

CONSUMER PERCEPTION TOWARDS ELECTRIC VEHICLE INDUSTRY- A STUDY ON THE ROLE OF ELECTRICAL VEHICLES IN ENVIRONMENTAL SUSTAINABILITY

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ABSTRACT

‘Global warming’, ‘Greenpeace’ and ‘Ozone Layer Depletion’ are the terms almost everyone is quite familiar. As society becomes more concerned with the natural environment, businesses also have to adopt environmental concerns as their corporate social responsibility. Marketing the environment friendly products are called as green marketing. In recent era the automobile sector has been one of the major reasons behind global warming due to its high carbon emissions. So as a social responsibility, it is necessary to promote green vehicles in Indian market by the automobile industries to reduce its effect on environment. Green marketing can be considered to be contributing towards enhancing environmental performance of industry and an important element of the evolution of the Indian automobile industry as it responds to challenges of environmental regulations, increasing customer expectations and economic pressure. This report essentially, provides an in-depth study of the consumer’s attitude and perceptions towards Green vehicles. It tries to answer fundamental questions that affect the awareness level and preference of the consumers to opt for an environment friendly car over a normal car.

INTRODUCTION

“Better late than never” is the English saying. With reference to the Environmental issues of late there is awareness among people. Continuous exploitation of nature for the past 200 or more years since industrialisation has started showing its consequences. Of late we see round the world unforeseen natural calamities like flood, famine, earthquake, tsunami etc. The best example for

this is, recent flood in Kerala and landslide in Kodagu (Aug 2018). Some of the villages virtually disappeared; roads and building were just swallowed by nature at the wink of an eye.

The reasons for these above havocs are nothing but environmental pollution. It is well known that air, water, soil, is contaminated completely. If we trace the factors for this environmental pollution at the very outset we find two major factors, like industrialisation and motor vehicles. According to one of the study 75% of carbon monoxide emissions come from automobiles and in urban areas 50 to 80%. Indians are finding hard to breathe in metropolitan cities. Recently Delhi people suffered a lot because of smog. People could not breathe even. Schools were declared holiday. Lot if vehicles collided each other due to invisibility. People stewarded moving around with masks. Delhi Government restricted vehicles from entering the city. This incidence shows that even the CNG (compressed natural gas) is not a solution for pollution.

Knowing that automobiles are the root cause for major pollution we must find a solution, why vehicles lead to pollution? It's mainly when fuel burns in engines produces lot of smoke especially diesel vehicles. This smoke contains carbon dioxide (co₂) and nitrogen (N₂). The government had tried to control on this emission by making pollution free certificate compulsory in all vehicles. Later, making Euro IV series engines compulsory.

The above all experience compelled the Government to do something in this regard. Now government is thinking that electric vehicle (EV) is the best solution for pollution. Electric vehicle does not lead to pollution at all. So in a country if there is a 100% electric vehicle 50 to 75% of pollution is reduced. It would be great achievement. Hence government is slowly encouraging automobile industries to produce electric vehicles. Also giving incentives and subsidies for electric vehicles.

The present situation in India shows it is high time to go for electric vehicles. In international market Dollar value is going up, at the same time petrol price is shooting like a rocket. Common man with meagre income who has small vehicle are finding it very difficult to cope up. People are addicted to travel by own vehicle especially in cities now are not in a position to afford for petrol or diesel. Sometime ago people bought diesel vehicles when diesel price was considerably low. This has led to further deterioration of environment. But now the price has become almost equal.

Our prime minister's concern is to reduce import of petroleum. It has many advantages. One of which is, we can reduce the dependence on some countries who enjoy monopoly in petroleum products. Excessive dependence leads to economic slavery. This has to be curbed for the healthy growth of the country. Secondly, we can save lot of foreign exchange by cutting down petroleum imports. Major portion of our National income is spent on buying petroleum products. And when the price for this petroleum product increases in the international market increases the buying country will be the sufferer. Thirdly, and most importantly environmental pollution can be controlled. Our Prime Minister has shown this concern in the international forum as well. He has given a call to reduce global warming.

CONCEPTUAL FRAMEWORK

Electric vehicles are the vehicles which gets power from rechargeable batteries installed inside the vehicle instead of any fuel. These batteries are not only used to power the car engine but also for the functioning of lights and wipers. Electric cars have more batteries than normal gasoline car. The batteries are same as gasoline car but the difference is more batteries are used in it. The need for electric vehicles in today's world is clear. Moreover, electric vehicles have many advantages also. They are:

- 1. No gas or fuel required:** Once charged no gas or fuel need to be bought. The cost of fuel is more when compared to electricity.
- 2. No emissions:** electric vehicles are 100% emission free. So absolutely good for environment.
- 3. Safe:** no chances of blasting or catching fire in case of accidents.
- 4. Low maintenance:** the engine in electric vehicles does not require lubrication, servicing etc. Need not go to service stations often.
- 5. No noise pollution:** electric vehicles much quieter than other fuel vehicles.
- 6. No hassles of registration, pollution, certificate etc.**
- 7. Convenient for cities which faces traffic problems.** Since electric vehicles are compact it is easy to drive in cities.

DISADVANTAGES:

1. **Choice is less:** in petrol and diesel vehicle lot of choices are there but in electric vehicle only few choices. People are forced to buy of few choices.
2. **Not suitable for long distance:** once battery charge is exhausted. Recharge points are not available.
3. **Cost of batteries high:** batteries used to be replaced every 3 to 4years which is very costly.

However, if we weigh the merits and demerits on a weighing scale perhaps merits will weigh more, means to say electric vehicles are good compared to other vehicles. Understanding the uses of electric vehicle is decided to study the perception of electric vehicles and their needs. Once the need and perception of electric vehicles are studied, it will help the government to decide to introduce policies regarding whether electric vehicle's to be promoted or not. Because if people are not aware and not ready to buy electric vehicles, government cannot promote. Then other alternative has to think. Knowing all these advantages and disadvantages we must know whether the people of India are willing to buy Electrical vehicle (further it will be stated EV in the report). And whether there is any need for such vehicle need to Indian road condition and traffic problem. Badly there is a need for a detailed study in this regard. Unfortunately, no much studies are being conducted as far as Indian society is concerned.

Shashank Modi, Auto Enthusiast, Auto Research Engineer states in 2015 that there is a huge difference between developed countries like US and the developing countries especially south Asian countries like India when it comes to cars. In the first world cars are not a luxury, they are necessity mainly due to lack of public transport and expensive labour. Having said that, electric vehicle in India are very much possible and in fact more viable than countries like US due to following reasons:

1. Indians do not drive long distances, thus the range of anxiety problem associated with the electric cars are pretty much solved. Telsa gives you 250 miles on one run that is almost 400 km in one charge which is more than enough for an Indian consumer. When you're neighbour

Sharmaji ask “kitni deti hai” you can proudly say “kuch bhi nahi leti hai”.

2. Indian consumers careless about safety and power as much as they care for fuel economy. Since battery electric vehicles and hybrids save a lot of money and fuel, people will love them.

3. Electric vehicles have an excellent acceleration because there is no lag oil power (it is not an engine). They can quickly pass traffic.

