NAGINDAS KHANDWALA COLLEGE

OF COMMERCE, ARTS & MANAGEMENT STUDIES

MALAD(W), MUMBAI – 400064

RE-ACCREDITED BY NAAC WITH 'A' GRADE

ISO 9001: 2015 CERTIFIED

Project report on

Study of Consumer's Purchasing Behaviour Towards Electric Vehicles

Presented by:

Rishita Solani

Roll. No:

5030

In partial fulfilment of

T.Y.B.M.S (Marketing)

Semester VI

Project guide

Dr. Mona Mehta

University of Mumbai

Academic year 2021-2022

Malad Kandivli Education Society's
NAGINDAS KHANDWALA COLLEGE (Autonomous)
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Malad West, Mumbai-400064

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DECLARATION BY LEARNER

I, **Ms. Rishita Solani**, student of Nagindas Khandwala College in Semester VI, hereby declare that I've completed this project on **Study of Consumer's Purchasing Behaviour Towards Electric Vehicles** in the Academic Year 2021 – 2022.

The information submitted is true and original to the best of my knowledge.

Date of submission : 28-03-22

RSolani

Signature of student

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CERTIFICATE

This is to certify that **Ms. Rishita Solani** has worked and duly completed her Project Work for the Degree of Bachelor of Management Studies under the Faculty of Commerce. Her project is entitled, **"Study of Consumer's Purchasing Behaviour Towards Electric Vehicles"** under my supervision.

I further certify that the entire work has been done by the learner under my guidance and that no part of it has been submitted previously for any Degree or Diploma of any University.

It is her own work and facts reported by her personal findings and investigations.

Project Coordinator

External Examiner

Principal

28th March 2022

EXECUTIVE SUMMARY

Electric Vehicles are 100 percent green or eco-friendly because they are powered by electric motors. They do not emit toxic gases or smoke into the environment as they operate on a clean energy source. They're even better than hybrid cars because gas-powered hybrids generate emissions.

An electric vehicle (EV) is powered by an electric motor rather than an internal combustion engine that generates electricity by burning a mixture of fuel and gases. Therefore, the vehicle is considered as a possible replacement for current generation cars to address the problem of increasing pollution, global warming, depletion of natural resources, etc. Although the concept of electric vehicles has been around for a long time, it has attracted significant interest over the past decade given the growing carbon footprint and other environmental impacts of fuel-based vehicles.

The purchase behaviour of customers towards EVs, however, is not well understood. The purpose of this paper is to understand the purchase behaviour of customers of an EV charging station operator, in terms of their charging patterns, charging station usage and charging preferences. This study was conducted in an urban setting.

While the majority of new car sales are still petrol powered, the proportion of electric vehicle sales is increasing rapidly. This is primarily due to the cost of ownership being lower for electric vehicles, which has led to a change in consumer purchasing behaviour. As a result, the market share of electric vehicles is growing faster than that of traditional vehicles. This has led to charging infrastructure being developed to support the growing number of electric vehicles on the road today, with the majority of new car owners willing to invest in an electric vehicle for the longer term.

Tesla, Inc. is the world's only mass-market electric vehicle company. Designs manufacture and sells electric vehicles (EV) and EV powertrain components and services. The Company's products target a variety of consumer markets including the ultra-luxury, mid-luxury, mass consumer and emerging markets.

Electric vehicles (EVs) are the future of the transportation industry. They are cleaner, quieter, and more comfortable than their gasoline-powered counterparts. EVs also provide a sense of security and peace of mind knowing that one's vehicle will never run out of power and can be recharged at one's leisure. However, EVs are also expensive, and an EV infrastructure is not nearly as ubiquitous as a gasoline station network.

Electric vehicles are vehicles that are powered by electricity rather than gasoline. Current electric vehicles range from traditional cars and trucks to buses, motorcycles, and even trains. Most electric vehicles today are powered by batteries, although some are powered by hydrogen fuel cells or by a hybrid system that combines batteries and gasoline. Some electric vehicles can be "charged" using the electricity from a power plant, but others are able to "fuel up" at a series of charging stations across a city, state, or country.

Electric vehicles, or EVs, are a class of vehicles that use batteries instead of gasoline to power their motors and provide transportation. EVs have been in use since the 19th century, but in recent years, they've become more common due to technological advancements in battery capacity and electricity generation. EVs are being used in a variety of ways: some people use them as a primary means of transportation, others use them as a secondary vehicle, and some use them as a means of reducing their gasoline consumption. Some people even use them as a hobby, modifying their vehicles to go faster and farther on a single charge.

This electric vehicle research focuses on the advantages, disadvantages and potential of electric vehicles. This research will give you an excellent background on electric vehicles and what to expect from electric vehicles in the future. It will primarily focus on the impact of electric vehicles (EVs) on the power grid. It will help determine how an increase in electric vehicles will affect the grid and will also help determine the role electric vehicles will play in the future of the grid. It will also focus on how electric vehicles can be used to mitigate the effects of climate change. This document also discusses the current status of the power grid.

It was conducted to find out the definition, types, definitions and differences between electric vehicle (EV), plug-in hybrid electric vehicle (PHEV), fuel cell vehicle (FCV) and battery electric vehicle (BEV).The main objective of research is to describe the impact of technology in the automotive industry.

In this project, I will be looking at the various topics that are covered in the Electric Vehicle research field.

TABLE OF CONTENT

CHAPTER 1 :-

INTRODUCTION

CHAPTER 1: INTRODUCTION

Electric automobiles, not like traditional petrol and diesel automobiles, use one or extra electric powered motors for propulsion (driving). Electric automobiles have a battery which is charged through an energy supply. The electric power is then saved and used to strength the electrical motor. It could be powered autonomously with the aid of using a battery (once in a while charged with the aid of using sun panels, or with the aid of using changing gas to power the usage of gas cells or a generator). EVs include, however aren't confined to, avenue and rail vehicles, floor and underwater vessels, electric powered plane and electric powered spacecraft.

There are many varieties of electric powered automobiles along with electric powered motors, electric powered trucks; electric powered buses, electric powered bikes, electric powered trains, electric powered scooters etc. However, among all, production and setting the electrical motors on street is the imaginative and prescient to make India pollutants loose along with saving the valuable petroleum.

Tesla, BMW, Nissan, Chevrolet, Ford, Volkswagen, Kia is the 7 main producer of Electric Vehicles.

Electric vehicles are gaining worldwide interest and acceptance as a promising potential long-term solution to sustainable personal mobility. Transportation sector is responsible for 70% consumption of petroleum products in India. Nation is largely dependent on other countries for rising demand of fuel which affects GDP (Gross Domestic Product) of the nation. Hence in near future it is expected that the adoption of electric vehicles will increase significantly.

The marketplace is developing greater after the implementation of FAME (Faster Adoption and Manufacture of Hybrid and Electric Vehicles) scheme in 2015 through Ministry of Heavy Industry and Public Enterprises. The overall EV income in 2018 hit 365,920 Units and anticipated to develop at a CAGR of 36% until 2026. The EV battery marketplace in India is envisioned to be US$ 520 Million in 2018 and forecasted to develop at a CAGR of 30% until 2026. The overall MWh addition in 2018 hit 4. 75 GWh and anticipated to develop until 28.zero GWh through 2026.

