ABSTRACT

Our research project is titled “Consumer Behavior on Electric Vehicles” and for this we have used YouTube as a source for collection of data and for that we have used various tools such as data cloud, sentiment analysis in order to know about the perception of those users who have actually used the electrical vehicles themselves and did a in depth review of the same, because Electrical Vehicles are environmental friendly and offer lot of other advantages over the conventional vehicles. It becomes really important for us to figure out what the areas where electrical vehicles are lacking or what are the areas where it is perfect in order to figure out the current status of electrical vehicles in the country and to predict where it is heading and where we can see it in years to come.

I. INTRODUCTION

Green vehicles, such as electric vehicles (EVs), are gaining noteworthy popularity among consumers worldwide. The purpose of this paper is to establish EVs as a feasible long-term solution for the future of technology in the vehicle industry, which can decrease the current dependency on fossil fuels and also decrease greenhouse gas (GHG) emissions. As a part of long-term benefits, the adoption of EVs gives environmentally friendly innovation to society. Despite positive environmental implications, the total number of EVs in usage is still inadequate. One of the major causes of this insubstantial adoption of EVs is largely dependent on the perceptions of consumers regarding EVs. The theme of this particular literature can be implemented in order to better understand the consumers’ emotions and behavior towards the adoption of EVs.

I feel like that there is a possible cause for more recent developments within the technological adoption part that can assist to be a standard for upcoming developments which can lead in the field of EV in India.

Electric vehicles have become an important due option to mitigate climate change, but there are major uncertainties in the scale and timing of market and investment but there are companies like TATA which have vision and mission to demonstrate “NEW ELECTRIC VEHILE INDIA” to the world. Recently there was also an agreement between TVS Motors and Tata power to set up charging points for Electric Vehicles in some cities where there is already a presence of electric vehicles and TVS Motors and Tata Power both have their own applications named TVS iQube and EZ Respectively which will further help customers in finding the charging points for their electric vehicles.

Electric Scooters are presently available in these cities which are Delhi, Bengaluru, Chennai, Pune, Kochi, Coimbatore, Hyderabad, Surat, Vizag, Jaipur, and Ahmedabad. TVS motors and Tata power in this agreement will first establish charging stations in these cities and then in other cities and other parts of the country as well.

TVS Motors is doing all this as part of their vision of electrification under which they have planned to provide charging infrastructure for two and three wheelers electric vehicles across the country powered by renewable source of energy such as solar energy. Electric Vehicles are furthermore very good for environment as they don’t emit any carbon or greenhouse gases in the atmosphere which is also a feature because of which electric vehicles have become very important and getting the attention of customers as well as prime ministers or presidents of countries who want their citizens to use electric vehicles in order to conserve environment.

Electric vehicles if put simply runs on a electrical engine rather than on a petrol engine and that is the basic difference between a normal vehicle and a electrical vehicle. Electrical vehicles have lot of advantages over the normal vehicles such as they just need to be charged in order to run rather than requiring petrol or diesel to function and they are very eco friendly as well as electrical vehicles don't emit carbon gases or CFC's which damages the ozone layer of stratosphere and which in turn makes us more vulnerable to UV radiation that is released by sun's radiation and these radiations can be really harmful for human body.

Electrical vehicles are the future and the main reason is that all the countries nowadays are very concerned about the pollution and always talks about conserving the environment for future generation and sustainable
environment and because of all these factors, electrical vehicles have become very important because going ahead electrical vehicles will be the vehicles which will be in higher demand.

There is vision for 100% electrical vehicle market in India by 2030 and Indian government is already very much focussed on replacing the normal vehicles which damages the air quality and environment very badly with electrical vehicles which will be very eco friendly.

Electric Vehicles (EVs) are becoming a promising conduit for improving air quality, energy security, and economic opportunity in India, thanks to the tremendous growth of the automobile sector. The Indian government recognises the need to investigate sustainable mobility options in order to reduce reliance on imported energy sources, reduce greenhouse gas emissions, and offset negative transportation effects such as global warming. Carbon dioxide emissions can be lowered by implementing preventative actions to avoid catastrophic climate change, which poses a threat to the planet’s biodiversity. Major efforts have been made to reduce the use of fossil fuels in power generation, transportation propulsion, energy consumption, and carbon sequestration. Electric vehicles (EVs) could be a viable option for reducing carbon dioxide emissions.

