Consumers Delighted Perception on Electric Vehicles in India: An Empirical Study on their Purchase Intentions

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Abstract:
As in India due to downfall or over crowd of the pollution due to the emission from the fuels, we are in need of new source of the power energy for the vehicles. An electric vehicle (EV) could be the answer to India's industrial and environmental problems, according to the country's automotive industry. Inspite of Indian governments various enacting policies for electric vehicles, the implementation aspect is still considered very low. In regards to this context, our research article gives an examination and to understand the possibility in the penetration of the EV cars towards the potential market of India and also the opinion towards the preference of the buyers in our country. And to analyse this aspect we are bringing up the descriptive analytical student with random sampling from various domain customers who are intent to buy the vehicles.
Keywords: EV cars, Consumers delighted perception, Opinion choice of the vehicles, Environmental concern.

1. **Introduction:** India boasts one of the most extensive road networks globally. In India, road travel has emerged as a favored option, with more than two third of the population in the country opting for vehicles for their daily commutes. (Statista, 2020).

Traditional automobiles significantly contribute to climate change and the degradation of air quality. Every kind of vehicle generates dust through brake usage, tire wear, and the degradation of road surfaces. Thus the conventional and typical diesel vehicles give an adverse impact on the environment in comparison to the standard gasoline vehicles. Although, these both conventional vehicles omit pollution to a greater extinct as that in line with EV cars (EEA, 2018).

Authorities started with an implementation of financial measures like road tax to deter the acquisition and utilization of vehicles that contribute higher pollution. A different mode of green tax is being imposed on the vehicles which are of 1.5 decades aged thus focusing to bring down the usage of the older and pollutant vehicles and make the customers to adopt with more effective and eco-friendly vehicles. Taxes on fuel could serve as a motivating factor for creating vehicles that are more efficient and environmentally friendly, as well as for advancing alternative fuel options. Significant fuel taxes or a shift in societal attitudes could strongly motivate individuals to opt for more compact, efficient vehicles, or even to reduce their driving altogether (mobility strategy).

The FAME India Scheme serves as a motivating initiative targeted to bring an enhancement towards the usage of EV based hybrid vehicles. The initiative seeks to advance sustainable transportation by providing financial support for boosting production and developing the necessary infrastructure for electric vehicles.

In the year 2015, Heavy industrial ministry of India and the Public Enterprises brought up a legitimate program to enact the manufacturing plants and their promotion of EV cars including some hybrid models and thus resulting in the upgradation of the charging facilities across the country (Jose, 2018).

This initiative aims to enhance national energy independence, provide cost-effective and eco-friendly transportation options, and empower the Indian automotive sector to achieve a leading position in global manufacturing. (Gulati, 2013)

2. Literature Review

This study purely represents on the long run survival of the EV which merely depends on the enhancements of the battery life used in the EV so that to bring down the price and consumption of energy in developing the advanced fast charging stations all across the country (Marcello Contestabile, 2012)

India ought to focus on making targeted, smaller-scale improvements to address local load challenges instead of pursuing a massive overhaul. Promoting home charging is essential. Thorough consideration of location, demographics, traffic patterns, and safety is essential prior to the deployment of extensive charging infrastructure. In this connection, the efforts put in the field of energy and logistics is very crucial. Innovative policies and programs aimed at achieving development goals can significantly boost market growth. For example, providing financial incentives to drivers of electric vehicles, such as credibility in tax, some incentivisation, subsidies in tolls and parking lots along with access to the restricted lanes will enacts and attracts the potential buyers to make a possible switch (Dash P. K., 2013).

The logistic movement of the freight acts as a major role in bringing a disciplined and advanced mobility. As a researcher, he will analyse the potentiality in incorporating of EV cars into the urban logistic operations. A wide variety of enhancement in the technology within a fleet presents a chance to lower expenses associated with the final leg of delivery. A researcher introduced a problem involving the routing of a fleet with various vehicle sizes and types, incorporating time constraints specifically for electric vehicles. Here the author primarily focusses on the fluctuations in the variety of the EV cars. In the realm of small vans, electric vehicles frequently emerge as the leading technology option. In the realm of large vans, diesel presents a compelling financial solution, as electric alternatives must achieve greater distances to remain economically viable. In the truck segment, the more of articulated and rigid hybrid vehicles are preferred due to reduced running and rigid price compared to conventional trucks (Philippe Lebeau, 2015).