Government incentives to growth adoption had been first added withinside the overdue 2000s, inclusive of withinside the United States and the European Union, main to a developing marketplace for the cars withinside the 2010s. Increasing public hobby and attention and structural incentives, along with the ones being constructed into the inexperienced healing from the COVID-19 pandemic, is predicted to substantially growth the electrical car marketplace. The International Energy Agency stated in 2021 that governments have to do extra to fulfil weather goals, inclusive of guidelines for heavy electric powered cars. Electric car income might also additionally growth from 2% of world percentage in 2016 to 30% via way of means of 2030.

Much of this increase is predicted in markets like North America, Europe and China; a 2020 literature evaluation counselled that increase in use of electrical 4-wheeled cars seems economically not going in growing economies, however that electric powered 2-wheeler increase is likely. There are extra 2- and three-wheel EVs than another type.

EV emits 30-80 % much less greenhouse gas whilst as in comparison with Internal Combustion Engine (ICE) Vehicle. EV is known as promising options to motors and could potentially update ICE Vehicles withinside the close to future. China, Europe and the USA are the biggest markets for EV.

The stakeholders that have benefited from the rise of the electronic vehicle in India include technology companies, automakers, and charging infrastructure companies, among others.

And so, this report focuses on key stakeholders in this new industry.

Today, electric vehicle manufacturers, battery manufacturers, component manufacturers, and even electric vehicle drivers and riders must all find a way to work together.

1.1 Origin

E-mobility has arrived in India. In the Indian context, any discourse around Electric Vehicles can't be disjointed from pollutants and their impact, dependence on oil imports, dire want to have extra renewable assets of energy. The automotive enterprise should gain by viewing it now no longer as a threat but as an opportunity. The top information is that policymakers try to noticeably take it into account and the social circle throughout the nation is making EV a buzzword.

EVs first got here into lifestyles withinside the mid-nineteenth century, whilst power become some of the desired techniques for motor automobile propulsion, presenting a degree of consolation and simplicity of operation that couldn't be carried out via way of means of the fuel motors of the time. Internal combustion engines have been the dominant propulsion approach for motors and vans for approximately a hundred years, however electric powered energy remained not unusual in different automobile types, along with trains and smaller motors of all types.

In the twenty first century, EVs have visible a resurgence because of technological developments, and an elevated attention on renewable power and the ability discount of transportation's effect on weather alternate and different environmental issues.

1.2 Need for Electric Vehicles

India needs a transport revolution. The current path of adding more cars running on expensive imported fuels and clogging already crowded cities suffering from infrastructure shortages and severe air pollution is infeasible. The transition to electrical mobility is a promising global strategy for decarbonizing the transportation sector.

India has additionally introduced CO2 emission requirements for vehicles and even though the prevailing energy gadget in India is coal-based energy technology in low carbon eventualities in India could shift toward energy-efficient and decrease carbon-emitting technologies. This vision of the future is also evident in India's INDC communicated to the UNFCCC which incorporates formidable objectives for renewable and nuclear energy technology. Clean energy could create favourable permitting situations for EVs.

EVs have but negligible presence presently in India. The home production of electrical 2-wheelers (E2Ws), electric powered 3- wheelers (E3Ws) and electric-powered cars (E4Ws) have these days all started in the country. There have been almost a dozen home manufacturers of electrical 2-wheelers in 2014. Electric 3-wheelers are assembled by manufacturers withinside the casual area the use of batteries and additives imported from China.

1.3 India's Support to EVs

India is one of the few countries to support the global EV30 @ 30 campaign, which aims to make at least 30% of new car sales into electric vehicles by 2030. India's Glasgow Summit will meet 50% of India's energy needs, including renewable energy, from 1 billion tons of CO2 emissions by 2030 to net zero by 2070. I made a suggestion. The Government of India is developing and promoting India's EV ecosystem by incorporating various ideas such as: Faster adoption and manufacturing (FAME II) program for redesigned electric vehicles. Production-linked incentive (PLI) program for advanced chemical batteries (ACC) on the supply side. The recently launched PLI program for automobiles and auto parts for electric vehicle manufacturers.

As the EV marketplace has grown, so too has the authorities' guide for electric powered cars. The authorities have set a bold goal to boom the share of electrical cars withinside the united states' fleet to 40% with the aid of using 2030. It has additionally initiated numerous applications to guide the acquisition of electrical cars, such as coins grants, coverage schemes and tax exemptions. India has an extended listing of presidency tasks to guide the increase of the electrical automobile marketplace. The authorities have set apart a massive part of investment for electric powered automobile manufacturing, infrastructure, and in addition studies and improvement. It has additionally released numerous schemes and guidelines to assist human beings purchase their first electric powered automobile, along with supplying a tax exemption for electric powered cars with a pinnacle pace of much less than eighty km/h and a battery variety of much less than 250 km. The authorities are likewise making an investment closely in charging infrastructure and different helping measures along with measures to enhance the toll road network.

India has an extended records of helping the improvement and increase of the electrical automobile (EV) enterprise. The United States has a massive fleet of public and personal buses, and has additionally set a bold goal to boom the percentage of electrical buses withinside the united states' fleet to 20% with the aid of using 2030. This is a clean indication of the authorities' dedication to the increase of the EV enterprise withinside the United States. The authorities have additionally given economic guide to respondents shopping their first electric powered automobile, and is running with each home and overseas automakers to construct charging infrastructure withinside the United States.

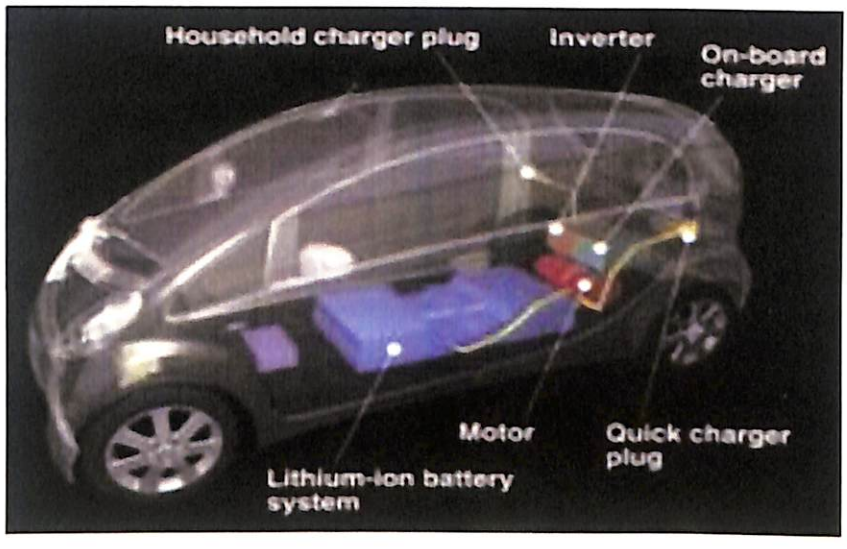
The authorities have performed a key position withinside the increase of the electrical automobile marketplace in India. It has set bold goals for the united states' electric powered automobile fleet, that have created a clean call for electric powered cars. The authorities have additionally invested a full-size sum of money in charging infrastructure, assisting human beings purchase electric powered cars. The result: a speedy increase withinside the electric powered automobile marketplace.

1.4 How does an Electric Vehicle work?

An electric powered automobile is powered with the aid of using an electric powered motor rather than a petroleum engine. The electric powered motor receives electricity from a controller, which regulates the quantity of power—primarily based totally at the driver's use of an accelerator pedal. The electric powered automobile (additionally referred to as electric powered automobile or EV) makes use of electricity saved in its rechargeable batteries, that are recharged with the aid of using not unusual place family electricity.