Due to harmful emissions from the transportation sector and investments by various OEMs, there is concern that the number of low-cost EVs will increase in the future years. Several variables, including technology advancements, lower car costs, government policy support, vehicle purchasing incentives, parking benefits, and enough public charging infrastructure, may contribute to the proliferation of electric vehicles in India. Because electric vehicles are produced in such small quantities, their overall market share in India is insignificant.

India’s overall greenhouse gas emissions in 2014 were 3202 million metric tonnes of carbon dioxide equivalent, accounting for 6.55 percent of global emissions. The energy sector accounts for 68 percent of greenhouse gas emissions in India, with agriculture, manufacturing processes, improvements in land use and forestry, and garbage accounting for 19.6 percent, 6.0 percent, 3.8 percent, and 1.9 percent, respectively.

India’s greenhouses gases emission is major cause of concern and because of that there is a huge chance that by 2030 owning a electrical vehicles might become compulsion for everyone who are living in metropolitan cities as electrical vehicles are the future and there is no doubt or two ways about it.

The FAME India Scheme is an incentive programme aimed at encouraging the use of electric and hybrid vehicles in India. Its goal is to encourage electric mobility by providing financial incentives for increasing electric vehicle production and building electric transportation infrastructure. FAME was created in 2015 by the Ministry of Heavy Industries and Public Enterprises to encourage the manufacturing and promotion of environmentally friendly vehicles, such as electric and hybrid vehicles. The scheme is intended to set up charging infrastructure and this scheme was put in place just for the sake of promoting the use of electrical vehicles in India and future also we can see many schemes like this being promoted in India to encourage the use of electrical vehicles in India.

II. LITERATURE REVIEW

(P. K. Dash, 2013) Potential Need for Electric Vehicles, Charging Station Infrastructure, and Challenges for the Indian Market: by Praveen Kumar and Kalyan Dash: India could invest in small scale reinforcements to control load concerns locally rather than attempting a massive overhaul. The practise of charging should be encouraged. Place, population, traffic density, and safety should all be carefully planned. Before putting in place a large-scale charging infrastructure, thinking about it will be very important and the importance of blending of activities. It is crucial in the domains of energy and transportation. Various inventive methods are used to achieve development goals. Drivers of electric automobiles, for example, are offered a financial consumer incentive through regulations and initiatives. tax credits, purchasing subsidies, low tolls, free parking, and access to limited interstate lanes are just some of the options available. will contribute to the market’s expansion and will really help India in taking a big step towards becoming Electric Vehicle centric country

(Masurali.A, 2018) Electric Vehicles for India: Overview and Challenges: by Mr. A. Rakesh Kumar, Dr. Sanjeevikumar Padmanaban: India contributes around 18% in transport sector alone in terms of carbon emission Delhi annual co2 emission of 69.4 million tones is equal to co2 emission of Bengaluru, Hyderabad and Chennai put together. The Electric Vehicle (EV) is one of the foremost feasible alternative solutions to beat the
Several automotive companies are introducing EVs and are expanding their portfolio. Promoting EVs can help reduce fuel dependence and pollution and beneficial for both consumers and the nation. The education of people has significantly higher influence over their awareness level on EVs. Apart from manufacturers, Government should also provide incentives to the consumers and government should promote electronic vehicles so that consumers can aware of the benefits of electronic vehicles.

(Mr. A. Rakesh Kumar, 2019) Electric Vehicles for India: Overview and Challenges: by Mr. A. Rakesh Kumar, Dr. Sanjeevikumar Padmanaban: Global pollution is increasing, and every attempt is being made to reduce CO2 emissions and rescue the planet. The introduction of electric vehicles is one such initiative. Because transportation is one of the greatest CO2 emitters, it is critical to cut emissions. The government has devised ambitious plans to bring electric vehicles to the Indian market and keep up with global trends. An in-depth report on EVs was included in the National Electric Mobility Mission Plan 2020. India faces a significant hurdle in transitioning from internal combustion engines to electric vehicles. This will necessitate extensive planning as well as R&D. To deal with range anxiety, charging infrastructure must be properly built. It’s critical to create demand by electrifying all government buses and providing tax breaks to personal electric vehicle owners.

