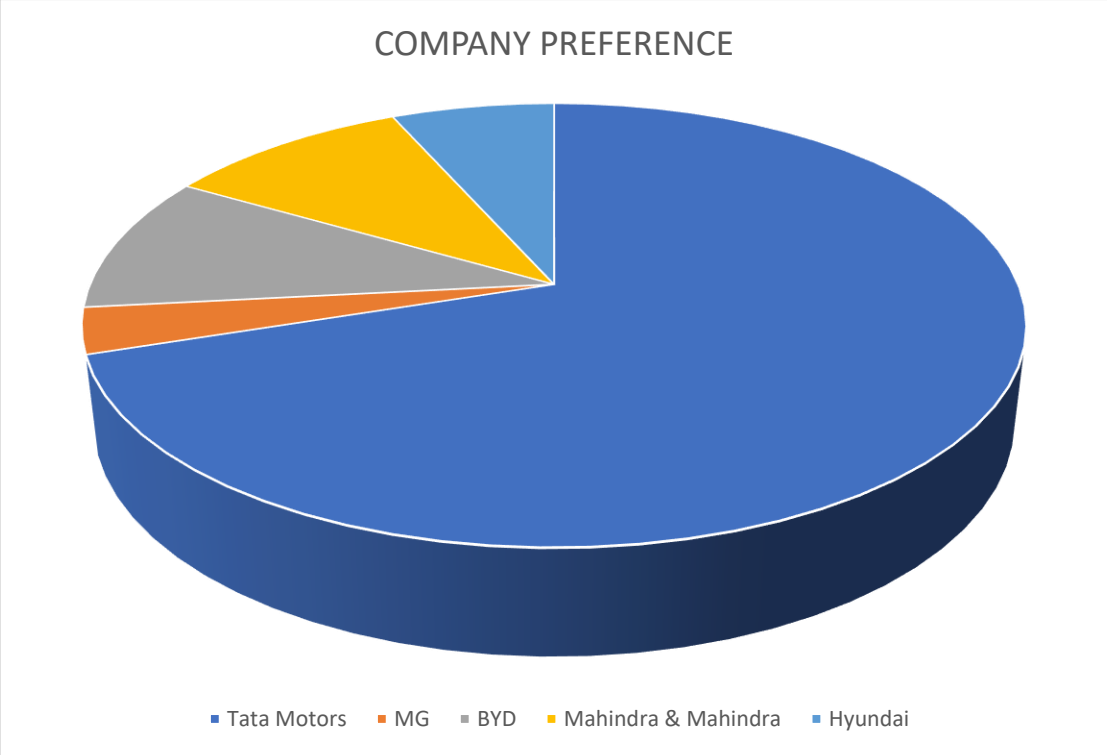


Table 7.6: Table showing public satisfaction with the cost difference between EVs and fueling vehicles

Options	No of Respondents	Percentage
Highly satisfied	7	23.3
Satisfied	20	66.7
Neutral	3	10
Dissatisfied	0	0
Highly satisfied	0	0
Total	**30**	**100**

Source: Primary data

the above table shows that 66.7% of the respondents are satisfied, 23.3% are highly satisfied and 10% are having neutral opinion.

Graph 7.6: Classification of the respondents on the basis of public satisfaction with the cost difference between EVs and fueling vehicles

