

## **CONSUMER PERCEPTION OF ELECTRICAL VEHICLES IN JAMNAGAR CITY**

**MR. RAJESH V. MANDALIA (M.PHIL, UGC NET, PH.D PURSUING)**  
ASSISTANT PROFESSOR OF COMMERCE AND ACCOUNTANCY AT  
S.V.E.T. COMMERCE AND B.B.A. COLLEGE, JAMNAGAR.

### **Abstract**

The growing environmental concerns and fluctuating oil prices have spurred interest in electric vehicles (EVs), particularly in developing nations like India. This study investigates consumer perception and the factors influencing the adoption of electric vehicles in Jamnagar City. The research is grounded in the context of India's National Electric Mobility Mission Plan (NEMMP) 2020 and explores awareness, preferences, and limitations surrounding EV adoption. A descriptive research design was employed, gathering primary data from 100 respondents through an online survey. The findings reveal a high level of interest in EVs, with 91% of respondents expressing preference for electric vehicles over conventional ones. Key factors encouraging EV adoption include zero emissions, reduced dependence on fossil fuels, and improvements in charging infrastructure, while barriers include limited charging stations and long recharge times. Hypothesis testing using the Chi-square method showed no significant relationship between gender or income and vehicle preference. The study highlights the need for government and manufacturers to invest in infrastructure, awareness campaigns, and pricing strategies to accelerate EV adoption. The research offers valuable insights for stakeholders aiming to tap into the potential of the Indian electric vehicle market.

### **Keywords**

Electric Vehicles (EVs), Consumer Perception, Environmental Impact, Sustainable Transportation Battery-operated vehicles, Hybrid vehicles, BS6 engine, Autonomous driving, Connectivity, Combustion engine, Public charging infrastructure, National Electric Mobility Mission Plan (NEMMP) 2020, Subsidies on EVs.

### **Introduction**

During the past couple of years, the environmental impact of petroleum-based transportation infrastructure, together with the fear of the rising price of oil has led to renewed interest in electric transportation infrastructure. The auto sector is one of the fastest-developing industries in India as well as within the world, and in present era, the auto sector has been surfing remarkable changes in its technology as they focus on moving towards better eco-friendly vehicles with battery-operated vehicles and also producing combustion engine vehicles which produce very little pollution. The phases

where we are able to see major changes are in connectivity, autonomous driving, the sharing economy, yearly updating of vehicles, and therefore the start of BS6 engine vehicles. In line with the 'National Electric Mobility Mission Plan (NEMMP), 2020 which was introduced in India in 2013 has the commitment to make a significant movement to electric vehicles and focuses on the problems of national energy security, vehicle pollution, and therefore the growth in domestic manufacturing sectors. Pollution related to the automobile sector in India is one of the factors responsible for such a heavy change within the automobile sector. Most cities in India have high pollution and high amplitude rates worldwide. Consistent with the WHO report 2019 for many polluted cities, 14 of the 20 cities in the world are from India. Some are significantly alert to such vehicles within the market, and a few are not. The auto industry must bridge this gap. People in India mostly do not have more knowledge about the electrical vehicles that the government, together with the auto sector, must take necessary steps to create people responsive to such technology. Make them understand the electrical vehicle and the benefits it brings. Such benefits can bring about a change in the minds of people in shifting to an electrical vehicle. This may only be done if the correct facilities and infrastructure are provided by the government. Therefore, we consider that we started the utilization of electrical vehicles on behalf of the combustion vehicle. Although electric vehicles have been to go under production in India for a couple of years, the market of electrical vehicles has not increased in India.

### Review of Literature

- Dr.Prathap B, Prof. Praveen Kumar and Prof. Savanth S (2020) studied how the electrical vehicle market is involving and the way people have gotten attentive to those technologies. They conducted this study by taking various countries around the world and comparing how they have adapted the utilization of electrical vehicles in their countries and developed a model based on that.
- Dr.Shivkumar L. Randar Miss. Vaishali R. (2020) studied about consumer behaviour in Solapur city. They tried to understand what encourages and discourages customers towards buying electric vehicles, what is the requirement they prefer based on which they assume what the government and automobile industry can do to increase the market of electric vehicles in Solapur City.
- V.V Ravikumar and Anil Khurana (2019) Talks about that the environment pollution is becoming a big concern for living beings. Internal combustion engines are major contributors. Therefore, many countries are moving towards

electric vehicles. They examined the different factors that could affect the transition to electric vehicles based on the literature available from previous studies globally and builds a conceptual model.