The extensive embrace of electric vehicles could play a significant role in alleviating issues such as environmental pollution, climate change, and reliability on the traditional and conventional mode of fuels. Nonetheless, to uptake of electric vehicles remains relatively modest, even with robust promotional policies put in place by the government. They provided an in-depth analysis of research on the consumer delighted preference towards the buying intentions of EV cars tending to get the knowledge of the policy and how they make to guide the further analysis. This research papers analyses on the economic and psychological aspects which affects the choice based preferences of buyers towards the EV cars. The impact of the financial and technological implications on the infrastructural utilization of the EV cars in drastically and substantially leads to the legitimate factors such as handling and operational costs, driving capacity, time taken to charge the vehicle, performance measurability and various global brands available in the market (Fanchao Liao, 2017).

The initial expansion of the electric vehicle market is ongoing, yet several obstacles hinder their broad acceptance. The challenges encompass the extra expense associated with the innovative technology, the comparative inconvenience regarding range and charging durations, as well as the consumer's grasp of the accessibility and practicality of the technology. This final aspect, often called “consumer awareness,” is essential. (Lingzhi Jin, 2017)

Transitioning from traditional engines to electric ones will significantly cut down on pollution and offer financial benefits to consumers. A number of nations have adopted this technology, playing a significant role in enhancing environmental conditions. The researcher observed the potential and obstacles encountered in the country regarding the implementation of electric vehicles. Factors such as governmental support, advancements in battery technology, industrial involvement, and environmental considerations have been taken into account. Considering the challenges such as the pricing of EV cars, their performance level and the potential market demand for those in the country. Hence the introduction of EV cars in Indian market targets merely on enhancing the green technology thus by reducing the greenhouse gas effect and bringing down the oil price. The Indian government should seize and penalize the opportunities and devise effective strategies to resolve the future grievances (Mohamed M, 2018).

The situation in India stands out, due to the present share value of the EV cars and hybrid mode vehicles are tentatively 0.1%. In the present day majority of the vehicles rely on the conventional set up of fueling system for logistics. Hence they contribute huge pollution towards the greenhouse gas thus effecting to the global warming. The differentiation with the local producers of the oil and their usage is enhanced a lot. India thus relied merely on the imported structure of tentatively over 70% to the needs of the fuel. It is thus the very critical to reach and explore the different varieties of elements and hurdles which effects for the shifting of sustainable and finest options (Pritam K. Gujarathi, 2018).

The logistic domain in Indian market is accountable for almost 18% of the pollution emitted by the vehicles as carbon. The electric vehicle stands out as a leading viable alternative to tackle the challenges we face. A number of automotive manufacturers are launching electric vehicles and broadening their offerings. Thus promoting and enacting the usage of the EV cars can drastically bring down the reliability of the vehicles on conventional and traditional set of fuels thus leading to the downfall of the pollution generated in the country as whole. The level of awareness regarding electric vehicles is greatly impacted by the education of individuals. In addition to the efforts of manufacturers, it is crucial for the Government to actively work on raising awareness and fostering a favorable view among prospective buyers. (Masurali.A, 2018).

In this paper he is clearly mentioned that the selection of the vehicles will be highly influenced by some factors such as technical enactments, acceptance by the society, comfort zone, availability, lesser cost and ease towards the infrastructure. Highly myth is that the above mentioned elements show significant effects on the customer vehicle preference. It has been observed that producers of electric vehicles and the authorities need to enhance their efforts in fostering public acceptance by developing additional infrastructure and emphasizing technological advancements to build confidence. Thus this analyses gives an insight about the populations concern towards the environment (Pretty Bhalla, 2018).

The fast growing pollution by the emissions of the vehicles is giving a strong warning and alarm to reduce and bring down the CO2 level in our planet. In this regard one most important initiative taken is the dependency on EV cars. The logistic domain thus remains as major contributor towards the emission of the CO2 pollution, which is very critical to bring it down. The Indian government has taken lot of initiatives and revealed the ideas to bring and promote the EV cars in to the market at the greater extinct to keep up the global evolution. The 2020 National Electric Mobility Mission Plan brings up a vast report on the implementation of the EV cars. Due to high population India is facing a big challenge in trans positioning the logistic sector from conventional vehicle to EV cars. This requires extensive planning and research and development efforts. It's essential to develop sufficient charging infrastructure to alleviate concerns about range limitations. It’s essential to create demand by transitioning all government buses to electric and providing tax incentives for individual owners of electric vehicles. (Mr. A. Rakesh Kumar, 2019).

