Changing Landscape in the Indian Automobile Market: Induction of Electric Vehicle Segment
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# Changing Landscape in the Indian Automobile Market: Induction of Electric Vehicle Segment

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## ABSTRACT

This paper aims to study and appraise the current induction of electric vehicles in the Indian automobile market. In order to accomplish this intent, a rigorous analysis has been carried out to explore the perceptions and current expectations with respect to Electric Vehicles and its potential for future as an upcoming mode of transport. To understand the level of awareness and knowledge of consumers and a careful analysis has been made on the impact and hurdles of switching to EVs effectively using a questionnaire. Total 152 responses were found valid and complete for analysis. This study enables to understand and explore the parameters that would lead to change in adoption of electric vehicles in changing Indian ideologies. The findings highlight both the weaknesses and the potential of electric mobility as well as the subtleties of how electric vehicles have evolved over time and how the state-of-the-art has changed. Conclusively it has been found that there is still a long way to go and many other factors to work upon before we can make a complete switch.

**Keywords:** Electric Vehicle, Automobile Industry, Consumer Perception, Environment

## 1. INTRODUCTION

Electric vehicles (EVs) are viewed as a promising way to increase the energy efficiency and sustainability of today's transportation systems. Due to displaced air pollution, EVs have the ability to lower carbon emissions, enhance public health, and capture additional co-benefits including improved energy and national security and noise reduction. Additionally, EVs have the ability to give storage to the electrical grid, or "vehicle-to-grid" (V2G) capability, which has the potential to incorporate renewable energy sources and offer additional financial advantages to EV owners. However, the expense of EVs has been a major impediment to their adoption in decarbonizing transportation globally. Consumer acceptance is a different issue that requires further

investigation, even though technological advancement and cost reduction are unquestionably key concerns for their successful spread. The EV market is supposed to develop at a CAGR of 44% between 2020 and 2027 and will hit 6.34 million unit yearly deals by 2027.

## 2. OBJECTIVES

The study aims at achieving the following objectives

- Analysing the perceptions and current expectations with respect to electric vehicles and its potential for future.
- Determining the causes of the lack of consumer interest in electric vehicles.
- Examining whether consumers are open to switching to electric vehicles as a realistic form of transportation.
- Identifying the present threats that are resulting in the slow growth of electric vehicles.

## 3. RESEARCH METHODOLOGY

The research article is exploratory and descriptive in nature. Data required for the study is obtained both from primary and secondary sources. A well-structured questionnaire that focused on the perception and adoption of electric vehicles in India was given to the respondents in order to gather their data. Responses were gathered from individuals representing various sexes, age groups, and professions. The convenience sampling approach was used to select the survey respondents. Total 152 responses were found valid and complete for analysis. The study helps to understand the level of awareness and knowledge of consumers along with their perception on various attributes EVs with respect to their decision making process and to explore the parameters that would lead to change in adoption of electric vehicles in changing Indian ideologies.

## 4. LITERATURE REVIEW

Lane and Potter (2007) used qualitative and quantitative methodologies, such as surveys, interviews, and the Theory of Planned Behavior, Value-Belief-Norm Theory, and habits, to investigate UK residents and potential customers of electric vehicles. Results showed that performance, ease of use, safety, reliability, and energy efficiency are the main factors in EV sales.

The social benefits of utilising EVs, which include a decrease in GHG emissions and other air pollutants, are discussed in Skerlos and Winebrake's (2010) paper. Considering the emissions from the power plants needed to charge such vehicles, EVs have demonstrated significantly lower emissions than conventional automobiles. The power source for these EVs—natural gas, coal, or alternative fuels—has a significant impact on the size of this discrepancy.

In order to determine consumer lifestyle patterns, receptivity to change, and attitudes, the Axsen et

al. (2012) study used a quantitative online survey on the lifestyle practise theory of 711 San Diego homes in the United States. The findings of the factor analysis showed that electric cars, solar power, and green electricity programmes appear to appeal to customers with various lifestyle clusters for various reasons.

Egbue and Long (2012) performed an awareness survey on 481 students, employees, and teachers at a technical university evaluating their degree of understanding of new technology acceptance. They discovered that elements including environmental awareness, technology awareness, prior EV experience, and expectations for EV sustainability play a significant influence when making an EV purchase.