Thus an electric vehicle will have three basic components :

- Energy Storage Unit
- Controller
- Propulsion system



The power garage unit could have a manner to keep energy. A chemical battery is the maximum not unusual place power garage era currently, despite the fact that it could be different - for example - A gasoline cell (which receives its strength from hydrogen in preference to a battery pack), may be used as opposed to a chemical battery because the power garage unit.

The controller acts as a pipeline or gateway to the electrical motor. The controller will do different matters too - it moderates the energy, may also act as a converter - converts energy from DC to AC, or it'd additionally boom or lower the amperage etc. The controller is the brains of the device.

The electric powered motor, that is the propulsion device, converts the electrical energy and converts this into bodily power for movement.

The complete device is a far simpler, extra green tool than the combustion engine discovered in maximum motors, permitting you to get the maximum mileage on your charge.

Historically, EVs have now no longer been extensively followed due to restricted riding variety earlier than desiring to be recharged, lengthy recharging times, and a loss of dedication via way of means of automakers to supply and marketplace electric powered motors which have all of the creature comforts of petrol-powered motors. That's changing. As battery era improves—concurrently growing power garage and decreasing cost main automakers are anticipated to start introducing a brand-new era of electrical motors.

Electric motors produce no tailpipe emissions, lessen our dependency on oil, and are inexpensive to operate. Of course, the manner of manufacturing the strength actions the emissions in addition upstream to the software company's smokestack—however even grimy strength utilized in electric powered motors normally reduces our collective carbon footprint.

Another component is convenience - Let's now no longer overlook vital points: charging up at domestic approach by no means going to a petroleum station—and electric powered motors require nearly not one of the maintenances, like oil modifications and emissions checks, that inner combustion motors require.

Electric vehicles broaden their maximum torque from 0 rpms—which means fast (and silent) 0-to-60 acceleration times. This means that the performance of a vehicle with a 100-kW electric motor exceeds that of a vehicle with a 100-kW internal combustion engine, which can only deliver its maximum torque within a limited range of engine speed.

1.5 Electric Vehicles in India

India will be at leading edge of studies in EV technology because it does not have an excessive oil endowment and has a big home marketplace that can assist in gaining enjoy in technology.

There are four types of electric vehicles available:

- **Battery Electric Vehicle (BEV):**Fully powered by electricity. These are more efficient compared to hybrid and plug-in hybrids.
- **Hybrid Electric Vehicle:**
    - **Hybrid Electric Vehicle (HEV):** The vehicle uses both the internal combustion (usually petrol) engine and the battery-powered motor powertrain. The petrol engine is used both to drive and charge when the battery is empty. These vehicles are not as efficient as fully electric or plug-in hybrid vehicles.
    - **Plug-in Hybrid Electric Vehicle (PHEV):** Uses both an internal combustion engine and a battery charged from an external socket (they have a plug). This means the vehicle's battery can be charged with electricity rather than the engine. PHEVs are more efficient than HEVs but less efficient than BEVs.
- **Fuel Cell Electric Vehicle (FCEV):**Electric energy is produced from chemical energy. For example, a hydrogen FCEV.

Examples:

- Fully electric cars - Hyundai Kona Electric, Tata Nexon EV 2020,Mercedes Benz EQC, etc.
- Motor cycles - Kabira Automobile, SVM Prana, Earth Energy (to be launched), etc.
- Scooters - Ather Energy, Hero Electric Photon 48V, Okinawa Praise, etc.
- Rickshaws - Lactrix Motors (Andaaz E Rickshaw), Entice Impex Pvt Ltd (Gatti E-rickshaw), Mahindra Treo, etc.
- Cargo three-wheeler - Ele by Greaves, Mahindra Electric Treo Zor, Altigreen Propulsion Labs neEV Flatbed, etc.
- Vans - Force Motors, Mahindra & Mahindra (Supro), etc.
- Heavy duty trucks, semi-trailer and tractor trucks - Infraprime Logistics Technologies Pvt. Ltd.
- Buses - Ashok Leyland, Tata Motors, Goldstone Infratech, etc.
- Mini pickup truck - Croyance Automotive, ELECRO 1.t India first electric cargo light truck, Mahindra eSupro cargo, Tata Motors, etc.
- Tractors - Cellestial E-Mobility.
- Railways – Electric Locomotives.
- Solar-electric boat – Aditya from NavAlt.
- Conversion of old vchicles in to battery vehicles - E-trio Automobiles for Maruti Alto and Maruti Wagon R, Nothway motorsports for Tata Ace Gold, MAuto Electric Mobility (First in India to introduce Retrofit EV Vehicles in Auto rickshaw category)
- Hybrid cars – Toyota Prius, Maruti Suzuki Swift, BMW i8, etc.

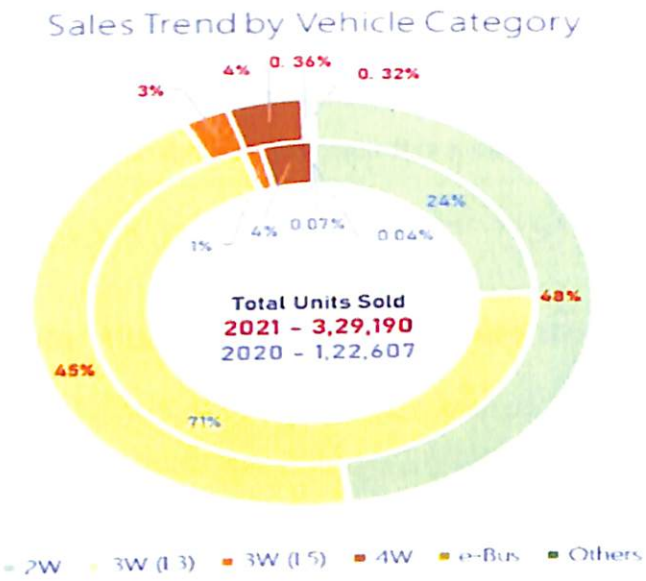
The vehicle segment wise contribution in 2021 was:

Electric 2W's – 48%

Electric L3 – 45%

Electric L5 – 3%

Electric 4W's – 4%



1.6 Electric vehicles Sales in India

Between 2001 and 2011, the percentage of families proudly owning motors extended through 88 % and 2-wheelers through 79%. Despite the increase in car possession, the auto possession became most effective 15.7 motors in step with a thousand folks and the 2-wheeler possession became 81.7 in step with a thousand folks in 2010. This is low in comparison to a far better level of car possession in a maximum of the evolved countries (World Bank, 2014).