Well then why are they not popular in Indian market? Yet because:

1. Infrastructure: Just imagine you buy a brand new Telsa and take it to the office every day. You charge the vehicle every couple of days at night. One day in your society, transformer dies now you cannot take your Telsa to the office next morning. This kind of a thing rarely happens in developed countries, but common in poor countries.

2. Cost: A normal Indian customers don't want to go beyond 8lakhs for a car. That is \$ 13000.

A Telsa cost \$ 65000.

3. Government regulations: The US government is pushing the auto industry to achieve 54.5 miles per gallon by 2025. So the industry as no choice but to push EVs to the market and invest more in R & D. The regulations in India are not that stringent, hence nobody cares.

4. Customer acceptance & service: People are not too sure about EVs yet your Maruti can be serviced anywhere in India, but nobody will touch the electric car like Prius because it is complicated.

Aditya, a writer, Jack of all trades states that electric car quite chaotic. An EV is not very pricy and most middle class with decent salary will not be able to afford. The customers in India want a cheap car with good mileage and also a place where he can anywhere as petrol bunks. But in India so far no much recharging stations for EVs. He says Mahindra Reva hit the roads some years back but it wasn't a big success. As fewer as 10000 cars were sold in the first 2 years. In an article Aditya vivek thota puts 3 questions to reveal the present scenario of electric vehicle:

1. How aware is the public and consumers of EVs and various initiatives and developments taking place in this field?
2. How much are the automakers and various companies involved in the development of products related to EVs aware of the expectations of the public?
3. Are we working towards the development of cost effective, consumer friendly and efficiently marketable technology that could meet the requirements of all sectors or population?

He says the vision was by 2030 make the transportation in India fully electric. But in the last 10 years we have not reached half way mark. But in the International market electric vehicle are hitting rapidly. Over 750 thousand sales of vehicles worldwide in the year 2016. The countries with huge population like China were successfully able to capture the market share in the EVs. According to a report by the International Energy Agency, in 2016 “China became the country with largest electric car stock, with about a third of the global total. With more than 200 million electric two wheelers, 3.3 to 4 million low speed electric vehicles and more than 300 thousand electric buses”.

As far as India is concerned there is lack of awareness about electric vehicles and its benefits. Recently NITI Ayog in India has laid a road map for the future transport. Recently IIM Ahmadabad has conducted a small scale research in Chennai. The target group was professional working population who actually constitute the decision makers of the society and can move the market trends for EVs. The idea was to understand the travel patterns, preferences given by the consumers while purchasing a new vehicle, the expectations of the consumer on EV and finally the awareness levels of the general public. The finding can be summarised in a single line that is low cost, low maintenance, high resale value, and mileage are few parameters that are preferred among consumers. Consumers' expectations are open, challenging the automobile manufacturers. One primary concern is battery life. And it is quite natural when we go for new system. Low cost battery with high durability is expected. While many aren't really aware, the concerns over battery seem to be the main reason for not opting for EVs. A marketing strategy emphasizing on the battery parameters is sure to strike a chord with consumers and at the same time, the Research and Development Department

should work towards developing more efficient battery technologies. Among the other important parameters include performance is good or better than their petrol and diesel vehicle. One noteworthy insight here the expectations of public infrastructure to support the smooth rollout of EVs. The people don't know new charging technologies available for quick charge.

The studies done previously clearly indicate that the people in India are totally unaware of the benefits of electrical vehicle, the latest developments in this field and also the Government incentives to boost the use of EVs. Hence through studies in this field lot of studies required to advice the policy makers to promote EVs. In this context I feel my research is a small help.

As an initiative in this field the Government of Karnataka approved "Electric Vehicle and Energy Storage Policy 2017" to help the state to become a hub for production of alternative fuel vehicles, reduce dependency on fossil fuels and push the 'Make in Karnataka' initiative.

The new policy aims at to attract investment worth Rs 30000crore and create around 55000 employment opportunities. The state is looking to set up new EV zones, set up charging stations in public and private spaces including airports, railway stations, and metro stations and encourage start-ups to develop business models focused on supporting economic applications for EVs. The government is also mooted incentives and concessions for manufacturers in line with the

Industrial Policy 2014-19 throughout the state including Bangalore district. Recently Karnataka Pollution Control Board's Environment Officer Rajshekhar Puranik has flagged off the electric vehicle in MRPL. The Managing Director of MRPL Kumar has drove it and said the EV will be used by officials and staff of various departments to move within the campus of refinery.

The government of India has issued show cause notice to TATA Motors for scraping bulk order for electric cars. TATA was supposed to release 5000 vehicles in the first phase but failed. It was considered to be a major setback for the initiative by the Government to replace petrol and diesel vehicle with electric vehicle. Suzuki has offered to set battery plant in India. Its stake for 50% of the share. Maruti Suzuki is planning to launch their first electric car by 2020. This will in the form wagonR, after which there will be many electric cars by Suzuki. It aims to sell 50lakh cars by 2030.

OBJECTIVES OF STUDY

1. To know the future need and perception of the people towards electric vehicle.
2. To compare the electric vehicle with other mode in focus with performance.
3. To evaluate the need for the promotion of electric vehicle by government.
4. To know the number of manufacturers who take the responsibility of producing electric vehicle.

METHODOLOGY

Data required for the study is obtained both from primary and secondary sources. Questionnaire consisting of 20 questions is prepared based on the objectives to collect the data from the respondents. In this study 100 respondents have been considered in and around Mangalore Taluk and who are been selected randomly. It has been undertaken during the month of January and February 2018. Journals and articles have been referred under the study. The relevant data are presented in appropriate tables in the report.

