

Perceived Perception towards Electric Vehicles in Mumbai

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Executive Summary

A vehicle that uses one or more electric motors for propulsion is referred to as an electric vehicle (EV). Due to its lack of tailpipe emissions, this kind of vehicle has the potential to drastically reduce urban pollution. Due to the distinctions between EVs and conventional automobiles, this sector has been expanding, resulting in new goods and changes in consumer views. Relative advantage, or how much a new technology is thought to be superior to an older technology that is being replaced, has a big influence on people's decisions about when, how, and how much to adopt. Environmental concerns of the modern era are driving the production and marketing of electric automobiles. A big consumer base, a technological basis with qualified and semi-skilled workers in India, and comparatively low production and labour costs have attracted nearly all international electric car manufacturers and component suppliers to locate their operations there. Individual perceptions on aspects like environmental issues, cost, trust, technological innovation, infrastructure, and societal acceptance are some of the elements that affect car customers' buying decisions. The results show that environmental concerns and consumer trust in technology are the antecedent factors for perception about Electric vehicle purchase and the factors which give adoption blowback cost, infrastructure, and social acceptance.

Keywords : Electric vehicles, Attitude, Perception, Technology, Environment

1 INTRODUCTION

Globally, electric vehicles are growing at a rapid pace, with a compounded annualized growth rate (CAGR) of 21.7 percent; by 2030, the number of electric vehicles is expected to increase from 8.1 million to 39.21 million. Several factors, such as efficiency, pollution, and environmental concerns, have influenced the enormous growth. Governments all over the world have begun to encourage EV industries by providing subsidies, as consumers increasingly prefer eco-friendly vehicles to petroleum or diesel vehicles.

In terms of the situation, the future of electric vehicles in India remains precarious. When oil prices rise or the climate changes, electric vehicles are the first solution to be discussed and considered. Indian companies entering the EV industry take a significant risk and make significant efforts to normalize the EV segment, but this has not yet occurred. More than 15 years have passed, but the EV industry has yet to realize its full potential. When we look at the roads today, we see a small proportion of electric vehicles compared to traditional vehicles. Now, in 2022, the EV industry has all of the tools it needs to reach its full potential and finally take off.

Collaborations between companies and the government have been beneficial in increasing EV production and market in India, as the Government of India has provided various schemes and benefits for EV manufacturers. Top executives from India's auto industry praised the government's new "vehicle scrappage policy" announced in the Union Budget for 2021-22. The budget for Fast Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) in 2023 is Rs. 2,908 crores, which is three and a half times more than the budget for FAME in 2022, which is Rs. 827 crores.

Consumer perception of electric vehicles in India has shifted dramatically as a result of both positive and negative impacts. Innovation has taken a quantum leap, encouraging consumers to consider affordability, eco-friendliness, and excellent service when purchasing an e-vehicle. Constant government promotion has resulted in a better mindset and knowledge of e-vehicles in the minds of consumers. This encourages EV manufacturers such as Tata Motors, Hyundai, Mahindra, and others to improve their products, thereby improving consumer perception of e-vehicles.

Electric Vehicles (EVs) are seen as one of the key means to reduce global greenhouse gas emissions and air pollution in the transportation sector, especially with the growing use of renewable energy. Production and marketing of electric cars are being driven by contemporary environmental concerns. By the year 2018 in India, the idea of electric automobiles as the best alternative for fuel cars (traditional diesel/petrol combustion engines) has undergone a revolution. Several indigenous Indian companies, including Tata Motors, Mahindra & Mahindra, TVS Motors, and Bajaj Auto, are utilizing the rapid growth phase of electric vehicles to their strategic competitive advantages in the sector. Nearly all worldwide electric car manufacturers and component suppliers have chosen to base their operations in India due to the country's trained and semi-skilled technological base, a platform with a huge customer base, and relatively reduced manufacturing and labor costs.

To comprehend Indians' purchasing intentions for completely electric cars, it is necessary to research the factors influencing buyer adoption of these vehicles. Consumers' decisions to purchase cars are influenced by a variety of situational factors, such as the regulatory environment, personal psychological factors including attitude and perception, and society acceptance and consideration levels. Few national governments have successfully updated their innovation development targets, and electric cars are thought to be a potential form of mobility. Indigenous governments are keen to tout electric automobiles as a practical method to clean up urban air and as a green choice for transportation.

2 REVIEW OF LITERATURE

(Chan, 2002) The transportation industry is compelled by environmental issues to adopt more environmentally friendly technologies. Electric vehicles (EVs) are viewed as a sustainable mode of transportation. The paper's main focus is on batteries because they are essential to make electric vehicles more economical, cost-effective, and useful in everyday life.

