

Determinants of Electric Vehicle Adoption in Ernakulam: A Study of Consumer Perceptions, Benefits, and Challenges

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Abstract:

The increasing adoption of electric vehicles (EVs) has become an important step toward sustainable transportation. This study examines the level of awareness, perceived benefits, challenges, and factors influencing the adoption of electric vehicles in Ernakulam district. The research is based on both primary and secondary data. Primary data were collected from 100 respondents using a structured questionnaire through simple random sampling, while secondary data were obtained from books, journals, websites, and newspapers. The findings indicate that environmental awareness, rising fuel prices, and lower operating costs encourage EV adoption, whereas high purchase costs, inadequate charging infrastructure, and range anxiety remain major barriers. The study suggests that improving charging facilities, increasing public awareness, and strengthening government support can accelerate EV adoption in Ernakulam.

Keywords: Electric Vehicles, Sustainable Transportation, Consumer Perception, EV Adoption, Charging Infrastructure.

1. INTRODUCTION

Electric vehicles (EVs) are emerging as an environmentally friendly alternative to conventional petrol and diesel vehicles. They help reduce carbon emissions, improve air quality, and decrease dependence on fossil fuels. Governments across the world, including India, are promoting EV adoption through financial incentives and supportive policies. Despite these initiatives, several challenges continue to affect their widespread adoption, including high initial costs, limited charging infrastructure, and concerns about battery performance. Ernakulam, being one of the most urbanised districts in Kerala, provides an appropriate setting to study the adoption of electric vehicles and the factors influencing consumer decisions. India is one of the world's largest automobile markets, and electric vehicle (EV) adoption has

grown rapidly in recent years. According to the latest FY 2025–26 industry reports, EV registrations crossed 2.5 million units, with two-wheelers and three-wheelers contributing the largest share of sales. Government initiatives, expanding charging infrastructure, rising fuel prices, and the introduction of affordable EV models by domestic manufacturers have been the major drivers of this growth.

2. REVIEW OF LITERATURE

Quang Bach Phan (2025) developed an empirical electric vehicle load model for distribution networks. The study showed that the proposed model accurately represents EV charging behaviour, helping electricity utilities improve distribution planning and support increased EV adoption. **Venkatraman Ethirajan (2025)** examined the challenges and barriers associated with electric and hybrid vehicles in India, focusing on grid optimisation. The study highlighted the environmental benefits of EVs and emphasised the importance of vehicle-to-grid (V2G) technology and smart mobility systems for future expansion. **Namrata Agarwal (2024)** conducted an empirical study on the issues and challenges of EV adoption in India using data analytics. The research identified inadequate charging infrastructure and the need for stronger policy support while suggesting measures for sustainable EV growth. **Nooha Mariyam (2024)** analysed consumer behaviour towards electric vehicles in Kochi city. The study found that consumers recognise the environmental and economic benefits of EVs and support their role in promoting sustainable transportation. **Elizabeth Vijoy (2023)** studied customer knowledge regarding electric vehicles. The research highlighted increasing consumer awareness of EVs as a cleaner alternative to conventional vehicles and noted that environmental concerns and government support are driving EV adoption. **Aziz Haffaf (2022)** conducted an experimental performance analysis of a grid-connected microgrid system integrating photovoltaic (PV) panels, battery storage, and an electric vehicle. The study demonstrated that the integrated system improved solar energy utilisation, supported grid stability, enhanced electricity demand management, and reduced carbon emissions, highlighting the benefits of combining renewable energy sources with electric vehicles in microgrid energy systems. **Rupesh Kumar (2020)** examined the challenges to electric vehicle adoption in India with a focus on the sharing economy. The study identified high vehicle costs, inadequate charging infrastructure, and low purchasing power as key barriers, while emphasising the role of shared mobility and public transportation in promoting EV adoption. **K. Sreeram (2019)** conducted a comprehensive analysis of the electric vehicle scenario in India, highlighting the transition toward cleaner transportation despite challenges such as high initial costs and limited charging infrastructure. The study emphasised the importance of policy support, battery-swapping technology, and domestic manufacturing to accelerate EV adoption. It concluded that strategic government initiatives and infrastructure development are essential for achieving India's long-term electric mobility goals.