Formulating a robust approach for embracing electric vehicles in India and guaranteeing effective execution presents a challenge, yet it is crucial for the government. The vast landscape and rich variety of India will pose challenges that demand innovative approaches. The acquisition of vehicles for government use, which includes the official cars, autos and public transports is also anticipating significantly for the growth of EV. Support in the monetary benefits from the private sectors like Ola and Uber which are the major food delivery service based industries in India are also interested in bring up the eco-friendly drives. But it is not ease to bring up immediately but might take an approximate of 5-8 years in the full pleged implementation (Janardan Prasad Kesari, 2019).

Individuals using scooters for short trips might think about switching to an electric option. However, those who require longer travel and already possess bikes such as a Hero Splendor may face challenges in transitioning to an electric two-wheeler. Enhancing the range of vehicles can be achieved quite easily by opting for larger battery capacities. When it comes to electric two-wheelers, each additional kWh can offer an extra 30km of range; however, this comes with an added weight of about 10kg, which results in the increase of overall curb weight of the bike by 10%. This increase in the weight will become a challenge in terms of smaller vehicles which are below 150cc (Yogesh Aggarwal, 2019).

3. Objective:

- To understand the consumer delighted perception in the context of purchasing EV vehicles in Indian market.
- To understand and also to analyse the factors affecting the customers in the process of purchasing EV in India.

4. Research Methodology:

The Descriptive research is done to analyse the gathered data. 212 is the sampling size that was gathered through questionnaire survey method. We have applied Chi square test to analyse the situation and test the hypotheses.

4.1. Data Analysis and Interpretation:

As mentioned the data was gathered by a Sample size of 212 respondents. From the gathered data, 60.4% were male respondents and remaining 39.6% were found female respondents.

Out of the above sample, it was found that 7.5% of respondents are between 18-23 years of age, 55.7% of respondents are between 24-40 years of age, 27.8% fall within 41-55 year's age and remaining 9% fall on 56 year's age and above.

4.1.1 Preference towards the type of the vehicles in Indian Market!

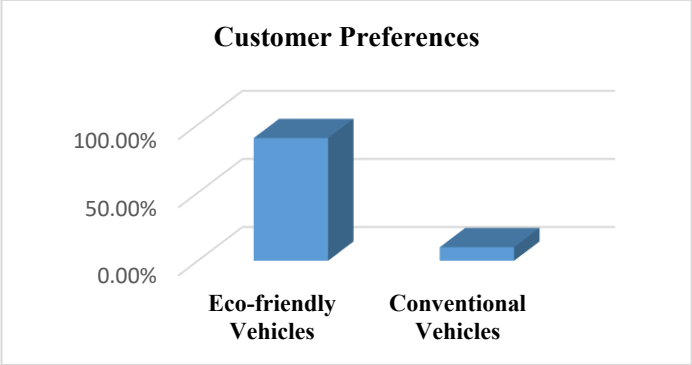


Fig 01: Type of Vehicles

From the above chart, it is clearly visible that **90.1%** of the customers preferred purchase of Eco-friendly EV Vehicles and **9.9%** showed their favour towards conventional vehicles. This shows that there is strong awareness and willingness of the customers to change their preference towards EV vehicles.

4.1.2 Preference towards the Choice of the vehicles in Indian Market!

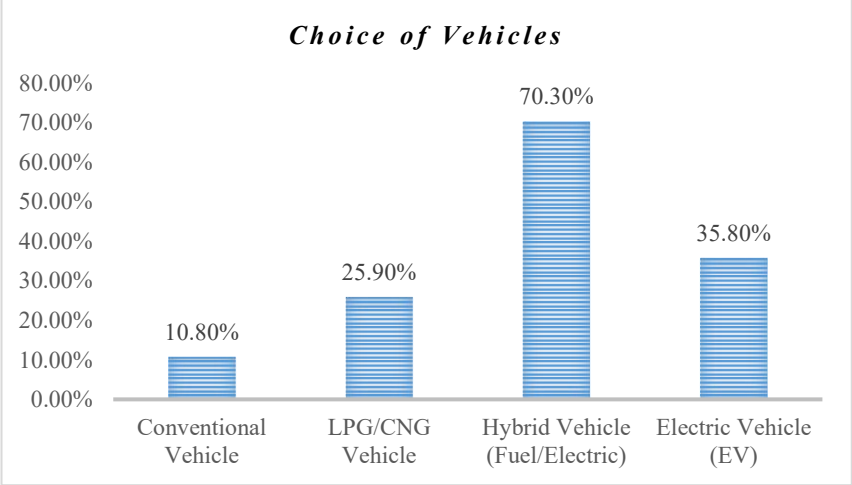


Fig 02: Choice of Vehicles

Above chart mentions the choice of vehicles by the customers and their priority towards Hybrid Vehicles. About 23 respondents likes conventional mode of vehicles, 55 respondents prefer LPG/CNG vehicles, 149 respondents preferred towards hybrid vehicles and 76 respondents preferred EV.

