A Study on Barriers to Adoption of Electric Vehicles

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ABSTRACT : Adoption of green& sustainable technologies in the transport sector is the need of the hour. High initial price charging time & limited range are the obstacles towards the adoption and diffusion of electronic vehicles. Deployment of electronic vehicle has been a key measurers to reduce pollution in urban areas caused by the logistic sector. A technology emerged more than a century ago EV failed in its several encounters with the gas powered cars and the efforts to penetrate the market. Though much progress has been made in the past decade, the wide adoption of EVs is still in question. In the process of reducing the pollutions world is searching for every alternative to reduce the emissions and find the solutions to the alternative energy's. The study aims to find out those barriers to the adoption of electric vehicles. The articles is contemporary and examines the different factors that affect a consumer's adoption of an EV.
Keywords : Electric vehicle, Economic benefit, Environmental concern , Attitude, social influence.

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INTRODUCTION

According to a research done by World Bank global transportation sector is responsible for 64% of oil consumption and rest 23% is related to co2 emission around the world. At present the most popular and most effective source of energy is electricity. So, our world is slowly adopting electric vehicle. As electric vehicle manufacturing is becoming popular every day its market share is also expected to rise rapidly. So, India's GDP is also expected to grow by amazing 25% by 2030. The best part of adopting an EV is reducing environmental pollution apart from which it is also lowering oil import by about 60 billion by 2030. It is also reducing use of fossil fuels along with zero emissions in the environment. Due to rising concerns on global warming and pollution many countries are raising awareness about the use of electric vehicles and its benefits. It's also due to low manufacturing cost and low maintenance cost, and also adoption of new technology such as autonomous driving and other fancy features.

Despite being zero effective towards pollution and eco-friendly there are many barriers for its adoption like lack of awareness, less charging points, lack of infrastructure, lack of service centers, varieties of price ranges, lack of trust towards new technology.

THEORETICAL REVIEW

Unsafe

People are finding technology involving batteries to be unsafe. The primary safety among the people is most probably the nature of battery to explode during an accident or due to extreme weather conditions causing fire. The most common type of battery used in EV is lithium ion battery which has tendency to explode if punctured or damaged.

Lack of Trust in Technology

As the technology is emerging in electric vehicle people have lack of trust due to several significant reasons. The technology is still not considered ready for daily usage such as autonomous driving. Manufacturing companies feel that electric vehicles are vulnerable to hacking and loss of control. People believe this loss of control over their vehicle could allow major technology companies to have higher control over their action and also can lead to expose their personal data.

Unreliability

People are doubtful about the battery and its degradation with time. This degradation could farther lead to a drop in the performance and range of the vehicle implying they cannot use the vehicle the same way they used it when the

vehicle was new. Apart from that customers find particularly challenging as the charging infrastructure is different across location adding many cases of unreliable. The charging points could turn out to be out of order forcing to detour the passengers if they are in a hurry.

Range

Range refers to the distance that electric vehicle can travel in one single charge or battery. Range is very dependent on size and condition of the battery with degradation of battery range can also decrease. Range is also dependent on the driving style of the driver and can never be comparable to conventional ice engines. In India EV only on aprox gives 300 to 400 kms on a single charge. So it's quite obvious that of a family with an EV cannot travel long distances.

Repair

Repairing and working on electric vehicle feels like ant repair mentality and people are more dependent on servicing centers which makes a lot of profit as there have the permission to repair electric vehicle. Repairing and on traditional vehicles is identified to be very popular and repairing cars on their own provides them a sense of satisfaction and is hobby for many. They prefer buying cars which can be repair avoiding dependency on service center.

Bad Looks and Futuristic Concept

Most people think that electric vehicles are ugly. They believe that all electric vehicles pose a similar design language which is not very desirable. They find this language to be wacky and cheap. They find this desire language to be hard effort to look futuristic. They feel it lacks the overall presence unimaginative.

Lack of Fun

People believe that electric vehicles are boring and not fun compared to ICE technology. They lack depth in experience like lack gear shifting, makes people less engaged while driving. They state that this feeling is further due to lack of manual transmission which is not possible in electric vehicle. They question the ignorance of fun and every vehicle should be fun to drive and own.