3. SIGNIFICANCE OF THE STUDY

The study provides insights into consumer awareness and acceptance of electric vehicles in Ernakulam. It identifies the major benefits and challenges associated with EV adoption and offers recommendations that

may help policymakers, manufacturers, and service providers improve the adoption of sustainable transportation.

4. STATEMENT OF THE PROBLEM

Although electric vehicles offer environmental and economic benefits, their adoption in Ernakulam is influenced by several factors such as awareness, affordability, charging infrastructure, and consumer perception. This study examines these factors and identifies the challenges faced by EV users.

5. OBJECTIVES OF THE STUDY

- To study the level of awareness about electric vehicles among people in Ernakulam.
- To understand the benefits of using electric vehicles as perceived by consumers.
- To identify the challenges faced by electric vehicle users.
- To analyse the factors influencing the adoption of electric vehicles.

6. RESEARCH METHODOLOGY

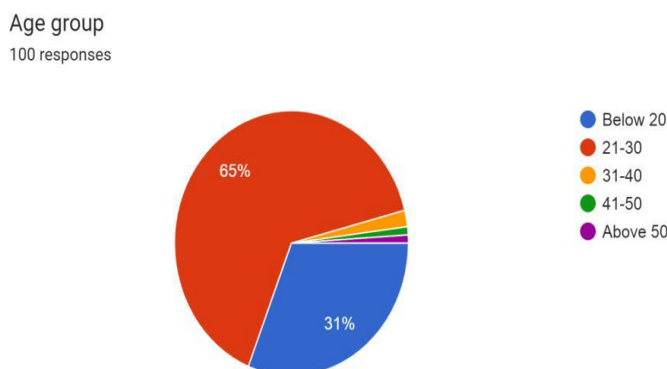
The study adopts a descriptive research design. The study area is Ernakulam district. Primary data were collected from 100 respondents using a structured questionnaire through simple random sampling. Secondary data were collected from books, research journals, government reports, newspapers, and authentic websites. The study was conducted during the period 2025–2026. The collected data were analysed using percentage analysis and other suitable statistical tools.

7. SCOPE OF THE STUDY

The study focuses on the awareness, benefits, challenges, and adoption of electric vehicles among residents of Ernakulam district. It is limited to the selected sample and does not represent the entire population. The study considers only the responses collected during the survey period. It mainly examines consumer perceptions and does not include the views of manufacturers, dealers, or policymakers. The findings are subject to the accuracy and honesty of the responses provided by the participants.

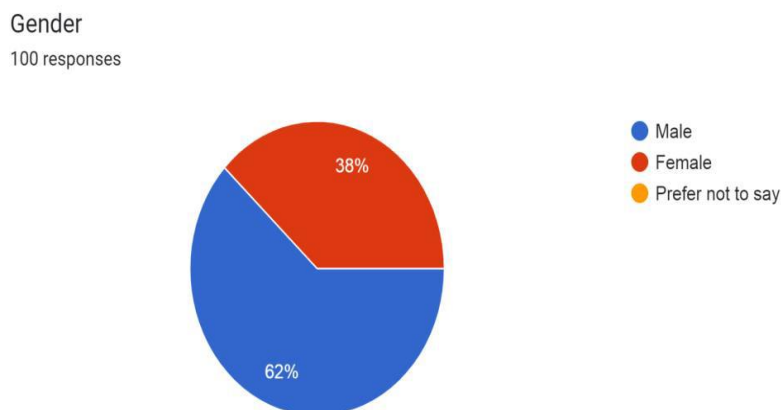
8. DATA ANALYSIS AND INTERPRETATION

FIGURE 1-AGE GROUP



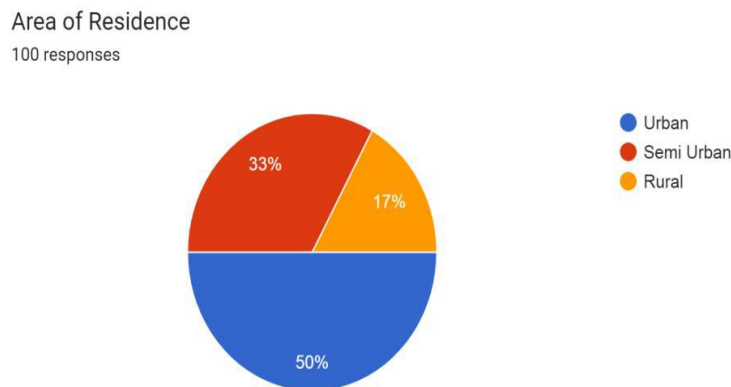
Out of 100 respondents, 65% are in the 21–30 age group, followed by 31% under 20 years. Only 4% of the respondents are over 30 years old. Overall, 96% of the respondents are below 30 years, indicating that the survey is dominated by the younger population.