(Hoyer, 2008) Electric car technology has been around for more than a century. Electric driving, however, was put on hold since combustion engines are readily available and simple to operate. Various (pushing and pulling) factors are currently reviving interest in electric vehicles. On the driving side, dwindling oil supplies and growing environmental consciousness about the impact of conventional internal combustion engines on the environment pave the way

for cleaner electric automobiles. Recent advancements in battery and electric motor technology enable electric vehicles to compete well with conventional cars on the pulling side.

(Neumann et al 2010) The introduction of electric vehicles can be seen as a safety measure and a guarantee of future security from an environmental standpoint, given the rise in high CO₂ emissions and the depletion of fossil fuel reserves. The technology that will be employed in the future EV is quite advanced and on the upswing, enabling efficient and comfortable high-distance coverage.

(M Pierre, C Jemelin, N Louvet - Energy Efficiency, 2011) Similar incidents have happened over the past few decades; they were perhaps more modest but nonetheless full of learning opportunities: in the 1990s, certain local governments sponsored innovations based on electric vehicles, and some individuals decided to use this type of vehicle for their everyday commutes. By presenting research between 2006 and 2008, we aim to explain the drivers' creative modal choice, highlight the challenges they faced at the time, and examine the usage patterns that influenced their mobility and use of electric vehicles.

(Rezvani, Jansson, and Bodin 2015) EV adoption studies are briefly summarised, but they only concentrate on the psychological aspects that are unique to each person and that affect people's intentions to embrace electric vehicles, and they only pick a few sample research. In addition to psychological constructs, we examine a wider range of adoption-influencing factors for electric vehicles in our review. Additionally, we compile all academic studies on electric vehicle preferences to present a comprehensive picture of the state of the field today.

(Ghasri et al., 2019; Sierzchula et al., 2014) In order to assist governments and automobile manufacturers in assessing consumer preferences, demand studies have looked into the financial, technical, fundamental, and political ideas of EVs.

(Dash P. K., 2013) instead of making a drastic adjustment, should invest in small-scale reinforcements to control the load difficulties locally. Home charging ought to be promoted. Before putting in place the massive-scale charging infrastructure, proper planning for location, population, traffic density, and safety should be taken into account. It is crucial to integrate activity in the transportation and energy sectors. Development objectives through various cutting-edge policies and programmes, such as the financial consumer incentives provided to

electric car users in the form of tax credits, purchase subsidies, discounted tolls, free parking, and access to restricted highway lanes, would aid in the market's expansion.

(Tornekari, 2020) listed the eight potential causes of the poor EV growth in India. He listed the following factors as barriers to the rise of EVs in India: charging time, price of an EV, range based on battery capacity, charging infrastructure, finite battery life, fear of new technology, government incentives, a lack of ads, and awareness campaigns. (Kalra, 2022) The capital cost has always been a significant factor in EV purchasing decisions, with 63 percent of consumers surveyed feeling that an EV is outside of their budget. The inadequate charging infrastructure in our nation is a significant barrier to wider EV adoption. However, large OEMs are also making efforts to enter the EV component market in order to reduce their reliance on imports and meet the government's mandate for a 50% localization rate in order to qualify for government subsidies. The electric vehicle industry is expected to be well-positioned for significant growth over the next ten years thanks to a comprehensive infrastructure that is affordable, accessible, and supports all consumer groups, as well as a strong financial environment, governmental incentives, and technological advancements, according to him.

3 RESEARCH METHODOLOGY

The review of the literature presented in the previous chapter acts as a foundation for the theoretical framework. In this research, seven factors have been integrated into the framework to better understand the consumers perception towards Electric Vehicles in Mumbai

RESEARCH OBJECTIVE:

1. To study consumers perception towards Electric vehicles in Mumbai.
2. To identify factors that influence consumers to purchase electric vehicles.
3. To study the nature of the relationship between demographic characteristics such as gender, age and income of the consumer and consumers perception towards electric vehicles.

RESEARCH DESIGN:

A cross-sectional correlation field study research design was used as the primary objective of the research was to study the perception and attitude towards Electronic Vehicles in Mumbai.

The items for the scale were identified through an extensive literature review and traditionally acknowledged theories and knowledge base. The research information was collected by means of a structured questionnaire. The items were rated on a 5-point Likert Scale with 1 being strongly disagree and 5 strongly agree. The questionnaire thus constructed was required to undergo a test for validity and reliability. The internal consistency of the items was tested for all the dimensions using Cronbach's alpha. The cut-off value used for Cronbach's alpha was 0.7.

Sampling Technique:

The Non-Probability Purposive / Convenience Sampling technique is used for the selection of the samples. The sample size for the current study is 312 which has been collected from respondents in Mumbai.

