



# Factors Influencing The Adoption Of Evs In Rajkot

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## ABSTRACT

As high greenhouse gas emissions and the ozone layer's thinning, governments are attempting to phase out the use of fossil fuels. As an environmentally conscious substitute for electric vehicles, have become more popular. But a variety of primary and secondary factors could influence adoption of electric vehicles, some tailored to Indians and others universal. As Transportation sector is emitting carbon dioxide at a rapid rate, which is causing worries about global warming. However, electric mobility has not yet become a mainstream option for the large number of people in India. Therefore, it is important to understand how people feel about Electric Vehicles (EVs). Therefore questionnaire was designed to identify factors affecting purchase decision of consumer in Rajkot city.

Keywords : electric vehicle, factors , purchase decision

## INTRODUCTION

The **electric vehicle industry in India** is slowly growing. The central and state governments have implemented schemes and incentives to promote electric mobility, and have introduced regulations and standards. Although India would benefit from converting its transport from internal combustion (IC) engines to electric motors, challenges include a lack of charging infrastructure, high initial cost and a lack of renewable energy. E-commerce companies, car manufacturers, app-based transport network companies and mobility-solution providers have entered the sector, however, and are slowly building electric-car capacity and visibility.<sup>[1][2]</sup>

Compared to the 16.16 lakh registration of petrol-diesel vehicles in Gujarat during 2019 – hardly 12 lakh plus petrol-diesel vehicles were registered in 2021. During 2020, 11.12 lakh such vehicles were registered in the state but the reduction was due to first and second Covid-19 waves and subsequent lockdowns, claimed the official.

The Gujarat government is committed to reducing its carbon footprint by 600,000 tons per year by decreasing pollution from the burning of fossil fuels. EV purchasers are eligible for subsidies of up to ₹20,000 for two-wheelers, ₹50,000 for three-wheelers, and ₹150,000 for four-wheelers.<sup>[55]</sup> Capital for infrastructure is being offered to set up charging stations in the state; 280 charging stations were set up across Gujarat after the EV policy was announced, and 250 more are planned.<sup>[56]</sup>

The cost of EVs is high, primarily due to the cost of lithium-ion batteries. The battery packs are imported, and cost about \$275/KWh in India. This, combined with the GST of 18% and the lack of lithium in India, further increases the cost of batteries.<sup>[73]</sup> The charging infrastructure for electric vehicles in India has not been fully developed.<sup>[74]</sup> Electricity in India is primarily produced by burning coal, which produces a large amount of greenhouse emissions. With the introduction of EVs and charging infrastructure, electricity demand will increase; introducing EVs to reduce GHG emissions would be ineffective if the electricity was produced by

burning coal. India's indebted distribution companies cannot meet the country's energy requirements as it is.<sup>[75]</sup> Fast charging stations are charging nearly Rs 25 per kWh to cover the investment and running costs which would not offer any benefit over ICE vehicles in terms of life cycle cost of the vehicle except surface air pollution reduction.

## LITERATURE REVIEW

Argueta R, (2019) the primary motivation for the government's efforts to encourage the use of electric vehicles is to save the environment. Electric vehicles can aid in the improvement of air quality. Government financial incentives, industry growth, and market demand patterns are all important factors in the adoption of electric cars.

Chun Yang, (2019) Energy conservation and environmental preservation are the primary reasons for 40% of people to acquire electric automobiles. Consumers' value pricing above everything else, but they also consider interior trimmings, storage capacity, and car engine performance. Consumers with a higher level of education favour hybrid automobiles in terms of market share.

Pelsmackper (2020) analyzed the factors influencing the intention to use electric vehicles by applying the planned theory of behavior (TPB). As a result, it was found that emotions and perceptions of electric vehicles, followed by subjective norms, influence the intention to use them. In addition, respondents with high intention to use electric vehicles said they had a reflective emotion toward driving behavior in the use of electric vehicles

Green (2020) In the constraints of RCT, consumers are limited by budget, so the relationship between cost and benefit needs to be fully considered before buying, particularly in the current market for electric vehicles because electric vehicles are much more costly than conventional vehicles. It may make consumers prefer to buy conventional vehicles because they have no choice if they do not have a big enough budget. The higher price of electric vehicles is mainly due to the expensive battery pack, but also to the absence of economies of scale.