(Mohamed M, 2018) Study on Electric Vehicles in India Opportunities and Challenges: by Mohamed M, G Tamil Arasan, and G Sivakumar: The replacement of internal combustion engines (ICE) with electric engines will significantly reduce pollution while also providing a financial benefit to consumers. Many countries have adopted this technology and are benefiting the environment as a result. The study observed the advantages and disadvantages of EV implementation in India. Government initiatives, batteries, industries, and the environment have all been taken into account. Cost of electric vehicles, efficiency of electric vehicles in India, and demand for electric vehicles were all taken into account. In India, the usage of electric vehicles is largely intended to reduce greenhouse gas emissions and oil costs. The government should make the most of the opportunities offered and identify appropriate solutions to the issues.

(Pretty Bhalla, 2018) A Study of Consumer Perception and Purchase Intention of Electric Vehicles: Pretty Bhalla, Inass Salamah Ali, Afrozoe Nazneen: Environmental concerns, cost, comfort, trust, technology, societal acceptance, and infrastructural availability all influence car selection. These arguments have been put to the test in both conventional and electric vehicles. They believe that these elements have a direct impact on an individual’s vehicle choice. They discovered that EV producers and governments must invest more in social acceptability of the car by expanding infrastructure and emphasising technology to build trust. According to the findings, the general public is fully aware of the environmental benefits. The government and manufacturers share responsibility for investing in car manufacturing.

(Janardan Prasad Kesari, 2019) Opportunities and Scope for Electric Vehicles in India: by Janardan Prasad Kesari, Yash Sharma, Chahat Goel: Developing an aggressive plan for EV adoption in India and assuring a well-executed implementation is a difficult task for the government, but it is critical. India’s geography and diversity will bring challenges that would necessitate smart answers. With the acquisition of four-wheeled cars for government offices, three-wheeled vehicles, and buses for public transportation, public procurement is likely to be a major driver of EV growth. The initial expansion of two- and four-wheeled electric cars is likely to be boosted by investments from fleet operators such as Ola and Uber, as well as operators of food distribution services. However, it may take 5-6 years for private EVs to attain popularity and acceptance.

(Yogesh Aggarwal, 2019) Indian Electric Vehicles Storm in a teacup: Yogesh Aggarwal, Vivek Gedda and Kushan Parikh: Users of scooters who only need to travel short distances may want to consider an EV, while those who need to travel longer distances and currently possess motorcycles like the Hero Splendor may find switching to an e2W challenging. It is relatively straightforward to enhance the range of an automobile by increasing the battery size. However, with electric 2Ws, every increase in kWh may provide an additional 30km of range, but the increase in weight is around 10kg, or about 10% of the overall weight of the bike. In smaller motorcycles, the weight issue is even more pronounced (less than 150cc).

Objective and need of the study:

(i) To find out people's perception about electric vehicles in India.
(ii) To overall analyse and review the growth of electric vehicles in India.
III. RESEARCH METHODOLOGY

A Research methodology is usually a guide system for solving problems with specific components such as phases, tasks, methods, techniques, and tools. Research methodology is a method of systematically solving research problems. Simply put, it describes how the study was done. It covers general survey design, purpose setting, data collection formats, data collection methods, sample designs, various tools and techniques used to present data, and finally, the analysis procedure.

1. Research Design:

The whole research design revolved around the You tube and it was used as the main source to collect information and for collection of reviews from the owner of electrical vehicles in India and to find out their perception and point of view about the electrical vehicles after using it themselves.

2. Selection of Sample:

Size of the sample was big and reviews from around 50-60 videos were taken into account from You tube to carry out the whole project and all those videos were posted by the owner or user of the electrical vehicles in which they had given their point of view after using the vehicles themselves.