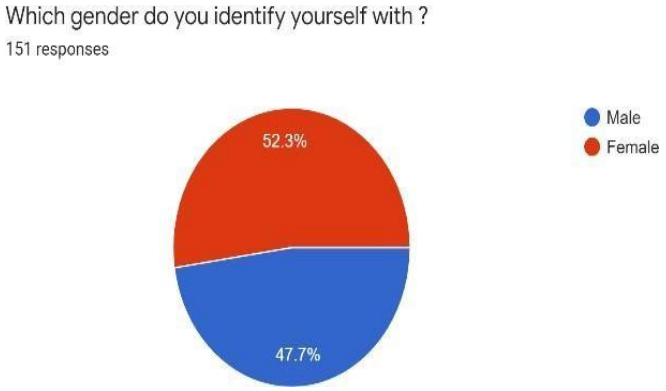
Thuy & Hong (2019) study is based on the Theory of Planned Behavior. In order to determine the elements influencing high school students' attitudes and intentions about the use of electric two-wheelers, researchers looked into high school students in the Vietnamese capital of Hanoi. They came to the conclusion that attitudes regarding the use of E2W were impacted by a variety of factors, including views of economic advantage, ease of usage, concern for the environment and fashionable design. However, it was discovered that the appeal to motorcycles, attitudes toward the use of E2Ws, and subjective norms all had an impact on people's intentions to use them.

## 5. DATA ANALYSIS AND INTERPRETATION

A survey was conducted titled–Gauging Consumer demand for Electric Vehicles (EV) and primary data was collected from respondents to identify the perceptions about dynamics of Electric Vehicles.

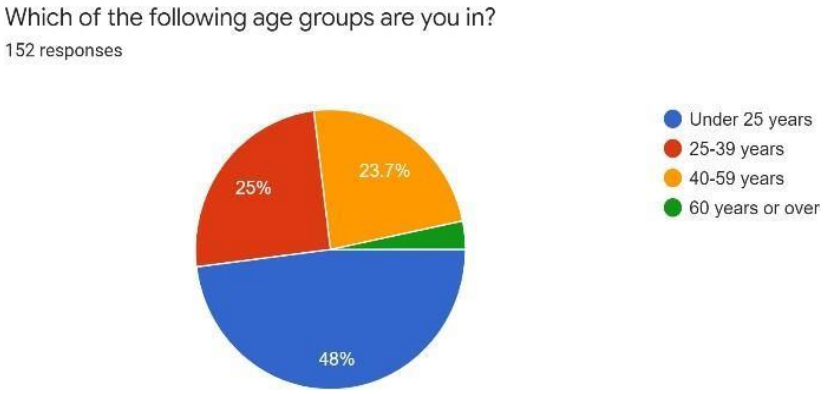
5.1 The study surveyed 152 participants, out of which approximately 52% were females and 48% were males.

**FIGURE1**



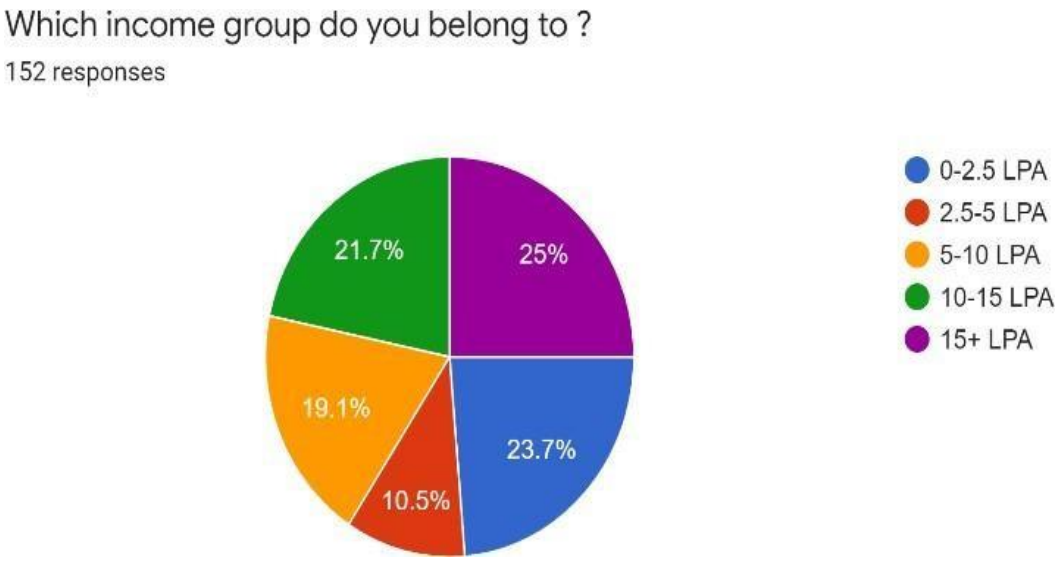
5.2 Nearly 48.7% of respondents were between the ages of 25 and 59, compared to almost 48% of respondents who were under 25.