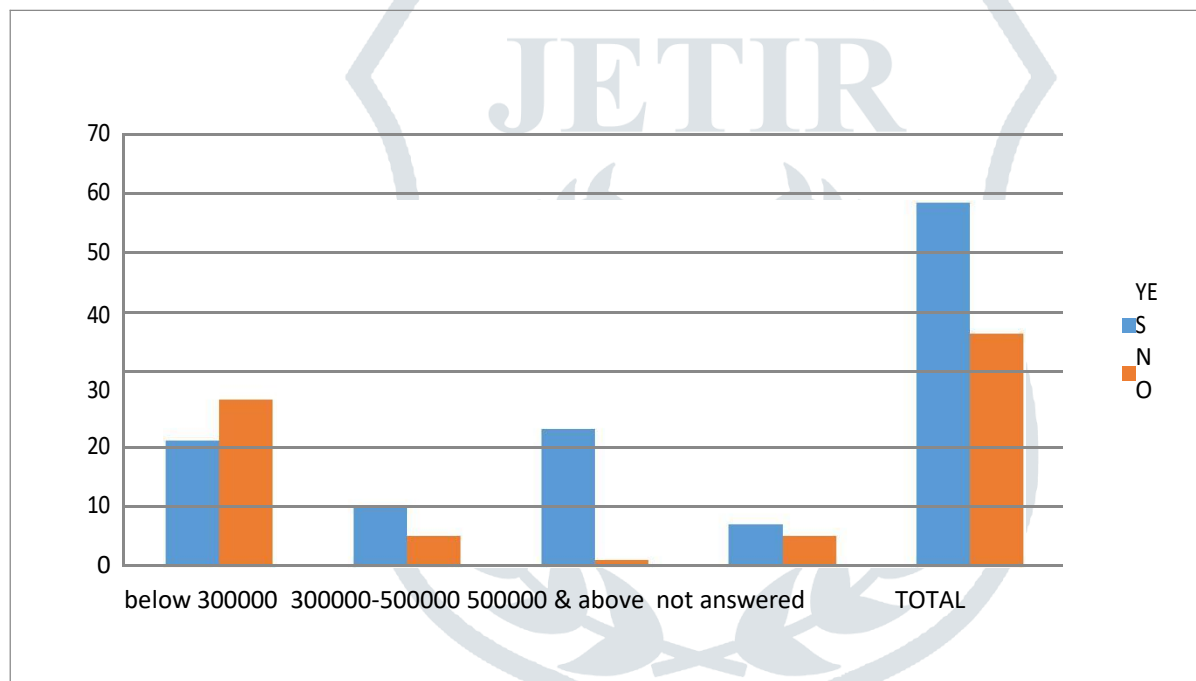
LIMITATION

- The study is conducted in a small area of Mangalore. The perception of this study Need not be the opinion of people of the country around. Moreover, the attitude of Mangalorean is different in all facets of life than other people around.
- This paper is restricted to 100 samples.
- There is no much studies conducted earlier in this field since this is recently upcoming Interest and concept. So much of the secondary data is not available.

DATA ANALYSIS AND INTERPRETATION

1. Table showing the respondents perception to buy electric vehicle based on their income level.

ANNUAL INCOME \ OPINION	YES	NO	TOTAL
below 300000	21	28	49
300000-500000	10	5	15
500000 & above	23	1	24
not answered	7	5	12
TOTAL	61	39	100

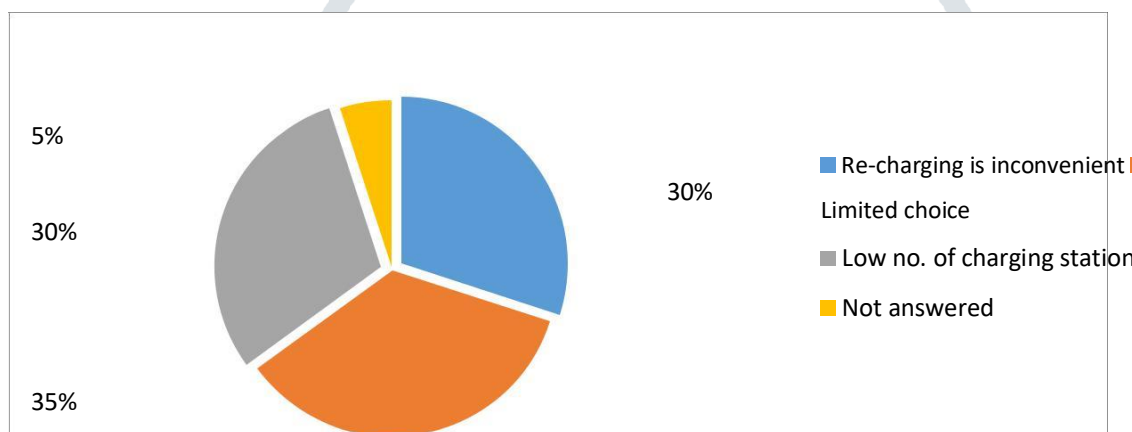


Interpretation:

The table above presents the respondents' perception to buy an electric vehicle based on their income. Here the income group lies between 5 lakh and above are showed comparatively high interest in electrical vehicle and lower income people dint responded much to the Ev's.

2. Table representing factors influencing the people for not preferring electric vehicle.

Factors	In percentage (%)
Re-charging is inconvenient	30
Limited choice	35
Low no. of charging station	30
Not answered	5
TOTAL	100

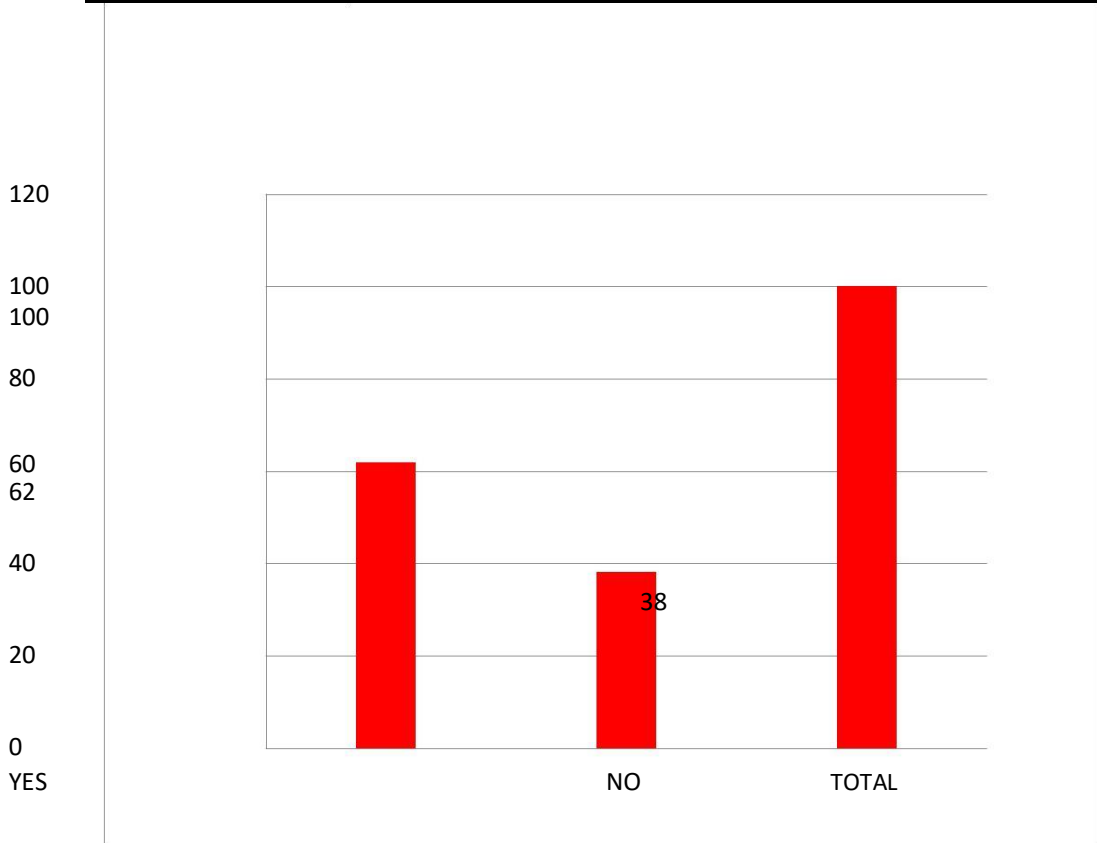


Interpretation:

The illustrative graph above shows reasons why the people don't prefer to electric vehicle. 35% of people say that there is limited choice, 30% say that there is inconvenience in re-charging and low no. of charging stations

