A STUDY ON FUTURE OF ELECTRIC VEHICLE (EVS) IN INDIA

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ABSTRACT

The automobile industry is responsible for numerous detrimental environmental effects since it is the industry that consumes the most fossil fuel worldwide. The study aims to explore the future of Electric vehicle in India. In this investigation, secondary resources like previously conducted research from scholarly journals and questionnaires were used for data collection.

The current trajectory of adding more cars which runs on crude oil, is cluttering already overcrowded cities. Indian cities are suffering from poor infrastructure and intense air pollution. Going 'electric' – as we see in many markets across the world – is a team effort. The research shows that the respondents are aware of global climate circumstances and open to making the transition from traditional to environmentally friendly modes of transportation. Various advances have been made in the evolution of electric vehicles, including shorter charging times, the advent of supercapacitors that guarantee enhanced charge storage, and a greater effective electromotive force.

Some governments in developed countries subsidise electric car manufacturing companies and customers purchasing electric vehicles to meet their carbon dioxide pollution reduction obligations, reduce production costs, and make EVs more affordable. The respondents emphasize the importance of affordability and infrastructure for EV in buying process. It was also discovered that a sizeable part of the population are unaware about government initiatives for electric vehicles, which in itself is a major setback.

Government has a vision of 100% electric vehicles by 2030. A major development towards

EVs will be led by the public transportation requirements in India. Possible areas for future study include improving the infrastructure efficiency, energy storage technologies.

Keywords: - Future, Electric Vehicle, India

INTRODUCTION

The transportation sector is experiencing revolutionary change as a result of issues related to the environment, the economy, and technology. Politicians all across the world have climate change and its causes and impacts at the top of their agendas. The automotive sector, which has been around for almost a century, is on the verge of a massive transformation. New business models, such as mobility as a service, and the growingfinancial viability of technologies, such as electric vehicles (EVs), may cause significantchanges in how we get about in the future.

According to the International Energy Agency (IEA), between 2008 and 2016, the number of electric vehicles in use throughout the world increased from 5,000 to over 2,000,000. Adoption of electric vehicles is just getting started in India. The public's preferences will change as the infrastructure supporting electric cars (EVs) develops. The transition to EVs may be facilitated by transparent government policies and monetary incentives.

More than a third of Indian buyers have showed interest in electric and hybrid automobiles, according to Deloitte's Global Automotive Consumer Study, 2022, as a result of India's focus on environmentally friendly, locally manufactured, and sustainable solutions in the aftermath of the pandemic.

Production of Automobiles in India

When it comes to economic growth and technological innovation, no sector is more important than the auto industry. Vehicle manufacturing in India has increased dramatically since the 1950s, when the country's yearly quota was set at 40,000. In the fiscal year 2022-23, passenger automobile sales in India climbed by 26.7%, as reported by the Society of Indian Automobile Manufacturers (SIAM).

The Indian passenger car market is expected to increase from US$32.70 billion in 2021 to US$54.84 billion in 2027, a CAGR of over 9%. According to projections, India's electric vehicle market would be valued Rs. 50,000 crore ($7.09 billion) by 2025. The CEEW Centre for Energy Finance estimates that the Indian market for electric vehicles would be valued as much as $206 billion by 2030.Fifty million jobs (direct and indirect) will havebeen created in the electric car industry by 2030. As of today, India's retail car finance sector is worth $60 billion, therefore it is estimated that the market for financing electricvehicles would reach $50 billion by 2030.

There will likely be a dramatic increase in automobile manufacturing, sales, and exports in India. When India makes the transition to electric vehicles, it will cement its position as a major player in the global auto industry.

India's emission norms and rates

In the foreseeable future, four-wheeled vehicles will continue to play a significant role in passenger transportation across the globe. Because of the fast motorization of the 20th century, citizens in industrialised countries have more mobility options than ever before. While motor vehicles have vastly improved our mobility, they have also introduced a number of problems due to their widespread use.