**FIGURE 2**



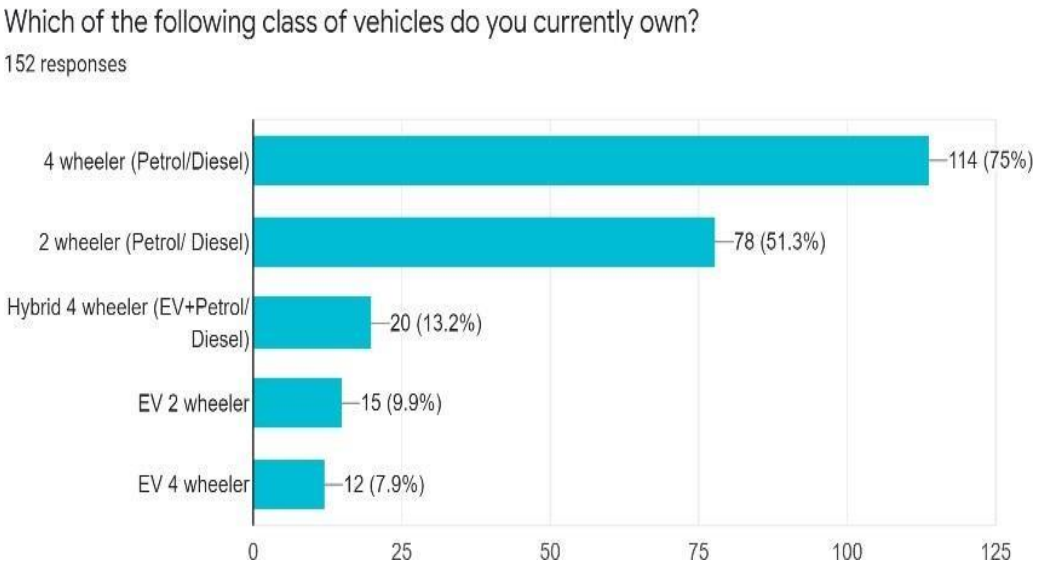

5.3 The income distribution of the respondents is as follows:

**FIGURE 3**



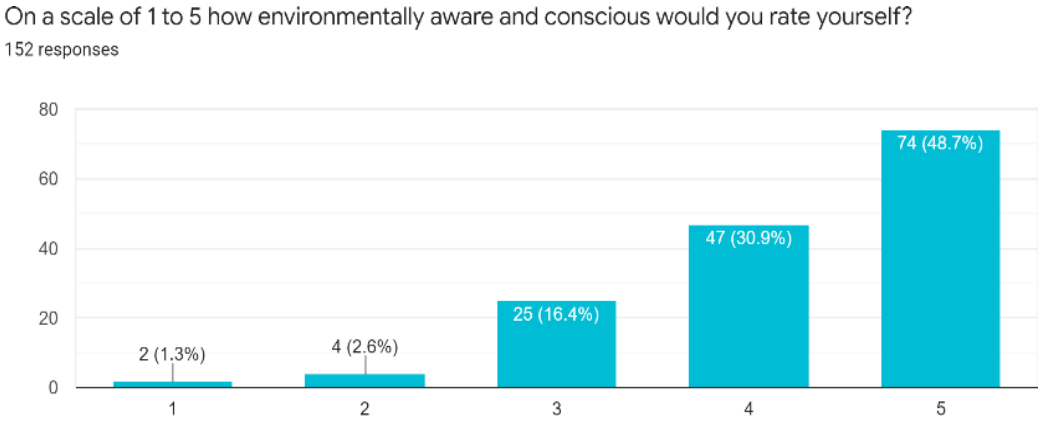

5.4 75% of the respondents owned 4-wheeler (Petrol/Diesel) and about 51.3% owned 2-wheeler Petrol/Diesel). About 13.2% of the respondents had hybrid four- wheelers, i.e., vehicles that run on both electric power as well as fossil fuels. 7.9% of the respondents owned EV 4-wheeler, and 9.9% of the respondents owned EV2 wheelers.

