

Trend or a potential paradigm shift: A Critical Study on Positioning Electric Vehicles (EVs) in India

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Abstract

As a means of transportation, vehicles have been of immense support to the human civilization since centuries. Like any other products, vehicles in its popular name as automobiles have gone through several changes in different stages of time due to the developments in the industrial environment as well as expectations from the users. Since the beginning of steam powered engine till now consumers of automobiles have been acquainted with the driving or propulsion component of the product. However, due to certain factors like availability of fuels, entry of leading global players etc., consumers across the global have been acquainted with the fossil-fuel based vehicles since long. With the increased number of usage in regard to the fossil-fuel engine vehicles, the emission of polluted gases has reciprocally inflated the level of harmful elements to the human health. Thus the invention and proliferation of battery operated vehicles also known as electric vehicles in the last few decades across the globe has been considered to be a game changer. The common belief in adopting and using the electric vehicles (EVs) may lie in its ability to run without emitting the harmful gases thus pronouncing it as an eco-friendly product. Initially the market of EVs was mostly dominated by startups or local to regional players. With the growth of this segment, leading players in automobiles have ventured into EVs making the former more competitive. The EV market has been in the uprising trend and promises high in the years to come globally including India. However, its rate of growth in developing markets is considered to be relatively less in comparison to that of developed economies thus posing challenges to the existing and potential players in different segments. Even if there are encouragements coming from various houses both governmental as well as private bodies to increase the use of EVs by the consumers and thereby reducing the dependencies on fossil-fuel based vehicles, the shortcomings in its acceptance as a real substitute are very rarely investigated. Though majority of the earlier studies on EVs have communicated mostly about the technical advancements and eco-friendly nature of the product, the consumer side has been a neglected territory. The current study is an attempt to understand the various dimensions of EV being positioned in the

consumers' mind, primarily the owners. The focus of the study has been to understand the EVs differently from various dimensions creating a niche for it and just not something as another trend. Rather the emphasis has been to bring out potential areas where EV can be positioned as a sustainable offering in the days to come. Undertaken in the eastern part of India, where EVs are mostly confined to local and start up sellers, the results of this study have been uniquely put into an empirical model to explore the relationships between the positioning factors and ownership traits responsible for the sustainability of the same.

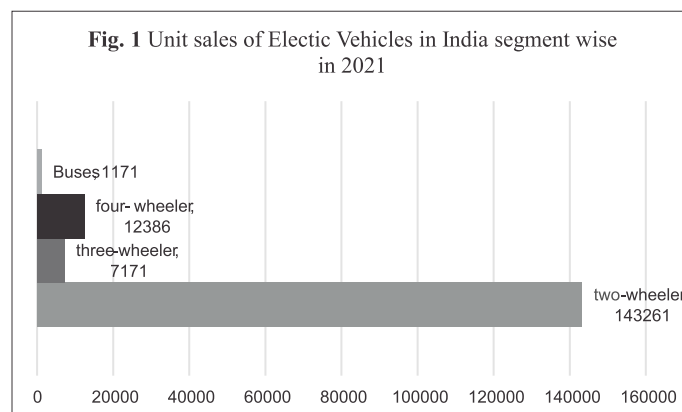
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Introduction

History of vehicles dates back to the Mesopotamia civilization where the movement efforts by human beings were substituted by the use of wheels. However, the word vehicle has been used in synonymous with the word automobile, mostly understood as driven by engines rather than animal or human driven carts as being perceived during earlier days. Thus, it's a common understanding that a vehicle is a generic product offered to the human civilization which minimizes the travel botheration by the people across the globe by its efficient and effective functions with least manual efforts. Be it for commercial or domestic purpose, the places are driven with ease by the use of this product available in various forms like two-wheelers, three-wheelers, four-wheelers and so on (Newson, 2013). Thus, the vehicles are always considered as one of the sustainable offerings the human civilization has been bestowed with thanks to the development in engineering, science and technology. Like any other products meant for human consumption, this vehicle as a product has also undergone several changes from time to time due to changing needs of its consumers as well as various other environmental and other factors (Larson, 2008). The advancements in this product category have also provided the strategists and policy makers across the globe impetus to invent, experiment and execute upgraded and user-friendly products suitable to the society at large. In this context, the introduction of Electric Vehicles, popularly

known as EVs almost revolutionized the concept of vehicles by using battery propulsion motors and replacing more traditional fossil fuel-based vehicles. With a CAGR of 22.6%, the global market of EV is expected to reach more than \$800 billion by 2027 (Chan and Wong, 2004). The rise of EV in the Indian market can be easily understood by the number of units being sold in various segments like two wheelers, cars, buses etc. from January – December 2021 (Fig. 1).