FIGURE 2-GENDER



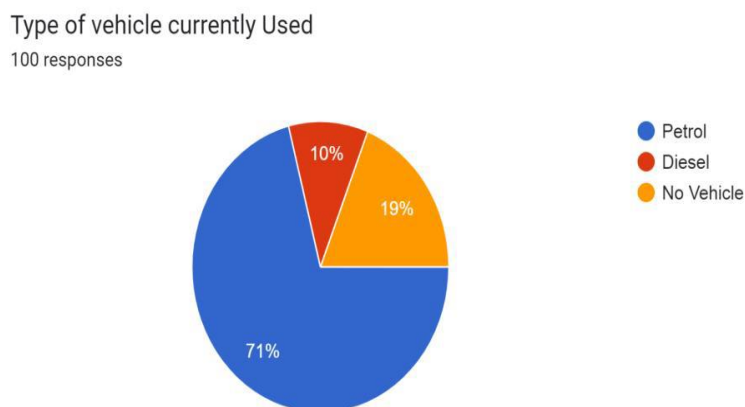
The data shows that 62% of the respondents are male, while 38% are female. This indicates that the survey sample is predominantly male. Therefore, the findings may reflect a stronger male perspective.

FIGURE 3-AREA OF RESIDENCE



The data shows that 50% of the respondents are from urban areas, 33% from semi-urban areas, and 17% from rural areas. This indicates that most respondents are from urban regions. The higher urban representation may be due to better EV awareness and charging infrastructure.

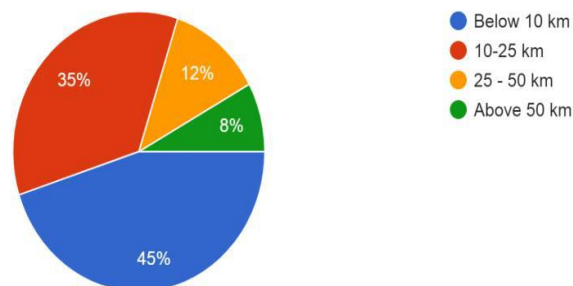
FIGURE 4-TYPE OF VEHICLE CURRENTLY USED



The data shows that 71% of respondents currently use petrol vehicles, while 10% use diesel vehicles. This indicates a strong dependence on internal combustion engine (ICE) vehicles. Around 19% of respondents do not own any vehicle, representing potential first-time buyers. Overall, the findings suggest a significant opportunity for electric vehicles as an alternative to conventional fuel-based transportation.

FIGURE 5- DAILY AVERAGE TRAVEL DISTANCE

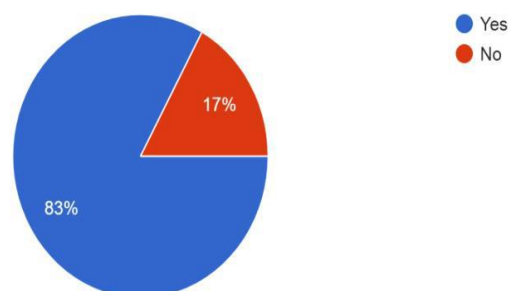
Daily Average Travel Distance
100 responses



The data shows that 80% of respondents travel less than 25 km daily, with nearly half travelling under 10 km. Only 8% travel more than 50 km per day. This indicates that most daily travel distances are short. Therefore, basic electric vehicles are sufficient to meet the daily mobility needs of most users, and range anxiety is likely minimal for the majority of respondents.