**FIGURE 4**



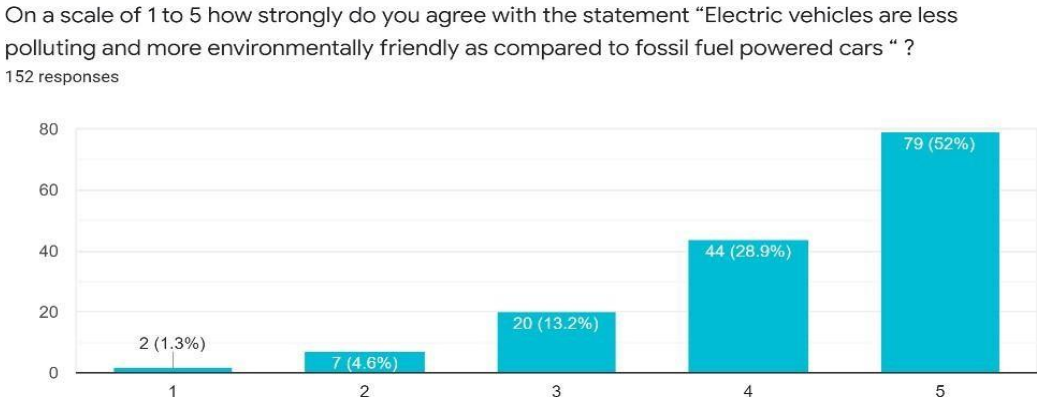

5.5 When posed with the question, "How environmentally aware and conscious would you rate yourself ?", the results showed that the majority of respondents considered themselves environmentally aware and conscious.

**FIGURE 5**



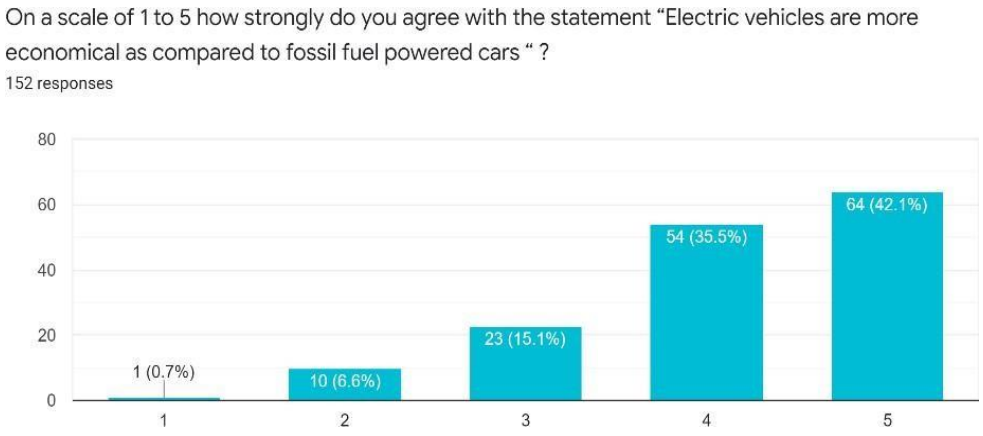

5.6 When posed with the question - How strongly do you agree with the statement "Electric vehicles are less polluting and more environmentally friendly as compared to fossil fuel-powered cars", the results showed that the majority of respondents felt that EVs are less polluting and more environmentally friendly as compared to fossil fuel powered cars.