- Rachana Vidhi and Prasanna Shrivastava (2018) studied that Electric vehicles reduce pollution only if a high percentage of the electricity mix comes from renewable sources, and suggested that vehicle battery manufacturing should take place away from the vehicle use area. Their paper also reviewed the different steps in the life cycle of an electric vehicle and their impact on environmental emissions, and recommended certain policies suitable for a different socio-economic group that suits the Indian market.
- Gallagher and Muehlegger (2018) contemplated the customer reception of hybrid electric vehicles in the USA and found that gatherings with solid importance for environmentalism and energy conserving toward hybrid electric vehicles. Their outcomes demonstrate that rising fuel costs and certain social inclinations bring about the highest sales.
- Fanchao Liao, Eric Molin and Bert van Wee (2016) there study talks about widespread adoption of electric vehicles which may contribute to the alleviation of problems such as environmental pollution, global warming and oil dependency. However, the current market penetration of electric vehicles is relatively low, despite of many governments implementing strong promotion policies. Their presented a comprehensive review of studies on consumption.

### **Objectives of the study**

The objective of this study is to understand consumer perceptions and factors that are important for the purchase of EV in Jamnagar City.

### **3.1. Research Methodology**

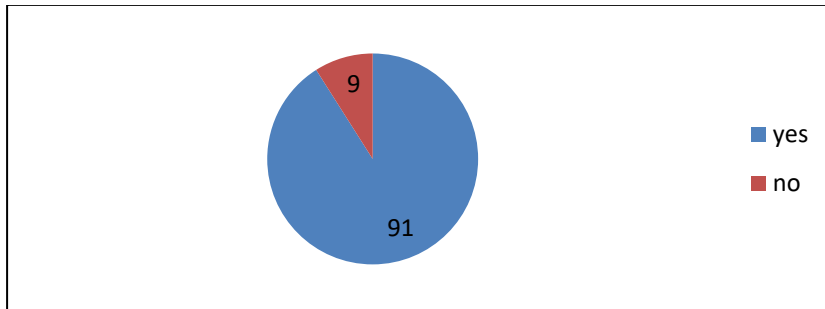
A descriptive research methodology was used. Primary data of a sample population of 100 were collected using an online questionnaire. The Chi-square test was used to test this hypothesis.

### **3.2. Data Analysis and Interpretation**

The sample size was 100, out of which 54% were male and 46% were female. 22% were aged below 25 years, 21% were aged between 25 to 35 years, and 20% were from age group of 36 to 45 years, 20% of from the age group of 46 to 55 years, and 17%

were from age group above 55 years. The following are some responses regarding this research.

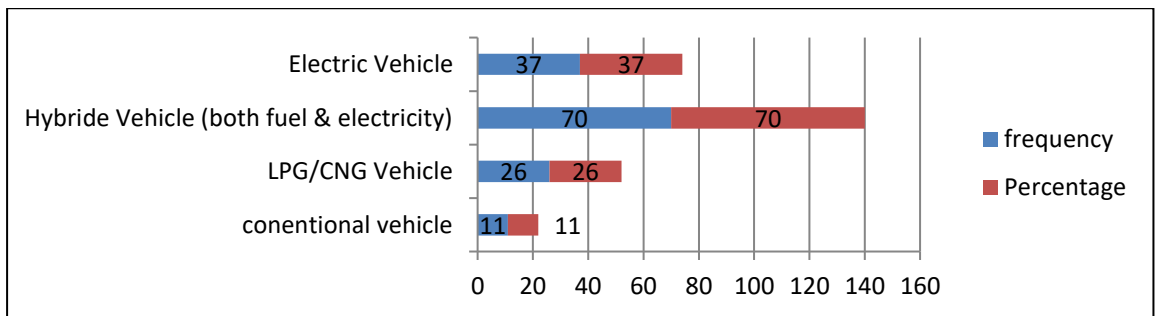
➤ **If they wanted to buy or change, would you prefer an electric vehicle?**



Source: Primary data

A total of 91% preferred EV, and only 9% preferred conventional vehicles. Hence, respondents were aware of climate conditions and were ready to change their preferences for EVs.