3. Table indicating whether the electric vehicles are good return on investment

YES	NO	TOTAL
62	38	100

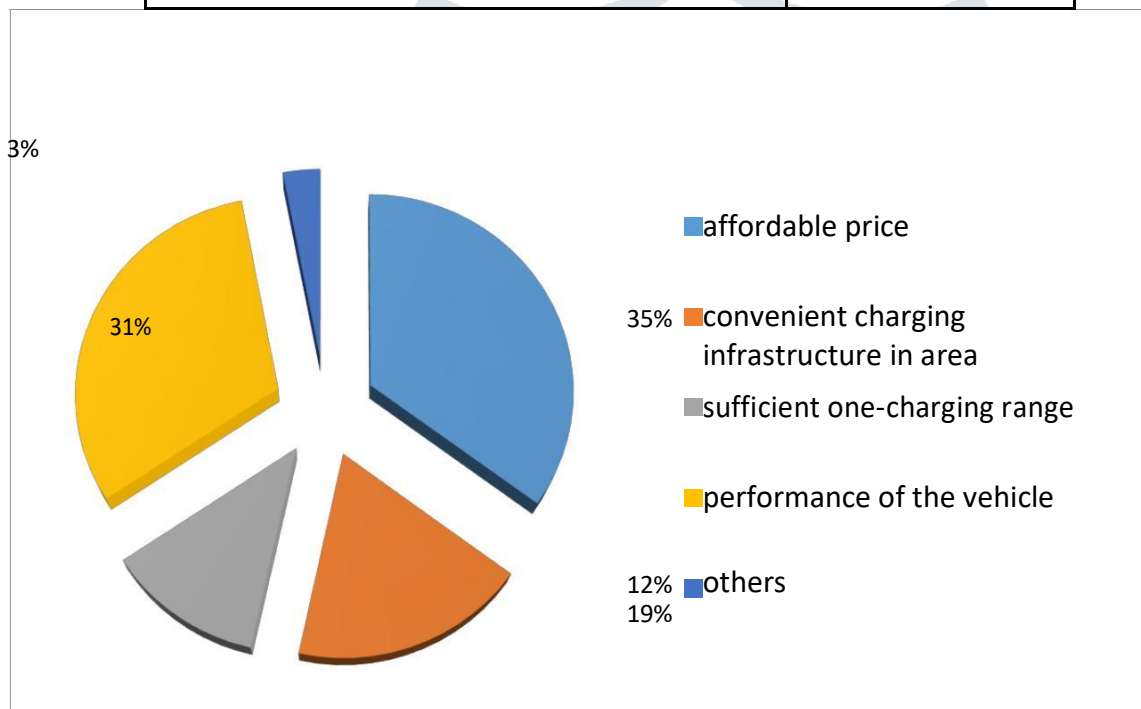


Interpretation:

As reflected in the table, 62% of the respondents felt that electrical vehicles are good return on the investments whereas 38% respondents felt it is not. Hence electrical vehicles are charged high the respondents opinions are varied much.

4. Table showing the factors which convince the respondents to buy electric vehicle as their next vehicle is shown below

Factors	In percentage (%)
affordable price	35
convenient charging infrastructure in area	19
sufficient one-charging range	12
performance of the vehicle	31
others	3
TOTAL	100

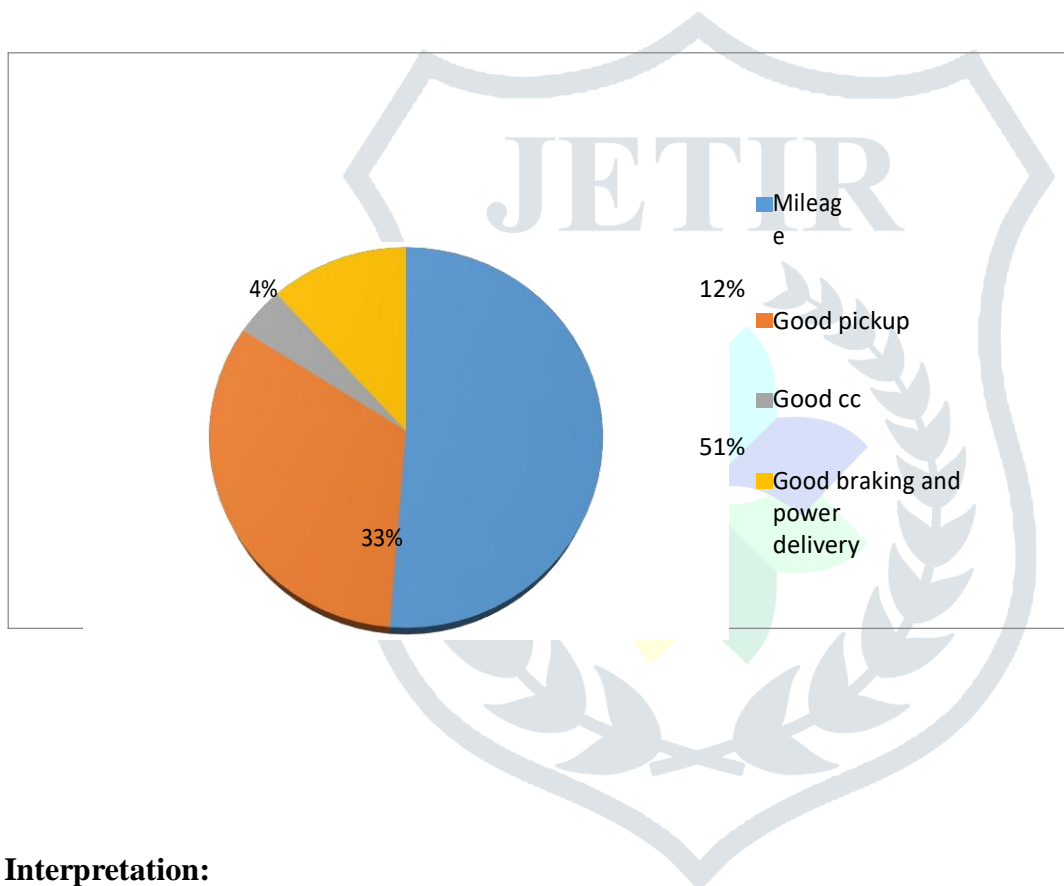


Interpretations:

The above table discover the factors which convince the people to buy electric vehicle. 35% of the respondents convinced with affordable price, 19% of the people prefer to buy if there is convenient charging infrastructure in area, 12% of the people are convinced with sufficient one- charging range and 31% respondents are convinced with performance of the vehicles.