**FIGURE 6**



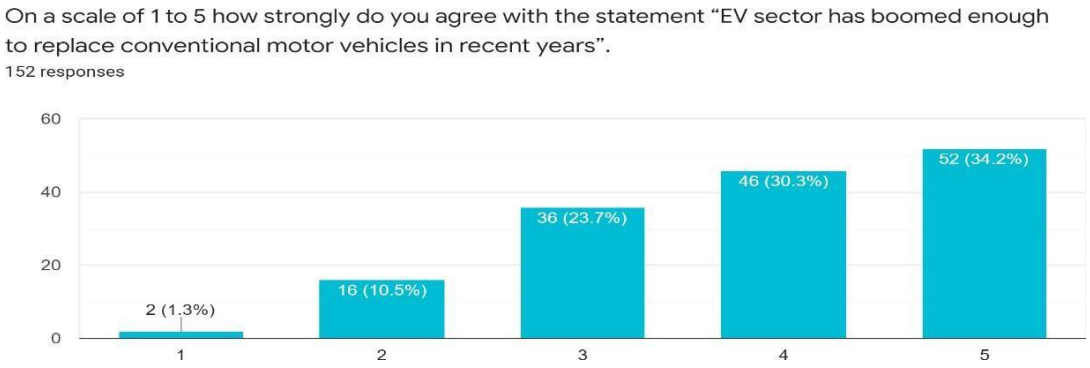

5.7 When posed with the question - How strongly do you agree with the statement "Electric vehicles are more economical as compared to fossil fuel-powered cars". The results showed that the majority of respondents felt that EVs are more economical as compared to fossil fuel-powered cars.

**FIGURE 7**



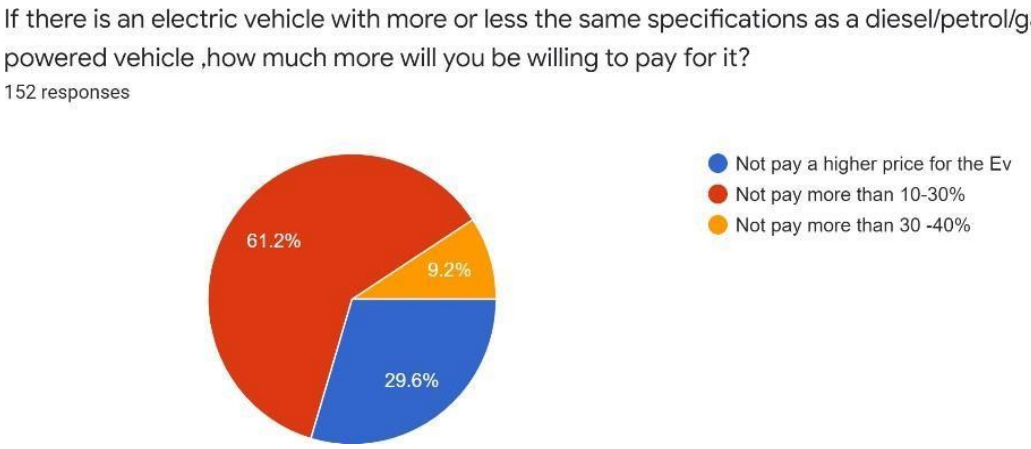

5.8 When posed with the question- How strongly do you agree with the statement "EV sector has boomed enough to replace conventional motor vehicles in recent years", the results showed that the majority of respondents felt the EV sector had boomed enough to replace conventional motor vehicles in recent years. However about 23.7% of the respondents were neutral about the statement indicating apprehension in the minds of consumers regarding the scalability of electric vehicles.