FIGURE 6- PUBLIC AWARENESS ABOUT ELECTRIC VEHICLE

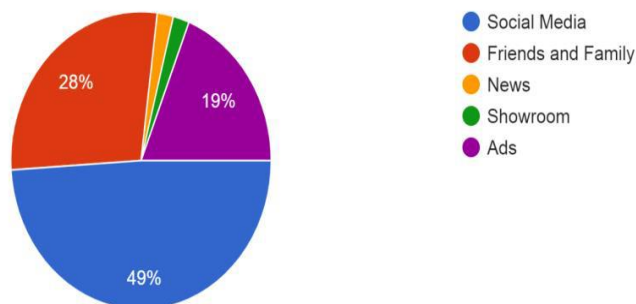
Are you aware of Electric vehicles ?
100 responses



The data shows that 83% of respondents are aware of electric vehicles, while 17% are not aware of them. This indicates a generally high level of awareness about EVs among the respondents. However, a smaller proportion still lacks awareness, highlighting the need for continued information and awareness campaigns about electric vehicles.

FIGURE 7-SOURCE OF EV INFORMATION

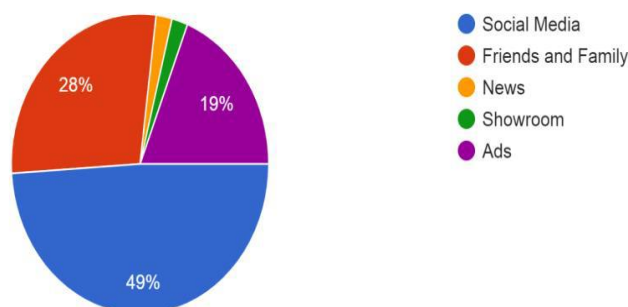
Source of your EV information ?
100 responses



The data shows that social media (49%) is the primary source of information about electric vehicles. Friends and family (28%) and advertisements (19%) also influence awareness and opinions. Traditional sources such as news and showrooms contribute only 4%. This indicates that digital platforms and personal networks are the main channels for EV information.

FIGURE 8-AWARENESS OF ELECTRIC VEHICLES

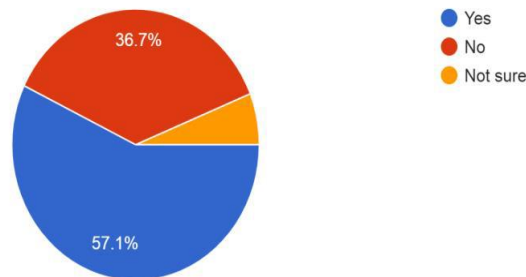
Source of your EV information ?
100 responses



A majority of respondents (83%) are aware of electric vehicles, while 17% are not. This indicates a high level of awareness in Ernakulam, which supports potential future EV adoption. However, awareness alone may not directly translate into purchase intention.

FIGURE 9-AWARENESS OF NEARBY EV CHARGING FACILITY

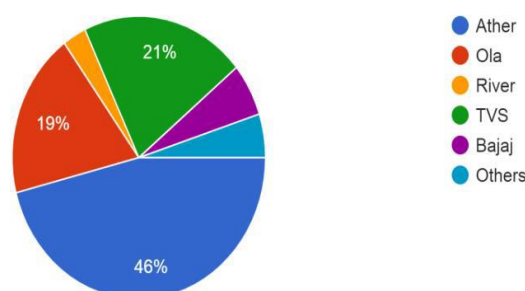
Do you know any EV charging station near your area ?
98 responses



While 57.1% of respondents know the location of nearby charging stations, 42.9% are unaware or uncertain. This indicates that a significant portion of the population lacks clear information about EV charging infrastructure. This uncertainty contributes to range anxiety and reduces confidence in switching to electric vehicles. As a result, EVs may still be perceived as less convenient compared to traditional vehicles.

FIGURE 10- EV BRAND PREFERENCE

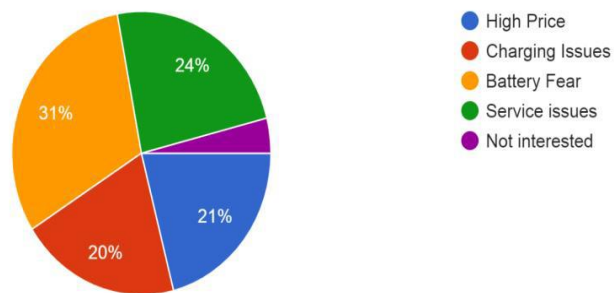
Which Brand would be your first preference of owning first EV
100 responses



The data shows that 46% of respondents prefer Ather for their first electric vehicle. This is followed by TVS (21%) and Ola (19%). Only a small share prefers other brands such as Bajaj (6%), others (5%), and River (3%). This indicates that EV preference is concentrated among a few leading brands. Ather appears to have the strongest preference among respondents.