Internal combustion engines using hydrocarbon fuels are the only propulsion system in passenger autos. When things are burned, they release greenhouse gases and other pollutants. In particular, passenger cars make heavy use of petrol and diesel, both of which are produced from crude oil. Dependence on foreign supplies of these fuels is a major problem for even the wealthiest countries. The political dependence on OPEC states for crude oil imports is another consequence of this interdependence. While conventional reserves are decreasing, crude oil consumption is expected to rise in the future. Both the price of crude oil and the cost of transportation are expected to increase as a consequence of these variables combining.

New Delhi, the capital of India, started an Odd-Even selection plan in the winter of 2020 based on licence plate numbers to reduce smog-related air pollution (The Economic Times, 2019). Greenhouse gas emissions are a major problem worldwide, and the transportation sector is a major contributor. The transport sector accounts for almost 20% of energy-related CO2 emissions and about 15% of global greenhouse gas emissions (Our World in Data, 2020). One of India's biggest environmental problems in recent years has been poor air quality. Concentrations of particulate matter that are too high, according to national and international standards, represent significant threats to public health in a variety of settings.

In 2019, air pollution is anticipated to be the cause of death for an estimated 1.2 million Indians. As a result of the country's rapid economic development, India's CO2emissions have increased by more than 55% over the last decade and are expected to increase by another 50% between now and 2040. The future standard of living of a population that is only expected to get larger will be significantly impacted by the energy decisions we make now.

The Bharat Stage Emission Standards (BSES) were put in place by the Indian government to reduce emissions from vehicles and other apparatus using internal combustion engines. The laws and the timetable for their implementation are set by the Central Pollution Control Board (CPCB), which is accountable to the Minister of Environment, Forests, and Climate Change.

The restrictions imposed at each level are based on the kind of petrol used by oil companies and the upgrades and improvements made by automotive firms to lessen the pollutants released by the vehicle. All of India has been adhering to Bharat stage III rules since October 2010. Bharat stage IV emission standards have been in place in 13 major cities since April 2010. The sulphur content of BS-V and BS-VI fuels will be 10 ppm, whereas BS-IV fuels include 50 ppm. The already stringent emission rules in India have been further tightened with the

introduction of Bharat Stage VI. The BS-VI standard is the world's strictest regulation of vehicle emissions to date. The PM2.5 concentrations in BS-VI gasoline range from 20 to 40 micrograms per cubic metre, which is a significant improvement above the maximum of 120 micrograms per cubic metre in BS-IV fuel, which is contributing to the worldwide environmental problem due to its diminishing availability. Toxic emissions from petrol and diesel vehicles have long-term, negative effects on public health. Electric cars produce far less pollutants than their fossil fuel counterparts (WEF, 2019).

LITERATURE REVIEW

"Potential Need for Electric Vehicles, Charging Station Infrastructure, and the Challenges Facing the Indian Market," by Praveen Kumar and Kalyan Dash.

Instead of conducting hugeinfrastructure overhauls, India couldfocus on targeted load reinforcements on a smaller scale. It's important to encourage charging at home. Before a widespread charging infrastructure is rolled out, it is important to consider factors like location, population, traffic density, and security. It is crucial to combine energy production and transportation systems. One innovative policy or plan that aids in the achievement of development goals is the provision of financial incentives, such as tax credits, purchase subsidies, reduced tolls, free parking, and access to restricted highway lanes, to drivers of electric vehicles. P. K. Dash (2013)

Fanchao Liao, Eric Molin, and Bert van Wee have compiled data on the preferences of buyers for electric vehicles.