**FIGURE 8**



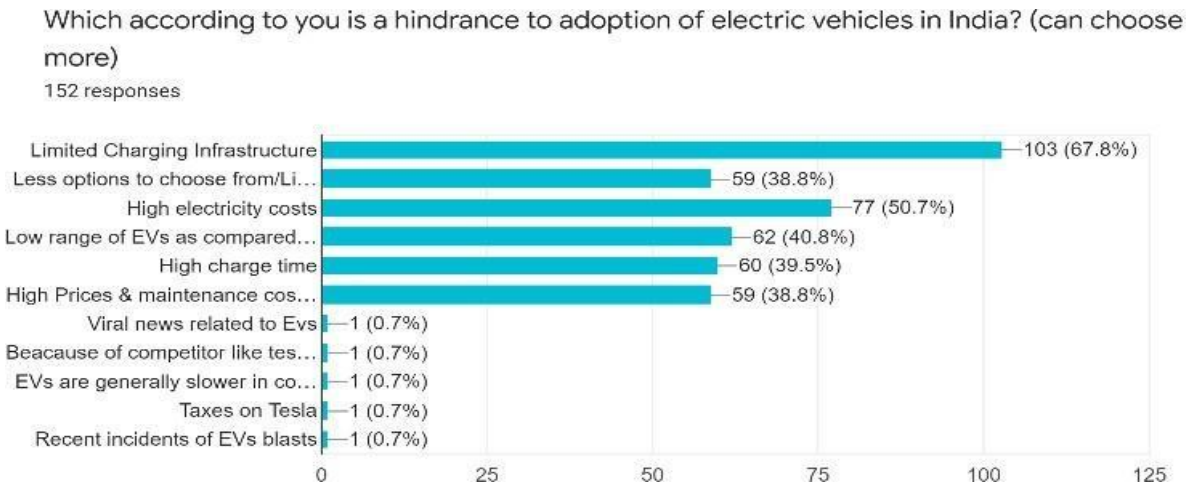

5.9 When posed with the question - How strongly do you agree with the statement "If there is an electric vehicle with more or less the same specifications as a diesel/petrol/gas-powered vehicle, how much more will you be willing to pay for it?", the findings showed that, while 29.6% of respondents were unwilling to pay more for EVs, 61.2% of respondents were only willing to pay a 10–30% increase. The results imply that if automobile companies wish to enter the segment, they must not price their EVs at a very high premium.

**FIGURE 9**



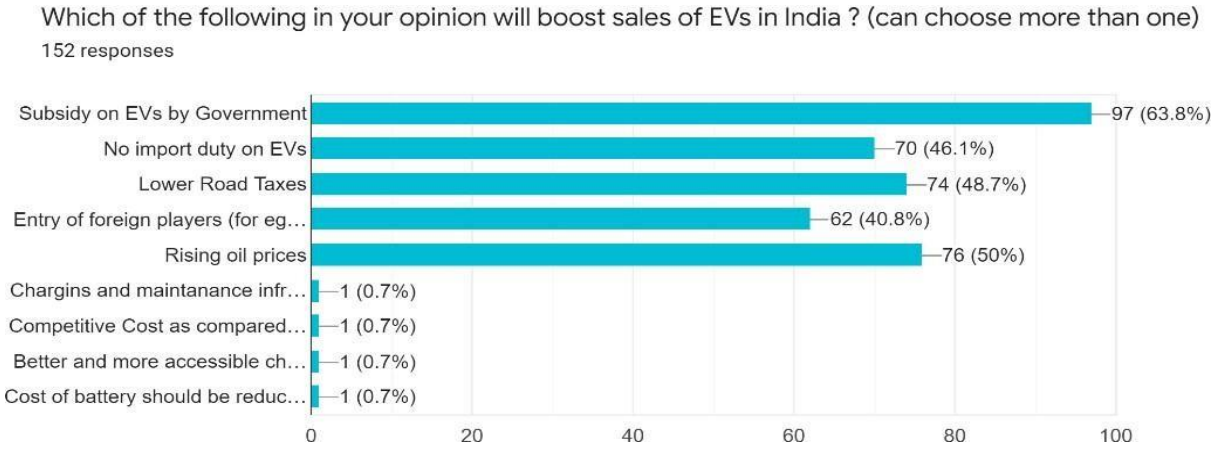

5.10 Limited charging infrastructure, high electricity costs, low range of EVs as compared to fossil fuel vehicles emerged as the major hindrance to the adoption of electric vehicles by respondents. The findings suggest that for EVs to be scalable in India, a suitable charging infrastructure and subsidized electricity tariffs are necessary. Other hindrances that were filled by participants were viral news related to EVs; because of competitors like Tesla, EVs are generally slower in comparison, taxes on Tesla, and recent incidents of EVs blasts.