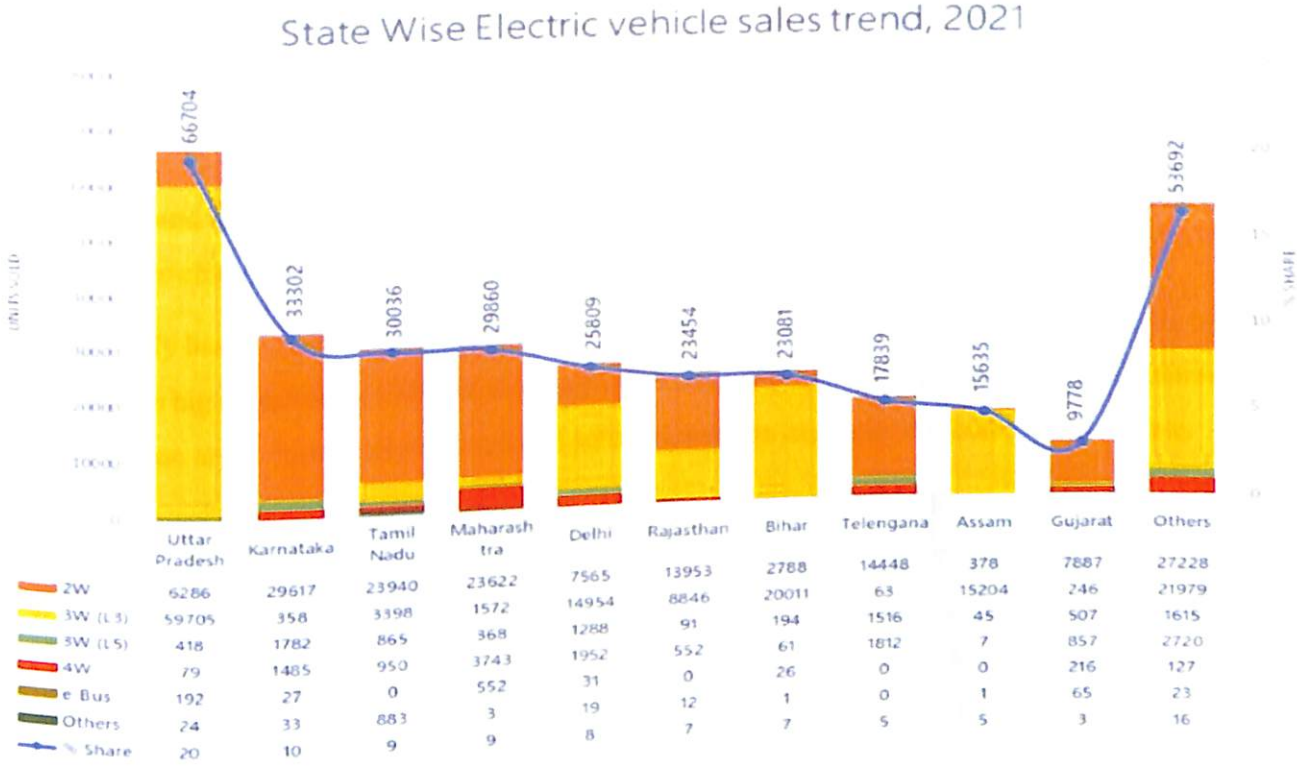
In financial year 2021, the leading type of electric vehicles sold in India was two-wheelers, reached around 144 thousand units. This was a five percent decrease from the previous year's 152 thousand units. The only section that saw growth was four-wheelers.

The EV enterprise in India has modified lots withinside the remaining year. Sales of electrical automobiles withinside us of a are on the rise. Although the bottom of the enterprise isn't always as deep-rooted yet, the hobby of shopping for EVs has notably increased. As consistent with a document withinside the Economic Times, EV income has sky-rocketed through 3 instances withinside the first 1/2 of the continuing fiscal.

More than 1.18 lakh EV gadgets had been bought in H1 FY22. This incorporates 58,264 electric-powered 2-wheelers in addition to 59,808 3-wheelers. Additionally, the income boom of ICE (inner combustion engine) vehicles has dipped.

Overall there's a surge in EV demand and supply in the country. Reasons using income had been attributed to many elements which include patron outreach, falling battery prices, advanced charging infrastructure, and of the route the growing fuel.

In April, Union Minister Nitin Gadkari had claimed that India will become the number one EV maker in the world in a few years. "India is moving ahead towards making electric vehicles. In due course of time we will be the number one electric vehicle maker in the world. All reputed brands are present in India. E mobility will be the important tool to develop pollution-free transport," Gadkari had said.



With 66,704 units sold in India, Uttar Pradesh has the highest share (20%) of the Electric Vehicles sold.

Karnataka, Tamil Nadu, Maharashtra, Telangana, and Rajasthan have the highest sales share (67%) of all the high-speed 2W vehicles (high speed) sold in 2021.

Uttar Pradesh, Bihar, Assam, and Delhi have the highest L3 category e3-Wheeler sales, accounting for approximately 75% of total sales while the highest number of high-speed L5 category e3-Wheelers are sold in Telangana, Karnataka, and Delhi.

Maharashtra has the highest electric 4W sales for 2021, with 3743 units (26%), followed by Delhi and Telangana. each with around 1900 units (13%) sold. Maharashtra and Gujarat have the highest e-Bus sales in 2021, with 552 (47%) and 216 (18%) units sold respectively.

1.7 Technologies and Policies for electric vehicles

Electric automobiles have received interest of coverage makers and car producers globally. However, as proven in numerous different studies, elements influencing EV marketplace encompass excessive battery expenses , monetary incentives, charging infrastructure, and neighbourhood production. The authorities have currently introduced call for incentives for electric powered automobiles under the Faster Adoption and Manufacturing of Electric Vehicles (FAME) program.

Battery technologies are also undergoing multiple transformations which would be able to address the cost, driving range, and speed-related barriers. Presently, lithium ion (Li-ion) battery is the favoured alternative for EVs because of its more than one benefits inclusive of excessive power density, lengthy cycle lifestyles and excessive charging and discharging price capability.

EVs primarily based totally on superior battery technology can achieve a quicker discount in expenses but could require big investments in R&D, demonstration tasks and switch of generation. In the reference state of affairs those aren't completely realised and subsequently the expenses discounts are moderate.

EV technology to be had presently display an extensive version of their expenses and performance. EV 2-wheelers for instance with a low payload ability and with a restricted using variety may be acquired at low expenses while EV-2 wheeler variations similar to conventional 2-wheelers are rather greater high priced. To deal with this generation diversity, the reference state of affairs assumes that the much less high priced EVs with using variety limitations (e.g. electric powered 2-wheelers primarily based totally on lead acid batteries) can play a function inside towns in which journey lengths are shorter. However those technologies will now no longer be viable for inter-town delivery. Therefore, those much less high-priced technology are restricted to city delivery call for. Advanced and greater high priced generation options, e.g. respondents with a better using variety are made to be had for each city and inter-town delivery.

Besides EV 2-Wheelers and EV 4-Wheelers, EV 3-Wheelers have proven a speedy increase in current years and that they have taken percentage from each the cycle rickshaws and 3-wheelers powered with the aid of using diesel, gas and CNG. The charge of less expensive electric powered 3-Wheelers is under USD six hundred that's an awful lot under the value of traditional 3-wheelers. The electric powered 3-Wheelers have consequently been assumed to update all of the traditional 3-wheelers put up 2020.

1.8 Is India ready for Electric Vehicles ?

Every coin has two sides. Same ways everything in this world has an positive as well as negative impact.

The positive impact will be, Yes, India is ready. India has been production indigenously and efficiently the use of Electric Locomotives that pull teach coaches with heaps of heaps of load. This has now no longer handiest stored traditional gas like coal, diesel however has additionally stored the surroundings from getting polluted further.

Accordingly, production and the use of the electrical automobiles isn't always a huge hurdle. According to a document through NITI Aayog, India can store 64% of predicted passenger road-primarily based totally mobility-associated strength call for and 37% of carbon emissions in 2030 through pursuing a shared, electric powered, and linked mobility future. This could bring about a discount of 156 mega toe in diesel and petrol intake for that year. At USD 52/bbl. of crude, this will mean an internet financial savings of approximately Rs 3.nine lakh crore (about 60 billion USD) in 2030.

