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# Consumer Perception Towards Electric Vehicle

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## ABSTRACT

This paper includes what are the various factors that affect the overall perception of a consumer towards an EV and whether or not those factors have a relationship with the perception towards the electric vehicle.

Also, this study includes topics like why should we switch to electric vehicle and what is the need for an electric vehicle and how should we adopt it and are we ready enough to adopt this technology in to our daily routine. And what are the various types of EV currently present and what all are the factors that directly influence an EV adoption in country like India. And when was first EV introduced and how does it grow from back then until now.

In this study we also take into account the relationship between barriers and the perception towards EV and also to find out this we have used statistical tools and graphs, which are done using one factor ANOVA test.

Also, some attributes related to the consumer are also taken into account and how they influence it perception and how these attributes affect the factors and barriers for the EV perception and adoption.

**KEYWORDS:**Customer, EV, Sustainable development, Attributes

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## INTRODUCTION

### All about EV

According to (Wikipedia) an **electric vehicle (EV)** is a vehicle that uses one or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery, solar

panels, fuel cells or an electric generator to convert fuel to electricity. EVs include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft and electric spacecraft.

EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time. Modern internal combustion engines have been the dominant propulsion method for motor vehicles for almost 100 years, but electric power has remained commonplace in other vehicle types, such as trains and smaller vehicles of all types.

### **How does the electric engine work?**

Electric cars function by plugging into a charge point and taking electricity from the grid. They store the electricity in rechargeable batteries that power an electric motor, which turns the wheels. Electric cars accelerate faster than vehicles with traditional fuel engines – so they feel lighter to drive.

### **How does charging work?**

You can charge an electric vehicle by plugging it into a public charging station or into a home charging unit. There's plenty of charging stations around the UK to stay fully charged while you're out and about. But to get the best deal for home charging, it's important to get the right EV electricity tariff, so you can spend less money charging and save more on your bill.

### **What types of electric cars are there?**

There are a few different types of electric vehicle (EV). Some run purely on electricity, these are called pure electric vehicles. And some can also be run on petrol or diesel, these are called hybrid electric vehicles.

**Plug-in electric** - This means the car runs purely on electricity and get all their power when they're plugged in to charge. They don't need petrol or diesel to run so don't produce any emissions like traditional cars.

**Plug-in hybrid** - These mainly run on electricity but also have a traditional fuel engine so you can use petrol or diesel too. If you run out of charge, the car will switch to using fuel. When it's running on fuel, these cars will produce emissions but when they're running on electricity, they won't. Plug-in hybrids can be plugged in to an electricity source to recharge their battery.

**Hybrid-electric** - These run mainly on fuel like petrol or diesel but also have an electric battery too, this is recharged through regenerative braking. These let you switch between using your fuel engine and using 'EV' mode at the touch of a button. These cars cannot be plugged in to an electricity source and rely on petrol or diesel for energy.

## **What are the inner parts of an EV?**

EVs have 90% less moving parts than an ICE (Internal Combustion Engine) car. Here's a breakdown of the parts that keep an EV moving:

**Electric Engine/Motor** - Provides power to rotate the wheels. It can be DC/AC type; however, AC motors are more common.

**Inverter** - Converts the electric current in the form of Direct Current (DC) into Alternating Current (AC)

**Drivetrain** - EVs have a single-speed transmission which sends power from the motor to the wheels.

**Batteries** - Store the electricity required to run an EV. The higher the kW of the battery, the higher the range.

**Charging** - Plug into an outlet or EV charging point to charge your battery.

## **Factors responsible for EV adoption (dans, 2021)**

**1- Reduce overall cost** - the price of electric vehicles is considerably somewhat higher than that of conventional vehicles, but we are getting ever-closer to parity, and also there is growing evidence that in terms of total costs, running an electric vehicle is far cheaper as compared to the gasoline powered vehicle.

**2- Sustainable environment-** EVs can, in fact, also help reduce air and noise pollution. By choosing an electric car, one can reduce their carbon footprint, impacting to environment in a better way. Also, by this way we will not depend only on a single source of fuel and energy.