## Determining Factors for Consumer's Electric Vehicle Purchase Decision

### Cost

The cost of an EV is typically higher than a conventional gasoline-powered vehicle. Therefore, consumers need to consider the price of the car, maintenance costs, and charging expenses when making their purchase decision. However, the good news is that over time, EVs' total cost of ownership can be lower than that of conventional vehicles due to their reduced operating costs.

### Range Anxiety

Range anxiety is a concern for many prospective EV buyers. Range anxiety refers to the fear of running out of battery power while driving, which could leave the driver stranded. However, with the advancement of battery technology and the expansion of charging infrastructure, this concern is becoming less of an issue.

### Charging Infrastructure

The availability and accessibility of charging infrastructure are critical when purchasing an EV. Consumers need to know where they can charge their EVs, how long it takes to charge, and if there are any associated costs. Governments and private companies are investing heavily in expanding the charging infrastructure to make EV ownership more convenient and accessible.

### Performance

The driving experience of an EV is different from that of a conventional vehicle. Electric motors provide instant torque, resulting in a smooth and quiet ride. Consumers need to consider the performance of an EV, including acceleration, handling, and braking when making their purchase decision.

## Environmental Impact

One of the primary reasons for purchasing an EV is its positive impact on the environment. EVs emit fewer greenhouse gases and pollutants than conventional vehicles, making them an eco-friendly option. Consumers who prioritize reducing their carbon footprint and contributing to environmental sustainability would consider this factor when purchasing an EV.

## Style and Design

The style and design of an EV can also influence a consumer's purchase decision. The design of an EV can range from futuristic to more conventional styles. Consumers may have personal preferences for the look and feel of their vehicle, which can influence their decision to purchase an EV.

## Brand Loyalty

Brand loyalty can also affect a consumer's decision to purchase an EV. Some consumers may prefer a particular brand over others due to their reputation for producing high-quality, reliable vehicles. Therefore, EV manufacturers must establish trustworthy and dependable brands to attract consumers.

## Incentives and Rebates

Incentives and rebates offered by governments and manufacturers can also influence consumers' decisions to purchase an EV. These incentives can include tax credits, rebates, free charging, and other perks to make EV ownership more affordable and convenient.

## Social Influence

The influence of family, friends, and colleagues can also play a role in a consumer's decision to purchase an EV. Positive experiences and recommendations from those in their social circle can encourage consumers to consider purchasing an EV.

## Driving Habits

Consumers' driving habits can also influence their decision to purchase an EV. For example, if a consumer has a long daily commute, they may prefer an EV with a longer driving range. Similarly, if a consumer frequently takes road trips, they may consider a plug-in hybrid electric vehicle (PHEV) that offers electric and gasoline-powered driving options.

## Availability and Variety of Models

The availability and variety of EV models can also influence a consumer's purchase decision. Consumers may prefer a particular model based on its features, driving range, or design. Therefore, manufacturers need to offer a range of EV models to attract more consumers.

## Resale Value

The resale value of an EV can also influence a consumer's purchase decision. Consumers may hesitate to purchase an EV if unsure about its long-term value or resale potential. Therefore, manufacturers need to establish the long-term value of their EVs to attract and retain consumers.

## Safety Features

Safety is critical for consumers when purchasing any vehicle, including an EV. Consumers need to know that EVs are equipped with the latest safety features and technologies to ensure their safety and the safety of their passengers. Therefore, manufacturers must prioritize safety features and technologies in their EV models to attract and retain consumers.

## Geographical Location

The geographical location of a consumer can also influence their purchase decision. Consumers living in urban areas may prefer EVs due to their lower emissions and reduced noise pollution, while consumers living in rural areas may prefer gasoline-powered vehicles due to their longer driving range and access to gasoline stations.

## Support and Maintenance

Consumers also consider the availability and quality of support and maintenance services when purchasing. They need to know they can access reliable and affordable maintenance services and support when required. Therefore, manufacturers and dealerships must provide comprehensive support and maintenance services to attract and retain consumers.

## OBJECTIVE

To increase consumer awareness of e vehicles

To identify which factors most influence buying behaviour of ev

## RESEARCH METHODOLOGY

### Research Design

The purpose of this research is to examine factors influencing the purchase of electric vehicles in Rajkot city of Gujarat. Data was collected from January – February 2024 through questionnaire. the questionnaire is comprised of two sections. The first section of the questionnaire focuses on the respondents' demographic characteristics. The second section of the questionnaire includes questions about the Financial Factors, Vehicle Performance, Availability and Access to Infrastructure, Environmental Concerns , Societal Influence

### Data Collection Method:

Primary survey method.