The entry of many leading players of automobiles like Tata motors, Hyundai Motors, Piaggio Vehicles, Audi, Hero Electric etc. have made the electric vehicle market competitive and provided scope for improvisation (Preetha and Poornachandran, 2019). There were many visible and prominent factors behind the inclination of customers more towards EVs include the reduced use of fuel based vehicles responsible for increasing the air and noise pollution



Source: Collected and compiled by the author

level. This also in turn acts as a substitute of fuel based vehicles and thus decrease the dependencies on fuel like petrol and diesel which has been perishing from the Earth's repository at a faster rate (Altun et al., 2019). It subsequently enables nation builders and policy makers of different countries to provide transport and travel solutions to their citizens at a lesser cost and with more convenience, that to almost saving the extra cost put on the purchase of fuel and so on (Sen et al., 2019). Traditionally, the invention of EVs were more of providing a sustainable solution to the pollution causes occurring due to the emission of toxic gases as well as increased level of noise in cities by the

increased use of fuel based vehicles. However, there are certain limitations as well as challenges which have come to the front in the recent years in the product positioning of EVs (Greene et al., 2020). Adding to that the manufacturing and market space of EVs being mostly covered by the regional to national players, the differentiation strategies have become challenges for the sellers while building a global recognition (Bhardwaj and Bhardwaj, 2019). Also the two-wheeler segment of EV is becoming more crowded with number of units sold soaring up can suggest the minute planning and differentiation strategies need to be configured for long run. These issues can be from various directions, technological as well as non-technological. This study has been an attempt to understand the challenges in the sustainability of EVs because of the shortcomings the product has been going through in terms of owners' perception about the issues related to positioning of the same (Pevec et al., 2020).

Literature Review

EVs are mostly considered by the consumers as a substitute to the fuel based vehicles due to various factors like economic, societal, environmental as well as technological advantages associated. The popularity of EVs in various segments like two-wheelers, cars etc. among the owners was recognized only few years back with various developing markets across the globe (Das et al., 2020). The vehicle in specific forms like hybrid EVs has become a popular category due to its exclusive features in comparison to other categories (Pelegov and Pontes, 2018). Because of its nascent stage in different developing markets like India, this has undergone several studies and evaluation to upgrade its features and making it more preferred over the traditional vehicles (Rajper and Albrecht, 2020). However, there has been very few studies done in understanding the adoption process of EVs being a different form of vehicle and setting a trend for consumers. In most of the markets across the globe, these vehicles have not found the same scale of production like those of fuel-based vehicles, putting the sellers into a difficult position while calculating the demand and reciprocating with the supply (de Rubens et al., 2020). This in other terms, creates a challenge for the marketers and channel partners of EVs

while making branding and promotion activities in order to push up the sales (Khurana et al., 2020). The financial considerations like high prices while owning these vehicles have been the reasons for the low and slow adoption of EVs. In addition to that the technological challenges while using the EVs are found in various parts of world when the owners were raising the related issues like charging the batteries and so on (Berkeley et al., 2018). With its contribution in reducing the pollution level, EVs are still finding it tough to make themselves equal with traditional fuel-based vehicles as far as the commercialization of theirs is concerned in various countries in the world (Wu et al., 2019). Inadequacy of supporting infrastructure for EVs adds to the list of shortcomings in the adoption and ownership of these vehicles (Deng et al., 2020).

Ownership of EVs

Like any other vehicles, considering ownership of EVs can be having multiple factors. The innovations of this segment be it a two-wheeler, a car or a commercial vehicle, the purpose for which it can be sold to a customer needs to be defined at first (Gomez Vilchez et al., 2019). The customers are primarily looking forward to buy an EV looking at the additional benefits and sometimes the unique benefits attached with it (Gopal et al., 2018). The advantages associated with EV like comfortable driving and sometimes the comparatively lower cost for some customers make it a great offering (Benajes et al., 2020). There are a substantial number of customers who because of their environmental consciousness think of owning an EV (Okada et al., 2019). Certain important factors like the dealers involved in communicating the customers and prospects about the product can make the difference (Teli and Murumkar, 2018). Value added services like pick-up and delivery etc. provided by dealers can be feel good factors for the owners (O'Neill et al., 2019). The employees' attitude towards the customers can be a differentiator (Lee et al., 2020). Being an innovative product and with special components used in EVs unlike the fuel-based vehicle ask for real time service support from the dealers (Foley et al., 2020).