**3- Pollution regulations-** the implementation of emissions limits for vehicle manufacturers in the India by introducing an upgrade in the form Bharat stage VI. More and more companies are now considering their engine plants as assets that need to be disposed of urgently, disinvesting at an accelerated pace if emissions targets are to be met. In addition, several countries have brought forward the ban on the sale of petrol and diesel vehicles

**4- Technology of the future-** Electric Vehicles (EVs) are ahead of the conventional vehicle with advanced technology. EVs are safer and more comfortable than vehicles running on petrol and diesel. Also battery technology continues to improve considerably, meaning we could soon be able to travel hundreds of kilometers on a five-minute charge, and having practically no problems with degradation over time.

### **Objective of the study**

- To find out the overall forces and barriers that act as a hurdle in the path of the consumer for adopting the EV
- To study the impact of demographic features on consumer perception towards EV-
- To study the effect of age on the consumer perception towards the EV
- To study the effect of Education level on the consumer perception towards the EV
- To study the effect of Income level on the consumer perception towards the EV

## **LITERATURE REVIEW**

### **EV industry in India**

(Briefing, 2021) according to them The Indian automotive industry is the fifth largest in the world and is slated to be the third largest by 2030. Catering to a vast domestic market, reliance on the conventional modes of fuel intensive mobility will not be sustainable. In an effort to address this, federal policymakers are developing a mobility option that is “Shared, Connected, and Electric” and have projected an ambitious target of achieving 100 percent electrification by 2030.

Also, by making the shift towards electric vehicles (EVs), India stands to benefit on many fronts: it has a relative abundance of renewable energy resources and availability of skilled manpower in the technology and manufacturing sectors. This will ultimately help India to broaden its horizons in terms of growth and manufacturing

(Briefing, 2021) the American electric vehicle and clean energy company Tesla Inc. marked its entry into India by incorporating its subsidiary, Tesla India Motors and Energy Pvt Ltd, in Bengaluru.

In February 2021, Ather Energy, India’s first intelligence EV manufacturer moved its US\$86.5 million factory from Bengaluru (Karnataka) to Hosur (Tamil Nadu). Ather Energy’s factory is said to have an annual production capacity of 0.11 million two-wheelers.

This week, Ola Electric, the subsidiary of the unicorn Indian ride-hailing start-up, also announced that it would be setting up the world’s largest electric scooter plant in Hosur (which is a two and a half-hour drive from Bengaluru) over the next 12 weeks, at a cost of US\$330 million, and aiming to produce 2 million units a year. By 2022, Ola Electric wants to

scale up production to pump out 10 million vehicles annually or 15 percent of the world's e-scooters.

Recently, Sterling and Wilson Pvt Ltd (SWPL), India's leading engineering, procurement, and construction company announced its entry into the electric mobility segment in India. It has signed a 50-50 joint venture with Enel X, to be incorporated on April 1, 2021, to launch and create innovative charging infrastructure in India

## **India's EV market: Growth projections and government policy**

### **Projections**

In April 2019, NitiAayog, the federal think tank, published a report titled "India's Electric Mobility Transformation", which pegs EV sales penetration in India at 70 percent for commercial cars, 30 percent for private cars, 40 percent for buses, and 80 percent for two- and three- wheelers by 2030. These targets, if achieved, could lead to a net reduction of 14 exajoules of energy and 846 million tons of CO<sub>2</sub> emissions over the deployed vehicles' lifetime. Electric vehicles sold until 2030 can cumulatively save 474 million tons of oil equivalent over their lifetime, worth US\$207.33 billion.

This will help India fulfill its global commitments to lower carbon emissions and increase use of cleaner sources of energy and transportation as required by the Nationally Determined Contributions (NDCs) under the United Nations Framework Convention on Climate Change (UNFCCC) and EV30@30.

However, this study emphasized only on the infrastructure part does not take into account the other individual or psychological factors which prevent the consumer for switching to the EVs Also, there are some cities which are performing really very despite the lack of infrastructure.

(Liao et al., 2016).In the article of Fanchao Liao (Consumer preferences for electric vehicles: a literature review) they mention that the various studies concerning EV adoption can be roughly divided into two categories: economic and psychological. The most widely applied methodology among economic studies is discrete choice analysis in which EV adoption is described as a choice among a group of vehicle alternatives described by their characteristics or "attributes". Consumers make decisions by making trade-offs between attributes. Economic studies focus on estimating the taste parameters for attributes which denote their weights in the decision. Psychological studies focus on the motivation and process of decision-making by examining the influence of a wide range of individual-specific psychological constructs (attitudes, emotion, etc.) and perceptions of EV on intentions for EV adoption.