5. Table showing people's expectation of core element in electric vehicle

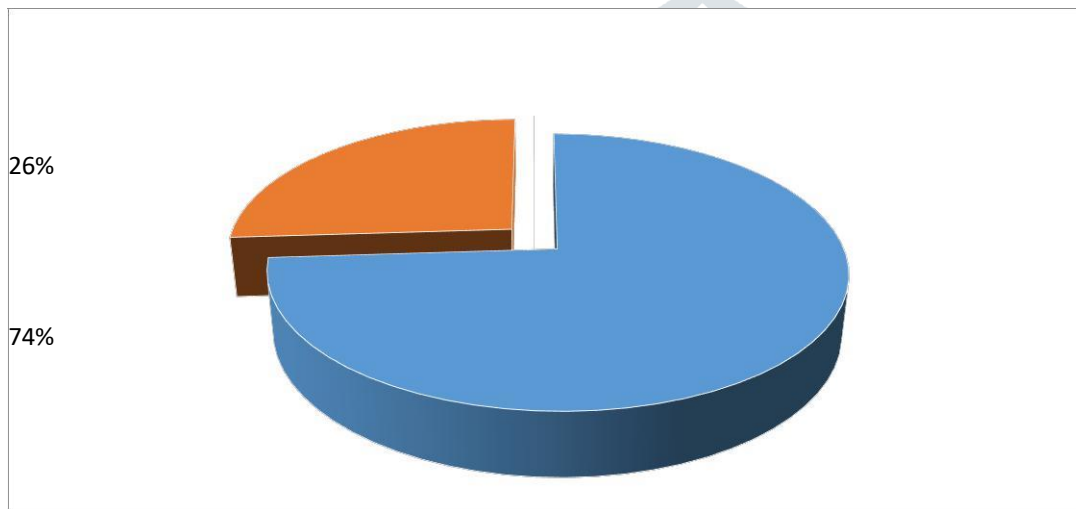
Core element	In percentage (%)
Mileage	51.26%
Good pickup	32.77%
Good cc	4.2%
Good braking and power delivery	11.76%
TOTAL	100%

**Interpretation:**

The interpretation marked the percentage of core element expected by the respondents which revealed as, 51% of the respondents expect mileage, 33% of the respondents expect good pickup, 12% of the respondents prefer good braking and power delivery and 4% of the respondents prefer good cc while purchasing of electric vehicle.

6. Table showing the no of people think that Electric vehicle are substitute for fuel vehicle

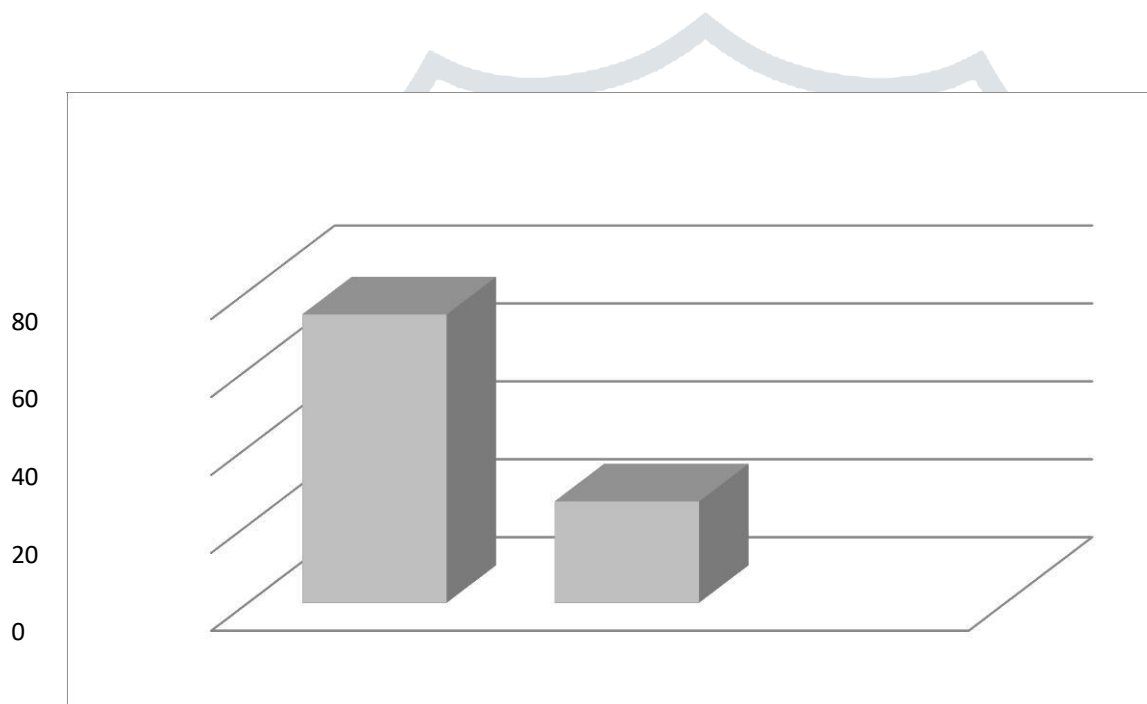
YES (in %)	NO (in %)	TOTAL (in %)
74	26	100

**Interpretation:**

As reflected in the table, 74% of the people think that the EV's are substitute for fuel vehicle and 26% of the people feel that EV's are not the substitute for fuel vehicle.

7. Table showing the respondents who like to switch to electric vehicle if their expectation are met

YES (in %)	NO (in %)	TOTAL(in %)
74	26	100

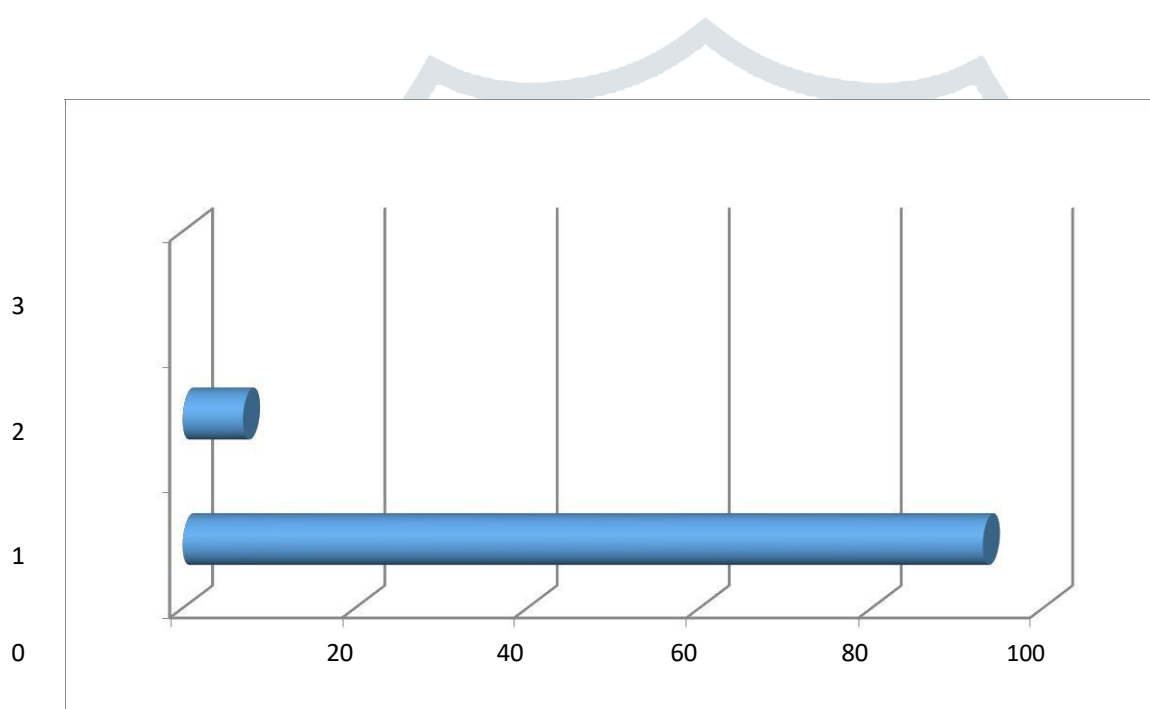


Interpretation:

As reflected in the table 74% of the respondents like to switch to EV's if their expectations are met and only 26% of the respondents don't like to switch to EV's even if their expectations are met.