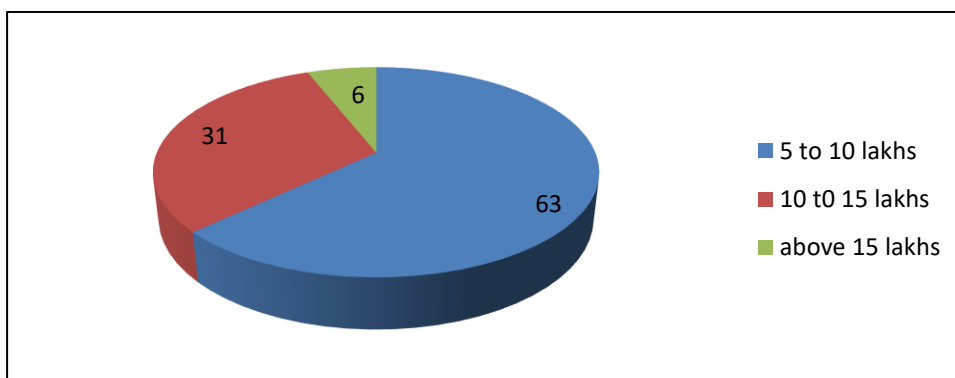
➤ **Which of the following would you prefer?**



Source: Primary data

When asked about the choice of vehicles, the majority of respondents were selected as hybrid vehicles (both fuel and electricity).

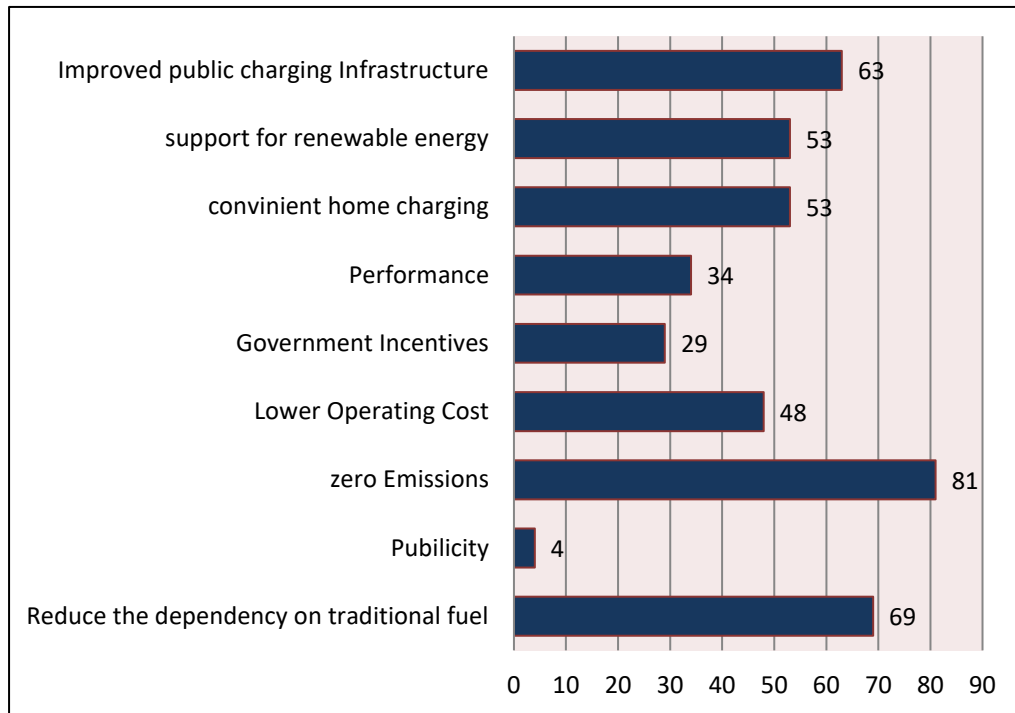
➤ **How much should be the cost of EVs in Jamnagar city?**



Source: Primary data

When asked about the cost of EVs, most respondents were expected to buy EVs in the range of 5 to 10 lakhs.

