

Customer Perception and Buying for E-Vehicle with Reference to Passenger Car Market in the Changing Environment



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Launch of electric vehicles in India will be impactful and supportive for the Indian Government by cutting its oil bills. Entry of electric vehicle is expected to help to reduce oil import, energy security, and large financial benefits to power utilities. Possibility of reducing the dependency on fuel is less by the renewable through “smart charging”. These benefits are expected to provide a net positive economic impact of approximately \$85 billion and reduce emission by 37%. The implementation of electric vehicle all over the world is in need to produce eco friendly vehicle to save the nature and natural resources. Government offer incentives to improve E-vehicle acceptance along with measures to maintain infrastructure facilities. This transformation from fossil fuel vehicle to electrical vehicle will be more risky and it should meet its infrastructure for E-vehicle charging and customer perceptions around electric mobility. This study has been taken to understand customer perception and buying behaviour for the e-vehicle of automobile industry more specifically with passenger car market in Coimbatore. Present research is a descriptive study, primary data and secondary data has been used. Objectives were framed, research design prepared, required data have been collected and suitable analysis were made. Findings of the study reveal that there is a positive move from customers will boost the e-vehicle market and help automobile industry manufacturing units, dealers, insurance companies, oil bunks and banks.

Keywords: E-Vehicle, Transformation, Perception, Behaviour, Energy

1. Introduction

The world’s fifth-largest auto market is geared up for a stunning transformation moving completely towards electric vehicles (EVs) by 2030. This is part of the Honourable Prime minister Narendra Modi government’s vision to helm a renewable-energy revolution in the country. The present government expects that the automobile sector’s massive conversion will cut its oil bill, reduce emissions and curb the up-coming demand for road infrastructure for the next 12 years. Many of our cities are among the World’s most polluted, suffering utter degradation over the years and vehicular pollution is one of the major causes for air pollution. India is the Asia’s third-largest country imports oil requirement of fossil fuels by 82%.

The Government of India acknowledge the pressure to look at sustainable mobility solutions to reduce dependency on imported energy sources, reduce green house gases (GHG) emissions and mitigate adverse impacts from transportation. The present India’s road transport minister Nitin Gadkari said “We should move towards alternative fuel...I am going to do this, whether you like it or not, “shift to alternative fuels and technologies including bio fuels, electric vehicles, and overall system efficiency of infrastructure. The National Electric Mobility Mission Plan (NEMMP 2020) was announced recently to incentivize use and production of electric vehicles (EVs) in India with a view to diminish adverse environmental impacts of vehicles and to enhance energy security. The electricity that powers your EV can come from many sources, which include low-emission sources like natural gas and zero emission sources like wind, solar, hydro, and nuclear power, which enable EVs to dramatically reduce gaseous emissions. In this context EVs are expected to play a significant role in low carbon transition of India and it will be large impact for the future passenger car market.

Electric Vehicle

India’s first electric car was launched in 2001 by REVA, a Bengaluru-based company. Back then, it cost Rs250, 000 per unit. (Mumbai-based Mahindra bought over REVA and renamed it Mahindra Electric—it remains the only electric passenger vehicle-maker in India.) Since then, except for 2016 when the segment saw 36% growth to 22,000 units, including four- and two-wheelers, the EV industry has been subdued. On Sept. 14, 2017. Suzuki, the parent firm of India’s largest car-maker, Maruti Suzuki, announced its plan to set up a \$600 million lithium ion-battery factory. Mahindra, too, is investing some Rs.600 crore to ramp up its EV division, and is expected to launch electric variants of its popular SUVs, Scorpio and XUV 500. “We believe the auto industry and manufacturers are willing to make this change since most of these have electric car platforms ready,” However, it may not be an easy ride. For one, securing long-term battery supplies and developing a battery management system technology that helps recharge batteries are tough. “There are currently only a few large global battery suppliers such as LG Chem, Samsung SDI, and BYD no Indian company seems to be doing this currently.

Statement of the Problem

Introduction of electric vehicle in India will have the massive conversion of fossil fuel to electric vehicles; its impact will be on the automobile sector which will influence the customer’s perception and customers buying behaviour, manufacturer,

dealers, bankers and petrol bunks. Due to current environmental problems caused by vehicles, the global aim is to protect our environment and diminish greenhouse gas emissions. However, the launch of Electric Vehicles is still in the initial stage and hesitant. The factors which are importance to customers need to be identified when making product and consumer-related buying decisions related to vehicles. “This industry (EV) is starting to take off and it’s still a tiny percentage of the overall vehicle market but it’s starting to reach an inflection point where it can have a very significant impact globally,” Keep in mind the researcher eager to know the perception of customers and their buying behaviour for electric vehicle, the factors considered by customers for e-vehicle and to understand the changing environment.

Objectives of the Study

- To study the customers perception towards electric vehicle.
- To assess the buying behaviour of customers for electric vehicle
- To identify the factors considered by customers for electric vehicle
- To offer suggestions and recommendation.