The widespread use of electric cars has the potential to lessen the negative environmental and economic impacts of pollution, global warming, and oil imports. Low rates of electric vehicle (EV) adoption persist despite attempts

by governments. The range, charging time, vehicle performance, and the number of brands on the market all have a role in determining the viability of an electric automobile. One of the most important factors in the success of electric vehicles is the availability of charging stations. Tax cuts and other forms of incentive may have a major impact. This is what the studies (Fanchao Liao, 2017) say

Muhammed, G. Tamil Arasan, and G. Sivakumar. 2018. Opportunities and Challenges for India's Electric Vehicle Market.

Changing from dirty internalcombustion engines to greener electric alternatives will benefit everyone. Several countries are using this technology to help the environment. Consideration has been given to initiatives from the government, batteries, industries, and environmentalists. Electric vehicle (EV) demand, EV efficiency in India, and EV price were all considered. The introduction of EVs in India is driven by a desire to reduce carbon dioxide emissions and save money on fuel. The government has to make the most of the current circumstances in order to address the issues at hand. (Mohamed, M. 2018, cited in)

Pritam K. Gujarathi, Varsha A. Shah, and Makarand M. Lokhande analysedthe Indian electric vehicle market by considering consumer perceptions, government regulations, and industry challenges.

Compared to that, less than 0.1% of India's auto market is comprised of electric and plug-in hybrid automobiles. All cars today are designed around the idea of using fossil fuels. Greenhouse gases are produced by them, adding to global warming and pollution. The disparity between U.S. petroleum production and demand is increasing. Oil imports cover over 70% of India's

yearly needs. Because of this, studies into the causes and challenges of more ecologically friendly and sustainable alternatives must begin immediately. according to a recent report (Pritam K. Gujarathi, 2018)

RESEARCH METHODOLOGY

The goal of this study is to better understand the development of EVs in India. The purpose of this research is to better understand the attitudes of Indian citizens about EVs and the factors that encourage their widespread use.

Brief Illustration

A total of 104 people took part in the research; 56 women and 48 men. The distribution is shown in all its beauty in Fig. 1. Participants were selected using a combination of snowball sampling and voluntary response sampling. Women between the ages of 18 and 30 made up the bulk of the 101 respondents. Only one person between the ages of 30 and 35 responded, while two people aged 45 and up did. Nobody under 18 bothered to answer.

The largest group of responders (59.6%) was comprised of students, followed by (26%) serviceman, (10.6%) self-employed, (1.9%) homemaker, (1%) businessman, (1.0%) government employees.

Age Group	**No. of respondents**	**Percentage**
Below 18	0	**0 %**
18-30	101	**97.1%**
30-45	1	**1%**
Forty-five and above	**2**	**1.9%**

Table1- Age group of participants

Gender	No. of respondent	Percentage
Female	56	**53.8%**
Male	**48**	**46.2%**

Table2- Gender of participants

Occupation	No. of respondent	Percentage
Student	62	**59.6%**
Serviceman	27	**26%**
Self employed	11	**10.6%**
Home Maker	2	**1.9 %**
Businessperson	1	**1%**
Govt Employee	**1**	**1%**

Table3- Occupation of participants

The locale of the study

The study was conducted in Delhi.

Research Methodology

The research design for this study was

descriptive design.

Tools of data collection

Data was collected from secondary resources such the World Wide Web, academic publications, and previously published research. The majority of the information for this research came from questionnaires. It was suggested that we use a Google form questionnaire to collect a sizable number of responses to the survey. Ten questions were formulated to learn more about electric vehicle (EV) growth in India. The purpose of this research is to better understand the attitudes of Indian citizens about EVs and the factors that encourage their widespread use. The questions were structured in accordance with the aims of the research. The final tally of responses was 104.

Seeking Acknowledgement

The study objectives were explained to the participants. They also learned that their responses will be compiled and assessed as part of the study.

Strategy for Data Collection

The researcher reached many people by using social media to promote the study. The user's information will be kept confidential, as promised in the form's header. About 10 minutes were spent by each respondent filling out the Google form.