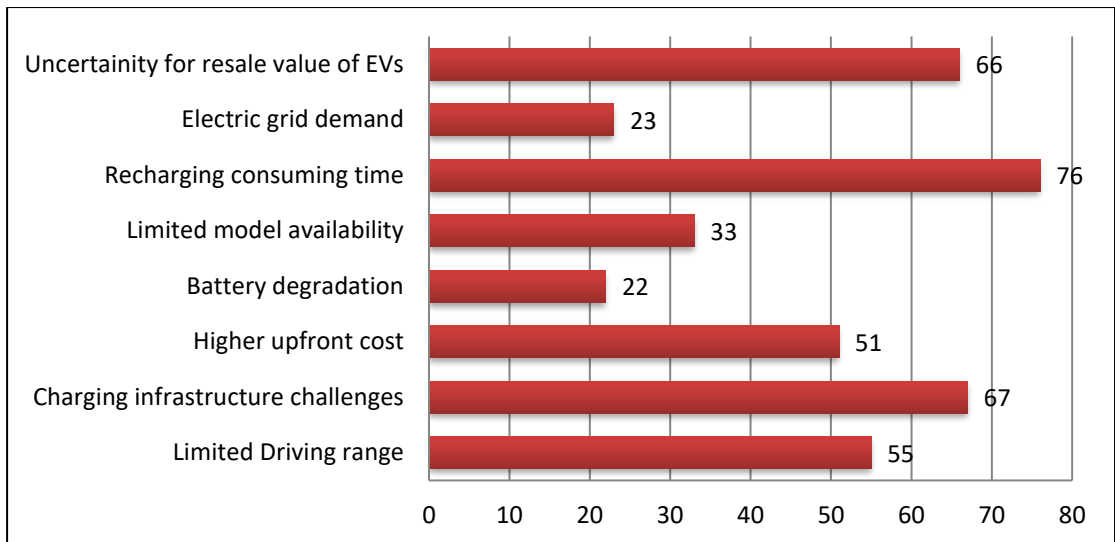
➤ **Reasons for selecting an EV**



Source: Primary data

To find the consumer perception it's important to find out the factors for selecting EV. Respondents consider zero emissions, less dependency on traditional fuels, improved public charging infrastructure as important factors.

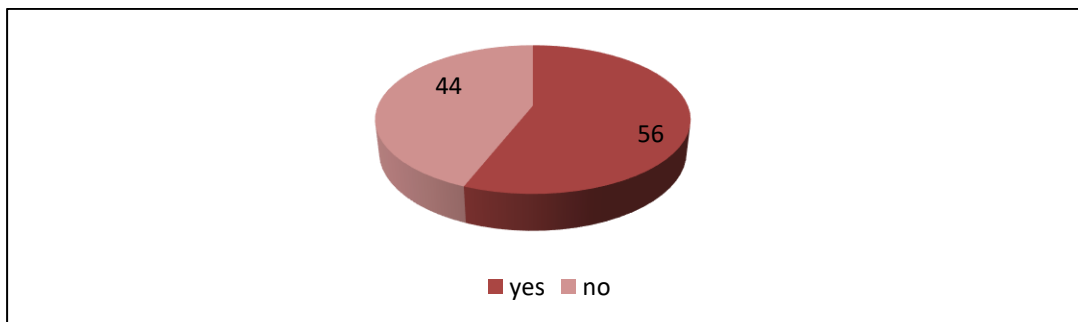
**Limitation for selecting an EV**



Source: Primary data

Respondents consider recharging time, limited charging stations, difficulty in charging as major limitation to consider EVs in current situation.

➤ **Do you think it is too early for EVs, that they are not reliable enough?**



Source: Primary data

Majority respondents consider that it's too early due to current infrastructure and development to launch EVs in India.

Respondents were being asked about the various factors which influences the purchase decision of a vehicle. Majority of respondents consider performance, fuel efficiency, price, technical features and environment friendly as very influential, whereas they consider style, size and brand as moderately influential factors.

**Hypothesis Testing**

➤ **Relationship between Gender and Choice of Vehicle**

**H<sub>0</sub>** - There is no significant relationship between Gender and choice of vehicle

**H<sub>1</sub>** - There is significant relationship between Gender and choice of vehicle

Groups of Gender	O <sub>i</sub>	E <sub>i</sub>	O <sub>i</sub> - E <sub>i</sub>	(O <sub>i</sub> - E <sub>i</sub> ) <sup>2</sup>	(O <sub>i</sub> - E <sub>i</sub> ) <sup>2</sup> /E <sub>i</sub>
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<b>Male</b>					
Conventional	8	7.02	0.98	0.9604	0.1368
LPG/CNG	7	12.42	-5.42	29.3764	2.3652
Hybrid Vehicle	32	27	5	25	0.9259
Electric Vehicle	7	7.56	-0.56	0.3136	0.0415
<b>Female</b>					
Conventional	5	5.98	-0.98	0.9604	0.1606
LPG/CNG	16	10.58	5.42	29.3764	2.7766
Hybrid Vehicle	18	23	-5	25	1.0870
Electric Vehicle	7	6.44	0.56	0.3136	0.0487
<b>Total</b>				$\sum(O_i - E_i)^2/E_i$	<b>7.5423</b>