### Population:

Rajkot city target consumer are two wheeler user of age 18-60

### Sampling Method:

Random Sampling, Convenience sampling

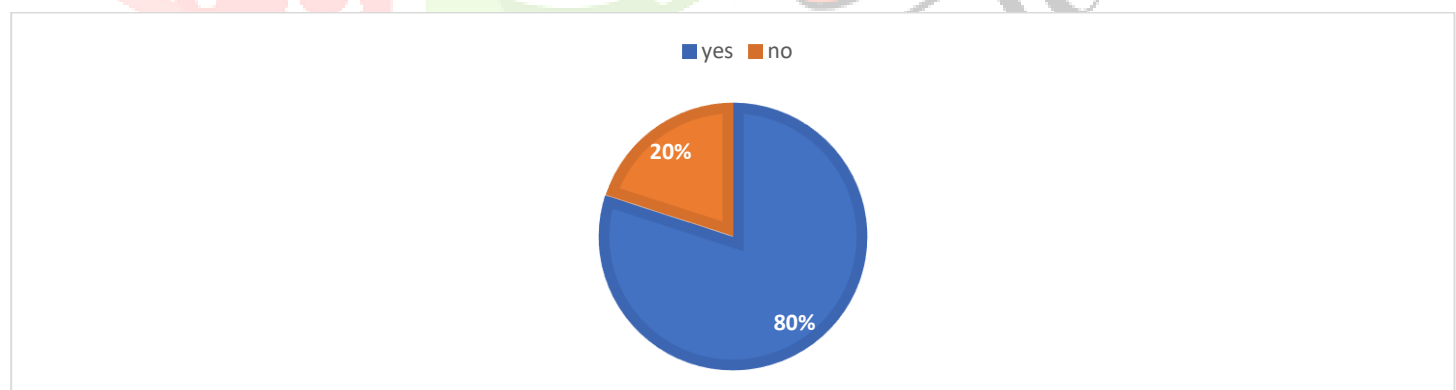
## DATA COLLECTION

Age	Responses
20-30	70
30-40	20
40-50	08
More than 50	02
<b>Grand Total</b>	<b>100</b>

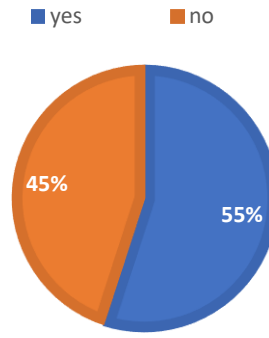
Occupation	Responses
Business	25
Employee	55
Household	06
Student	14
<b>Grand Total</b>	<b>100</b>

Income	Responses
Rs. 3,00,000 - Rs. 5,00,000	65
Rs. 5,00,000 - Rs. 10,00,000	27
More than Rs. 10,00,000	08
<b>Grand Total</b>	<b>100</b>

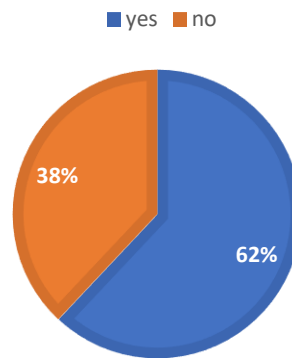
Do you believe electric vehicles offer long-term cost savings compared to petrol/diesel vehicles?



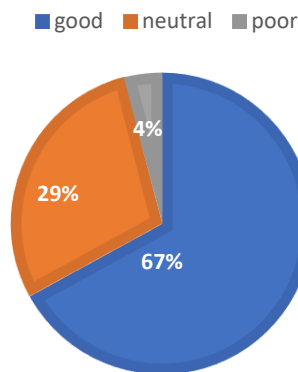
Are you aware of any financial incentives or subsidies offered by the government to reduce the cost of purchasing electric vehicles?