Constraints imposed by data collection

The study's investigator struggled to enlist a diverse age range of volunteers. There were occasions when many reminders were necessary to get people to finish the survey. There is a deadline by which the study must be finished. That's why we were able to gather our data in only two weeks. There were unanswered questions from some responses.

Analysing the Data

The research's objectives guided the study's quantitative analysis. The descriptive information was analysed using content theory. Separate groups were then created from the data. It was feasible to pick out and highlight recurrent ideas. Categories and subcategories were used to organise the data. Taking the intended results into account.

Considerations of a Moral Nature

The study's concept was briefly covered.

It was made clear to respondents that their responses will be stored. Both the respondents' anonymity and the privacy of their replies were ensured. Participation was voluntary.

Limitations of the research

The Delhi metropolitan region provided all of the samples for the research.

The majority of the study's participants were under the age of 30. Including participants of varying ages in the study could prove fruitful.

The scope of this research does not provide a thorough examination of all aspects of EVs.

Participation is totally voluntary.

After describing the study's purpose in detail, we asked for the participants' permission to proceed with the research. Before taking part in the study, participants were provided with the necessary background material. Every effort was taken to ensure the participants felt comfortable with the option to stop participating at any moment. In case they had any questions or concerns, participants were provided the researcher's contact information.

Reimbursements

Prior to the commencement of the study, participants were informed that they would be compensated in no way for their participation. However, after the study is finished, the results will be made available to them if they have shown an interest in learning about them.

CONCLUSION

When a nation wants to expand its economy and industrial base, nothing is more important than the automobile industry. In terms of both technical progress and environmental

friendliness, the advent of electric automobiles represents a major step forward. Rising earnings, more fuel-efficient models, more exports, and easier access to finance are just some of the demographic variables that have contributed to a jump in automotive sales.New programs, incentives, and rules have been enacted by the Indian government to support the country's automobile industry, andthere has been some improvement in this area.

