



CUSTOMER BUYING BEHAVIOUR ON ELECTRIC VEHICLES IN INDIA

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Abstract

The conclusion of the research on customer purchasing behaviour for electric vehicles in India indicates that, considering there are many advantages, the general acceptance rate of electric vehicles is still below expectations. Over the next few years, electric vehicles will probably rule the Indian market. The purpose of this research is to identify the elements that influence people's inclination to purchase electric vehicles. The research proposes a larger paradigm for technology acceptance that incorporates the implementation of technology models and the dissemination of innovation. The objective of this research aimed to determine the characteristics that influence customers' decisions to buy electric cars (EVs) and how these factors may be leveraged to increase demand for EVs. The research identified several types

of significant variables that influence consumers' decisions to buy electric vehicles, such as cost, anxiety about range, efficiency and ease of use, cultural and ecological standards, and subsidies and legislation. Together, these components have an impact on customer behaviour regarding EV purchases. The poll also found that education and understanding regarding EVs have a significant impact on the decisions made by purchasers. Raising consumer knowledge of EVs and educating them about them may increase demand from customers and hasten the market's adoption of EVs. Whenever it comes to buying EVs, consumer behaviour may also be significantly influenced by government regulations and incentives.

Introduction

India is one of the developing country and its economy also growing in terms of GDP India is ranked amongst fifth position and in automobile sector the industry contributes around 15% of the



country's GDP each year and by 2024 it is predicated that it could reach up to 25%. With the approval of the global climate change agreement, India plans to implement the "Faster adaptation and manufacturing of Hybrid and Electric vehicles" (FAME) program, which would see the deployment of 6 to 7 million EVs by the end of 2020. After this deployment, the EV market in India is anticipated to expand. Compared to the US, China, and other European countries, the Indian electric sector is now in its infancy. India now holds a stake of less than 0.1% in relation to other countries. The automotive industry, which has been around for the past few years, are working on for transformation, as a result of the increase in the price of fossil fuels and the environmental effects caused by their emissions. Fuel-burning engines are powering an ongoing transition in the industry toward electric bikes and cars. Government officials have implemented regulations aimed at encouraging the use of electric

cars in India, enhancing air quality, and achieving sustainability environmental goals by reducing greenhouse gas emissions and oil reliance. Among the various entities expressing enthusiasm for EV adoption are the business and government sectors. Manufacturers and consumers are adopting electric vehicles mostly due to government tax reductions, other incentives and the earlier adoption and production of hybrid and electric vehicles (FAME) program. Advances in battery technology are increasingly addressing issues with limited range and infrastructure for charging batteries. Moreover, many automobile manufacturers are introducing electric vehicles entering the Indian market, providing customers with an extensive range of options. According to the Economic Survey 2023, the domestic electric vehicle industry in India is expected to develop at a compound annual growth rate (CAGR) of 49% from 2022 and 2030, with 10-million-unit sales annually by that time.



Additionally, it is projected that by 2030, the electric vehicle sector would generate about 50 million jobs both direct and indirect. The top OEMs began creating and producing new electric vehicle models. Although India is still a long way from fully embracing electrification, the country's electrification journey has begun, and it has done so with great perseverance. We have seen many automobile companies are launching electric cars with high range and low consumption of electricity power which could help for cost minimization, companies like Tata, Mahindra, MG, Kia, Ather, Ola etc. not only base model automobile companies even top end luxury automobile companies like Mercedes- Benz, BMW, Audi, Porsche, Lamborghini and so on are manufacturing cars and bikes to replace the conventional diesel, petrol and CNG engine. Despite the majority of customers view electric vehicles (EVs) as being disadvantage than diesel, petrol, or CNG-powered vehicles. There wouldn't be a technological

revolution or long-term success for electric automobiles if consumers rejected them. As a result, it is crucial to understand how customers see EVs as this information might impact their decision to buy one and promote the use of electric vehicles. The primary barrier to the broad acceptance of electric or hybrid vehicles in India is the shortage of public charging stations. According to reports, by March 2023, there will be 6,586 public charging stations, 419 of which would be located on national highways. According to a Confederation of Indian Industry (CII) research entitled "Changing Infrastructure for Electric Vehicles," India may need 1.32 million charging facilities by the end of 2030 in order to keep up with the country's rapidly increasing demand for electric vehicles. Additionally, it has been anticipated that annual sales of EVs would reach around 106 million by 2030. India needs more than 4 lakh charging stations a year in order to satisfy its demand, which is typically 1 charger for



every 40 electric vehicles. By 2030, 1.32 million charging points should be installed yearly. Nevertheless, the rate of expansion of charging stations for electric vehicles is not keeping up with the need for electrification. Due to a lack of infrastructure and the longer period required for charging, consumers are buying lesser electric vehicle in India, two-wheelers are more popular than four-wheel vehicles.

Literature Review

(Lingzhi Jin, 2017) Different possibilities and challenges come with this shift. Governments throughout the world are attempting to replace conventional gasoline and diesel engines with electric models. Rules are being established to promote the use of electric cars and bikes, which should improve air quality by reducing greenhouse gas emissions and avoiding dependence on oil.