Cost of Purchase and Ownership

The most popular and frequently mentioned theme through the data was the cost of purchase involved with electric vehicles. It is worth noting that average cost of EV is higher than petrol vehicles. Majority of the user mentioned that cost involved in the purchase of EV is their barrier to adoption. They believe

the technology is overpriced and highly taxed considering the specification and build quality of the vehicles. Data also states that electric vehicles are also expensive to maintain and repair unlike normal vehicle and hence they insurance cost is also high.

Lack of Infrastructure

Lack of infrastructure in our country is also pushing customers back from purchasing electric vehicles. There are no adequate charging stations in all the major cities and locations which again stopping its development. Due to no battery manufacturing facility in the nation is making its difficult to manufacture our own vehicles and develop own companies in the nation.

Lack of Awareness

There is no proper program to make everyone aware of its uses and how it helps in our daily life. It does not reach out to rural areas where literacy is very less and also very difficult for them to understand its importance and how it improves the society. Due to lack of awareness of its benefits and also its part and role in improving our environment and society also slowing the pace of its development in the nation.

GOVERNMENT POLICIES TO PROMOTE EV'S

Central Government

The Government released a -pronged strategy aimed at both customers and producers, wherein it offers $1.4 billion in subsidies to shoppers, even as imposing a hike on import tariffs to boom manufacturing of these vehicles by home corporations. The Government is mainly focusing to impress public transportation because the subsidies, in particular to be had for two-wheelers, three-wheelers, and buses. This policy additionally earmarks $140 million to expand charging infrastructure which must similarly help the development of the EV enterprise in India. On 14 December 2018, the government additionally released a record which outlines the usual and suggestions for EV Charging infrastructure. Beyond the specs of the charging infrastructure, the pointers also required a charging station to be present each 25 km along a road/highway.
Energy Efficiency Services Limited (EESL) is shopping 10,000 numbers of Electric Vehicles from reputed manufacturers for distribution to Government Departments on apartment version and upfront sale version. EESL's tender of 10,000 number of EV's has decreased the cost of EV's notably.

National Electric Mobility Mission Plan, 2020

The National Electric Mobility Mission Plan, 2020 was launched by the Government of India in year 2012 with the aim of improving the national fuel security through the promotion of hybrid and electric vehicles.[1] Auto industry contributes 22% to the manufacturing GDP. From the help of new Manufacturing Policy, contribution of manufacturing in overall economy will increase to 25% by year 2022. The National Electric Mobility Mission Plan targets 30% of EV penetration in India by 2030.

Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME)

The Government started Faster Adoption and Manufacturing of Hybrid and Electric vehicles (FAME) scheme which provides incentives for purchasing electric vehicles. Phase I of the scheme lasted from 2015 to 2019, while Phase II began in 2019 and is planned to be completed in 2022. Government is releasing tenders to increase charging infrastructure in the country. The scheme offers incentives to the electric and hybrid vehicles ranging from Rs.1, 800 to Rs.29, 000 for scooters and motorcycles and Rs.1.38 Lac for cars. FAME is a part of National Electric Mobility Mission Plan by Government of India.

Go Electric campaign

The authorities released the Go Electric marketing campaign inside the begin of 2021 to inspire the adoption of electric mobility automobiles and electric cooking home equipment and to ensure energy protection in the country. Road Transport and Highways Minister Nitin Gadkari launched the marketing campaign, announcing Go Electric is a destiny for India so that it will sell low-price, environmentally pleasant and indigenous electric products. He expressed situation about the large value of importing fossil fuels and said CO2 emissions from transportation cars are a primary task. The country should encourage using vehicles that run on alternative fuels which include electric batteries, CNG and biofuels. The Government to suspend the registration price for EVs will persuade states additionally to give tax breaks.

