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## **A Study on Adoption of Electric Vehicles in India: Performance and Challenges**

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### **ABSTRACT**

Contamination of climate is now being a worldwide concern. Poisonous emission from gas powered motors is one of the major reason for contamination. Due to this the world is gearing up to transform to alternate modes of transport. Electric vehicles are considered as the alternate to fuel vehicles. The study covers the different electric vehicles that are used in India. The performance of the electric vehicles and the features of the electric vehicles. The challenges that are faced by the users of the electric vehicles. It provides an overview about the electric vehicle industry and the perception of the customers towards the electric vehicles and the willingness to buy and use electric vehicles. However the pace of adoption of electric vehicles may vary from country due to different reasons. It is necessary to provide adequate charging infrastructure and other facilities to make it a success and other facilities that are required to increase the use of the electric vehicles.

**KEYWORDS:** Electric vehicles, Performance, Charging, Challenges

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### **INTRODUCTION**

India today is one of the top ten automotive markets in the world. With the growth in population and steady economic growth the automobile sales is expected to continue in the upcoming years. Introduced more than 100 years ago electric cars are seeing a rise in popularity for the same reason they were first popular. In the last couple of years there has been a lot of discussion around the prices of fuel and disruption of supply of fuel has heightened the debate on energy security and brought the focus on to alternate technologies. There is high push from the Indian government to embrace EVs as method of transport and give strategies on electric vehicles. The evolution of the automotive industry contributed a lot to the economic growth of the country. He also helped the finance and insurance sectors. The success of any vehicle mainly depends upon the performance and features and the customer preference towards using the vehicles. There are still a lot of improvements need to be done in the electric vehicles after getting suggestions and feedbacks from the users of the electric vehicles. Government also planning and executing many plans and schemes for promoting the use of electric vehicles such as incentives, low registration fees, tax exemptions and other policies. There are lot of improvements need to be done in upcoming years in electric vehicles and making it suitable for all forms of transport and also economically affordable.

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### **STATEMENT OF THE PROBLEM**

Due to rapid increase in emission caused by the fuel vehicles and extreme fossil fuel usage we are in need to transform to different mode of transport. It is considered it should be ecofriendly and at the same time provide same features as that of the fuel vehicles. The life of the electric vehicles and the range it can drive is considered a problem. We don't have enough charging infrastructure to charge the vehicles in the run. The performance of these vehicles and the cost associated with it. We are using beta version of the electric vehicles and there is still a lot of improvement need to be done after getting reviews from the end user of the vehicle. Lack of standardization and no universal charging methods is not followed by the manufacturers and it makes difficult to establish charging stations.

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### **OBJECTIVES OF THE STUDY**

- To study about the alternate technologies in automobile sector such as electric vehicles.
- To study the consumer willingness in buying and using electric vehicles.
- To study the performance of the electric vehicles and the features of those vehicles.
- To study the challenges to be faced in using electric vehicles by the consumers.
- To study about the barriers in adopting electric vehicles as an alternate to fuel vehicles.

## RESEARCH METHODOLOGY

The study used two types of data primary data and secondary data. Primary data is collected through questionnaires, meeting with individuals and interviewing personally. Secondary data makes use of websites, research papers and journals. The sampling method used in the study is convenient sampling.

### Data collection

- Primary data
- Secondary data

### Sample size

It refers to the number of respondents selected for the study. Here the sample size of the study is 120 respondents.