Report by (WIRE, 2021) they found out that the: -

1. There is a considerable difference between customers' understanding about a certain technology and their actual awareness. There is a need to create awareness of technologies to build understanding and interest.
2. Although reliability and safety are the most important factors for choosing a vehicle, car owners more often take into account the performance and personalization of the vehicle as they are paying a premium over a conventional vehicle.
3. Electric range is a higher priority compared to performance and the preferred range is between 100 km and 150 km (90% of customers wanted a minimum 100 km range from EVs).

Technology - reliability, fuel economy, range, easy availability of the fuel, good everyday performance, low cost of ownership, good resale value, low noise and vibration, inexpensive to purchase, very low/ zero emissions, sporty performance, tax credits and other incentives, electric vehicles. 65% of customers want EVs to look different.

At the same time, they (40%) want the EVs to be priced below the price of a conventional vehicle. Industry challenges - Consumer perception on electric vehicle technology, range anxiety, and value addition offered by electric models have negatively impacted sales growth of EVs. Thus, OEMs are standardizing fast chargers for every EV model and exploring opportunities in vehicles with longer range and offering competitive pricing as compared to conventional vehicles.

The respondents were questioned based on numerous factors such as technology awareness, preferred vehicle range, features, ease of charging, usage pattern, resale value, low noise and vibration, inexpensive to purchase, very low/ zero emissions, sporty performance, tax credits and other incentives to understand what motivates them to consider purchasing a hybrid and electric vehicle.

### **Barriers in adoption of EVs**

The acceptance of EVs in India depends upon a series of real or perceived factors, these barriers were identified through reading and comprehending various literature review, relevant online content, previously published studies, articles, blogs and websites also. All in all three barriers were found to be of much importance which are: -

- Technical barriers
- Social barriers
- Economic barriers

1. **Technical Barriers:** - most of the consumers are not aware of the technology of EVs, making them feel uncomfortable while using or purchasing an EV. The awareness about EV

technology in India is almost negligible, thus the sales of the EVs is relatively low. There are some factors that contribute to technical barriers which are: -

**1.1 – limited range-** EVs operate with a battery and these batteries need to be charged in order for the vehicle to run. One of the most important concerns for the EVs is the range anxiety. Users who do not need to travel long distances for their daily routines are likely to show more interest in EVs. From this we can conclude that the EVs range is a technical barrier.

**1.2 – Reliability and Performance** – EVs are newly launched vehicles with newer technology and the consumer are not aware of this technology doubting their reliability and functioning. Lack of performance is known to affect user perceptions of EVs. Also there is no track record of EVs performing very well.

**1.3 – limited battery life**—EVs operate on the power provided by its lithium batteries. However, the typical life of an EV battery improved more recently, now it has the ability to last more years than its predecessor. After this improved battery life period, battery replacement should be borne by the user. These batteries are also quite sensitive to overcharging, which creates a problem and act as a hurdle for EV users. Limited battery life requires frequent replacements, which is a major hurdle for all the EV users.

**2. Social barrier**—these include how the consumer understands the attributes of EV, like the consumer knowledge, environment, experience and other people around. The three main social barriers to EVs are:-

**2.1- lack of knowledge** –the Indian consumer is not fully aware of the benefits and limitations of the EVs. They do not know the functioning of the EV and hence perceive that the EV will cost them more than the conventional vehicle. They are also not aware of the saving they could generate by not purchasing – petrol or diesel.

**2.2- lack of awareness towards the environment** -Emission reduction is one of the key advantages of using EVs. In total, electricity is generated from hydropower, windmill, solar sources etc. which is emission-free. However, consumers are often uncertain about possible emission reductions due to EVs and, at times, they are environmentally unaware about the harm caused by greenhouse gas emissions due to the use of CVs

**3. Economic barriers:** -the EVs are way more expensive than a conventional vehicle and the lower cost of the other vehicle are generally the biggest barrier for the EVs. Also, there are other cost involved with an EV, which are its battery replacement cost and the charging cost. Lack of offers from the company as compared to the conventional vehicle. The other barriers include: -

**3.1-highpurchase price-** Consumers perceive the higher purchase price of EVs as a major concern. Manufacturing costs of EV are higher; hence EVs have a higher price than those of conventional vehicle. Giving incentive or Subsidizing EV would boost the purchase of EV and it is becoming a popular method in many countries to promote their sales. PHEVs tend to be even costlier due to the complexity of their dual operations.