FIGURE 11-REASONS FOR NOT PURCHASING AN EV

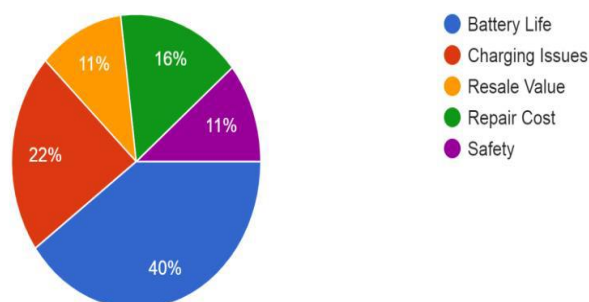
If you know Evs , why haven't you bought one ?
100 responses



The data shows that the main barriers to EV adoption are concerns about battery issues (31%) and maintenance or repair problems (24%). Cost (21%) is a comparatively lower concern. This indicates that technical reliability is a greater barrier than price. Only 4% of respondents are not interested in EVs, suggesting overall positive interest but hesitation due to perceived risks.

FIGURE 12-MAJOR CONCERNS ABOUT ELECTRIC VEHICLES

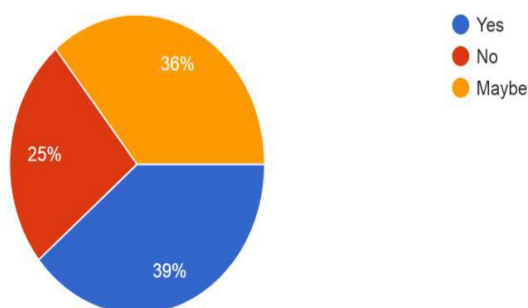
Biggest Fear About Evs ?
100 responses



Battery life (40%) is the most dominant concern among respondents, indicating widespread worry about the durability and lifespan of electric vehicle batteries. Charging station availability (22%) and repair costs (16%) are also significant concerns. These issues reflect practical challenges related to EV ownership. Overall, range anxiety and battery reliability remain the main barriers to EV adoption.

FIGURE 13-PRACTICALITY OF EVS IN DAILY USE

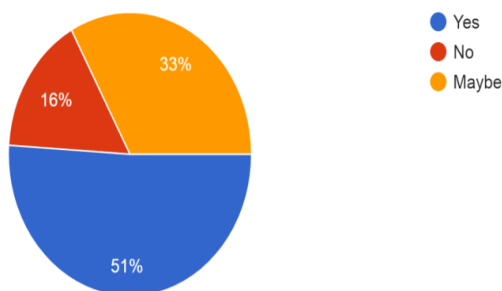
Do you feel EVs are practical for your daily travel?
100 responses



Around 39% of respondents said “Yes”, 25% said “No”, and 36% said “Maybe” regarding EV practicality. While a portion of respondents find EVs practical, a majority (61%) remain uncertain or negative. This reflects ongoing concerns about charging infrastructure and vehicle performance.

FIGURE 14-INFLUENCE OF CHARGING CONVENIENCE ON EV PREFERENCE

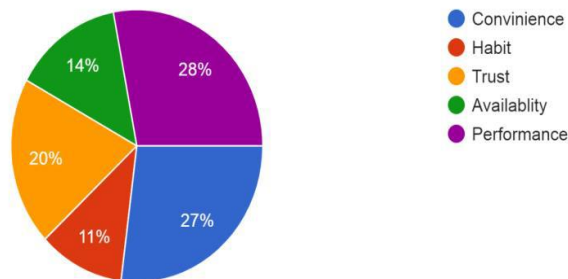
Would you choose EV if charging was easy as fuel refilling ?
100 responses



More than half of the respondents (51%) said “Yes”, 16% said “No”, and 33% said “Maybe”. This indicates a moderately positive attitude toward EV adoption. It also suggests that improved charging convenience could significantly increase adoption rates. Charging infrastructure remains a key challenge in Ernakulam.