### Tools used

- Percentage Analysis
- Chi-square

## REVIEW OF LITERATURE

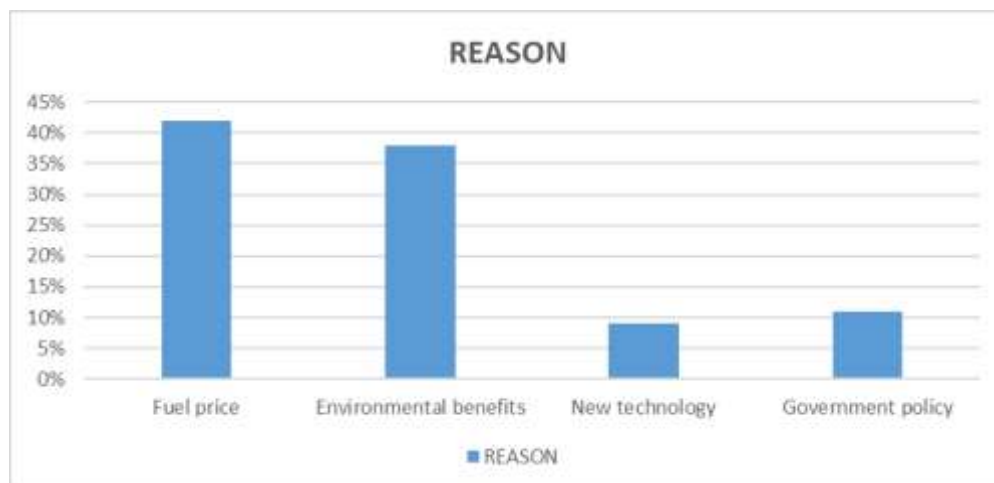
- **Anand Gopal (2013)** – studies about the energy consumption of electric vehicles. The study claims that the important barrier to substantial Market penetration of EVs in India is the impact of EVs will have a huge electricity demand and it is to be viewed seriously in shifting towards electric vehicles usage in India. Government has to focus on increasing the electricity generation technologies.
- **Aishwarya Panday (2014)** – stated that Hybrid electric vehicles are gaining more popularity, the role of the energy management system in the hybrid drive train is escalating. The strategies discussed in this paper are real time implementable and are robust in nature. PHEV's charge depletion mode of operation is desirable, but a blended mode of operation may be a promising solution to extend operating electric vehicles.
- **Arpit Rastogi (2021)** – the study aims to develop and validate the factors affecting the sustainable manufacturing of electric vehicles in India that could be used by original equipment manufacturers and service providers in the electric vehicles industry. The service providers and new players are keen on entering in the electric vehicles market to secure the market and achieve competitive advantage over the other manufactures. Existing fuel vehicle manufacturers also started developing electric vehicles due to the trend in the market.

### TABLE

#### PERCENTAGE ANALYSIS

TABLE SHOWING REASON TO TRANSFORM TO ELECTRIC VEHICLE

Sno	REASON	NO.OF RESPONDENTS	PERCENTAGE
1	Fuel price	50	42%
2	Environmental benefits	46	38%
3	New technology	11	9%
4	Government policy	13	11%
	<b>Total</b>	<b>120</b>	<b>100%</b>



### INTERPRETATION

The above table indicates that out of the total respondents taken for the study, 42% of the respondents state fuel price as the reason to transform to electric vehicles. 38% of the respondents choose environmental benefits as the reason to transform to electric vehicles. 9% of the respondents choose new technology as the reason. 11% of the respondents choose government policy as the reason to transform to electric vehicles.

### INFERENCE

Most (42%) of the respondents choose fuel price as the reason to transform to electric vehicles.

### CHI SQUARE

Chi-square

Age/Feature	Range	Low maintenance	Look & Comfort	Pollution free	Total
18 – 25	14	34	12	10	70
25 – 30	10	13	3	0	26
30 - 40	3	0	5	6	14
40 & above	2	4	2	2	10
<b>Total</b>	29	51	22	18	120

### Interpretation

In the above analysis the calculated value (24.0710) is greater than the table value (16.92) at the level of 0.05 significance. Hence null hypothesis is rejected. Thus there is significant relationship between age and attracted feature in electric car.

### FINDINGS

- Most of the respondents states the reason to transform to electric vehicles is because of the fuel price.
- Most of the respondents attracted feature in electric vehicle is low maintenance compared to fuel vehicle.
- Most of the respondents preferred electric vehicle company is Tata Motors.
- The preferred price of electric car by the respondents is 5 lakhs – 10 lakhs.
- The respondents states that performance, counter fuel price and environmental benefits are the advantages of using electric vehicle.
- Most of the respondents states that we are in the development stage for adopting electric vehicles.

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## SUGGESTIONS

- Standard chargers should be developed by manufacturers to support implementation of charging stations.
- Import taxes on foreign electric vehicles can be reduced to encourage entry of many companies.
- Electric vehicle manufacturers has to focus on improving the range and safety measures in electric vehicles.
- Charging stations has to be established in many places to boost the sales. People feel that because of lack of charging stations it becomes difficult to use electric vehicles for long drives.
- Lack of power supply in metro cities can affect the charging of electric vehicles. Power supply will be a great issue in charging the vehicles.
- The main reason to shift to electric vehicles is pollution. Majority of electricity is produced using fossil fuels. So governments should also focus on producing electricity using alternate ways.

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## CONCLUSION

Individuals have begun utilizing electric vehicles because of many variables like fuel cost, innovation and so forth. The presentation and elements of the vehicle will be the fundamental variable for its prosperity. Government is additionally executing different plans and plans for the electric vehicle client like sponsorships and duty exclusions. It is found that vehicle clients have shown interest in purchasing electric vehicles and they are searching for certain enhancements in the vehicle contrasted with that are in winning use. The existence of the battery vehicle has been a biggest trepidation in the vehicle clients. As the battery must be changed sooner or later it includes incredible cost. One of the explanation influence its deals.

So it is feasible to move to electric vehicles utilization in the impending a long time by tracking down upgrades to conquer the difficulties. It is in the beginning phase and to become famous among individuals it will require some investment.

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