8. Table showing whether the automobile industry must focus or promote electric vehicle in future

YES	NO	TOTAL
93	7	100

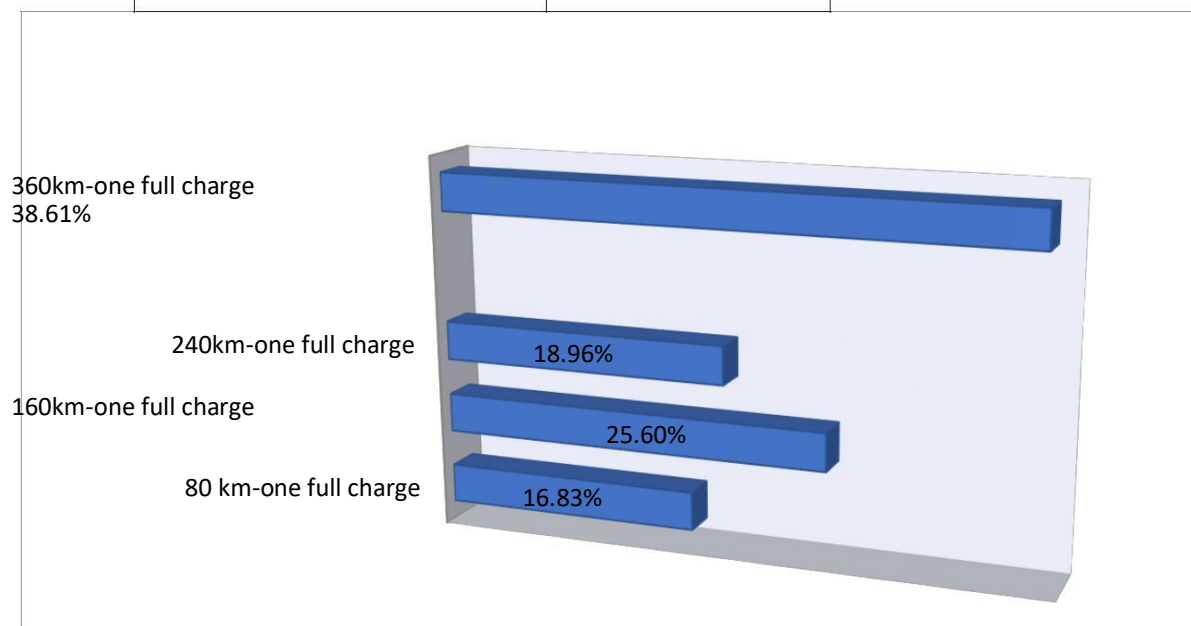


Interpretation:

The above table presents that 93 respondents expect the automobile industry to focus on electric vehicle and only 7 respondents don't think there is need for automobile industry to focus on electric vehicle.

9. Table on people's demand for mileage in electric vehicle (car)

80 km-one full charge	16.83%
160km-one full charge	25.6%
240km-one full charge	18.96%
360km-one full charge	38.61
100	
TOTAL	

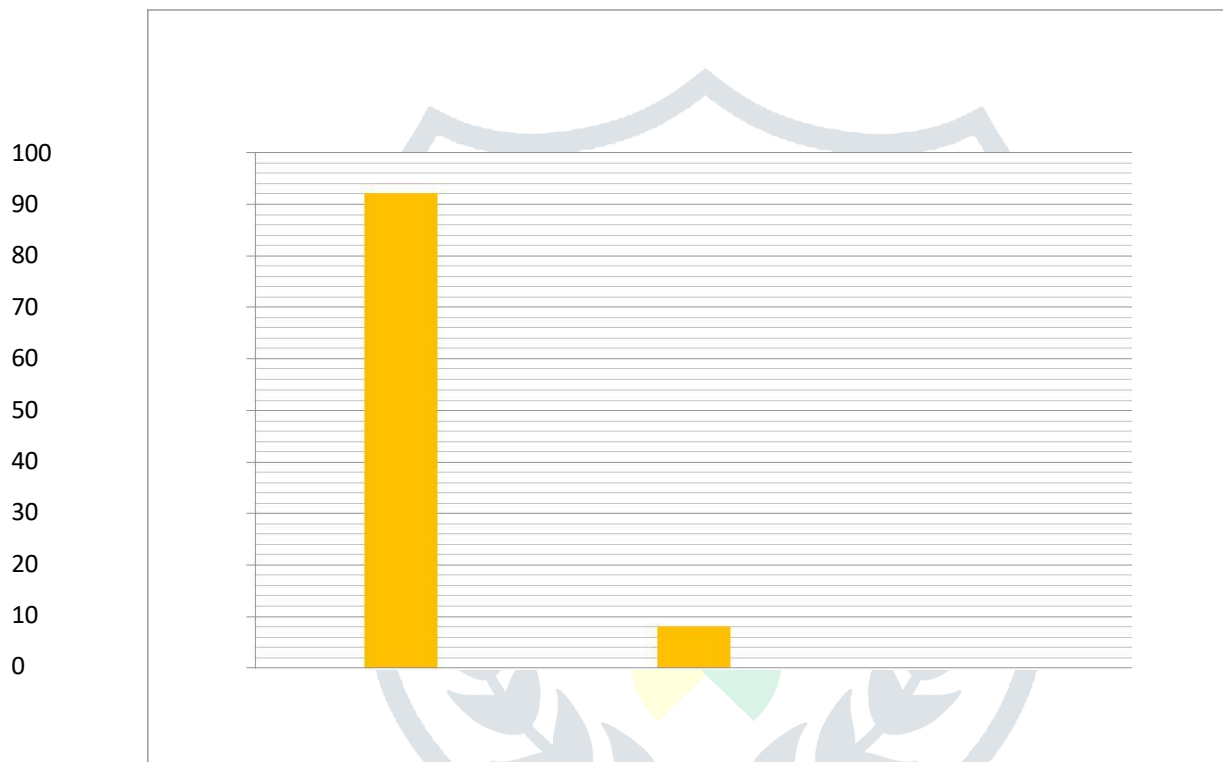


Interpretation:

As observed in the above table 38.61% people give more importance to mileage in EV's that is 360km-one full charge, 18.96% expect 240km-one full charge in EV's, 25.60% people prefer 160km-one full charge and only 16.83% people prefer 80km-one full charge in EV.