Scope of the study

Today automobile market trend is facing the impact of change technology or transformation with E-vehicle concept. The manufacturer and customers are required to change their mind according to the market trend. As far as the present study is concern it gives attention on the customer’s perception and buying behaviour of the customers on E-vehicle in the present environment. For the purpose of the study the researcher is able to collect primary data and secondary data from the available resources. It is an attempt to bring out the status of change technology or transformation in manufacturing sector, in consumer buying behaviour on e-vehicle and more specifically on passenger car. There is a scope of providing valuable input and suggestions which help the e-vehicle market for the sustainable development.

Methodology

For the purpose of the study, required data have been collected through the primary sources by well designed questionnaire from the sample size of 70 respondents. For the secondary data it has been collected from the sources like books, periodicals, research articles, seminar reports, news papers, study reports of expert committees, departmental publications, plan documents, published dissertations, broucher, pamphlets and advertisements. Period considered for the study is the financial year 2017-2018 and geographical area of the study as far as primary data is concern only at Coimbatore City, Tamil Nadu state.

2. Review of Literature

The following are Literature review to understand more about the significance of the study problem as well as to high light the research gap in the respective field.

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3. Analysis and Findings

This particular chapter shows the analytical part and findings of the study. For the purpose of statistical analysis the following tools have been adopted.

1. Anova

2. Post Hoc Test
3. Weighted Average Technique
4. Application Of Factor Analysis
5. Garret Ranking Method

1. Anova

When there are two or more groups that are to be compared on the basis of their mean values the Test of ANOVA has been applied.

In this particular study the respondent's opinion are to be compared on the basis of their personal profile like age, gender, family size, income etc.

The following constructs are analysed with the test of ANOVA. The important parameters while purchasing a fossil fuel passenger car, Features that are important to be present in fossil fuel passenger car, the factors that influence to buy a fossil fuel passenger car, Brand loyalty for the currently using fossil fuel passenger car, Factors which are Important while purchasing an electric vehicle in future, agreeability of e-vehicle in Social Life, Intention to use an e-vehicle.

Null hypothesis: There is no significant difference between the Respondents belonging to various age groups and opinion on the constructs of the study.

Table of ANOVA Test

Construct	Important parameters	Features	Factors influencing	Brand loyalty	Electric car factors	Social life	Intension to buy e-vehicle
Age 31-40	58.8000	31.8000	37.2000	10.6000	65.2000	13.800	20.200
41-50	64.1842	39.8684	38.0526	12.0000	71.8421	12.2105	17.7895
>50	67.0000	38.7500	41.8333	13.5000	65.0000	12.5833	19.4167
F ratio	40.014	25.378	3.071	15.741	23.819	1.946	1.659
Significance	.000	.000	.053	.000	.000	.150	.197

Alternative Hypothesis: There is a significant difference between the Respondents belonging to various age groups and opinion on the constructs of the study.

Above table clearly reveals that the significant level for perception on important parameters to be considered the while purchasing a fossil fuel passenger car(p is **.000**), influencing features considered when buying the fossil fuel passenger car(p is **.000**), the brand loyalty of the fossil fuel passenger car(p is **.000**),and opinion of e-vehicle in their social life(p is **.000**), respectively which is below 0.05 and therefore there is a statistically significant difference between the age factors and the constructs on the study.

Whereas the significance level for perception on influencing features considered when buying the fossil fuel passenger car (**p is .053**), opinion of e-vehicle in their social life (p is **.15**) and Intention to buy an e- vehicle in future (**p is .19**) respectively which is above 0.05 and therefore, the null hypothesis is accepted and there is no statistically significant difference between the age factors and the constructs on the study.

2. Post Hoc Test

To find out which group differs significantly from, others post hoc test is performed.

Table of Post Hoc Test

Construct	Age	Age	Mean deviation	Significance
Important parameters	41-50	31-40	5.38	.000
	>50	31-40	8.20000	.000
Features	41-50	31-40	8.06842	.000
	>50	31-40	6.95000	.000
Brand Loyalty	41-50	31-40	1.40000	.003
	>50	31-40	2.90000	.000
e-vehicle important factors	41-50	31-40	6.64211	.000

In the above table all the table significance are less than .05 level of significance. Therefore the two groups compared differ significantly in their opinion on the constructs under study, observing the mean difference value it can be stated that the respondents belonging to the age group 41-50 and above 50 give significantly higher opinions on the constructs than the respondents belonging to the age group 31-40.

3. Weighted Average Technique

Weighted average technique is used to find out which particular item is relatively more important than the other items for a specific purpose.

The above table reveals that almost 72% of the information from the data is extracted by three factors. They are **safety and charging time, Battery performance and environmental friendly and engine power.**

6. Garrett Ranking Method

1. Positive Factors Influence the Respondent to buy an e Vehicle

An e vehicle purchase in future may be influence by so many positive factors like eco friendly, safety etc. These items are asked to be rated by the respondents. The intention is to find out the most important positive factors to buy an e vehicle.