These figures actually suggest a pressing requirement for substitute of traditional cars with electric powered cars. Whilc distinguishcd producers including Maruti Suzuki India, Hcro Electric Vehicles, Mahindra and Mahindra arc already registered electric powered producers in India, present day collaborations including Suzuki and Toyota, are making plans to release electric powered cars in India. On the equal strains India's first EV producer Mahindra and Mahindra has solid a partnership with Ford to broaden electric powered mobility answers which can be low cost for the Indian consumers.

Among the world's 20 maximum polluted towns withinside the world, thirteen are in India. Vehicular pollutants are one of the main members to air pollutants. India is withinside the organization of nations that has the very best particulate matter (PM) stages. Its towns have the very best stages of PM10 and PM2.five (debris with diameter of 10 microns and 2.five microns). These figures are six instances greater than the WHO "safe" restriction of 25 micrograms and constitute the exigency for Electrical Vehicles.

As a signatory to the Paris weather agreement, India is obligated to convey down its proportion of world emissions through 2030. Thus the authorities of India are making key tasks including release of National E-Mobility Programme, making plans tips to inspire using such cars through NITI Aayog etc. to sell EVs in India.

And the negative impact will be, No, India isn't always equipped: More Indians decide upon petrol, diesel or fuel line pushed vehicles. They do now no longer appear to be equipped to shop for and use the electrical vehicles because of their gradual choose up, gradual velocity and non-availability of electrical charging centres withinside the area in their area.

As according to the facts of Society of Manufacturers of Electric Vehicles, handiest 22,000 devices of EVs had been offered in India with the aid of using March 2016, of which 2,000 had been 4 wheelers. At the equal time, income of electrical vehicles grew at an astounding price of 94% from 2011 to 2015 worldwide, led with the aid of using China, US, and Europe.

Just after 9 months of the release of Ola's bold Electric Vehicle assignment in Nagpur, it confronted principal roadblock with Ola drivers trying to go back their electric powered vehicles and transfer lower back to petrol or diesel variants. The purpose being excessive working costs and lengthy wait instances at charging stations. In 2015, the authorities had released Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME), a scheme that supplied incentives for smooth gasoline era vehicles with the lengthy-time period goal of boosting their income.

However, notwithstanding incentives as excessive as INR 140,000 on a few vehicles, the scheme obtained a lukewarm reaction. Sales of electrical and hybrid vehicles contributed to handiest a fragment of the three million passenger cars offered in India in 2016. India lacks widespread infrastructure and important era to guide Electric Vehicle manufacturing. Efficient additives consisting of excessive-density batteries stay a key project.

A strong deliver environment of charging stations is every other project for Electric cars. Though the marketplace in India has given a tepid reaction to electric powered cars however there exists large possibility for the increase of electrical cars. The authorities of India are devoted in the direction of adoption of Electric Vehicles for a purifier and greener environment. Robust helping infrastructure with decrease tax on EVs should assist to acquire the dream faster.

1.9 Benefits of Electric Vehicles

1) Cost Effective - With introduction of boost generation and committed R&D, each value and protection of electrical automobiles has long gone down. Government is incentivizing using Electric Vehicles through offering subsidies and decrease motor taxes on EVs. Another major benefit electric vehicles have over traditional internal combustion engines is the cost of ownership. For example, if you look at the Hyundai Kona, it can travel around 450 kilometreses on a single charge and the running costs are even reduced to less than US$1/km.

2) Environment Friendly - Electric Vehicles are a hundred percentage eco-friendly. They do now no longer emit poisonous gases or smoke withinside the surroundings which results in international warming and enables to lessen pollution. If you are planning to use or buy an electric car, it is certainly good for the environment. The land is deforested, the land is healed, and now it's imperative that we take the environment into account when making decisions. Because there are no emissions, you can reduce your carbon footprint. Electric vehicles are one of the most sustainable means of transport on the market today.

3) Energy Security - As strength is majorly comprised of both renewable reasserts or from reassets that emit no greenhouse gases for this reason EVs assist in keep electricity safety through transferring dependence from non- renewable assets to renewable assets.

4) Less Maintenance - Electric automobiles require much less upkeep than traditional automobiles as there are fewer fluids (like oil and transmission fluid) to extrude and less shifting parts. The first and most important reason why you can buy an electric car is the cost of protection. When you buy a car with an internal combustion engine. It has higher mechanical components, so you may encounter more complex and protection problems. And because of its simple form and ease of use, it costs less to store. This is one of the main benefits of having an electric car in India.

5) Reduction in Noise pollution - Electric automobiles are quieter to function than gasoline-powered automobiles, main to discount in noise pollution. Another advantage of electric cars over current cars is safety. Common sense is simple, there's no engine under the hood so there's no noise. The motor system is so quiet that you can even leaf through the e-book in it. Considering the realistic and silent side of the car interior, electric cars can generally provide a more comfortable experience because of their completely silent operation. Manufacturers need to transmit false sounds so that passers-by are not afraid of them.

6) Fuel Price Increase - When buying an electric car, you don't have to worry about daily fluctuations in petrol and diesel prices. Although the government adjusts fuel prices to world market prices, you don't have to worry anymore.

7) **Easy Home Charging** - the crowds show up at gas stations during rush hour. If you want to fill up on the way to work, you can sometimes be late. If in this case you only need to connect the car, then an electric car has a great advantage. It takes 45 hours to get home and then you can move. Yes, if you have an electric car, your home can be your gas station! The only downside, in this case, is that if one day you forget to plug the machine into the socket, this will appear. Modern electric cars are also equipped with a fast-charging function, which you can load in 60 minutes.

8) **Easy to drive** - All electric cars, from electric scooters to electric buses, are gearless. Yes, electric cars are interesting because you don't have to control the switching mechanism. A set of buttons or pedals can increase or decrease speed, nothing more. If you think a petrol/diesel automatic car gives you the same convenience, then we have more advantages than buying an electric car.

9) **Government Incentives** - the advantages of shopping for an electrical automobile don't seem to be restricted to the car itself. currently the Delhi government conjointly needs you to shop for an electric car as a result of electric cars are the future. The Delhi government recently introduced a replacement electric vehicle policy that may permit you to urge a lot of benefits up to Rs.150,000.

1.10 Associated Challenges

1) **Battery Manufacturing:** It is anticipated that through 2020-30 India's cumulative call for batteries might be about 900-1100 GWh. However, there may be challenge over the absence of a production base for batteries in India, main to sole reliance on imports to fulfil growing call for. As in keeping with authorities' data, India imported extra than $1 billion really well worth of lithium-ion cells in 2021, despite the fact that there may be negligible penetration of electrical motors and battery garage withinside the energy sector.

2) **Insufficient charging stations:** In 2018, it was reported that there were only 650 charging stations in India. This is significantly less than the neighbouring charging stations that already had over 5 million charging stations. Due to the lack of charging stations, it is inappropriate for consumers to cover long distances. In addition, it can take up to 12 hours to fully charge the vehicle at the owner's home using a dedicated small slow charger. Also, the cost of a basic electric vehicle is much higher than the average price of a vehicle running on traditional fuel.

3) **Policy Challenges**: EV manufacturing is a capital-intensive sector and requires long-term planning to reach the break-even point and generate profits. Uncertainty in government policies related to EV production has discouraged investment in the industry.