REVIEW OF LITERATURE

The technology at the back of electric powered motors is advancing. Tesla's new Model 3 and the Chevy Bolt each have levels well over 2 hundred miles — in 2015, the world's pinnacle-promoting electric car best had a top range of eighty miles. But for all the hype, electric powered motors make up best zero.2 percent of passenger automobiles worldwide. We are seeing the ones numbers creep up, but slowly. "For all of the enthusiasm for electric vehicles within the information, actual progress in the market remains taking a while to emerge,"

says MIT Sloan professor David Keith. Thanks to some new policy changes, the ones numbers are going to get tons larger within the subsequent 20-plus years. Last month, both France and the U.K. Banned the sale of gas and diesel cars and trucks starting in 2040 in response to rising levels of nitrogen oxide within the air posing a public fitness risk. (Air pollutants are anticipated to cause up to 40,000 deaths inside the U.K. Each 12 months.). Norway and India have each pledged to make the exchange even faster, in 2025 and 2030, respectively. But even as 2025 is simplest 8 years away, 2040 might also nonetheless appear to be a long way off. However, in that time, adoption of electric cars has to head from a totally small amount to a hundred percentages — and there are many barriers to adoption that need to first be conquer.

Austin Morton, Element EV Team and Paula Arango, Communications

The concept of electrical motors (EVs) has existed for over a century. However, the technology to update the inner combustion engine (ICE) has handiest stuck up in current years. As OEMs release electric powered motors and vans with elevated velocity and variety, the demand for electric motors has regularly accelerated. Yet, there are still boundaries to adoption. In Element's 2021 EV Readiness Client Survey, higher car expenses, range tension, and new charging infrastructure costs were said because the pinnacle 3 boundaries for fleet adoption. In response, we have outlined key factors that will help you check the transition to electric powered vehicles.

NEED FOR THE STUDY

Electric vehicles makes zero emissions of carbon monoxide, it also offers an opportunity to replace the fossil fuels which is vastly used in transportation sector. Despite being zero effective towards pollution and eco-friendly there are many barriers for its adoption like lack of awareness, less charging points, lack of infrastructure, lack of service centers, varieties of price ranges, lack of trust towards new technology.

OBJECTIVES OF THE STUDY

To study the aims at knowing the barriers in adopting electric vehicles. To know the reasons for its less promotion**.** To create awareness among the users in India

RESEARCH METHODOLOGY

The purpose of methodology is to describe the process involved in research work. This includes the overall research design, data collection method, the field survey and the analysis of data. Research is a common parlance refresh to a search for knowledge. One can also define research a scientific & systematic

search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. The advance learner's dictionary of current English lay down the meaning research as a careful investigation & inquiry specially search for new facts in any branch knowledge.

Sources of Data

The data has been collected through primary and secondary sources.

1. Primary sources:-The data has been collected from simple structured questionnaire.
2. Secondary sources:-The data has been collected from information sources, brochure and personal experience.

Sampling Method

The sampling method chosen is "survey method"

> ➢ Sample size: - The sample size for this project is 50.

Statistical Tool

The statistical tool used for the study is "percentage method"

Limitations

1. The study is limited to geographical area of Bangalore city
2. The sample size is limited to 50 respondents which is very small.
3. The information provided by the respondents is assumed to be true.

RESULTS

Table 1 : Do you wish to opt EV as your next vehicle?

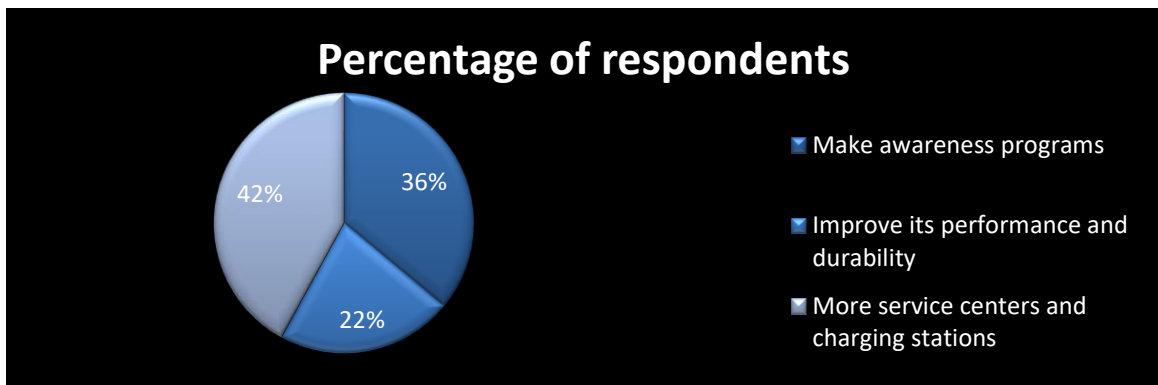| Options	No. of respondents	Percentage of respondents
Yes	28	56%
No	22	44%
Total	50	100%