10. Table shows the Govt's intervention in electric vehicle is right on the preference of people

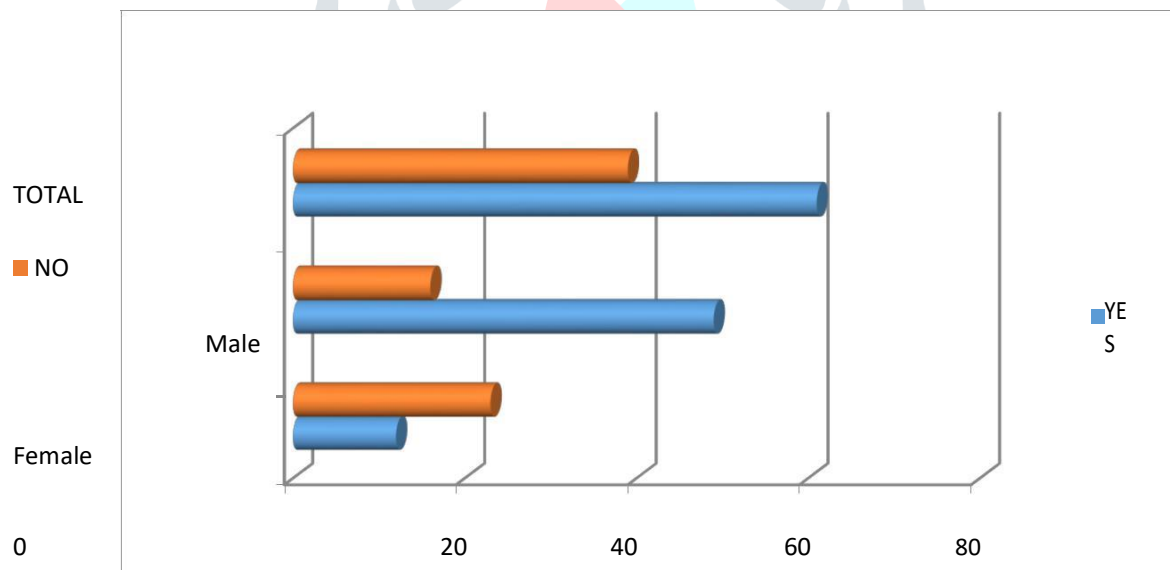
YES	NO	TOTAL
92	8	100

**Interpretation:**

The interpretation marked about the govt's intervention in EV reveals that 92 respondent's states that govt's intervention is right and only 8 respondents don't prefer govt's intervention in EV.

11. Table showing gender wise perception of respondents towards electric vehicle

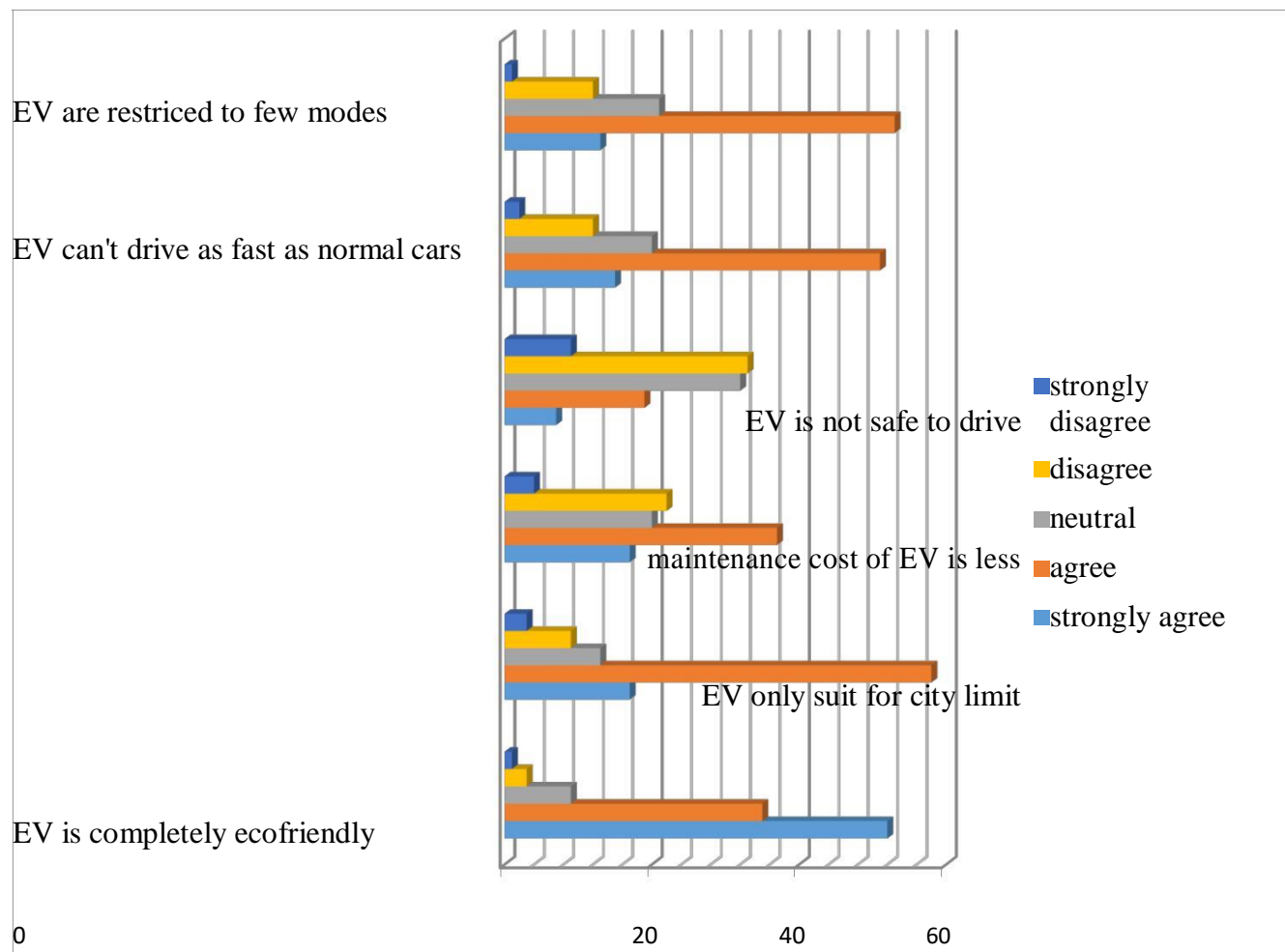
OPINION \ GENDER	YES	NO	TOTAL
Female	12	23	35
Male	49	16	65
TOTAL	61	39	100



Interpretation:

In explaining this result, it can be stated that 65 are male respondents and 35 are female. In that 65 male, 49 people are in favour of buying electric vehicle. In 35 female, only 12 are in favour of buying electric vehicle.

12. Figure represents the perception of customers towards electric vehicles.



Interpretation:

Delving deeper into the figure we can observe that around 53% of respondents agree that EV are restricted to few modes, 51% of respondents agree that EV can't drive as fast as normal cars, 33% of respondents disagree that EV is not safe to drive, 37% of respondents agree that maintenance cost of EV is less, 58% of respondents agree that EV only suit for city limit and 52% of respondents strongly agree that EV'S are completely eco friendly.