**3.2- battery replacement cost** - As mentioned earlier, the battery life of an EV is about eight to ten years, and the consumer have to bear the cost of its replacement. This hurdle act as a key barrier against EV purchase. Previous research has also pointed out that the cost of the battery accounts for a significant proportion of an EV's total purchase price.

**3.3- higher cost for charging** – there exists a direct relationship between the sales of the EVs and the price of the electricity. More the price of electricity less will be the demand for the EVs and vice-versa. Also because of the lack of charging infrastructure there exists a monopoly for charging a significantly higher price.

From the above literature review, it can be concluded that the studies on the consumer perception about EV have been conducted in various countries like USA, Australia, Canada, South Africa etc. This study analyses the perception of Indian consumers towards the electric vehicles and from this analysis, we can understand what are the factors driving the consumer perception about EV.

## **RESEARCH METHODOLOGY**

**Data Collection:** Data collection is characterized by standard validated techniques as the method of gathering, measuring and analyzing accurate insights for study. The most important goal of data collection is to ensure that data-rich and accurate data is obtained for statistical analysis in order to make data-driven research decisions.

**Primary Data:** Primary data is information obtained from first-hand sources by a researcher, using techniques such as surveys, interviews, or experiments. It is compiled, straight from primary sources, with the research project in mind. In comparison with the term secondary data, the information already present is used.

**Secondary Data:** Secondary data refers to knowledge that is gathered by someone other than the user. Censuses, data gathered by government agencies, operational records and data originally gathered for other research purposes are popular sources of secondary data for social science.

For this project the primary data was used with the help of a questionnaire designed. And some previous researches were also analyzed in view of this project. The responses for the survey and analysis were captured using an electronic questionnaire. The survey questionnaire was distributed to respondents majorly from towns and cities in India. A Likert-scale having five points was used in the questionnaire: 1, 2, 3, 4, 5 represent “Highly Disagree”, “Slightly Disagree”, “Neutral”, “Slightly Agree”, “Highly Agree” and some open ended questions were also used. A total of 58 valid questionnaire responses have been selected through the electronic survey.



**Research Instrument:** Research instrument adopted in the research is “questionnaire” which was convenient and helpful in obtaining the responses from the respondents. The questionnaire in the form of Google Forms is used. Questionnaire consists of a number of close ended questions and Likert scale question were also designed in a particular order.

**Sample:** A sample, as the name applies, is a smaller representation of larger whole. The selected respondents constitute what is technically called a sample and the selection process is called sampling. The sample is collected mainly from the metropolitan cities of the India.

**Sample size:** The number of people in your survey depends on the population size and how accurately you want the findings to reflect the population as a whole. It refers to the number of sampling units selected from the universe for investigation. The sample size of 58 Indian respondents has been taken.

## **DATA ANALYSIS AND INTERPRETATION**

This research is based on the Indian respondents' perception, and awareness mostly focusing towards the electric vehicles in the metropolitan cities. The factors which act as a hurdle in respondents to buy an electric vehicle in the near future would then be used to determine and analyze and does this factor really affect the purchase of an EV.

### **Result of the survey**

The result from the survey showed that around 58.6% of respondents were male and the remaining 41.4% respondents were female. The majority of the respondents have completed a bachelor's degree with the percentage being 70.7% and 25.9% had completed their master's degree and the remaining 1.7% accounts for PhD and again the 1.7% accounts for high school.

The survey also found out that the respondents were in the age group of under 25 years to 50 years, where in the maximum age group which is under 25 years accounted for 79.3% and in 26-30 years age group accounted for 13.8% and the age group of 41-50 years accounted for 3.4% and the age group of over 50 years accounted for 3.4%

### **Factors which acted as a hindrance for EV adoption**

Barriers	Percentage (%)
Limited option for recharging car	34.5%
Limited driving time	12.1%
Higher price	17.2%

Lack of consumer technology	22.4%
I don't trust the technology	13.8%

(Table 1 showing factors acting as a hindrance to consumer perception)

## **CREATION OF THEORETICAL STRUCTURE AND HYPOTHESIS**

### **Age impact on perception on EV**

#### **Hypothesis**

H1: The different age groups have different perception towards electric vehicle.