Analysis
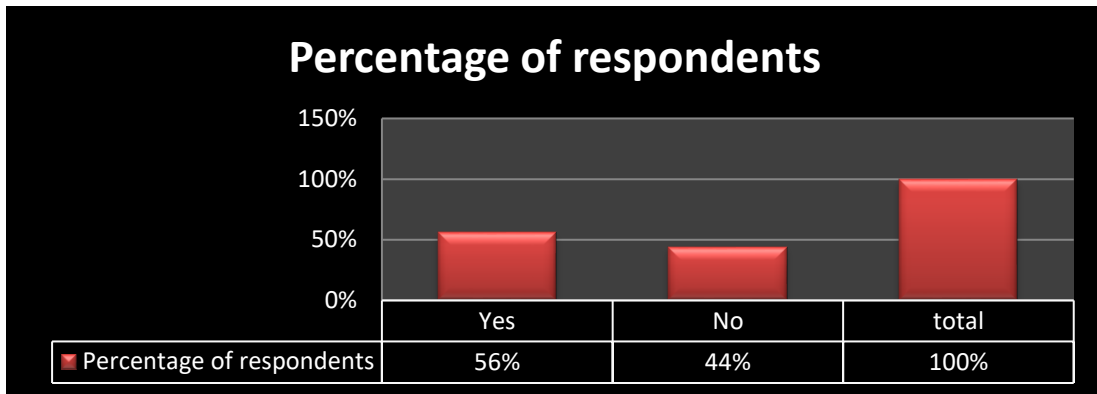
Interpretation

The above table shows that 56% of respondents selected YES, 44% selected NO. It says that many people are ready to purchase the electric vehicle if infrastructure is developed.

Table 2 : What should be done to develop EV in India?

| Options	No. of respondents	Percentage of respondents
Make awareness programs	18	36%
Improve its performance and durability	11	22%
More service centers and charging stations	21	42%
Total	50	100%

Analysis

Interpretation

The above table shows that 36% of respondent's selected make awareness programs, 22% selected improve its performance and durability, 42% respondents selected more service centers. The chart shows that service centers and charging stations should be developed and more infrastructure development is necessary.

Table 3 : Is high price also a barrier to its adoption?

| Option	No. of respondents	Percentage of respondents
Yes	32	64%
No	18	36%
Total	50	100%

Analysis
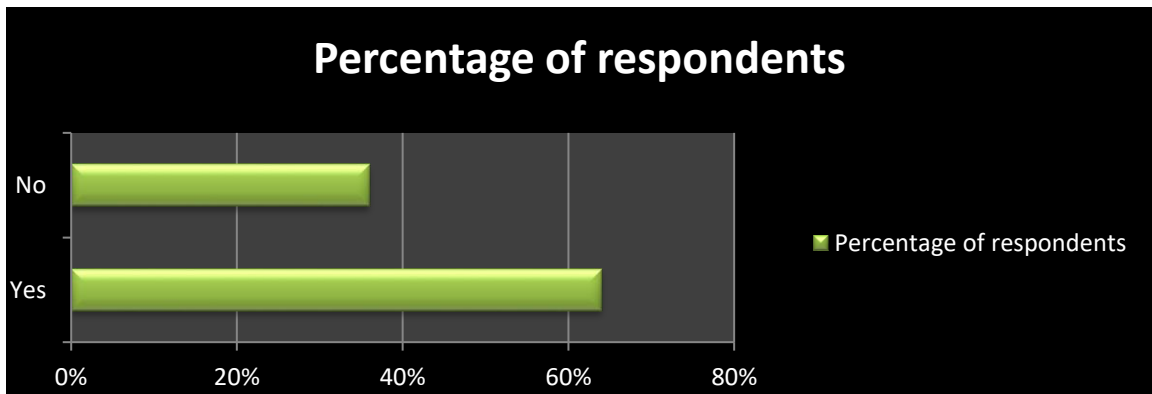
Interpretation

The above table shows that 64% of respondents selected YES, 36% selected NO. This says that a high price segment also the biggest barrier for electric vehicles adoption.