Positioning of EVs

Though off late, EVs have attracted the major global

automobile players to foray into this segment, the market of the former is mostly dominated by local players as well as startups (Choi et al., 2020). The high infrastructure cost related to the production of these vehicles compel them on compromising with the advertisement budget (Korreck, 2019). The vehicles are still considered to be lying in the experiment set by the buyers due to their uncertainty related to reliability, performance as well as relative advantage over other forms of vehicles (Shalender, 2020). This segment of vehicle is found to be one of the major offerings to the customers in the middle age and experimenting in nature (Han et al., 2019). The customers of EV keep on comparing the components with the fuel based vehicles to understand the differentiating dimensions (Wei et al., 2018). There is a natural understanding of EV as a vehicle which can be owned without too much botheration in terms of documentation and compliances (Mohamed et al., 2018). As the concern for global ecosystem becomes more and more, the vehicle is perceived by many as a friend to the environment and expectation from government increases in terms of making it available at an economical and subsidized cost (Ma et al., 2019). The positioning of EVs for that reason has not become very clear even if the vehicles in this category have been here for some good number of years (Villar et al., 2018). Based on the earlier studies and relevant literature review, a model is proposed which indicates the sustainability of EV in relation to the ownership and product positioning (Fig. 1).

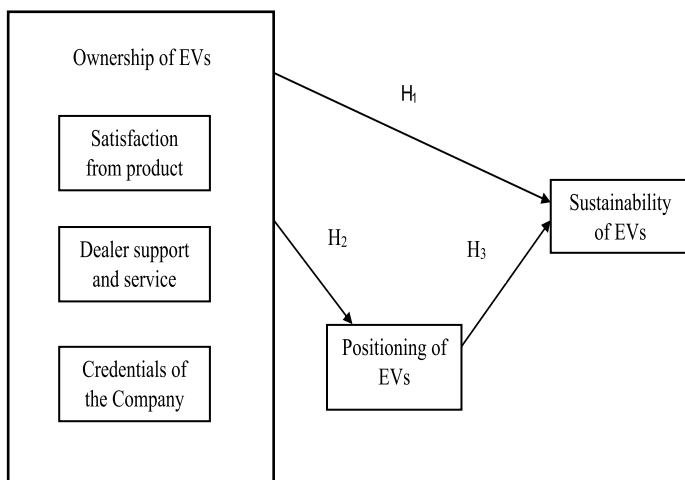


Fig. 1: Research model proposed by the author

Based on the earlier studies and the peculiarity of EVs as an offering, further experiments are necessitated in understanding the hypotheses developed, viz.

H1: There is a direct effect of ownership of EVs on the sustainability

H2: Ownership of EVs can have direct impact on the positioning

H3: Positioning of EVs can directly affect the sustainability

Objectives of study

Considering the challenges in understanding the nature of EV customers due to lack of continuous studies and connectivity with them, the study was done with the following objectives.

- To understand the various dimensions of EV ownership vis-à-vis the positioning of the same mostly the two-wheeler segment as its customer base is found to be more in comparison to other segments of EV.
- To find out the relationship between different constructs that can be the indications of the relationship between this innovative product and its sustainability.
- To create a research pathway where further studies can be done in order to refine the micro factors responsible for the success of EV in the time to come.

Research method

In order to find out the underlying constructs of ownership and positioning of EVs leading to the sustainability of the product, a structured questionnaire based on a 5-point Likert scale (Where 1 = Mostly disagree to 5 = Mostly agree) was used. Data were collected from 960 existing EV users mostly two-wheelers in the state of Odisha and West Bengal. Selection of these two states was made as the EV as a product is at a very nascent stage in the market (Singh et al., 2021). The findings of the study can contribute greatly to the strategy making of new players entering into this market. The demographic profile of these respondents, like age, gender, years of EV possession, Average weekly hours of driving EV and sole ownership or additional ownership are collected (Table 1). As can be seen most of the EV owners are aged between 31- 45 years and a substantial portion are male owners. The EV has been possessed by the owners mostly in between 2 to 5 years while some of them are having the vehicle for less than 2 years.

Table 1 Demographic profile of EV owners

Age	Count	Percentage
18 to 30 years	231	24.05
31 to 45 years	545	56.79
46 to 60 years	184	19.16
Total	960	100
Gender		
Male	652	67.92
Female	308	32.08
Total	960	100
Years of EV possession		
Less than 2 years	289	30.12
2-5 years	556	57.9
More than 5 years	115	11.98
Total	960	100
Average weekly hours of driving		
Less than 30 hours	315	32.8
30 – 50 hours	546	56.91
More than 50 hours	99	10.29
Total	960	100
Types of ownership		
EV as the sole vehicle	119	12.38
EV as an additional vehicle	841	87.62
Total	960	100

Source: Compiled from collected data

Interestingly, most of the respondents were found to own EV as an added vehicle to their collection. The EV was found to be driven by respondents mostly in between 30-50 average hours per week.