H0: all the age groups have same perception towards electric vehicle.

#### **Testing of the hypothesis**

Anova: Single Factor

#### SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Column 1	46	176.25	3.83152174	0.6112621
Column 2	8	28	3.5	0.1607143
Column 3	0	0	#DIV/0!	#DIV/0!
Column 4	2	7.75	3.875	0.78125
Column 5	2	7.5	3.75	0.125

#### ANOVA

<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	0.767991	4	0.19199775	0.3445008	0.84666461	2.5462731
Within Groups	29.5380435	53	0.55732158			
Total	30.3060345	57				

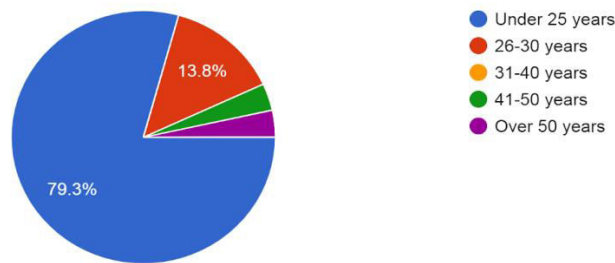
Table – 2, statistics of EV perception (based on the age group)

#### **DECISION RULE**

- If F stat > F critical, reject null and accept alternate hypothesis.

- If p value  $< \alpha$ , reject null and accept alternate hypothesis
- **Result** – here, F stat  $<$  F critical i.e.,  $0.34 < 2.54$ , so we will accept null and reject alternate hypothesis and p value  $> \alpha$  i.e., is  $0.84 > 0.05$ , we will accept null and reject alternate hypothesis.

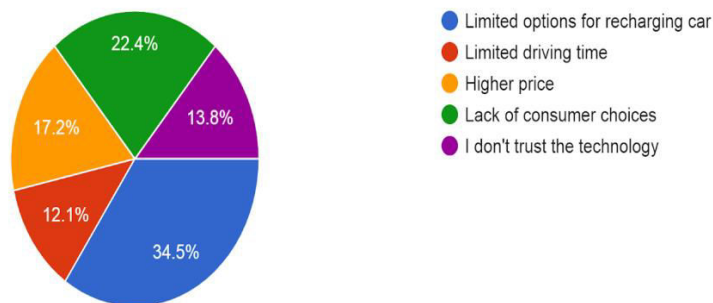
Age  
58 responses



## INTERPRETATION

The above pie chart depicts the various age groups of the respondents and as we can see that the majority of the respondents are from the age group of under 25 years with 79.3% and then comes the age group of 26-30 with 13.8%.

What might discourage you from buying an electric vehicle?  
58 responses



## INTERPRETATION

This pie chart represents that what all are the factors that affect the perception of the consumer towards the EV. 34.5% considers that the lack of infrastructure affects their perception toward EV. And the second most influencing factor turns out to be limited driving

## **Education level impact on perception on EV**

### **Hypothesis**

H1: The different education levels have different perception towards electric vehicle.

H0: all the education levels have same perception towards electric vehicle.

### **Testing of the hypothesis**

Anova: Single Factor

#### **SUMMARY**

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Column 1	0	0	#DIV/0!	#DIV/0!
Column 2	1	3.75	3.75	#DIV/0!
Column 3	41	153.5	3.7439	0.6359
Column 4	15	58.5	3.9	0.32857
Column 5	1	3.75	3.75	#DIV/0!