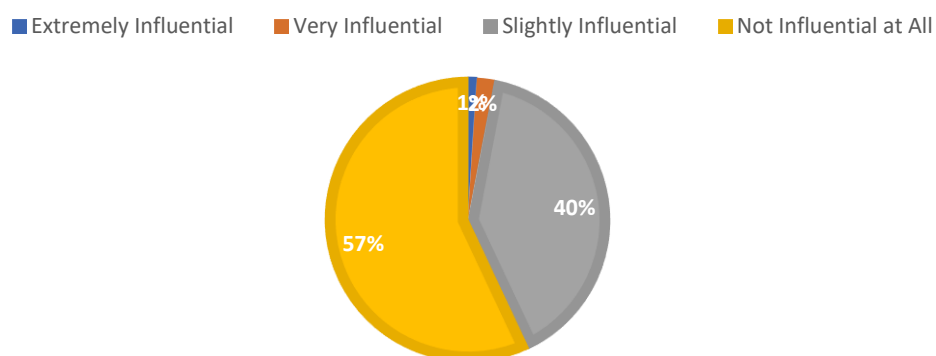
Would you be willing to wait longer for charging if it meant an extended driving range for the electric vehicle ?



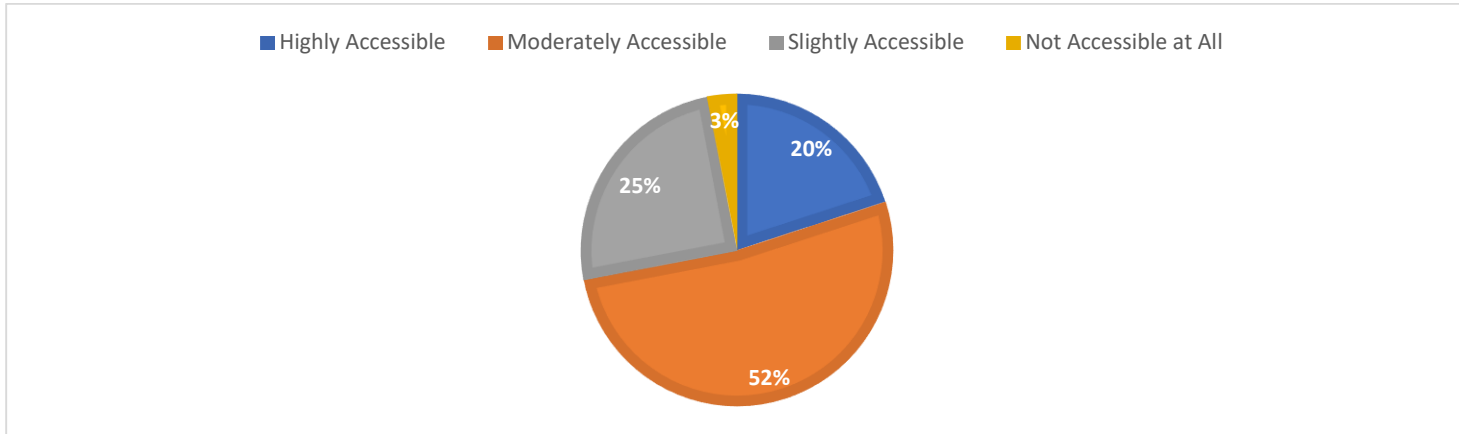
How would you rate the environmental friendliness of electric vehicles compared to conventional petrol/diesel vehicles?