FINDINGS

1. It is interesting to find that the high income groups prefer more EV's than the low income group. 23% of the respondents in the survey who belong to income level over 5lakh per annum prefer to go for EVs. Only 1% of the respondents of this group said no to EV. It is surprising that elite class perceive and show interest for EV. Means to say the high income group has concern for their pocket as well as environment.
2. The main reason why the EV has not become popular till date is the lack of choice. Till now only Mahindra is on the market. New brands are yet to come to market. Maruti planning to release EV by 2020. People are also aware of charging stations.
3. The research finding show people's expectation to buy EV is price. 35% of the respondents feel it must be affordable. Then 31% of the respondents need good performance of vehicle.
4. The finding in research clearly shows the people expectation in EV is mileage. Whatever is indicate in earlier researches and secondary data are seem to be true. In some of the articles it is said in foreign countries people think of luxury and convenience when they buy a vehicle. Price, mileage, pickup, etc are secondary. But in India in contrary to that people's expectation is first and foremost is mileage. In this research also 51.26% of the respondents opted for mileage and 32.77% for good pickup. Other factors like engine capacity, braking, power delivery are rated very low that is 15.78% in total.
5. Regarding advertisement and information of electric vehicle to the respondents the outcome is rather balancing. Among the respondents 58% are aware of electric vehicle through advertisement but 42% are not aware of electric vehicles. This shows government has to concentrate more on advertisements and propaganda.

6. As expected the respondents feel that government has to intervene and proper incentives to be given for electric vehicle. 92% feel the intervention is needed. Only 8% feel no intervention is needed. This shows if govt intervenes and announce lot of incentives like subsidy, loans with low interest, discount, tax reduction etc it market for electric vehicle will increase. Whatever dreams the govt has to make 1005 EV by 2030 will come true.

7. As expected before the research itself, it is found in the research as well 58% of respondents feel EV is eco-friendly and it is suitable for city limits. Perhaps people in cities are well aware of pollution by automobiles. Many are facing lot of health issues.



JETIR SUGGESTIONS

Based in the findings the following suggestions can be made:

1. Majority of the respondents suggested more intervention by the govt. The govt. should provide incentives, tax reduction, etc.to promote electrical vehicles.so that our environmental pollution can be reduced by some extent. Just because govt.is not promoting the electrical vehicles companies are not showing much interest in it.

2. Publicity and advertisement to be increased. Till now the concept of EV has not reached the common man. So advertisement to be increased. It seem like govt itself is not interested in promoting EV's. May be for the reason that majority of the petrol and diesel bunks are owned by politicians. If 100% EV's come on the roads the bunk owners will suffer. So the lobby or petrol bunk owners seem to be strong. Therefore the EV has not become a national policy.

3. Many of the respondents felt shortage of re-charge stations to be increased. Like in foreign countries the re-charging structure is to be increased. Once upon a time there were no much petrol bunks. Then people had to travel miles together to fill the petrol or keep petrol in tins and bottles ready. But electric charges can't be kept in tins and bottles.
4. Price reduction has to be made. The present price for EV is too high which is not affordable for a common man. Therefore in the findings the common man was not in favour of EV's.
5. Mileage of EV has to be increased. Just 180 to 200km per charge will not attract Indian customers because Indian customers are more conscious of mileage than safety.
6. For Indian road conditions unlike foreign countries the engine capacity to be increased. Otherwise in hilly areas it is difficult to travel.
7. Research is to be made for further improvement in the EV's. In foreign countries government is spending lot of money on research and development of EV's. But the govt. of India has not invested any amount on R& D. Therefore for EV's we have to depend on foreign countries. Domestically more EV models to be released.
8. More choice is to be given. So far in Indian market EV is the monopoly of one or two companies. It is as good as forcing the customer to buy a shirt of one company in a readymade shop. There must be many choices as far as brand of vehicles concerned.

CONCLUSION

Car pollutants cause immediate and long-term effects on the environment. Car exhausts emit a wide range of gases and solid matter, causing global warming, acid rain, and harming the environment and human health. Engine noise and fuel spills also cause pollution. Cars, trucks and other forms of transportation are the single largest contributor to air pollution in India, but car owners can reduce their vehicle's effects on the environment. Car pollution is one of the major causes of global warming. Cars and trucks emit carbon dioxide and other greenhouse gases, which contribute one-fifth of the United States' total global warming pollution. Greenhouse gases trap heat in the atmosphere, which causes worldwide temperatures to rise. Without greenhouse gases, the Earth would be covered in ice, but burning excessive amounts of fossil fuels, such as gasoline and diesel, has caused an increase of 0.6 degrees Celsius, or 1 degree F, in global temperatures since pre-industrial times, and this will continue to rise over the coming decades. Warmer global temperatures affect farming, wildlife, sea levels and natural landscapes.

There are several ways that car and truck owners can reduce the effects of environmental pollutants. Old and poorly maintained vehicles cause most pollution from cars, but electric, hybrid and other clean, fuel-efficient cars have a reduced impact. When buying a new car, check the fuel economy and environment label. High ratings mean low pollution levels. Maximize fuel economy by removing all unneeded items, such as roof racks, and driving steadily, rather than accelerating quickly and braking hard. Keep your vehicle well-maintained, with regular tune-ups and tire checks, and leave the car at home whenever you can. Walk, bike or use public transportation when possible.

The research shows it will take further years for EVs to come to Indian market. Govt. is aiming at 100% EV by 2030. But the achievement is not even halfway. Here the govt. lack of initiatives is clearly been seen. People in general are ready to go for EV's. That means to say they are conscious about environmental pollution. The present havocs are there in their mind. Perhaps

it is the right time to push EV's. The field researches regarding EV to be backing in India. In foreign countries the studies regarding EV has started long back in 80's. But in India only some articles are available. So far no much detailed studies are not available.

In conclusion we can say the concept of EV is ideal both theoretically and practically. Theoretically more studies are required. There are ample scopes for research studies in this field. So scholars have encouraged to do their doctoral work in this area. Practically the country needs substitute for petrol and diesel vehicles. So EV has to be pushed. It has been revealed in present research of mine as well. When we look into the facts we are very much sure about the consequence of vehicles on environment. And electrical vehicles will give solution to it by one extent. Then what are the problems in encouraging electrical vehicles? When we look into this question we come across the facts that

- Electrical vehicles are costly, no much options in brands, and no much charge stations.
- Consumers are interested in EV's. Even present EV customers are satisfied but they expect more features and luxury and innovation in it. When it comes to that companies failed and need to work on it.
- Hence potentiality is presented but focus from the giant automobile sector is required. They should identify the needs and requirement of Indian customers and based on that they should produce EV'S.
- Government should take strict policy on the pollution and policy on the boosting of electrical vehicles .it is possible only when government come up with supporting hands towards electrical vehicles.

Overall, there is a need for taking steps against environmental pollution and people and government must understand the need and promote electrical vehicles. .and companies should do a research on the consumer requirement in EV'S and should diversify the business. It's time for the companies to produce the vehicle as per the requirement of environment.

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