Factor analysis

Exploratory factor analysis was conducted on various dimensions like ownership of EVs, positioning of EVs as already cited in the model. Cronbach's alpha was found to determine the reliability of each measure (Kim, 2019).

For Ownership of EVs

Three factors namely satisfaction from product, dealer support and service as well as credentials of the company were taken out constituting the dimension ownership of EVs (Table 2). These factors explained 51.45% of variance. The factor satisfaction from product contained six items, whereas the factor dealer support and service was measured on five items. The third factor, i.e. credentials of the company contained four items. Reliability of measurement was found to be in the range from 0.68 to 0.79.

Table 2 Factor analysis (Ownership of EVs)

Factor	Items	Factor Loading	Variance Explained	α
Satisfaction from product	I am comfortable in driving.	0.781	18.36	0.68
	It performs as per my expectation.	0.721		
	Its value for money.	0.705		
	It makes me feel unique.	.687		
	It's a status symbol.	0.659		
	It makes me feel responsible for Environment.	0.631		
Dealer support and service	Service facilities are available easily.	-0.732	17.91	0.79
	Friendly and informative staffs.	-0.711		
	No compromise on quality issues.	-0.679		
	Pickup and delivery facility is available in case of emergency.	-0.651		
	Safety standards are met properly.	-0.619		
Credentials of the Company	Reputation of seller matters.	-0.632	15.18	0.72
	The company needs to express honestly.	0.629		
	Marketing of products should adhere to the ethical standards.	0.601		
	Assurance from a known employee inspired me to purchase.	0.592		

Source: Analyzed and compiled from collected data

For Positioning of EVs

Three factors viz. differentiation, economy and psychology were taken out and named constituting the dimension, i.e. positioning of EVs (Table 3). These factors explained

63.50% of variance. The factor differentiation was measured on four items, whereas the factors economy and psychology were measured on four and three items respectively. The reliability of the scale was in the range of 0.73 to 0.81.

Table 3 Factor analysis (Positioning of EVs)

Factor	Items	Factor Loading	Variance Explained	α
Differentiation	Its pick up is different.	0.762	24.23	0.81
	Hassle free documentation.	0.753		
	No need for pollution certificate.	0.729		
	Long riding without botheration.	0.683		

Factor	Items	Factor Loading	Variance Explained	α
Economy	Zero cost on fuel consumption.	0.788	21.02	0.79
	Hardly any expense on battery.	0.771		
	Pocket friendly maintenance.	0.739		
	Subsidy can help me to think buy again.	0.71		
Psychology	No nearby battery recharge points.	0.724	18.25	0.73
	Higher on-road price deters me from changing frequently.	0.695		
	Kith and kin are not ready to replace their older vehicles.	0.592		

Source: Analyzed and compiled from collected data

Testing the hypotheses

In order to understand the contribution of each independent variable to the model, enter method was used and the hypotheses were tested by multiple regression (Heo and Han, 2018). Statistical tools like VIF (Variance Inflation Factor) were taken to understand the multicollinearity and in this case, VIF values found below 1.1 representing an acceptable range.

4.2.1 Hypothesis 1

In this case, the predictor variables were the three sub-fields

of ownership of EVs, i.e. satisfaction from product, dealer support and service as well as credentials of company where as the dependent variable was sustainability of EVs. The relationship was found to be significant with sustainability ($F = 11.029$, $p < .001$, $R^2 = 0.089$). Except satisfaction from product, which is insignificant to sustainability of EVs, other two, i.e. dealer support and service as well as credentials of the company are having significant relationship with the sustainability (Table 4). Thus it is established that ownership of EVs can lead to sustainability of EVs thereby supporting H1.