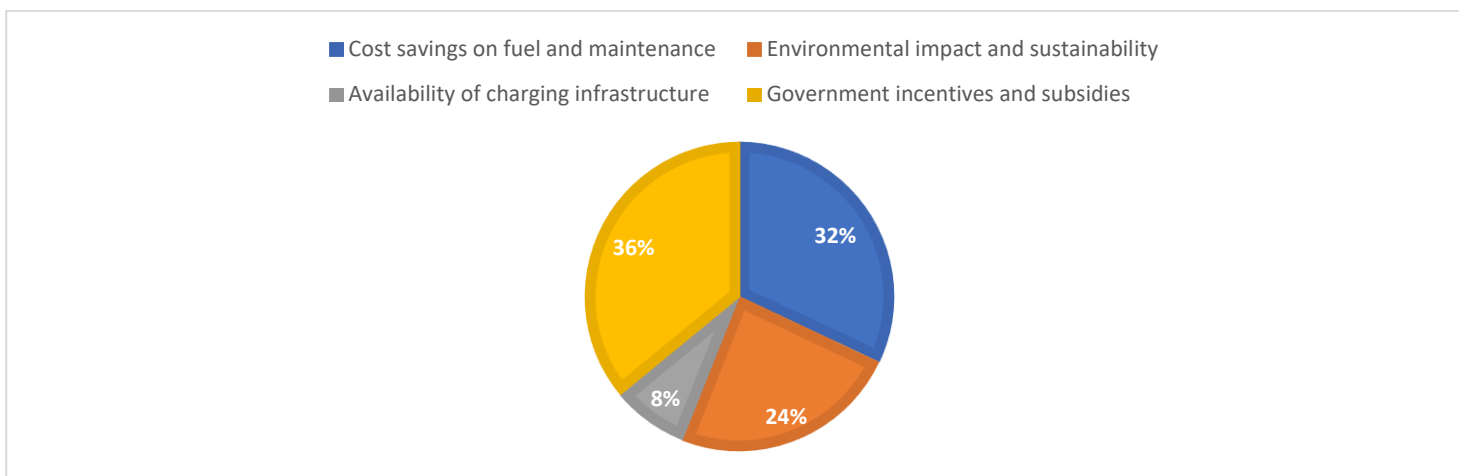
To what extent do you think the opinions and behaviors of your peers influence your decision to consider electric vehicles?



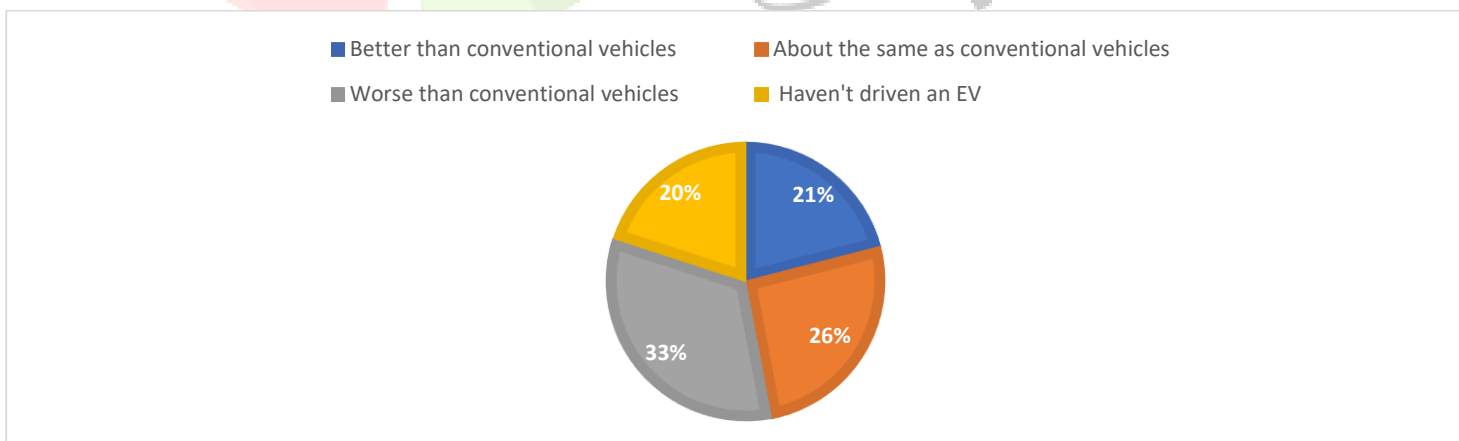
How accessible do you perceive the availability of charging infrastructure for electric vehicles in Rajkot?