(Pretty Bhalla, 2018) A study suggests that governments and e-car producers should focus on increasing public awareness of the benefits associated with e-cars.

According to the research, industry and the government must now spend on social acceptability and infrastructure development because the public is fully aware of the advantages of the environment.

(Deloitte, 2011) China and India are among the nations that believe they were the first in the world to adopt electric vehicles. Customers with postgraduate and doctoral degrees, high levels of education, and urban residence are the first mover nations' possible purchasers.

(Dr Prathap B, Prof. Praveen Kumar and Prof. Savanth S, 2020) researched the significance of the battery-powered vehicle sector and the spread of awareness of these technologies. They conducted the research by analysing the ways in which different nations have adopted the usage of electric cars and creating a model according to those comparisons.

Research Methodology

Data collection method:



This data has been taken from both primary and secondary sources; the primary source of data was inclusion of questionnaire base which was circulated among the audience with question relating to customer buying behaviour on electric vehicles in India. Secondary sources of data were collected through the help of internet sources and articles which was published and latest news.

The primary data which was collected through the audience, on that data it was conducted multiple linear regression.

Objective:

The objective of this research paper is:

To understand the factors influencing purchase decision.

To explore government incentive influence.

To evaluate awareness and perception of electric vehicles.

Sampling method:

The sample size was 106 respondents. This sampling used with the questionnaire basis which was circulated among the audience randomly irrespectively.

Tool for data collection:

Demographics of the respondents:

Question	18 - 25	26 -35	36 - 45	46 and above
Age	79	19	7	1

EXHIBIT – 1

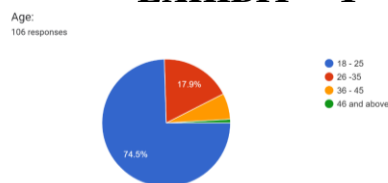


Fig 1

Question	Petrol/Diesel	Hybrid	Electric	Both (Electric and fuel)
Type of current vehicle owned	30	11	24	41

EXHIBIT – 2

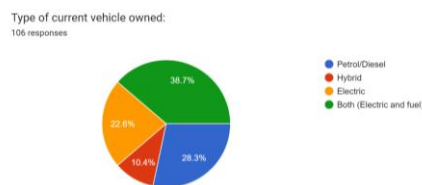


Fig 2

Question	Four-wheeler	Two-wheeler	Both	None
What type of electric vehicle have owned?	16	49	30	11

EXHIBIT - 3

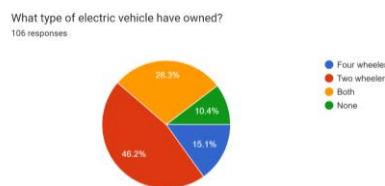


Fig 3



Question	Very satisfied	Satisfied	Dissatisfied	Very dissatisfied
How satisfied are you with your current vehicle?	64	37	4	1

EXHIBIT - 4

How satisfied are you with your current vehicle?
106 responses

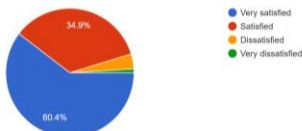


Fig 4

Question	Very aware	Somewhat aware	Neutral	Not aware
Awareness about electric vehicles	88	16	2	0

EXHIBIT - 5

Awareness about electric vehicles:
106 responses

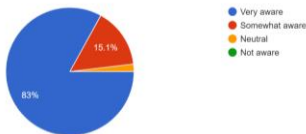


Fig 5

Question	Environmental concerns	Cost savings	Government incentives	Performance
Reasons for considering an electric vehicle:	38	47	15	6

EXHIBIT - 6

Reasons for considering an electric vehicle:
106 responses

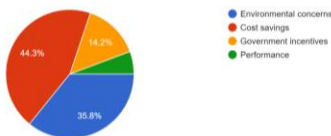


Fig 6

Question	Very important	Important	Neutral	Not important
How important is the initial cost of an electric vehicle in your purchase decision?	69	31	4	2

EXHIBIT - 7

How important is the initial cost of an electric vehicle in your purchase decision?
106 responses

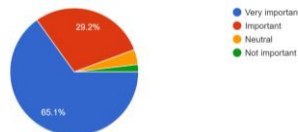


Fig 7

Question	Strongly agree	Agree	Disagree	Strongly disagree
Influence of government incentives on your decision to buy an electric vehicle:	71	29	6	0

EXHIBIT - 8

Influence of government incentives on your decision to buy an electric vehicle:
106 responses



Fig.8

Question	Major concern	Moderate concern	Minor concern	Not an issue
Concerns about the availability of charging stations:	67	35	4	0

EXHIBIT - 9

Concerns about the availability of charging stations:
106 responses

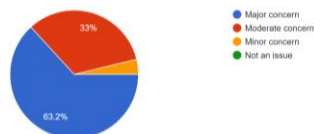


Fig 9

Question	Definitely	Probably yes	Unsure	Probably not
Would you consider purchasing an electric vehicle in the future?	62	32	11	1