Following the Garrett ranking method the rates given by the respondent are converted into ranks are given in the following Table.

Table of Garrett Ranking

	80	67	60	53	47	40	32	
	1	2	3	4	5	6	7	Total
	7.14	21.43	35.71	50.00	64.29	78.57	92.86	
Eco friendly	49	5	0	5	11	0	0	
	3920	335	0	265	517	0	0	5037
Adaptation	0	10	2	5	15	16	22	
	0	670	120	265	705	640	704	3104
Comfort	0	0	12	21	12	10	15	
	0	0	720	1113	564	400	480	3277
Low cost	5	15	20	5	5	15	5	
	400	1005	1200	265	235	600	160	3865
Safety	6	10	0	25	12	17	0	
	480	670	0	1325	564	680	0	3719
Economy	10	10	16	5	5	7	17	
	800	670	960	265	235	280	544	3754
Less fuel	0	20	20	4	10	5	11	
	0	1340	1200	212	470	200	352	3774

From the table it is concluded that eco friendly, safety are the two most positive factors that influence the respondent to purchase the e vehicle in future.

2. Stops the Respondents to buy an e Vehicle

What are the various factors stops the respondent to purchase an e vehicle in future by so many drawbacks factors like charging time, cost of the e vehicle etc. These items are asked to be rated by the respondents. The intention is to find out the factors stops the respondent to buy an e vehicle in future.

Table of Garret Ranking

Character value	82	70	63	57	52	47	42	37	30	
Rank	1	2	3	4	5	6	7	8	9	TOTAL
	5.56	16.67	27.78	38.89	50.00	61.11	72.22	83.33	94.44	
Not proven technology	0	0	0	0	0	0	2	0	6	
	0	0	0	0	0	0	84	0	180	264
Variety	0	0	0	0	0	0	0	8	0	
	0	0	0	0	0	0	0	296	0	296
Too much hassle	2	0	0	0	0	6	0	0	0	
	164	0	0	0	0	282	0	0	0	446
Infrastructure	0	2	0	0	6	0	0	0	0	
	0	140	0	0	312	0	0	0	0	452
Low driving range	0	0	2	0	0	0	6	0	0	
	0	0	126	0	0	0	252	0	0	378
Tech	0	0	0	6	0	0	0	0	2	
	0	0	0	342	0	0	0	0	60	402
Resale	0	0	6	0	0	2	0	0	0	
	0	0	378	0	0	94	0	0	0	472
Cost	0	6	0	2	0	0	0	0	0	
	0	420	0	114	0	0	0	0	0	534
Charging time	6	0	0	0	2	0	0	0	0	
	492	0	0	0	104	0	0	0	0	596

From the table it is concluded that charging time of e vehicle, cost of the e vehicle are the two most drawbacks factors that stops the respondent to purchase the e vehicle in future.

4. Suggestions

The following are suggestions of the customers those who are using fossil fuel car for their regular purpose and plan to go for electric vehicle in the near future.

1. It is suggested that the government need to take appropriate policy in order to encourage the production and usage of e-vehicle.
2. Manufacturer of e-vehicle requested to approach the government in order to avail incentives and privileges for e-vehicle.
3. It is also suggested to the government that to generate and supply adequate electricity power to encourage and manage e-vehicle.
4. The customers of the study suggested that the charging station and other infrastructure for e-vehicle need to be established with the concept of accessibility and affordability.
5. It is also suggested that to safeguard the environment for which the eco-friendly e-vehicle need to be introduced and encourage for the sustainable development.

5. Conclusion

Change technology is the order of the day, the present ruling Government is focusing on the development in the name of digital India policy, Transformation, Artificial Intelligence, Automation etc.. As far as this particular study is concern with the customers, those who are using fossil fuel car are favouring for transformation from conventional technology to modern technology, It clearly shows that the perception of the customers towards e-vehicle is favourable and encourage able. The study also reveals that the age group between 40-50 and above 50 are willing to go foe e-vehicle and also they are supporting e-vehicle in order to safeguard the nature and environment. the statistical tools like ANOVA , Post Hoc Test, Weighted Average Technique, Application Of Factor Analysis, Garret Ranking Method and its analysis shows the encouraging trend for e-vehicle and its change technologies. From the study it is clearly understood that customer's perception and buying behaviour favourable for e-vehicle and it is influenced by the establishment of adequate charging stations, availability of electricity, connectivity, Government incentives, Banks support and services. According to the Government policy there is a proposal to convert the existing fossil fuel vehicle to e-vehicle by 2030.Hence the manufactures, marketers, bankers and customers need to make their mind in order to accept the change technology and transformation for e-vehicle and more specifically about the passenger car market. The study also throws a light on for their research opportunities in the same field of e-vehicle in order to understand the present environment.

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