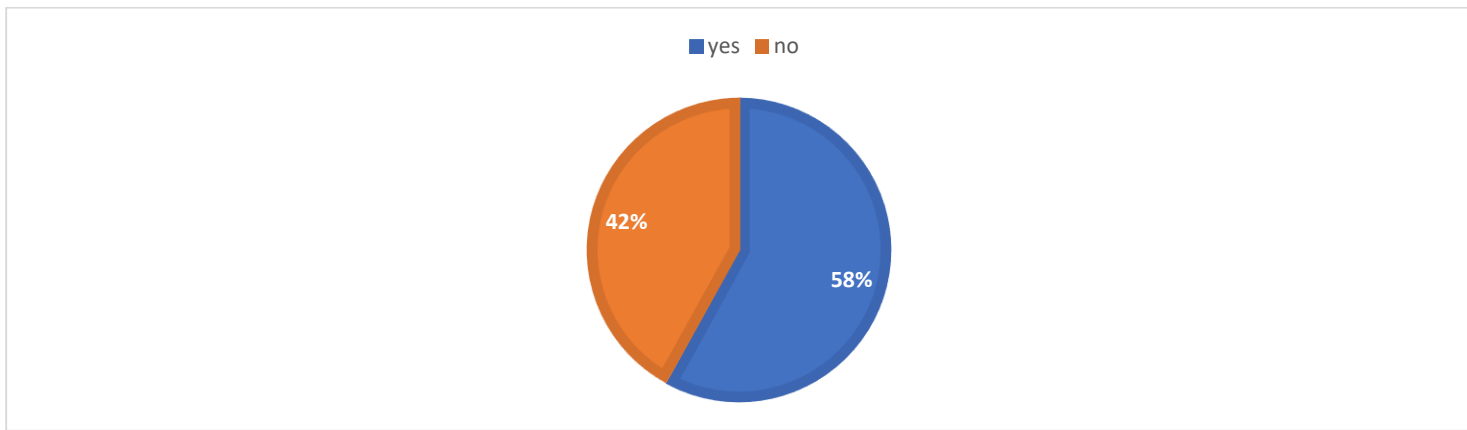
What factors will most influence your attitudes towards electric vehicles ?



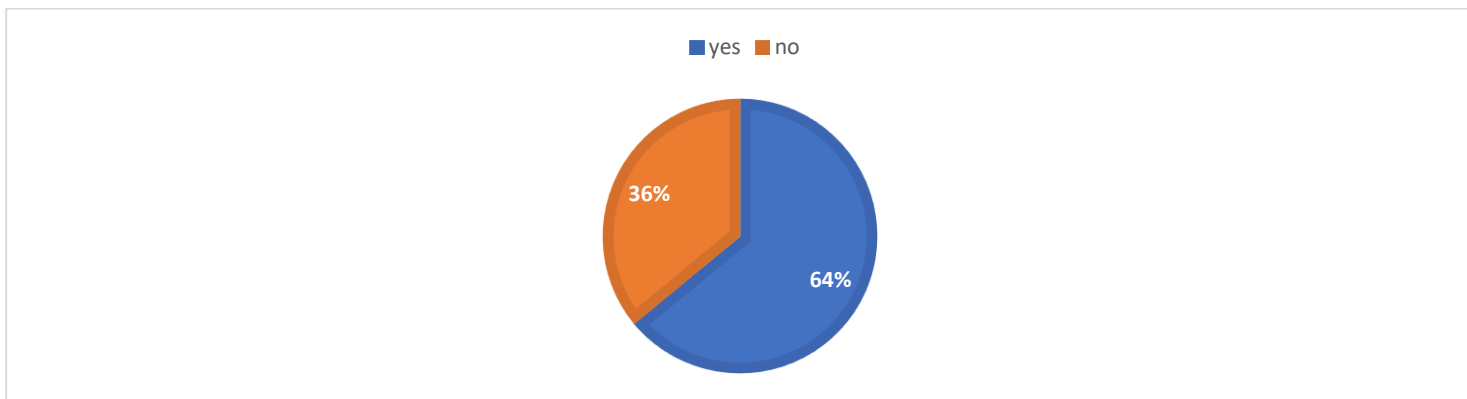
Have you ever driven an electric vehicle (EV)? If yes, how would you rate its performance compared to conventional vehicles?