**FIGURE 10**



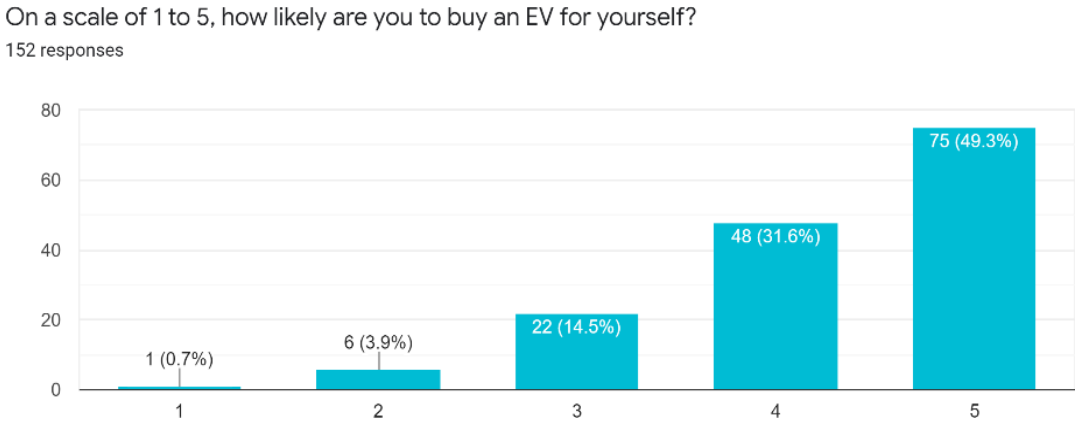

5.11 Subsidy on EVs by the Government, rising oil prices and lower road taxes emerged as popular answers to factors that might boost sales of EVs in India by the respondents. Other answers filled by respondents include charging and maintenance infrastructure, competitive cost as compared to fossil fuel cars, Better and more accessible charging stations, cost of the battery should be reduced.

**FIGURE 11**



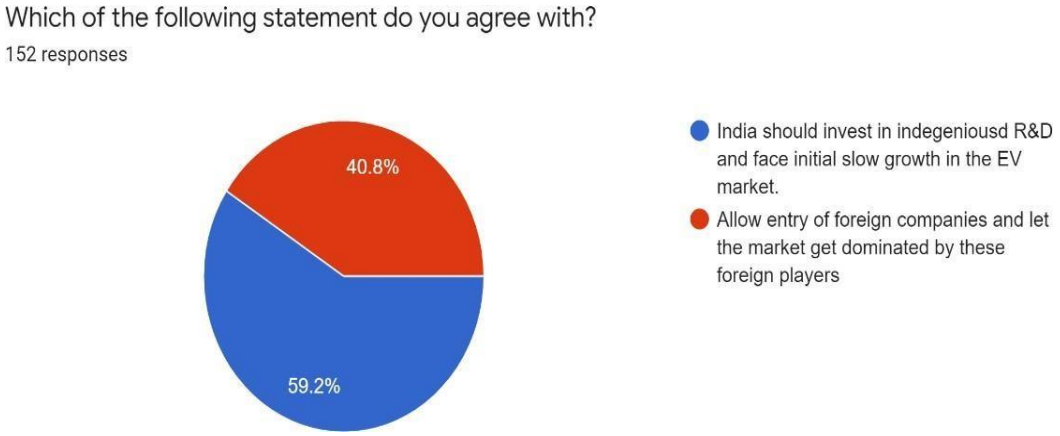

5.12 When posed with the question-On a scale of 1 to 5, how likely are you to purchase an EV by an Indian manufacturer (E.g., Mahindra, Tata), the results imply that respondents were highly accepting of the capabilities of Indian car manufacturers, which could potentially translate into huge domestic production of EVs in the coming years, thereby negating or minimising the possibility of importing EVs. This would provide a huge boost to domestic manufacturers and lead to the overall growth of the sector.

**FIGURE 12**



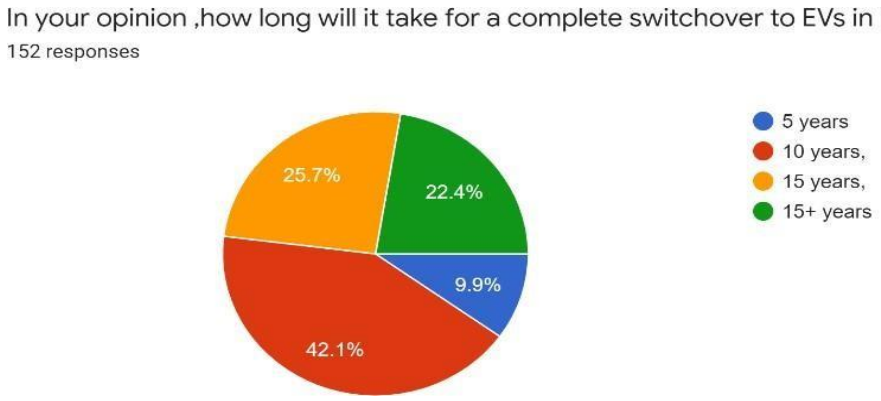

5.13 Similar results were found when respondents were asked to choose between the statements–India should invest in indigenous R&D and face initial slow growth in the EV Market or allow entry of foreign companies and let the market get dominated by these foreign players. These results lead us to believe that if domestic manufacturers of EVs are given an incentive under PLI schemes and make in India policy, then the EV sector could see exponential growth.