4) **Lack of Technology and Skilled Labour:** In India, there are technical flaws in the production of electronic devices that form the backbone of the EV industry, such as batteries, semiconductors and controllers. EV maintenance costs are high and require a higher level of skill. India does not have a dedicated training course for such skill development.

5) **Unavailability of Materials for Domestic Production:** Batteries are one of the most important components of electric vehicles. India does not have known reserves of lithium and cobalt needed to produce batteries. Reliance on other countries for the import of lithium-ion batteries is an obstacle to being completely self-sufficient in battery manufacturing.

6) **Economic** - The economic challenge is a major challenge of EV in India. In the developing nation EV adoption and large market growth is difficult. Economic challenges have different aspects. Although gasoline and diesel are costly than electricity due to their high initial investment of EV, the price are more. Since the systems of EV is not matured enough and most of the assembly process are to be done manually, mass production of the expensive parts of EV are still not economically justified, causing the selling price to be expensive in order for the company to maintain a healthy profit margin. Indian population consist of middle-class respondents and the respondents may find difficult in high initial investment.

7) **Low Mileage** - One of the foremost drawbacks of owning an electric-powered automobile is that it does not offer sufficient mileage to take customers to their destination. On one hand, in which traditional motors may be refuelled at petrol stations, electric-powered motors do not have such regularized infrastructure. Also, it takes as much as an hour to charge 80% of the automobile which is honestly a protracted wait and because of this drawback, maximum Indians no longer choose to wait and charge up their motors.

8) **Environmental** - EV reduces the emission gases. But the power generation method for charging EVs additionally produces greenhouse gas emissions. The emission of greenhouse gases into the surroundings reasons worldwide global warming [27]. The processing and manufacturing of electricity garage structures as well because the disposal of electrochemical batteries can also additionally cause respiratory, pulmonary, and neurological diseases. Therefore, protection measures have to be taken into attention all through the manufacturing of electricity garage structures, in particular, the batteries. EVs aren't totally smooth from emission in the course of its existence cycle however with the improvements in production era and utilization of opportunity energies, the general environmental impact may be reduced.

1.11 Solutions to overcome these challenges

1) **Electric Vehicle as Way Forward:** EVs help improve the overall energy security situation, as the country imports more than 80% of total crude oil demand, worth about $ 100 billion. The promotion of electric vehicles is also expected to play an important role in creating jobs in the local electric vehicle manufacturing industry. In addition, through multiple grid support services, EVs are expected to help strengthen the grid and enable higher penetration of renewable energy while maintaining safe and stable grid operations.

2) **Opportunities for Battery Manufacturing and Storage:** Given the recent technological turmoil, battery storage offers a great opportunity to promote the country's sustainable development, given government initiatives to promote electrical mobility and renewable energy (until 2030). With increasing per capita income, there is a great demand for consumer electronics in areas that require batteries with advanced chemistry, such as mobile phones, UPS, laptops and power banks.

3) **EV Charging Infrastructure**: EV charging infrastructure that draws power from the local power supply can be installed in homes, utilities such as gasoline and CNG dispensers, and parking facilities in commercial facilities such as shopping malls, stations and bus stops. The Department of Energy requires that at least one charging station be installed on each side of the freeway every 3km and every 25km. The Ministry of Housing and Urban Affairs requires that 20% of parking space be reserved for electric vehicle charging facilities in residential and commercial buildings.

4) **Increasing R&D in EVs:** The Indian market needs to encourage unique technologies suitable for India from both strategic and economic perspectives. It makes sense to use a local university or existing industrial centre, as lowering prices requires investment in local R & D. India should work with countries like the United Kingdom to synergize the development of electric vehicles.

1.12 Increasing Scope

EVs can deliver broader developmental advantages and additionally assist in decreasing CO2 emissions. Studies display that electric-powered cars can enhance power performance, lessen air pollutant emissions, growing penetration of renewables , and decrease CO2 emissions withinside the lengthy-term. The reports range throughout nations e.g., in a country with power inefficient and CO2 in-depth energy generation quarter the shift to EVs may also neither enhance performance nor lessen CO2 emissions.

No one can deny that the automotive industry has come a long way in India. Today, roughly a quarter of the country's passenger vehicles are electric, a number expected to grow to 40% by 2027. And yet, the pace of change has been hard to keep up with. As the scope of the electronic vehicle has increased, so too have the number of stakeholders in the transportation ecosystem.

In the next decade, India is expected to more than quadruple its electric vehicle (EV) fleet, which currently stands at around 100,000 units. This rapid growth has already begun to reshape the country's transportation landscape. The share of new cars sold as electric has jumped from less than 1% in 2017 to nearly 5% in just one year.

The truth lies somewhere in between these extremes: the increasing scope of the electronic vehicle in India is already having a significant impact on the country's transportation landscape, and it's likely to continue to do so in the years to come.

The push for Electric Vehicles (EVs) is driven by the global climate agenda established under the Paris Agreement to reduce carbon emissions in order to limit global warming. The global electric mobility revolution is today defined by the rapid growth in electric vehicle (EV) uptake. About two in every hundred cars sold today are powered by electricity with EV sales for the year 2020 reaching 2.1 million. The global EV fleet totalled 8.0 million in 2020 with EVs accounting for 1% of the global vehicle stock and 2.6% of global car sales. Falling battery costs and rising performance efficiencies are also fuelling the demand for EVs globally.

1.13 Impact of Penetration of electric vehicles in India

Currently, the EV marketplace is extraordinarily small in India. The sale of electric-powered automobiles has ended up dormant at 2000 units for the previous two years. But there may be an imaginative and prescient for 100% electric-powered vehicles sales by 2030. The compound annual increasing rate of EV is 28.12%. India's first electric-powered vehicle Reva (Mahindra), became delivered in 2001 and seeing that, its launch, it is able to promote some more units. In 2010, Toyota started the Prius hybrid model, followed by the Camry hybrid in 2013. Electric buses and hybrid cars have been started as pilot thought in a few cities.

The Bangalore Municipal Transport Corporation recently commenced electric-powered shipping on a dense corridor withinside the city. A survey was carried out in Ludhiana city, which validated that 36% of the prevailing vehicle and two-wheeler proprietors were interested in transferring to electric-powered cars. Telangana State Government is likewise encouraging the use of EVs introduced that the EV proprietors could now no longer pay any street tax.

Hyderabad metro rail may be the primary metro rail withinside the country to have EVs charging stations to be monitored and operated via way of means of the electricity grid. Hyderabad government is likewise taking into consideration changing diesel-run public transport motors with electric powered motors. This year, the New Delhi government was given approval for putting in place 131 public charging stations withinside the capital. In November 2018, the Delhi Govt. launched a draft coverage aiming to transform 25% of their motors to EVs via way of means of imparting numerous incentives and via way of means of putting in place charging infrastructures in each residential and non-residential area. This coverage is meant to expand a charging factor at each three km by offering a subsidy of 100% (as much as INR 30,000) and waiving out the street tax, parking charges, and registration rate for EV by 2023. In Mumbai-Pune highway, a private company named Magenta Power is likewise operating for putting in place EV charging infrastructure.

India is poised for a dramatic shift in its transportation landscape. The United States of America is on target to come to be the world's biggest marketplace for electric-powered cars, way to authorities mandates and plummeting battery costs. But the influences of this shift are a way from clean. Some say that electrification will assist the United States of America cope with its air pleasant and power safety woes, even as others declare the United States of America will squander its possibility to expand a sturdy economywide easy power machine.