FIGURE 15-DETERMINANTS OF ICE VEHICLE PREFERENCE

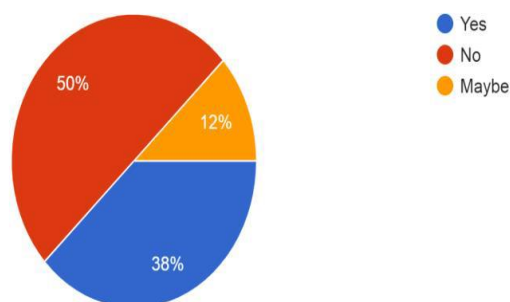
Main Reason you still prefer ICE vehicles ?
100 responses



Among respondents, 28% prefer ICE vehicles due to performance, 27% due to convenience, and 20% due to trust. Additionally, 14% cited availability and 11% mentioned habit. This indicates that performance and convenience are the primary reasons for continued preference for conventional vehicles over electric vehicles.

FIGURE 16-AVAILABILITY OF HOME CHARGING FACILITY

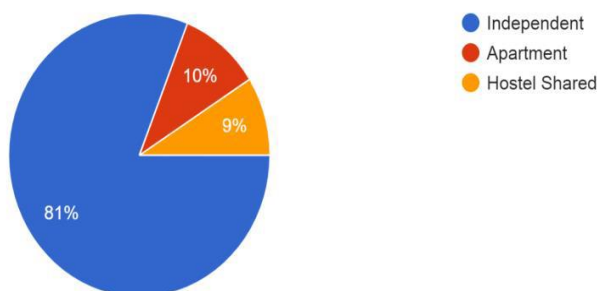
Do you have a facility to charge EV at home?
100 responses



Exactly 50% of respondents do not have a home charging setup, which is a major barrier to EV adoption. While 38% have access to home charging, 12% are unsure, likely due to living in apartments or rented accommodation. This indicates that the lack of private charging infrastructure is a key factor limiting EV adoption in Ernakulam.

FIGURE 17-TYPE OF RESIDENTIAL ACCOMMODATION

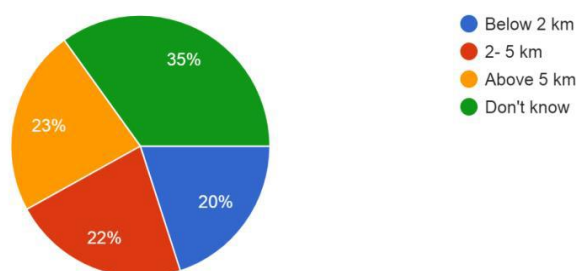
Type of house you live in ?
100 responses



Out of 100 respondents, 81% live in independent houses, while 10% live in apartments and 9% stay in shared hostels. This indicates that a large majority have better potential to have private charging facilities. However, the 19% living in apartments and hostels may face practical difficulties in setting up home charging infrastructure.

FIGURE 18-ACCESSIBILITY OF CHARGING STATIONS

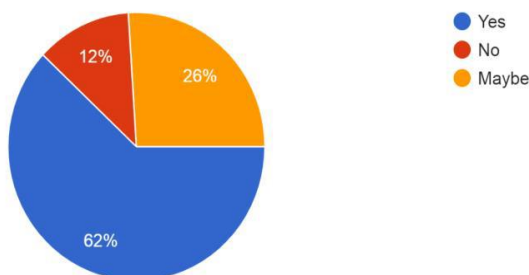
Distance to nearest charging Station
100 responses



About 20% of respondents reported that charging stations are within 2 km, 22% said 2–5 km, and 23% stated that they are located more than 5 km away, while 35% do not know the distance. The high percentage of respondents (35%) being unaware of charging station locations indicates a lack of awareness. Additionally, the 23% of reporting stations more than 5 km away suggests gaps in charging infrastructure in certain areas of Ernakulam.