#### **ANOVA**

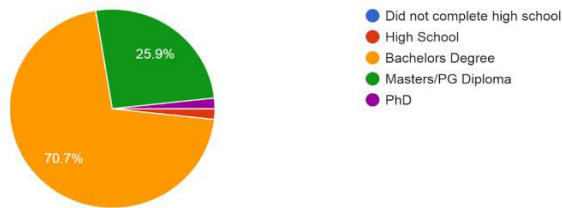
<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	0.270058873	4	0.06751	0.11913	0.97511	2.54627
Within Groups	30.03597561	53	0.56672			
Total	30.30603448	57				

*Table –3, statistics of EV perception (based on the education level of consumer)*

### **DECISION RULE**

- If F stat > F critical, reject null and accept alternate hypothesis.
- If p value <  $\alpha$ , reject null and accept alternate hypothesis
- **Result** – here, F stat < F critical i.e  $0.11 < 2.54$ , so we will accept null and reject alternate hypothesis and p value >  $\alpha$  i.e is  $0.97 > 0.05$ , we will accept null and reject alternate hypothesis

Education level  
58 responses



## INTERPRETATION

The above pie chart depicts the information related to the education level of the respondents and in that the highest level of the education completed by the respondents was of bachelor degree with 70.7% and then followed by masters/PG diploma with 25.9%. The question was added to find the relationship between the education level of the consumer and the perception they hold towards EV.

What might discourage you from buying an electric vehicle?  
58 responses



## INTERPRETATION

Also, again for comparison the pie chart which depicts all the factors which may influence consumer perception is shown here.

### Income level impact on perception on EV

#### Hypothesis

H1: The different income levels have different perception towards electric vehicle.

H0: all the income levels have same perception towards electric vehicle.

## Testing of the hypothesis

Anova: Single Factor

### SUMMARY

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
Column 1	40	152.75	3.81875	0.6794471
Column 2	10	35.75	3.575	0.2368056
Column 3	7	27	3.8571429	0.1845238
Column 4	0	0	#DIV/0!	#DIV/0!
Column 5	1	4	4	#DIV/0!

### ANOVA

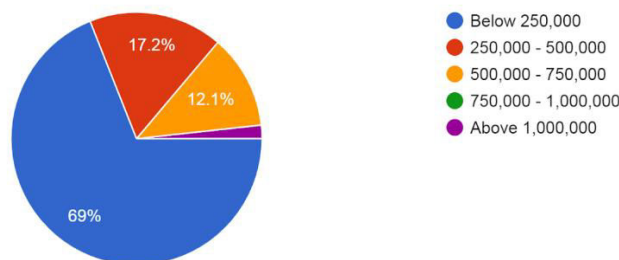
<i>Source of Variation</i>	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	0.56920413	4	0.142301	0.2536234	0.90619	2.54627
Within Groups	29.7368304	53	0.5610723			
Total	30.3060345	57				

*Table –4, statistics of EV perception (based on the income level of consumer)*

## DECISION RULE

- If  $F \text{ stat} > F \text{ critical}$ , reject null and accept alternate hypothesis.
- If  $p \text{ value} < \alpha$ , reject null and accept alternate hypothesis
- **Result** – here,  $F \text{ stat} < F \text{ critical}$  i.e  $0.25 < 2.54$ , so we will accept null and reject alternate hypothesis and  $p \text{ value} > \alpha$  i.e is  $0.90 > 0.05$ , we will accept null and reject alternate hypothesis.

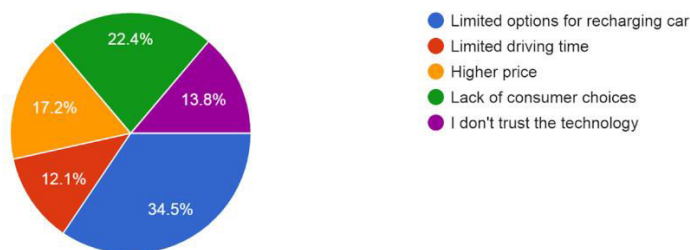
Yearly income  
58 responses



## INTERPRETATION

The above pie chart depicts the information related to the income level of the respondents and in that the level of the income of the respondents was below 250,000 with 69% and then followed by 250,000 – 500,000 with 17.2%. The question was added to find the relationship between the income level of the consumer and the perception they hold towards EV.

What might discourage you from buying an electric vehicle?  
58 responses



## INTERPRETATION

Also, again for comparison the pie chart which depicts all the factors which may influence consumer perception is shown here.