Table 4 Enter Multiple Regression between Ownership of EVs and Positioning of EVs, Sustainability of EVs

Predictor Variables	Dependent Variables Standardized Beta Coefficients (β)			
	Differentiation	Economy	Psychology	Sustainability of EVs
Satisfaction from product	I/S	.096*	.131**	I/S
Dealer support and service	.205**	.142***	.139***	.192**
Credentials of the Company	.178*	I/S	.185**	.158***
R^2	.071	.118	.124	.089
F	8.271***	12.789***	13.285***	11.029***

* $p < .05$, ** $p < .01$, *** $p < .001$

I/S: insignificant

Source: Analyzed and compiled from collected data

Hypothesis 2

Here, the predictor variables were the three sub-fields of ownership of EVs, i.e. satisfaction from product, dealer support and service as well as credentials of company where as the dependent variable was positioning of EVs, i.e. differentiation, economy and psychology dimensions. The three regression equation models depicted the relationships significantly with differentiation ($F = 8.271$, $p < .001$, $R^2 = 0.071$), economy ($F = 12.789$, $p < .001$, $R^2 = 0.118$) and psychology ($F = 13.285$, $p < .001$, $R^2 = .124$). There were two negative correlations, i.e. one between dealer support and service with differentiation ($\beta = -.205$, $p < .01$) and another between satisfaction from product and economy ($\beta = -.096$, $p < .05$) suggesting that positioning of EVs on differentiation strategy hardly depends up on dealer support and service and at the same time positioning on economy dimension may not be based on the satisfaction

from the product owner of EVs. However, there are positive correlations in all other cases. Thus out of nine relationships, only one, i.e. between satisfaction from product and differentiation was found to be insignificant. It can be thus concluded that hypothesis 2 is accepted (Table 4).

Hypothesis 3

For establishing the relationship, three sub-fields of positioning of EVs, i.e. differentiation, economy and psychology were taken as predictor variable and sustainability as the dependent variable (Table 5). The model was found to be significant ($F = 91.162$, $p < .001$, $R^2 = 0.531$). Differentiation ($\beta = .521$, $p < .001$), economy ($\beta = .367$, $p < .001$) and psychology ($\beta = .278$, $p < .001$) were all found to be positively correlated to sustainability of EVs. With all the relationships were found to be significant, hypothesis 3 is supported in the model.

**Table 5 Enter Multiple Regression between
Positioning of EVs and Sustainability of EVs**

Predictor Variables	Criterion Variables
	Standardized Beta Coefficients(β)
Differentiation	Sustainability of EVs .521***
Economy	.367***
Psychology	0.531
R2	
F	91.162***

*** $p < .001$

Source: Analyzed and compiled from collected data

Discussion and conclusion

As found from the entire study, EV as a product has started gaining momentum like another offering to the automobile industry. The positioning of this product needs to be appropriately planned as it is still considered to be another possession of a vehicle rather than prime vehicle considered by the owners. EV because of its uniqueness is still lagging in finding repeat customers of it (Ta et al., 2018). The sellers need to understand that the customers

require the same kind of support in terms of battery charging points, informative and supportive dealers, and affordable on-road prices and so on in order to make EV as one of their prime options while deciding to own a vehicle (Brase, 2019). Overall, the infrastructure required to accommodate the smooth run of EVs by the customers, needs to be taken care of either by the companies themselves or with the support of other stakeholders. The customers are having expectations from the government,

(be it state or central) to promote and subsidize EV to make it popular and thereby creating a sense of dignity and honor among the customers. Thus customers' psychology, the uniqueness maintained by the manufacturer/marketer and of course the cost factor is going to write the rules for EVs. The silos remaining in customers' mind in possessing the vehicle can only be modified or removed when the companies start focusing on positioning the product in the right direction, e.g. though it is similar to any traditional vehicle, but the uniqueness must be communicated properly with the core usage of a vehicle remaining the same. This can also be positioned in terms of an economy product in certain ranges or segments where it should address the issue of owning a vehicle at an affordable cost.

Implications and future scope of study

Though this study has been done on an emerging offering like EV, it had got its own limitations in terms of few players operating in this part of the world as well as the traditional understanding about the automobile being dominated by the fuel based vehicles. However, the rate of adoption of EVs in other parts of the market can have a serious impact on the competitive structure of this market. The presence of EVs in different segments and availability as well can have a significant impact on the acceptance of the same. Thus the results of this study can be used for many purposes of future research works and studies by various stakeholders like the researchers, managers, marketers and others. The potential studies can be made to understand and coming up with a model which can address different challenges EV is facing as a product and its failure to create loyal customers, e.g. insufficient supply of batteries and other components, inadequate infrastructure as well as unclear safety standards. There can be future studies to understand the changing mind set of customers in accepting EV not as a unique product but as a regular offering solving their purpose of owning it. These types of studies can add to the understanding of the sustainability of EVs in the long run in a more comprehensive manner. More similar and intensive studies can be undertaken in other markets of the world to have a comprehensive understanding about the shift in behavior of automobile owners towards electric vehicles.

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