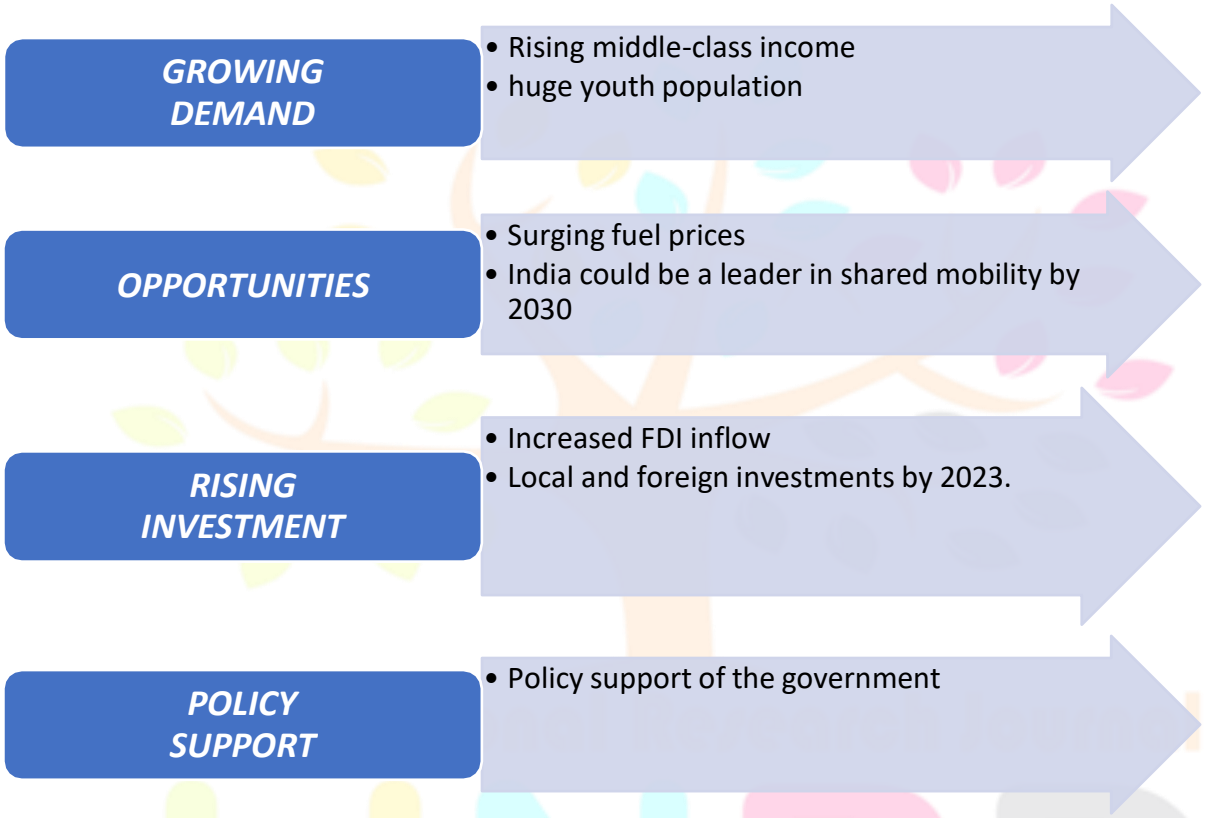

Fig 2- Analysis for need of EV in India

Respondents are aware of global climate circumstances and open to making the transition from traditional to environmentally friendly modes of transportation. The global advancement of automobiles has been characterized by two primary features: energy efficiency and environmental management. Clean and sustainable energy produced by electric vehicles help solve these problems.

Electric cars (EVs) are a more environmentally friendly and effective solution to this problem than conventional vehicles that rely on fossil fuels for power.

Because of the importance of affordability in the consumer decision-making process, most automobiles must be mass-produced with the middle class in mind. The EY research also found that an Indian client places a high value on cost efficiency; if

the EV industry is unable to demonstrate cost benefit and optimal utilization, it risks failing to attract Indian customers. The research also states that the rising popularity of electric vehicles (EVs) like Tesla, an American manufacturer, is due to the effect of international trends on Indian customers.

Respondents are open to the possibility of purchasing an EV in the future if the necessary infrastructure is put in place.The high price of entry, the scarcity of charging locations, and the lengthy recharge period all work against gaining widespread customer acceptance. Due to their lower price, greater energyefficiency, and easier maintenance, electric vehicles (EVs) have largely replaced conventional rickshaws in India's public transportation industry. Because of this, the Indian market now prefers electric automobiles over those powered by internal combustion engine. (Study by EY,2022)

Concerns have been raised that a sizeable part of the population does not know about government initiatives for electric vehicles, despite their importance for achieving mission 2030 goals. Rapid adoption of electric vehicles in India requires government participation at several levels, control of EV infrastructure, quick decision-making, stakeholder cooperation and coordination, and dedication to both short- and long-term objectives. (Report from EY, 2022)

Many people in India look to social media for guidance and ideas, therefore these platforms might significantly affect the market share of EVs in the country. Many survey participants cite social media as the reason they are familiar with EVs.

Respondent's conventional car lacked a charging port in the garage, the most convenient position. Consumers that install charging stations in their homes gain mobility and convenience. According to the EY research from 2022, a significant barrier to EV adoption in India is the existing scarcity of convenient charging locations. The convenience and popularity of EVs are boosted by a high density of charging stations, say Liao et al.

Concerns about global warming, pollution, and the emissions of petrol and diesel cars are shared by 59% of Indian customers, suggesting that the perceived savings on fuel expenses, environmental conscience, and improved driving experience are driving consumers' interest in EVs.

The most recent legislative measures revealed in this year's Union Budget concerning battery swapping and charging infrastructure complement these efforts. These advancements should increase customer trust and pave the road for overcoming obstacles to widespread adoption. (Deloitte, 2022).

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