Data collection:

Structured questionnaires were e-mailed to 800 respondents. The filled questionnaires were screened for consistency and completeness. Incomplete questionnaires were discarded. After screening, 312 completed questionnaires were used for the purpose of the study.

Tool for Analysis:

The data has been presented using Pie-charts, Frequency tables and Crosstabs. Linear Regression, ANOVA, Chi-Square test using Statistical Package for Social Science (SPSS).

DATA ANALYSIS**Descriptives**

The demographic of the study is as mentioned below:

Age

	Frequency	Percent	Valid Percent	Cumulative Percent
20-25	124	39.7	39.7	39.7
26-32	82	26.3	26.3	66.0
33-37	62	19.9	19.9	85.9
Valid 38-42	28	9.0	9.0	94.9
43-47	10	3.2	3.2	98.1
48 and above	6	1.9	1.9	100.0
Total	312	100.0	100.0	

Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	186	59.6	59.6	59.6
Female	120	38.5	38.5	98.1
Others	6	1.9	1.9	100.0
Total	312	100.0	100.0	

Income

	Frequency	Percent	Valid Percent	Cumulative Percent
0 - 30,000	90	28.8	28.8	28.8
30,000 - 60,000	116	37.2	37.2	66.0
Valid 60,000 - 1,00,000	86	27.6	27.6	93.6
Above 1,00,000	20	6.4	6.4	100.0
Total	312	100.0	100.0	

Type of Vehicle

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Diesel/Petrol	116	37.2	37.2	37.2
Electric Vehicle	86	27.6	27.6	64.7
Hybrid	42	13.5	13.5	78.2
CNG	46	14.7	14.7	92.9
Others	22	7.1	7.1	100.0
Total	312	100.0	100.0	

HYPOTHESIS:

H₀₁: There is no significant difference of perception towards electric vehicles across different age groups.

H_{a1}: There is a significant difference of perception towards electric vehicles across different age groups.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of AvgPerception is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Interpretation:

The significance value is 0.000 which is less than 0.05, hence we reject the null hypothesis. Therefore, we can say that **There is a significant difference of perception towards electric vehicles across different age groups.**

H₀₂: There is no significant difference of perception towards electric vehicles across Gender.

H_{a2}: There is a significant difference of perception towards electric vehicles across Gender.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of AvgPerception is the same across categories of Gender.	Independent-Samples Kruskal-Wallis Test	.137	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Interpretation:

The significance value is 0.137 which is higher than 0.05, hence we failed to reject the null hypothesis. Therefore, we can say that **There is no significant difference of perception towards electric vehicles across Gender.**

H₀₃: There is no significant difference of perception towards electric vehicles across different income groups.

H_{a3}: There is a significant difference of perception towards electric vehicles across different income groups.

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of AvgPerception is the same across categories of Income.	Independent-Samples Kruskal-Wallis Test	.041	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Interpretation:

The significance value is 0.041 which is less than 0.05, hence we reject the null hypothesis. Therefore, we can say that **There is no significant difference of perception towards electric vehicles across different income groups.**

4 FINDINGS:

In the case of electric vehicles, the user may lack or believe that they lack the knowledge required to make an informed decision. This creates an unfavorable perception of electric automobiles. Because a vehicle is a tangible and visible asset, a person may be concerned about how far the car will travel on a single charge, where I will recharge it, what the cost will be, and whether it will be more expensive than a conventional vehicle.

The majority of respondents are aware of the fact that, E-vehicles improve the air quality and hence, feel neutral about the contribution of EV towards sustainable environment. But still the companies should create awareness and educate the society about usefulness of Electric vehicles.

This research attempted to identify those factors influencing consumer perception towards electric vehicles in Mumbai and how much these factors affect the perception of a consumer. It considered various factors like age, gender and income level of the consumer as variables that affect the perception of a consumer. The research found a significant relationship between the factors and the perception towards an electric vehicle, by testing out the various hypotheses. also influenced by education and income level to make a decision to buy an electric vehicle.

5 CONCLUSION:

The Indian market for electric vehicles is expanding. The national and state governments have started programmes and incentives to encourage the use of electric vehicles, and there are also rules and standards in place. Even though the country stands to gain significantly from switching its transportation from internal combustion engines to electric motors, there are obstacles to overcome, including a lack of charging infrastructure, a high initial cost, and a lack of electricity generated from renewable sources. Nevertheless, e-commerce businesses, automakers, app-based transportation network companies, and mobility solution providers have entered the market and are gradually increasing the capacity and visibility of electric cars. The government is aiming to establish a subsidy for businesses who establish facilities for charging electric vehicles around India. A 200-KW charging infrastructure for EVs would be developed up with a subsidy of about ₹ 4-5 lakh.

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