3. Sources and collection of Data:

You tube was used as the main source for collection of data and various other platforms were used to derive interpretation and meaning from the videos that were collected from the You Tube. All those videos that were selected for this project were from India and subtitles from those video were downloaded in a text file using Downsub website where URL address of those video were pasted and later on downloaded from the website and compilation of all those subtitles were stored together in a text file. Later on sentiment analysis was done on that file using Microsoft excel after installing the Microsoft azure plugin from the store.

Sentiment Analysis: Sentiment analysis was used as a medium to derive meaning from the subtitles of the videos that were collected for the purpose of carrying out the project.

Sentiment analysis is the process of classifying whether a block of text is positive, negative, or neutral. Sentiment analysis is a word context mining that shows a brand’s social sentiment and helps determine if the products it manufactures are in demand in the market. The goal that sentiment analysis is trying to achieve is to analyze people’s opinions in ways that help the company grow. It focuses not only on polarity (positive, negative, neutral) but also on emotions (happiness, sadness, anger, etc.). For example, what if you want to analyze whether a product meets customer requirements or if this product is needed in the market? We may use sentiment analysis to monitor reviews of this product. Sentiment analysis is also efficient if you have a large amount of unstructured data and want to automatically tag and classify this data.

Why to do sentiment analysis:

According to a survey, 80% of the world’s data is unstructured. Data should be analyzed and structured, whether in the form of email, text, documents, articles, and so on. Sentiment analysis is necessary to store data efficiently and inexpensively. Sentiment analysis helps solve real-time problems and all real-time scenarios.
4. **Tools used for Data Analysis:**

(i) First of all, You Tube was used as the main source for the collection of information and reviews from the owner of electrical vehicles were taken into the account.

(ii) DownSub website was used to download the subtitles from all those videos and it was done by pasting the URL address of all those videos into the website and their subtitles were downloaded.

(iii) All those downloaded subtitles were compiled together and were stored in a text file.

(iv) Later on sentimental analysis was done on that file using Microsoft excel after installing Microsoft Azure plugin into the excel.
IV. DATA ANALYSIS AND INTERPRETATION

- A total of 2820 statements that were collected from around 50 videos from youtube were reviewed and analyzed and sentiment analysis was done on the same in order to find out the emotions and feelings of those individuals who used electrical vehicles.

- Around 2820 were analyzed and above is the screenshot of the same.
- And following were the results of the sentiment analysis.

<table>
<thead>
<tr>
<th>Sentiment</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>405</td>
</tr>
<tr>
<td>Neutral</td>
<td>562</td>
</tr>
<tr>
<td>Positive</td>
<td>1854</td>
</tr>
</tbody>
</table>
After reviewing, analyzing and doing sentiment analysis on around 2820 comments we found that most of the comments were positive (66%, i.e. 1854) and many comments were neutral also (20%, i.e. 562) and very few comments were negative (14%, i.e. 405).

It was evident that most of the users of the electrical vehicles had positive things to say about it and were hopeful of a brighter future of electrical vehicles industry in India and this is a very good sign as it shows that electrical vehicles industry can have a bright future in the country and it is here to stay.

Few comments were neutral as well as and these users basically could not reach to a conclusion after using electrical vehicles that whether they have liked its performance and overall happy with it or they did not liked what it offered and overall unhappy with it and these users were basically in between.

Very few comments were negative and these were basically from those users who had found flaws in one of the electrical vehicles that they had used and were unhappy about it and wanted a improvement in it in the future.

In order to find out the words which dominated, came out on the top and were used more frequently during the whole sentiment analysis of all these 2820 comments, a word cloud was also used and its results are displayed below:
Top 5 words that were used more frequently than others as per the word cloud are Car, Battery, Electric, Vehicle and ev.

It makes sense also because these words are quite often used in relation with electric vehicles and hence they have dominated this word cloud.

Findings:

Most of the users had good things to say about the electrical vehicles and provided positive feedback after using these vehicles and it can also be seen as very good for the future of electrical vehicle in the country as this industry is still in its early stage in India and there is scope for lot of improvement and in times to come we can expect even better results and performance from electrical vehicles in future.

Few users could not come to a final decision and were quite confused and that's why they decided to be neutral and decided not to say anything good or bad about the vehicles.