Source: Primary Data

### Customers' Gender and Choice of Vehicle Chi-Square Test

Degree of Freedom	Level of Significance	Calculated Value of Chi - Square	Table Value of Chi-Square	Hypothesis accepted
3	5%	7.5423	7.815	Calculated Value < Table Value, hence Null hypotheses is Accepted

Table reveals that, there is no significant relationship between gender and choice of vehicle because null hypothesis is accepted. Here, the table value is higher than calculated value.

### ➤ Relationship between Income group and Choice of Vehicle

**H<sub>0</sub>** - There is no significant relationship between Income and choice of vehicle

**H<sub>1</sub>** - There is significant relationship between Income and choice of vehicle

Groups of Income	O <sub>i</sub>	E <sub>i</sub>	O <sub>i</sub> - E <sub>i</sub>	(O <sub>i</sub> - E <sub>i</sub> ) <sup>2</sup>	(O <sub>i</sub> - E <sub>i</sub> ) <sup>2</sup> /E <sub>i</sub>
<b>Below 15000</b>					
Conventional	10	8.88	1.12	1.2544	0.1413
LPG/CNG	3	3.36	-0.36	0.1296	0.0386
Hybrid Vehicle	9	9.12	-0.12	0.0144	0.0016
Electric Vehicle	2	2.64	-0.64	0.4096	0.1552
<b>15000-20000</b>					
Conventional	12	7.77	4.23	17.8929	2.3028
LPG/CNG	3	2.94	0.06	0.0036	0.0012
Hybrid Vehicle	6	7.98	-1.98	3.9204	0.4913
Electric Vehicle	0	2.31	-2.31	5.3361	2.3100
<b>21000-25000</b>					
Conventional	6	5.92	0.08	0.0064	0.0011
LPG/CNG	1	2.24	-1.24	1.5376	0.6864

Hybrid Vehicle	6	6.08	-0.08	0.0064	0.0011
Electric Vehicle	3	1.76	1.24	1.5376	0.8736
<b>26000-30000</b>					
Conventional	7	8.88	-1.88	3.5344	0.3980
LPG/CNG	4	3.36	0.64	0.4096	0.1219
Hybrid Vehicle	10	9.12	0.88	0.7744	0.0849
Electric Vehicle	3	2.64	0.36	0.1296	0.0491
<b>Above 30000</b>					
Conventional	2	5.55	-3.55	12.6025	2.2707
LPG/CNG	3	2.1	0.9	0.8100	0.3857
Hybrid Vehicle	7	5.7	1.3	1.6900	0.2965
Electric Vehicle	3	1.65	1.35	1.8225	1.1045
<b>Total</b>				$\Sigma(O_i - E_i)^2 / E_i$	<b>11.7155</b>

Source: Primary Data

#### Customers' Income and Choice of Vehicle Chi-Square Test

Degree of Freedom	Level of Significance	Calculated Value of Chi - Square	Table Value of Chi-Square	Hypothesis accepted
12	5%	11.7155	21.0263	Calculated Value < Table Value, hence Null hypotheses is Accepted

Table reveals that, there is no significant relationship between income and choice of vehicle because null hypothesis is accepted. Here, the table value is higher than calculated value.

#### Significance of present study

- This study will be helpful to understand the level of awareness and willingness of consumers to buy Electrical vehicles.
- It will provide a thorough analysis of factors that are encouraging and discouraging customers to buy Electrical vehicles as well as the expectation of customers from manufacturers and government with respect to electric vehicles.
- In short, this study helps us to understand the market potential of electrical vehicles and consumers' expectation from producers and government.

#### Conclusion

With the depletion of traditional fuels and constant hike in fuel prices, there is a need for energy transition in vehicles in India. Govt. has taken initiative

to fight pollution levels by promoting EVs and giving subsidies on purchase. To boost its production, Govt. has eased the FDI norms. Various emerging brands are launching EVs in India. The Government and manufacturers should join their hands to build the infrastructure and create positive environment for EVs. The respondents are aware of global climate conditions and are ready to change their preference from conventional to eco-friendly vehicles. Cost is an important factor while considering the purchase of EVs.

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