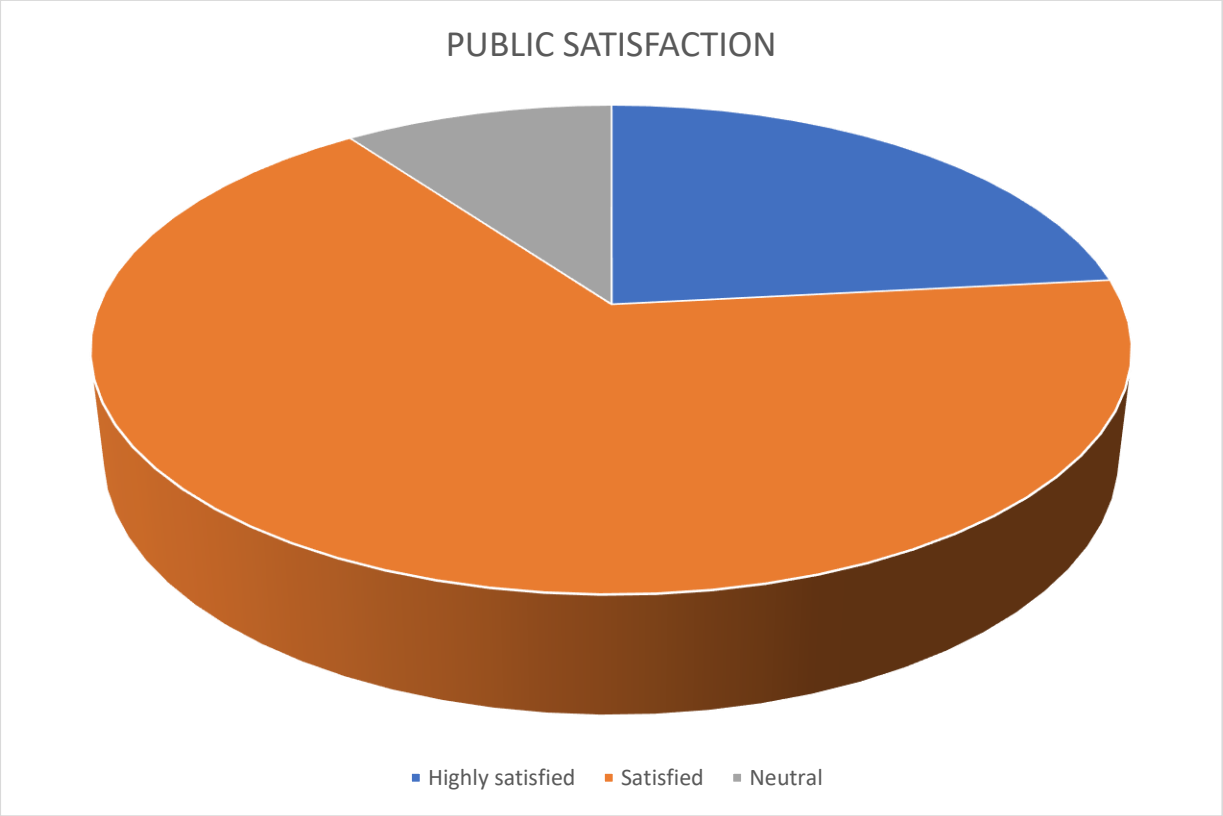


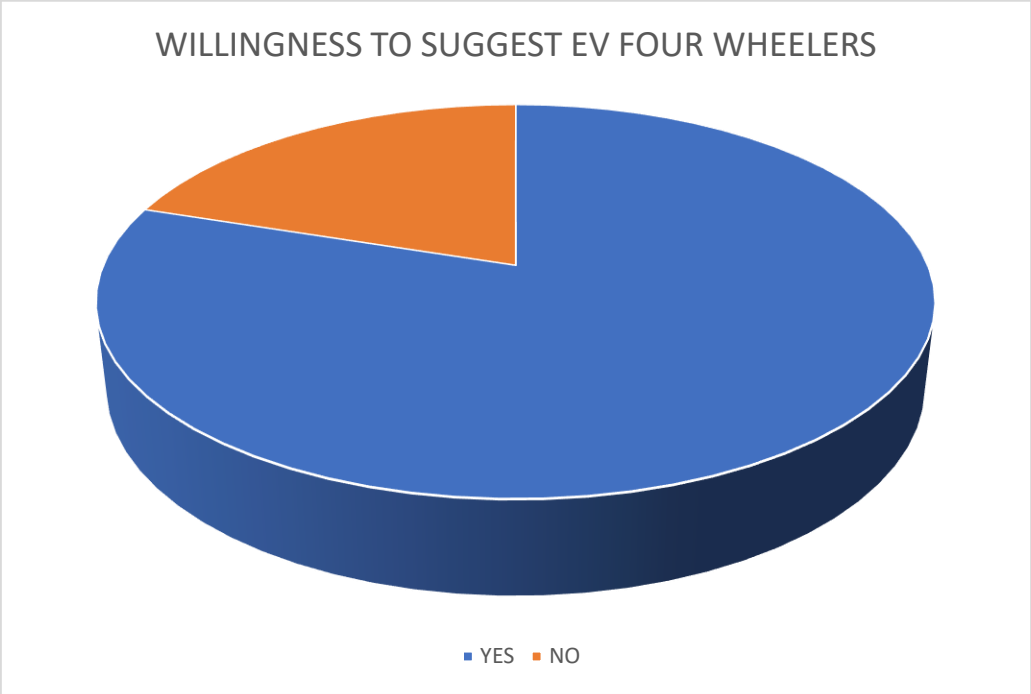
Table 7.7: Table showing willingness of the respondents to suggest EV four-wheelers to others

Options	No of Respondents	Percentage
YES	24	80
NO	6	20
Total	30	100

Source: Primary data

The above table shows that 80%of the respondents are willing to suggest EV four wheelers to other and 20%are not willing to suggest EV four-wheelers to others.

Graph 7.7: classification of the respondents on the basis of willingness of users to suggest EV four-wheelers to others



8. Findings

- Most users pleased with AI-driven electric four-wheelers.
- The use of AI boosts battery life and eliminatesmaintenance problems - Smart features makes Tata Motorsthe most preferred brand
- The charging infrastructure issue is not as easily solvedby AI solutions

9. Suggestions

- AI-driven EV tech needs Govt incentives.
- Improve smart charging infrastructure.
- Raise the profile of AI advantages in EVs.
- Improve battery safety with AI monitoring systems.

10.Conclusion

The study can infer that the Artificial Intelligence has tremendous impact onincreasing customer satisfaction ofelectric four-wheelers in ThrissurDistrict. AI increases fuel efficiency,safety and environmental impact of thevehicle while responding to some of

themajor concerns that customers demand.AI-driven electric four-wheelers canmake a significant contribution, giventhe right kind of attention andinfrastructure it deserves.

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