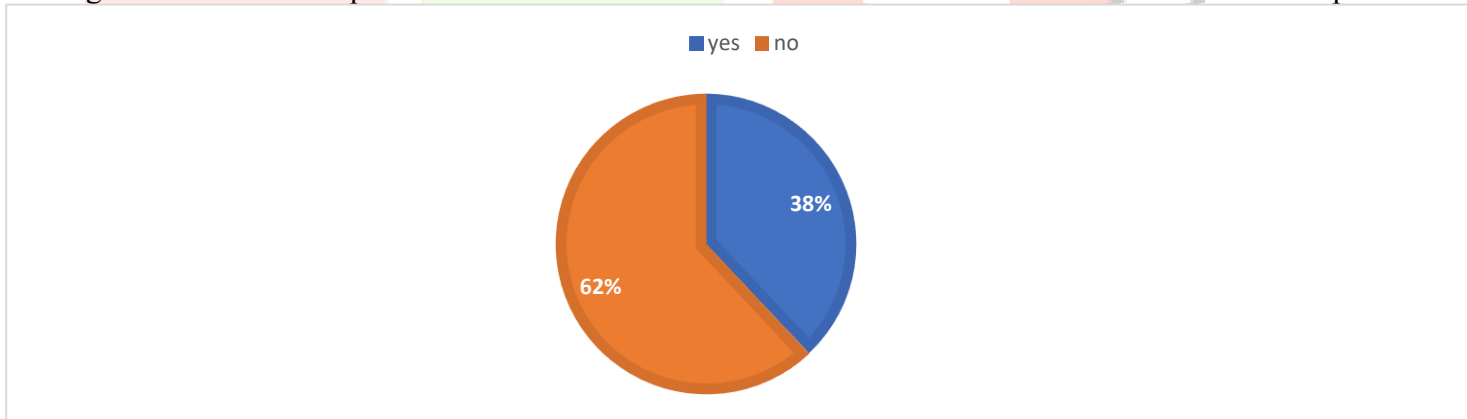
Is the perception of electric vehicles as a long-term cost-saving investment a driving factor in the decision to adopt them in Rajkot?



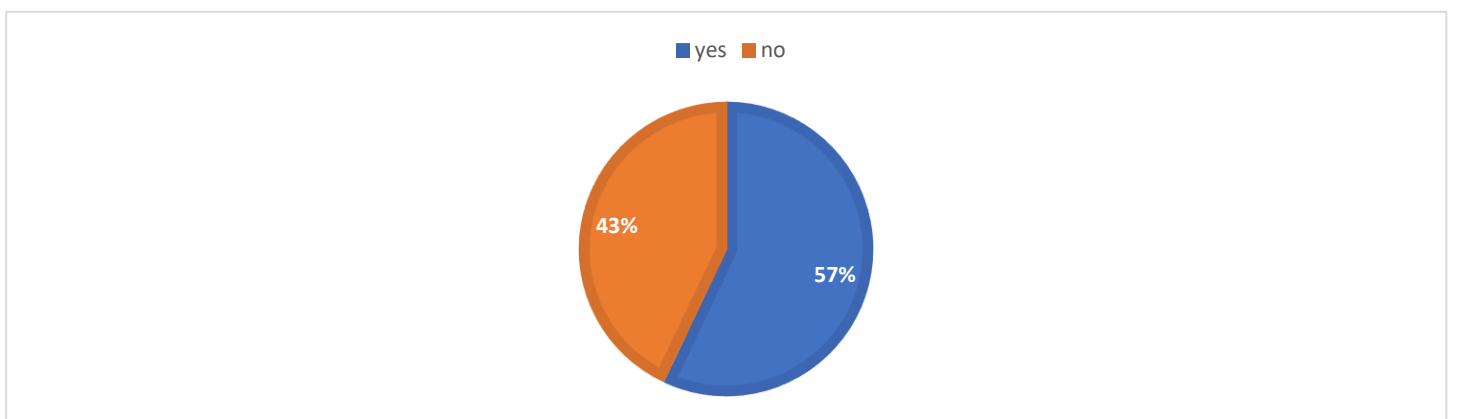
Is the absence of engine noise in electric vehicles perceived as a factor influencing the decision to adopt?



Is the potential for a quieter and smoother driving experience with electric vehicles considered in the decision-making process for their adoption?