Very few users did not liked the performance of electrical vehicles and were unhappy about it and that's why few comments were negative and they felt like there was scope for improvement.

Reach of electrical vehicles in India is very limited and citizens who are in in big cities like Mumbai, Hyderabad and Bangalore, etc are aware about these vehicles and they also are using but in many parts of the country specially in rural areas the awareness level about the electrical vehicles is quite less.

Most of the people that are from south Indian states like Karnataka, Tamil Nadu, Telangana, Kerala and Andhra Pradesh had good awareness about the electrical vehicles and hence most of the reviewers of these vehicles were from these states only.

V. RECOMMENDATIONS

As it has been mentioned earlier also in the report that the awareness level about the electrical vehicles in the country specially in the rural areas is quite less and in order to improve upon it certain steps must be taken.

Certain programmes or yojana can be taken from the government side in order to improve the awareness about the electrical vehicles in the country.

Reach of electrical vehicles is very limited in the country and that's why certain steps should be taken to improve its reach in the country.

More charging points must be built in the future as electrical vehicles needs its batteries to be charged in order to function properly and that's why it would need the support of more charging points.

Government should also come with certain schemes and should offer some subsidiary or can also offer some cost advantages in order to promote the use of electrical vehicles in the country.
• Government has the vision of having 100% electrical vehicles on road by 2030 and in order to achieve they can some major steps like making it a compulsion to use electrical vehicles.

• Best way to improve the awareness level and in order to promote the use of electrical vehicles in the country would be to invest in advertisements as it is one of the most captivating medium to attract attention.

• Electrical vehicles are environment friendly also and that's why government should make it their priority to promote the use of electrical vehicles in the country.

• Companies should also be provided with some manufacturing benefits or cost savings in order to encourage them to produce more electrical vehicles.

• Government also will have to make that the availability of electrical vehicles should be there for everyone in every part of the country.

VI. CONCLUSION

To conclude it can be said that the overall perception about the electrical vehicles in the country is positive and there is lot of scope for improvement and growth for electrical vehicles industry in the country. However, there are few who are not that much impressed with the concept of electrical vehicles and showed their dissatisfaction after using the vehicles themselves and it is clear sign just like any other thing and product nothing is perfect in this world and the same goes for electrical vehicles as well. Also, few are also not sure whether electrical vehicles are good or bad and hence they are neutral when it comes to the use of electrical vehicles in the country. Electrical vehicles offer lot of advantages over conventional petrol or diesel vehicles such as they have low maintenance costs because they don’t have many moving parts as an internal combustion vehicle, their servicing requirements are less in comparison to conventional petrol or diesel vehicles and not only since, they are environment friendly also and it only makes sense to invest in electrical vehicles instead of conventional vehicles. Government should make it their priority that to promote the use of electrical vehicles in India as they are environment friendly, have low maintenance costs and offer several other advantages over conventional vehicles. Government has set this target of having 100% electrical vehicles on road in the country by 2030 and in order to achieve this vision of their they would also need to make sure that they offer some cost advantages, subsidiary to the manufactures of electrical vehicles in order to encourage them to produce more electric vehicles and at the same time they would also need to make sure that they setup sufficient amount of charging points in the country to support the functionality of electric vehicles. Government would also have to make sure that electrical vehicles should be available and should be within the reach of everyone in every part of the country.

ACKNOWLEDGEMENT

I would like to extend our sincerest gratitude to Dr. Avinash Rana for his invaluable support and correcting us out whenever we used to deviate or when we used to commit some mistake while working on the project I do not think it would be just to end such thanks giving without thanking our respondents for co-operating with us. Finally I also extend my heartiest thanks to all my friends and well-wishers for being with me and extending encouragement throughout the project.

VII. LIMITATIONS OF THE STUDY

✓ The scope of this research was limited to the reviews that were there on Youtube.
✓ No separate survey was conducted.
✓ No face to face interviews were conducted
✓ You Tube was the only source of data.
✓ There was no primary source of data.

VIII. REFERENCES


[3] (Mr. A. Rakesh Kumar, 2019) Electric Vehicles for India: Overview and Challenges: by Mr. A. Rakesh Kumar, Dr. Sanjeevikumar Padmanaban.