EXHIBIT 10

Would you consider purchasing an electric vehicle in the future?
106 responses

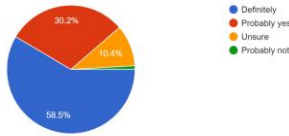


Fig – 10

Results and Discussion

Dependent variable – “Current vehicle satisfaction”

Independent variable – “Age, current vehicle, type of electric vehicle, electric vehicle Awareness, Reasons for considering an electric vehicle, importance of initial cost of EV, Influence of government incentives in purchasing EV, availability of charging stations and purchasing an EV in the future”

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.44200611					
R Square	0.595369401					
Adjusted R Square	0.649935282					
Standard Error	0.5802749					
Observations	106					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	9	7.866383045	0.874042561	2.589534161	0.0102069	
Residual	96	32.3977679	0.337476749			
Total	105	40.26415094				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.865114862	0.423541675	2.042572205	0.043836535	0.024390884	1.705838639
Age	-0.160934486	0.089589682	-1.796350668	0.045584089	-0.3387686	0.016899628
current vehicle	0.878488413	0.051524746	1.523314902	0.030967409	-0.023787389	0.180764225
type of electric vehicle	2.045387603	0.06789921	0.688454544	0.01544760	-0.089391463	0.180166669
electric vehicle Awareness	3.318953008	0.147788236	2.158175992	0.03408445	0.025595678	0.612310338
Reasons for considering an electric vehicle	-0.09859451	0.069305513	-1.422607024	0.015809143	-0.236164866	0.038975846
importance of initial cost of EV	1.113263325	0.104071989	1.08631709	0.027917983	-0.08631795	0.31844619
Influence of government incentives in purchasing EV	-0.186017252	0.111891143	-1.55268947	0.12381320	-0.423841102	0.051896518
availability of charging stations	1.188807146	0.109831716	1.35304402	0.01792194	-0.069407086	0.366621379
purchasing an EV in the future	2.116677695	0.08411889	1.387080288	0.016863543	-0.050295586	0.283651976

Discussion and Findings:

From the “Regression Statistics” table from above regression output, the “R square” is 0.595 and the “Adjusted R square” 0.649 is which suggests that the independent variables are explaining a substantial amount of variance in the dependent variable “current vehicle satisfaction” for this dataset.

From the “ANOVA” table from above regression output, the significance level is 0.010 which is less than the acceptable significance level 0.05 and we can accept “alternative hypothesis” and say that “There is a significant linear relationship between at least one independent variable and the dependent variable” in this dataset.

From the “P-value” in the above table from regression output, only “Age, current vehicle, type of electric vehicle, electric vehicle Awareness, Reasons for considering an electric vehicle, importance of initial cost of EV, availability of charging stations and purchasing an EV in the future” variables is significance as it is less than 0.05. So, we will reject the variable “Influence of government incentives in purchasing EV” as its significance level is 0.123 which more than 0.05. Also, there is no multicollinearity as VIF is 1 for all.

From the “Coefficients” from the above table of regression output, we can determine the regression equation which will be as follows:

$$Y = 0.865114862 + (-0.160934486 * \text{Age}) + (0.878488413 * \text{current vehicle}) + (2.045387603 * \text{type of electric}$$



vehicle) + (3.318953008 * electric vehicle Awareness) + (-0.09859451 * Reasons for considering an electric vehicle) + (1.113263335 * importance of initial cost of EV) + (1.188607146 * availability of charging stations) + (2.116677695 * purchasing an EV in the future)

Suggestions:

Installing more charging stations might make people more interest in buying electric cars. Since we aim to decrease emissions and releases of greenhouse gases, we must invest greater attention to electric vehicles. Companies need to concentrate on educating customers about the most recent models of electric vehicles. Another practical approach to the problem of growing gas costs is through the use of electric vehicles, and the nation may profit from government support for them. To encourage consumption of electric vehicles, the government may provide subsidies. Reduced tax rates could encourage purchasers to explore electric vehicle options. The industry can grow if the initial cost of electric vehicles is minimized. By promoting the deployment of electric vehicles, the

government could be allowed reduce its need on crude oil.

Conclusion

The automobile sector has to adapt quickly to alternate forms of energy since fossil fuel supplies remain low and petrol prices are rising in India. In order to combat this issue, the government has minimized pollution, encouraged the use of electric cars (EVs), and simplified regulations on foreign direct investment (FDI). As a consequence, many new brands are launching EVs in India. The finding of the questionnaire shows that participants are aware of the global environmental issue and are ready to consider buying an electric vehicle in the future, especially if there is a suitable infrastructure for charging them. The research underlines the necessity of EV adoption in the Indian automobile industry, while also acknowledging the obstacles and constraints involved. Still, India has an opportunity to speed up the shift towards the broad use of EVs, especially in the two- and four-wheeler categories, and bus services, with the right measures like developing infrastructure for charging, providing incentives, enhancing electronic devices and infrastructure, and instructing



consumers. Additional improvements are required for long-distance vehicles. Accordingly, if appropriate measures are taken to remove barriers and encourage EV use, the EV industry in India has the ability to grow rapidly and considerably.

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