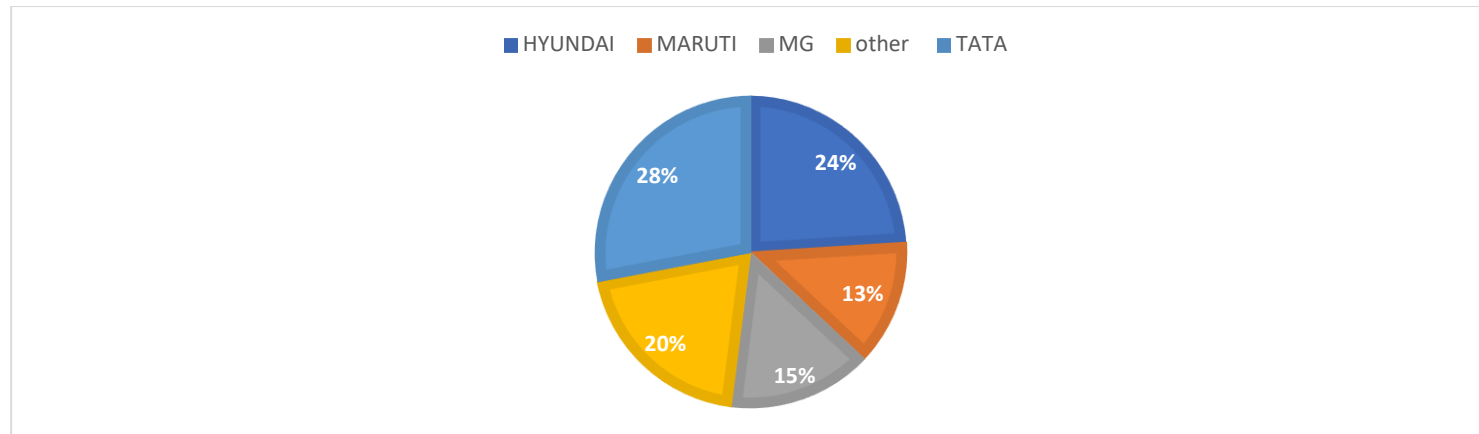


Do you believe that the ease of accessing charging infrastructure influences the decision to adopt electric vehicle Rajkot?





If you want to buy e-vehicle, which company you will prefer?



## HYPOTHESIS TESTING

H0: Significant are not more prefer as an E-vehicle.

H1: Significant are more prefer as an E-vehicle.

Table 1 Calculation of observed data

Observed (fo)	Maruti Suzuki	Hyundai	Tata	MG	Other	Total
Electric Car	06	16	21	10	13	66
Electric Bike	07	08	07	05	07	34
Total	13	24	28	15	20	100

Table 2 Calculation of Expected data

Expected (fe)	Maruti Suzuki	Hyundai	Tata	MG	Other	Total
Electric Car	8.58	15.84	18.48	9.9	13.2	66
Electric Bike	4.42	8.16	9.52	5.1	6.8	34
Total	13	24	28	15	20	100

Table 3 Calculation of Observed & Expected data

Chi-square	Maruti Suzuki	Hyundai	Tata	MG	Other	Total
Electric Car	0.775804196	0.001616162	0.34363636	0.0010101	0.003030303	1.125097125
Electric Bike	1.505972851	0.003137255	0.66705882	0.0019608	0.005882353	2.184012066
Total						3.309109191

Table 4 Cal. of Df, CV, P-value

Df = (r-1)(c-1)	CV	9.487729037
Df = 4	P-value	0.507490283

## CONCLUSION

Here Chi-Square value < Critical Value. Hence, we fail to reject H0. OR p value is 0.507490283 & alpha is 0.05. Since p value > 0.05. Hence, we fail to reject H0. So, the conclusion is that Significant are not more prefer as an E-vehicle.

## FINDINGS

Most of the respondents thinks that electric cars are very expensive.

Most of the respondents are agree that electric cars can replace regular cars in terms of satisfying consumer needs.

Most of the consumers expect changes like travel efficiency, comfort, maintenance, average and durability from E-vehicle rather than regular vehicle.

Availability of charging infrastructure for electric vehicles in Rajkot but charging time is high

Cost is primary concern of public and environment is secondary

55% of public are aware of government subsidies

Most people see electric vehicle as long term investmnet

## LIMITATION :

Data was collected only from Marwadi University Rajkot

There was limitation of time

As data collected through questionnaire there might be possibility that reviewer may not be fully loyal in answering question

## CONCLUSION :

The impact of financial and technical attributes of EV on its utility is generally found to be significant, including its purchase and operating cost, driving range, charging duration, vehicle performance and brand diversity on the market. Most people respondent think electric car are very expensive but can replace regular car in terms if satisfying consumer needs. The density of charging stations also positively affects the utility of EV, which demonstrates the importance of charging infrastructure development in promoting EV. As for the impact of incentive policies, tax reduction (either purchase tax or road tax) is most likely effective, while there is not yet evidence supporting the effectiveness of other usage cost reduction such as free parking and toll reduction. Although these variables are usually found to be significant, it is still too early for a definitive conclusion

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