## FINDINGS

Considering the case in electric vehicles as the person might lack the knowledge or feel to lack the knowledge required to make an informed decision. This ultimately forms a negative perception towards electric vehicles. A vehicle being a tangible and a visible asset, a person can be concerned about how much will the car drive on a single charge and where would I recharge it

and what would be the cost involved and will it be more expensive as compared to a conventional vehicle. Thus because of these reasons I conducted this research.

This research attempted to identify those factors influencing consumer perception towards electric vehicles in India and how much does these factors affect the perception of a consumer. It considered various factors like demographic, education of the consumer 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. This confirms that in addition to their demographic features, consumers are also influenced by education and income level to make a decision to buy an electric vehicle. The respondents usually perceived a strong infrastructural expectation for purchasing electric vehicles. The importance of these variables in predicting the perception towards electric vehicle is attributed to at least two factors an individual is strongly affected by their income level and the education and infrastructural condition of a country.

Also talking about Policies will have a strong impact on EV adoption. The world's EV cities deliver initiatives such as guidelines for fuel economy and discounts for cars with zero to low emissions, and emphasis on charging infrastructure. An ambitious EV strategy can help create trust among private suppliers and productive systems will boost demand for EVs. The incorporation of charging infrastructure within the FAME framework is likely to provide momentum to the construction of public charging facilities throughout the country. It would see the introduction of charging stations in not just in Tier 1 cities but also in Tier 2 cities and highways. One of the most important issues for customers is likely to be resolved – the india infrastructure regarding the charging facilities would also improve considerably. The incentives and subsidies under FAME are expected to give a big boost to the production of new battery materials and chemicals. These policies will enable the manufacturers to manufacture electric vehicles at a lower cost. And would also give rise to the mass production and thus it will make the cost of production go down and again the overall cost of the electric vehicle will go down. This would mean that the electric vehicles might see a surge in demand and more buyers in the market.

The consumers 'optimistic outlook towards electric cars was affected by these vehicles' reduced carbon levels, small maintenance costs and the government's discounts, programs and policies. This showed an increased positive perception towards the electric vehicle and also supported the actual buying behavior for electric cars.

Another aspect that has greatly influenced the decision to buy and therefore the real buying behavior for electric vehicles is television ads, manufacturers' after-sales programs and an abundance of knowledge accessible to consumers on the internet. Also, with a rise in disposable income, the provision of charging stations and the charging system, it contributes to good assumed perception influence by customers over the decision to buy an electric car.



## **CONCLUSION AND SUGGESTION**

From the analysis, it can be concluded that the various factors affect the perception towards the electric vehicle. The impact will be cumulative of all the factors. And unlike the conventional gasoline engine vehicles, which can cover a larger distance per litre of oil, electric vehicles require frequent charging for covering the same distances. This is primarily due to the battery capacity of these vehicles. Hence, these vehicles might see a greater adoption and acceptance for short distance travels. Because of other facilitating factors, the growth of this segment will be largely propelled by the two-wheeler and three-wheeler vehicles, light motor vehicles (LMVs) and city buses. For long distance vehicles like trucks and UVs, further development is required in the battery capacity and technology and investment in the charging infrastructure.

Because of the limited use of the electric vehicles, it can be seen that the shift towards the adoption of electric vehicles might not have a very huge and robust but with all the facilitating factors stated below we can hope that the transition from gasoline powered cars to electric vehicles would be fast and humongous.

- Increasing EV charging stations
- Government incentivizing policies for EV purchase
- Improving infrastructure
- Increase in the EV range
- Reducing the price of the EV
- Educating consumer about EV benefits
- Providing more EV choices to consumer
- Implementing strict pollution norms

Also, with respect to electric vehicles, the country is expected to one of the fastest growing countries and has a huge consumer base for the adoption and usage of electric vehicles. This could attract the foreign players along with the domestic one like Mahindra to invest in the production of electric vehicles.

The estimated battery market potential is USD 580 million in 2019 and is forecasted to grow to USD14.9 billion by 2027," itnoted.

The EV sales in India stood at 3.8 lakh units in 2019-20, and the EV battery market stood at 5.4GWh during the year. The electric two-wheelers were the highest selling in the entire segment lastfiscal.

As per the report, low and medium-speed electric two-wheelers (up to 40 kmph) with

conventional lead-acid batteries were dominating the market. ..

"With more companies getting FAME-II certification in 2020, sale of high-speed electric two-wheelers is expected to increase rapidly," it added.