FIGURE 19- IMPACT OF CHARGING TIME ON EV PREFERENCE

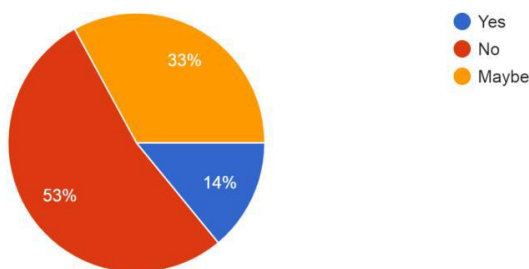
Do you think charging time is a problem ?
100 responses



The data shows that 62% of respondents believe that charging is a problem for electric vehicle users, while 12% do not agree and 26% are uncertain. This indicates that a majority of respondents perceive charging as a significant challenge in EV adoption. The high percentage of “Yes” responses highlights concerns related to charging infrastructure and accessibility. Therefore, improving charging facilities and convenience is essential to reduce perceived barriers to EV usage.

FIGURE 20-AVAILABILITY OF EV SERVICE CENTRES

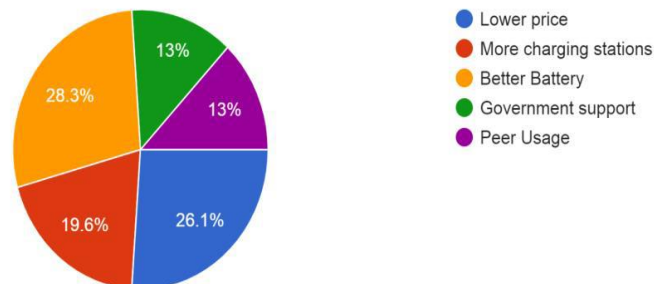
Do you think service centres are easily available
100 responses



Only 14% of respondents believe that service centres are easily available, while 53% said no and 33% were uncertain. This indicates that more than half of the respondents perceive poor service availability. It highlights that inadequate service infrastructure is a major barrier to EV adoption.

FIGURE 21- FACTORS MOTIVATING EV PURCHASE

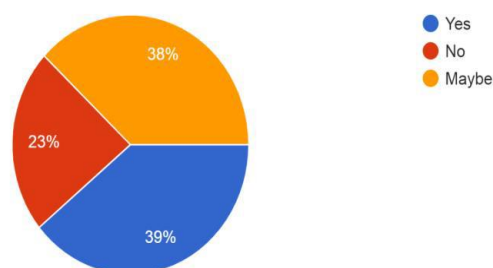
What would motivate you to buy an EV?
92 responses



When asked about factors motivating EV purchase, 28.3% selected better battery performance, 26.1% preferred a lower price, and 19.6% wanted more charging stations. Additionally, 13% chose government support and 13% mentioned peer usage, while the remaining respondents were not interested in purchasing EVs. This indicates that battery performance and affordability are the key motivating factors for EV adoption.

FIGURE 22-FUEL PRICE SENSITIVITY AND EV PREFERENCE

If petrol price increases, would you consider EV?
100 responses

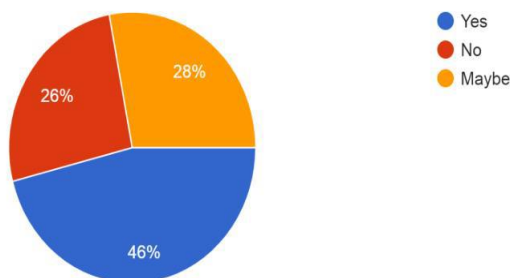


Regarding petrol price increases, 39% of respondents said they would consider buying an EV, 38% said maybe, and 23% said no. This shows that a majority (77%) are either willing or considering EV adoption. It indicates that rising fuel prices are a strong factor influencing the shift towards electric vehicles.

FIGURE 23-IMPACT OF ENVIRONMENTAL CONCERN ON VEHICLE CHOICE

Does environmental concern influence your choice?

100 responses

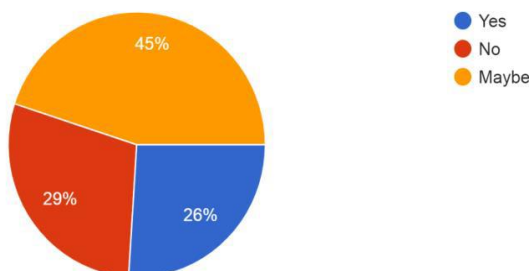


Out of 100 respondents, 46% said “Yes”, 26% said “No”, and 28% said “Maybe”. This indicates that nearly half of the respondents consider environmental concerns when choosing a vehicle. However, 54% are either unsure or not influenced, suggesting that environmental awareness alone is not a strong driver of EV adoption in Ernakulam.