Table 4 : Do you think does it really help in improving environment and pollution?

Options	No. of respondents	Percentage of respondents
Yes	44	88%
No	6	12%
Total	50	100%

Analysis
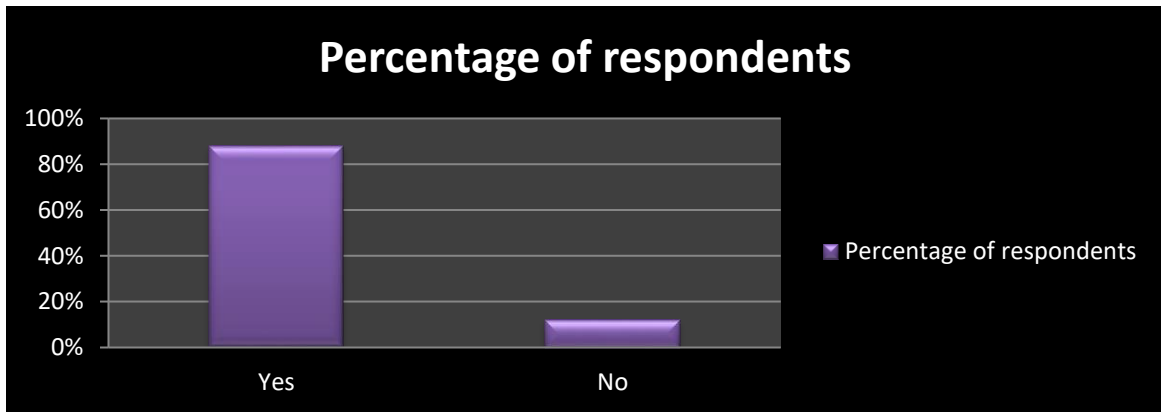
Interpretation

The above table shows that 88% of respondents selected YES, 12% selected NO. The above chart says that everyone believes that electric vehicle will really help in improving environment and pollution.

FINDINGS

Lack of charging stations is big barrier for EV adoption. Many people are ready to purchase the electric vehicle if infrastructure is developed. People have a believe that electric vehicles are eco-friendly. Service centers and charging stations should be developed and more infrastructure development is necessary. Many people are ready to spend only less or mid range amount on electric vehicle. High price segment also the biggest barrier for electric vehicles adoption. Many believe that to fully adopt electric vehicle in India it takes more 20 to 30 years. Majority of people believe that electric vehicle project will be successful in India. Everyone believes that electric vehicle will really help in improving environment and pollution. Countries population is not affecting the electric vehicles infrastructure.

SUGGESTIONS

Infrastructure of EV should be improved as much as possible to ensure its adoption and usage. More and more charging stations and service stations should be built. Government and private firms should make awareness programs to make everyone understand the advantages of EV. Development of EV depends on its performance and range, so performance of EV's should be improved. Government has to try to reach out in rural areas to make India completely run on electric vehicles. Battery recycling process has to be avoided to make sure that batteries are not wasted. Try to establish as many charging stations as possible throughout the national highways and highways. Give a

reward or appreciation for the people who have adopted EV. Get foreign investors to invest in Indian EV manufacturing companies. Encourage companies and organizations developing EV.

CONCLUSIONS

In the early twentieth century, carriage companies were converted to car manufacturers all over the world. Main advantages of EVs at that time were being clean, silent, vibration-free, reliable, easy to start and control, and free of bad smells. The main disadvantages were short range and high initial cost. Also, their running costs were higher than other forms of transportation. Interests in the EVs went higher in the middle years. Main reasons for that were environmental concerns and the shortage of gasoline during the World War II. But despite of its advantages, EV failed and ICEVs started its long dominance in the car market. EVs were brought back to the market the second time in the early 1990's, but failed shortly after its introduction. Being considered again in recent years, EVs in the formats of BEV, HEV and PHEV have made significant progress in their diffusions over the last decades, but still on a relatively small scale. sic fundamental approaches to be employed in managing EV development as a disruptive innovation include: establishing independent organizations with new management teams to pursue the innovation, aligning the EVs with the right initial market to enable it to grow, and instead of trying to get an accurate market forecast, employing a trial-and-error method with a goal to learn in the market exploration.

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