In terms of battery technology in the electric two-wheeler segment, lead-acid technology will be completely out of the market in the next five years, it said.

Elaborating on the electric vehicle market the report noted that the demand in the vertical is expected to be driven with subsidy support from the Central government due to high upfront cost. Besides, the electric vehicle market is poised for growth in the upcoming years as many new markets such as Raipur, Indore, Bhopal, have opened last year.

## **BIBLIOGRAPHY**

- Rezvani, Z., Jansson, J. and Bodin, J., 2015. Advances in consumer electric vehicle adoption research: A review and research agenda. *Transportation Research Part D: Transport and Environment*, 34, pp.122-136.
- Electric Vehicle Basics. Energy.gov. (2021). Retrieved 11 April 2021, from [https://www.energy.gov/eere/electricvehicles/electric-vehicle-basics#:~:text=There%20are%20two%20basic%20types,Cell%20Electric%20Vehicles%20\(FCEVs\).](https://www.energy.gov/eere/electricvehicles/electric-vehicle-basics#:~:text=There%20are%20two%20basic%20types,Cell%20Electric%20Vehicles%20(FCEVs).)
- *Advances in consumer electric vehicle adoption research: A review and research agenda.* (2015).
- gode, p. (2021). *Battery capacity needed to power electric vehicles in India from 2020 to 2035.*
- Liao, F., Molin, E., & van Wee, B. (2016). Consumer preferences for electric vehicles: a literature review. *Transport Reviews*, 37(3), 252-275. <https://doi.org/10.1080/01441647.2016.1230794>
- WIRE, B. (2021). *Understanding Indian Consumers' Priorities, Preferences and Willingness to Purchase Hybrid & Electric Vehicles, 2017 (2019 Report) - ResearchAndMarkets.com.* Businesswire.com. Retrieved 15 April 2021, from <https://www.businesswire.com/news/home/20190424005429/en/Understanding-Indian->

Consumers-Priorities-Preferences-and-Willingness-to-Purchase-Hybrid-Electric-Vehicles-2017-2019-Report---ResearchAndMarkets.com.

- Adhikari, M., Ghimire, L., Kim, Y., Aryal, P., & Khadka, S. (2020). Identification and Analysis of Barriers against Electric Vehicle Use. *Sustainability*, 12(12), 4850. <https://doi.org/10.3390/su12124850>
- Desk, H. (2021). *World EV Day: What is it and why our planet desperately needs clean mobility*. Hindustan Times Auto News. Retrieved 5 June 2021, from <https://auto.hindustantimes.com/auto/news/world-ev-day-what-is-it-and-why-our-planet-desperately-needs-clean-mobility-41599628061523.html>.
- Wein, J. (2013). [eBook]. Retrieved 5 June 2021, from.
- dans, e. (2021). The Five Factors Driving The Mass Adoption Of Electric Vehicles. *Forbes*. Retrieved 6 June 2021, from.
- *Electric vehicle market in India expected to hit 63 lakh units per annum mark by 2027: IESA*. The Economic Times. (2021). Retrieved 8 June 2021, from <https://economictimes.indiatimes.com/industry/auto/auto-news/electric-vehicle-market-in-india-expected-to-hit-63-lakh-units-per-annum-mark-by-2027-iesa/articleshow/79865522.cms?from=mdr>.
- Lee, Henry; Clark, A Charging the Future: Challenges and Opportunities for Electric Vehicle Adoption, Harvard Kennedy School, 2018, 3-4.
- Yogesh Hole et al 2019 J. Phys.: Conf. Ser. 1362 012121
- Lee, Henry; Clark, A Charging the Future: Challenges and Opportunities for Electric Vehicle Adoption, Harvard Kennedy School, 2018, 3-4.
- Briefing, I. (2021). *Electric Vehicle Industry in India: Investment Outlook and Market Profile*. India Briefing News. Retrieved 13 June 2021, from <https://www.india-briefing.com/news/electric-vehicle-industry-in-india-why-foreign-investors-should-pay-attention-21872.html/>.
- The future is electric. Downtoearth.org.in. (2021). Retrieved 13 June 2021, from <https://www.downtoearth.org.in/coverage/energy/the-future-is-electric-59653>.