FIGURE 24-FUTURE INTENTION TO PURCHASE AN EV

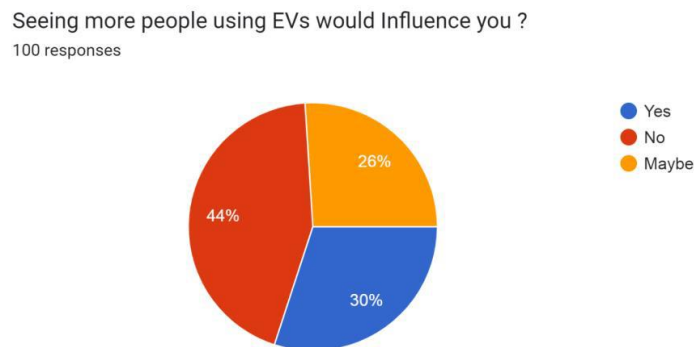
Would you buy EV in next 3 years ?

100 responses



Only 26% of respondents said “Yes”, 29% said “No”, and 45% said “Maybe”. The high percentage of “Maybe” responses indicates consumer hesitation toward EV adoption. This suggests that factors such as price, charging facilities, and battery concerns are contributing to uncertainty.

FIGURE 25-IMPACT OF SOCIAL INFLUENCE ON EV ADOPTION



About 30% of respondents said “Yes”, 44% said “No”, and 26% said “Maybe”. This indicates that social influence has a moderate effect on EV adoption decisions. However, it is not a major deciding factor for most respondents. Individual concerns appear to play a more important role than peer influence.

9. SUGGESTIONS

- More awareness programmes should be conducted through social media and public campaigns to educate people about the benefits and long-term savings of electric vehicles.
- The government and financial institutions should provide better subsidies, easy loan facilities, and exchange offers to make electric vehicles more affordable.
- More public charging stations should be established in both urban and rural areas to reduce charging-related concerns and improve convenience.
- Home charging facilities should be encouraged, and apartment complexes should be supported in installing common charging infrastructure.
- More authorised service centres and mobile service units should be introduced to provide better maintenance and after-sales support.
- Vehicle manufacturers should offer test drives, leasing options, and clear information about battery life, warranty, and maintenance to increase consumer confidence.
- Existing electric vehicle owners should be encouraged to share their positive experiences, as word-of-mouth promotion can help increase public trust and encourage more people to adopt electric vehicles.

10. LIMITATIONS OF THE STUDY

- The study is limited to 100 respondents.
- Time constraints affected data collection.
- Some respondents were unwilling to provide complete information.
- The findings are confined to Ernakulam district.

11. CONCLUSION

Electric vehicles have significant potential to promote sustainable transportation and reduce environmental pollution. While consumers recognise the long-term benefits of EVs, issues such as high purchase costs and inadequate charging infrastructure continue to affect their adoption. Strengthening charging networks, increasing financial incentives, and creating public awareness can improve the acceptance and use of electric vehicles in Ernakulam.

The study shows that many people in Ernakulam are aware of electric vehicles. About 83% of the respondents said they know about EVs. However, only 26% are planning to buy an electric vehicle within the next three years.

The main reasons for not buying an EV are concerns about battery life, limited charging stations, and the difficulty of accessing service centres. Around 40% of the respondents are worried about battery durability and charging facilities. About 53% believe that EV service centres are available but are not easily accessible. Many people also compare EVs with petrol and diesel vehicles in terms of performance and convenience.

The findings also show positive signs for the future. Around 77% of the respondents said they would consider buying an EV if fuel prices continue to increase. About 51% stated that better availability of charging stations would encourage them to switch to an electric vehicle. In addition, 81% of the respondents live in independent houses, making home charging a practical option.

The study concludes that improving charging infrastructure, increasing consumer awareness, expanding service centres, and providing financial incentives can encourage greater adoption of electric vehicles in Ernakulam and support the growth of sustainable transportation in Kerala.

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