The electric powered automobile revolution has been gradual to seize on in India. The United States of America has handiest a small handful of charging stations, and maximum electric powered cars are imported. But that is beginning to change. The authorities are making an investment in charging stations and different infrastructure, and a few corporations are beginning to manufacture electric powered cars in India.

EV technologies, because of their boundaries in using the range, are greater appropriate at gift for the city using wherein ride lengths are shorter in comparison to intercity travel. Hence, the passenger transport demand in this is separated among city and intercity shipping.

Electric cars, or EVs, were the challenge of an awful lot dialogue lately, mainly in India. It isn't always without reason. The Indian authorities has set a formidable goal to growth the share of electrical cars withinside the United States of America's fleet to 40% through 2030. This would require a fast penetration of EVs withinside the United States of America, which has the capacity to result in a paradigm shift withinside the Indian economic system and society.

Electric cars are unexpectedly gaining momentum in India. From authorities' projects to assist human beings purchase their first electric powered automobile, to automakers presenting a huge variety of electrical models, it's miles clean that the United States of America is prepared for electrification. This has had a large effect at the automobile marketplace, with electric powered cars now accounting for a good-sized element of latest automobile income withinside the United States of America. In the beyond yr. alone, the electrical automobile marketplace has grown tremendously, with the penetration of electrical cars withinside the United States of America growing significantly.

Electric cars have the capacity to seriously lessen our reliance on fossil fuels and our emissions of greenhouse gases. As their percentage of the marketplace increases, they may have even greater a ways-achieving influences, along with decreasing our dependence on oil and the associated geopolitical tensions, enhancing our air pleasant, and making our transportation machine greater efficient. The fast growth in electric powered automobile income we've got visible withinside the beyond few years is beginning to have a good-sized effect on our power and transportation systems. This is handiest the start of the influences we can see as we retain to growth the percentage of electrical cars in our transportation machine.

1.14 Future of Electric Vehicles in India

In 2020, Norway recorded that about 74.8% of vehicles in the country were electric vehicles and very few were conventional. According to WEF analytics, Norway's highest share of plug-in EVs is because of policies like--tax exemptions, toll exemptions, and other incentives. Norway has more electric vehicles per capita than any other country.

Electric Vehicle adoption has progressed in the past decade. As per the World Economic Forum report in collaboration with Statista, global electric vehicle sales have risen 30% almost every year of the past decade. Despite difficult circumstances and the Covid pandemic's negative impact on the automotive industry, electric vehicles made a giant leap forward in many countries in 2020. Falling battery costs and rising performance efficiencies are also fuelling the demand for EVs globally.

In the same way, the future of India is also going to be Electric Vehicles.

India is the fifth largest car market in the world and has the potential to become one of the top three in the near future — with about 40 crore customers in need of mobility solutions by the year 2030. To ensure a positive growth rate towards achieving India's Net Zero Emissions by 2070, a transportation revolution is required in India which will lead to better "walkability", public transportation: railways, roads and better cars. Many of these "better cars" are likely to be electric. Lately, there is a growing consensus among automotive professionals and the public alike that the future of vehicles is electric. However, in this regard, India still has a lot to cover in terms of battery manufacturing, establishing charging infrastructure etc.

The future of electric vehicles in India looks bright. The government has taken several steps to promote the use of electric vehicles, such as offering incentives for the purchase of electric vehicles and offering free charging points at public places.

With the government focusing on promoting electric vehicles, more respondents are likely to switch to buying electric vehicles in the future, which will increase the demand for charging infrastructure. This, in turn, will increase the profits of companies that provide charging infrastructure, such as charging station manufacturers.

The government is also working to expand the country's charging infrastructure so that electric vehicles have sufficient charge to reach their destinations.

The future of electric vehicles in India looks promising. The surge in the adoption of electric vehicles will have a significant impact on the country's energy landscape and the auto industry. The government's push for electric vehicles will also create a huge demand for charging infrastructure that will benefit charging companies like Zap-charge and electric vehicle manufacturers like Mahindra.

CHAPTER 2 :-

RESEARCH METHODOLOGY

CHAPTER 2: RESEARCH METHODOLOGY

The study explores consumer's purchasing behaviour towards Electric Vehicles. Electric Vehicles (EVs) have been making headlines in recent years. They offer numerous benefits, such as zero emissions, lower operating costs, and increased convenience. However, they also have drawbacks, such as higher initial costs, limited range, and long charging times. Despite these disadvantages, many people still choose to buy EVs because they are better for the environment and help reduce their carbon footprint. However, over the last decade, the field of electric vehicles has expanded to encompass a wide range of fields, including economics, politics, and sociology.

The research has been framed in a systemic manner. Researchers have been studying the effects of electric vehicles on the environment for years. The methodology of electric vehicles research has evolved over time as technology has advanced and data has become more readily available.

2.1 Statement of the problem:

The problem statement for this research is **"The study of consumer's purchasing behaviour towards Electric Vehicles"**

2.2 Objectives of Research:

The research has been based to explore the consumer's purchasing behaviour towards Electric Vehicles.

The objectives of this research project are:

- To study the behaviour of consumers who already bought or are going to buy an Electric Vehicle (EV) in the near future.
- To know and understand the importance of Electric Vehicles.
- To know how Electric Vehicles gain it's brand image just in few years.
- To evaluate the advantages and disadvantages of Electric Vehicle in India.
- To analyse the effects and impacts of Electric Vehicles in India.
- To create awareness on this topic through the research.

2.3 Methodology of Data Collection

The data has been collected through the fundamental sources of information which are described below:

1.Primary source of data

2.Secondary sources of data

- **Primary source**: Primary data is in a raw form of data that is primarily collected by the researcher through various forms like interviews, surveys, observing, etc. Primary source of data is the original and the most reliable source of data because here the researcher collects it himself/herself. The data is collected is first-hand. So, the researcher collects it through various medium hence it is in its raw form which is then standardized. Primary research focuses on gathering new data or information, which is then analysed and interpreted.
- **Secondary source**: Secondary source of data is the one that is already collected and systematized for others to derive information from. It is collected through varied sources such as articles, journals, books, reports, publications etc. I have followed the same route and have articulated my research accordingly. secondary research refers to the analysis and interpretation of existing data or information.

2.3.1 Pre-field method

This involves collection of primary and secondary data on the topic from various modes such as surveys, interviews, observations, etc. For the historical background, researcher has mostly relied and referred to secondary data such as books, records, journal articles, websites, etc. Some online journals and articles were also looked into for latest developments.

2.3.2 Field method

Field observation includes qualitative as well quantitative methods data collection. The research collected data by questionnaire method from the age group of 18-60. Methods for obtaining the primary data.

2.3.3 Post field method

The data collected, both primary and secondary, will be processed, assimilated and analyzed with the help of multiple methods. Various statistical tools were used for analyzing the data. A suitable bibliography is prepared to show the references used. As a whole, the research design is qualitative in nature.

2.3.4 Survey method

The survey method that has been used in conducting the aforesaid research has been through questionnaires where the questions were if varied types.

2.3.5 Observation Method

The observation method that has been used is done to understand how something occurs in its natural setting.

2.3.6 Sampling Method

The sampling method that has been used is that of random sampling to avoid any biases that may arrive and to keep the research authentic.