**FIGURE 13**




5.14 Finally, when posed with the question –In your opinion, how long will it take for a complete switchover to EVs in India, the majority of respondents anticipated a time between 10-15 years. This seems to be a valid assumption as the infrastructural prerequisites for the scalability of EVs are quite large and require significant financial investments, which must be made in a sustainable way in order to switch from fossil fuel-powered to electric vehicles (EVs).

**FIGURE 14**




## 6. FINDINGS

- Out of 152 respondents 52.3% were females and 47.7% were males.
- Nearly 48.7% of respondents were between the ages of 25 and 59, compared to 48% of respondents who were under 25.
- 75% of the respondents owned 4-wheeler (Petrol/Diesel) and about 51.3% owned 2-wheeler Petrol/Diesel). About 13.2% of the respondents had hybrid four-wheelers, i.e., vehicles that run on both electric power as well as fossil fuels.7.9% of the respondents owned EV4-wheeler, and 9.9% of the respondents owned EV2 wheelers.
- Most respondents thought they were aware of and concerned about the environment.
- Most respondents agreed that EVs are less environmentally damaging and less polluting than fossil fuel-powered vehicles.
- Most respondents agreed that electric vehicles are more economical than fossil fuel-powered vehicles.
- The majority of respondents felt the EV sector had boomed enough to replace conventional motor vehicles in recent years. However about 23.7% of the respondents were neutral about the statement indicating apprehension in the minds of consumers regarding the scalability of electric vehicles.
- 29.6% of respondents were unwilling to pay more for EVs, while 61.2% were only willing to pay a 10–30% increase. The findings suggest that automakers should not price their EVs at a significant premium if they want to penetrate the market.
- Limited charging infrastructure, high electricity costs, low range of EVs as compared to Fossil Fuel vehicles emerged as the major hindrance to the adoption of electric vehicles by respondents. A proper charging infrastructure and subsidized electricity rates for charging EVs is a prerequisite for the scalability of EVs in India. Other hindrances that were filled by respondents were viral news related to EVs ; because of competitors like Tesla, EVs are generally slower in comparison,

taxes on Tesla, and recent incidents of EVs blasts.

- Subsidy on EVs by the Government, rising oil prices and lower road taxes emerged as popular answers to factors that might boost sales of EVs in India by the respondents. Other answers filled by respondents include charging and maintenance infrastructure, competitive cost as compared to fossil fuel cars, Better and more accessible charging stations, price of the battery should be reduced.
- Respondents were highly accepting of the capabilities of Indian car manufacturers, which could potentially translate into huge domestic production of EVs in the coming years, thereby negating or minimising the possibility of importing EVs. This would provide a huge boost to domestic manufacturers and lead to the overall growth of the sector.
- These results lead us to believe that if domestic manufacturers of EVs are given an incentive under PLI schemes and make in India policy, then the EV sector could see exponential growth.
- The majority of respondents anticipated a time between 10-15 years for a complete switchover to EVs in India. This seems to be a reasonable assumption given the significant infrastructure requirements for the viability of EVs, which call for enormous financial expenditures that must be made in a sustainable manner in order to make the switch from fossil fuel-powered to electric vehicles (EVs).

## 7. CONCLUSIONS AND SUGGESTIONS

The current study reflects an optimistic perspective towards electronic vehicles. As more people become aware of their environmental impact, they will be increasingly likely to switch to electric vehicles in the future. Electric vehicles can significantly reduce greenhouse and pollutant gas emissions related to the transportation sector. Intensity to purchase electric vehicles is substantially correlated with factors such as high purchase cost, limited range, and lengthy charging times because these factors are viewed as significant hurdles to EV adoption and essential purchase criteria. More EV brands and models should be produced by the auto industry. Automobile manufacturers must avoid pricing their EVs at a significant premium if they want to penetrate the market. Scalability of EVs in India depends on having a suitable charging infrastructure and affordable energy tariffs for charging EVs.

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