It shown the majority of the choice in vehicles is preferred towards the hybrid, which a blend of both EV and Fuel vehicles in Indian Market.

4.1.3 Preference towards the cost of the EV in the Indian Market!

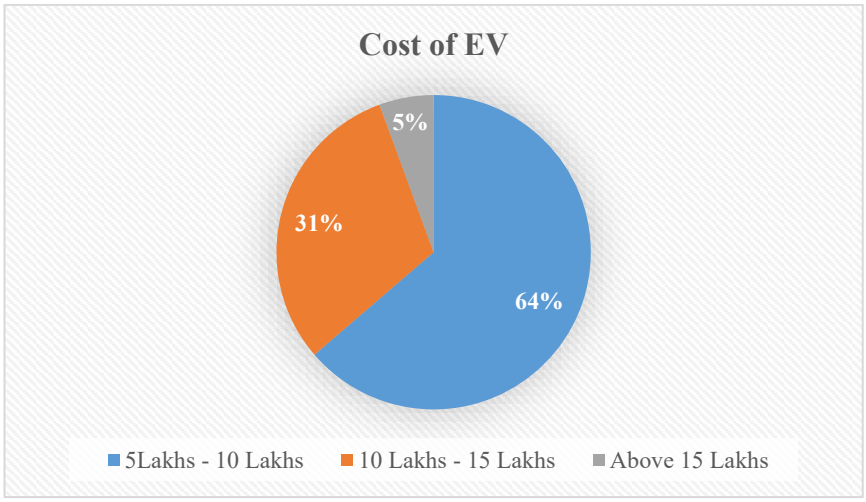
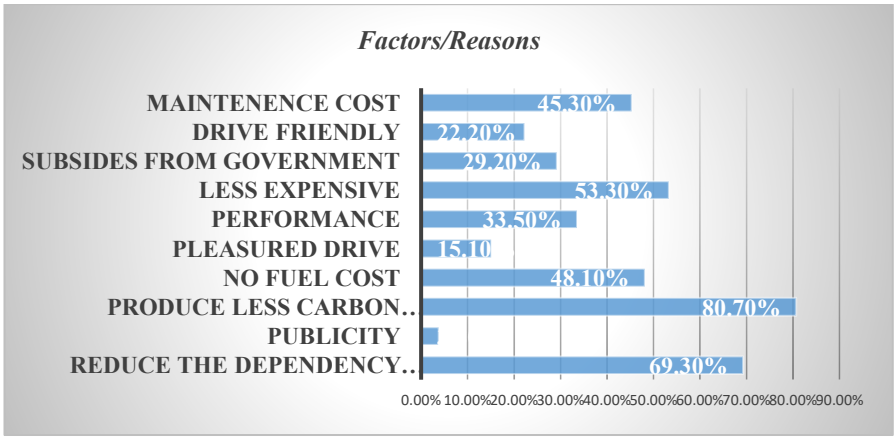


Fig 02: Choice of Vehicles

As cost is one of the important factors that influences on the mindset of the customer in their purchase intentions, majorly crowd of 64% of the respondents among 212, preferred the cost should be within 5 Lakhs to 10 Lakhs range for EV.

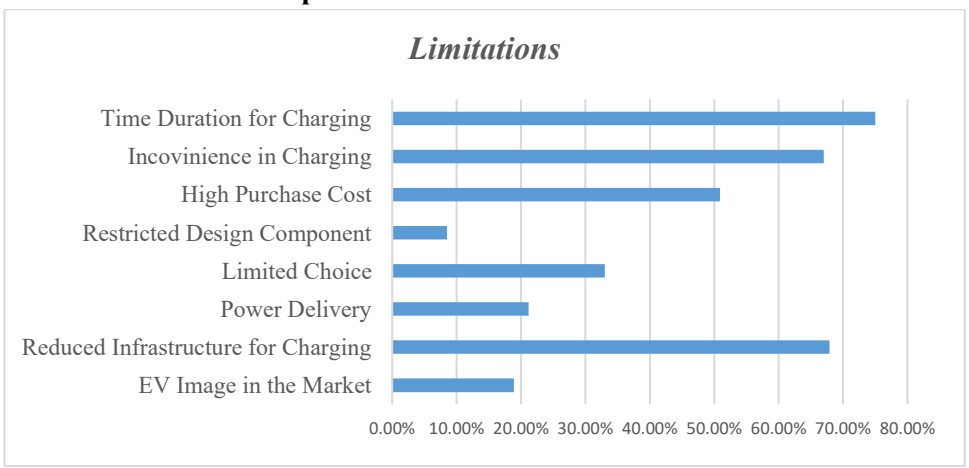
4.1.4 Some of the influencing factors/ reasons for preferring the EV in Indian Market:



To know about the consumers delighted perception, it is very important to identify the selection pattern based on the factors/reasons for the preference of EV in Indian market.

So as per the data received, the respondents considered less carbon emission, lesser the dependency on fuels and less expensive to run the vehicles as important factors/reasons for preferring the EV in Indian market.

4.1.5 Limitations in the preference of EV:



Interpreting the limitations on the preference towards the EV is that majority of respondents have mentioned regarding the longitivity in charging time, reduced infrastructural charging stations and complexity in charging as the significant limitations.

4.2 Hypothesis Testing

4.2.1 Test 1: To understand and check the relevance within the preferred vehicle choice and gender.

H0: Customer preference of the vehicle and gender wise have no significant difference.

H1: Customer preference of the vehicle and gender wise have a major significant difference.

Actual Frequency Count					
Count of Vehicle	**Column Labels**				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Male	18	19	71	17	124
Female	6	30	38	13	84
Grand Total	**24**	**49**	**109**	**30**	**212**

Expected Frequency Count					
Count of Vehicle	**Column Labels**				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Male	13.88679245	30.18867925	67.01886792	16.9056603	128
Female	9.113207547	19.81132075	43.98113208	11.0943396	84
Grand Total	**23**	**50**	**111**	**28**	**212**

P Value	**0.000315703**

H1 is accepted since the value of P is smaller than 0.05

4.2.2 Test 2: To analyse the relevance within the preference of vehicle and Customers Income Level.

H0: Preference of the vehicle and customer income level have no significant difference.

H1: Preference of the vehicle and customer income level have a major significant difference.

Actual Frequency Count					
Count of Vehicle	**Column Labels**				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Up to 5 Lakhs	6	14	30	14	68
5 to 10 Lakhs	7	24	28	6	69
10 to 20 Lakhs	6	7	32	5	43
20 Lakhs & above	5	3	20	5	32
Grand Total	**24**	**48**	**110**	**30**	**212**

Expected Frequency Count					
Count of Vehicle	**Column Labels**				
Row Labels	**Conventional**	**LPG/CNG**	**Hybrid**	**Electric**	**Grand Total**
Up to 5 Lakhs	7.377358491	16.03773585	35.60377358	8.98113207	68
5 to 10 Lakhs	7.485849057	16.27358491	36.12735849	9.11320754	69
10 to 20 Lakhs	4.66509434	10.14150943	22.51415094	5.67924528	43
20 Lakhs & above	3.471698113	7.547169811	16.75471698	4.22641509	32
Grand Total	**23**	**50**	**111**	**28**	**212**

P value	**0.556199434**

We interpret the analysis carried out in this research article doesn't hold much strong in this relevance.

5. Conclusion

As fuels dwindle and fuel prices continue to rise, it's essential to shift towards alternative energy sources for EV in India. Hence the Indian government is working predominantly on the combat reduction on CO2 pollution by supporting to the usage of EV cars and thus in cubing financial aid for the preference buyers. Also has cut down foreign direct investment regulations to enhance production capabilities. Numerous new companies are introducing electric vehicles in the country. Collaboration between the authorities and producers is essential to develop the necessary infrastructure and foster a supportive atmosphere for electric vehicles.

The preferred and potential buyers recognize the planets current state of Pollution created by the CO2 emission and thus they want to get aligned and prepared to shift their choices from traditional vehicles to more sustainable options. The price plays a crucial role when evaluating the decision to buy an electric vehicle.

Participants express a readiness to explore electric vehicles as a potential choice for their next purchase, provided that adequate infrastructure is in place. The high upfront expense, non-availability of the infrastructure required for fast charging and the time taken to fill the battery at a single slot are hindering the enhancement of consumer trust.

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