2.4 Scope of Study

The scope of research on electric vehicles is broad and encompasses a variety of different topics. It includes research into the impact that EVs have on the environment, and the climate, as well as research into the impact that EVs have on the economy.

2.5 Limitations of the research

A research is never completed. New things or events can always be there which can be missed out. Research is maybe done for a limited time period but the topic on which it is made is not consistent and continuos changes can take place in the nation. This research is time bounded as it involves a large set of complex variables which require a detailed study over a period of time. Authentic research is difficult to find and then analyze and specifically for a subject topic of this kind which is just in its primary stage of evolution becomes a little difficult for. As said in the previously about the new-ness of this project, I, myself had a very little understanding of this topic. Lack of sample size, for survey the responses that I had received would not suffice for a proficient research project, nonetheless the responses were still insightful. Inability to do a field work because of Covid19, with restriction prevailing, I was unable to reach out to people for a proper study.

2.6 Scope for further research

Further research can be taken on this topic considering all the aspects of brand's influence in various other industry. Consumer behaviour can be studied better with a larger sample size. Extensive research can be carried out for the vastness of the topic and its growing trend globally as well as in India. It can be taken over to the masses with much more diversified background where the availability of not just people but knowledge itself would be limitless.

CHAPTER 3 :-
REVIEW OF LITERATURE

CHAPTER 3: REVIEW OF LITERATURE

Electric vehicles (EVs) are a new technology, so there are few roads upon which to base a literature review. However, there is a wealth of information available on the Internet and in print. 4 persons named Satyendra Pratap Singh, Nitish Sharma, Shukla Ashish Chandrakant and Surendra Pratap Singh of Department of Electrical Engineering, Arya College of Engineering & IT Jaipur, India wrote an Article upon this topic.

In the current scenario, air pollution has become a serious problem for India. According to the latest global report, many cities in India are the most polluted cities. The main sectors that contribute to air pollution are the industrial sector and the transport sector. 51% of air pollution is caused by the industrial sector and 27% by the transport sector. Air pollution contributes to the premature death of 2 million Indians every year. To minimize air pollution, the electric vehicle (EV) can be a boon by reducing greenhouse gas (GHG) emissions. There is a significant threat in the uptake of electric vehicles in India.

Air pollution is one of the biggest threats in the global context and in a country that is the second largest in the world with almost 130 million inhabitants (equivalent to 17.7% of the world population). India has about serious air pollution problems for a decade and is growing at an alarming rate. This is caused by congested traffic, poor road conditions, and old automobile technology and traffic control systems.

The main pollutants emitted by automobiles are hydrocarbons, nitrogen dioxide, lead, carbon monoxide, sulphur dioxide, and particulate matter. According to Ref., the electric vehicle population in India is increasing at a rate of 37.5%. And the government is most focused on electric vehicles and charging stations. For reference, the location of the charging station has been proposed to optimize the charging stations and provide maximum power according to the requirements.

The cost per kilometre of electric vehicles is lower compared to ICE vehicles. There is no denying that many electric vehicles run a third of the cost, as electricity is significantly cheaper than gasoline. And since consumers spend most of their time charging their EVs in the garage, installing solar panels at home can save even more money. Due to the lack of a combustion engine in electric vehicles, their maintenance requirements are lower.

Today there are many more challenges to establish as the future of the electric vehicle. The main function to operate the EV in India is power generation. Without electricity, we cannot imagine an electric vehicle future. Therefore, it increases the responsibility of the distribution network to provide adequate electrical power without interference. This can be possible through proper network monitoring.

The main hindrance behind the business viability of work units in Republic of India is insufficient charging infrastructure. India solely had 650 charging stations in 2018, whereas China had over 456K charging points within the same year. one more reason making anxiety is charging time. charger potency consistent with the presently on the market technologies everywhere the world varies in share from low 70s to high 90s. Range anxiety is one among the foremost vital roadblocks to EV adoption. EVs usually have a shorter range that causes charging concern in consumers' minds. At present longest range work unit on the market is Tesla's model S that includes a range of 370 miles per charge. however since Tesla isn't entered the Republic of Indian market therefore Indians don't have reach to the current high range vehicle. EVs available in India do not have a spread of over five hundred kilometre per charge. this {can be} deeply related to the dearth of charging infrastructure within the country, and whereas typical vehicles can be refuelled at fuel stations, such is not the case once it involves EVs.

The electric vehicle market is poised to expand due to the government's ambitious plans and initiatives. 2030. India aims to reduce its excessive oil imports and curb urban pollution in the coming years. electric vehicles will play an important role in achieving this goal.

In 2012, the National Electric Mobility Mission Plan (NEMMP) 2020 was created, under which an incentive program, Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) was introduced in 2015 to reduce the cost of hybrid vehicles and electric. Electric vehicles and promote their market penetration. The FAME program offers a subsidy on the retail price of passenger cars. These subsidies range from INR 11,000 - 24,000 for mild hybrids, from INR 59,000 - 71,000 for strong hybrids, and from INR 60,000 – 1,34,000 for electric vehicles. There are also subsidies for two- and three-wheelers, light commercial vehicles, and buses.

The FAME program subsidy is not the only incentive mechanism impacting the hybrid and electric vehicle market in India. of Delhi) offers tax incentives that favour hybrid and electric vehicles over conventional technologies. According to the latest announcements by Finance Minister Nirmala Sitharaman, during the presentation of the union budget for 2020, the government has increased the import duty on electric vehicles to promote the brand in India.

Regular public events such as a ride-and-drive or electric vehicle Showcase is an effective way to draw a picture Enable media attention and consumers Experience an electric car. as a matter of fact, Studies directly suggest this Experience exchange with electric vehicles Experts are one of the most influential people Source of Information (Williams & Johnson, 2016). Ride and drive, the event described here will at least occur once a year.

Reserves of lithium, a rare metal essential for making electric vehicle batteries, were discovered at Mandya, 100 km from Bangalore. This will be the breakthrough in local EV battery manufacturing. Researchers from the Atomic Minerals Directorate, a unit of India's Atomic Energy Commission, have estimated lithium reserves at between 14,100 tonnes on a small piece of land in District in southern Karnataka. It is estimated that Chile has lithium reserves of up to 8 million tonnes, while 2.8 million tonnes were found in Australia.

Among the EVs that turned heads at the show are Maruti Suzuki's Future and Tata Motors' Nexon EV and Altroz EV. There is no shortage of power generation capacity in India to power these cars, says Rishabh Jain, manager of CEEW. , Centre for Energy Finance, a public think tank. Analysis suggests that commercial and passenger four-wheel-drive vehicles consumed 21.3 million tonnes of gasoline and diesel in 201718. If the distance travelled by these vehicles is covered by equivalent km, then it is estimated that nearly 50 billion units of electricity would have been needed to charge the EVs.

All we need is policy formulation for the installation of charging points, and that would require electric distribution companies to upgrade their transmission infrastructure, for example, to meet the demand for electric vehicles. Experts point out the commercial perspective in this segment. There are several opportunities for energy and battery providers. Even electric vehicle charging stations offer small business opportunities. This could boost the India initiative and provide opportunities for Indian companies. Oil and gas. Another good opportunity to take advantage of is to store excess solar energy in EV batteries that can be sold to the network.

CHAPTER 4

DATA ANALYSIS & INTERPRETATION

CHAPTER 4: DATA ANALYSIS AND INTERPRETATION

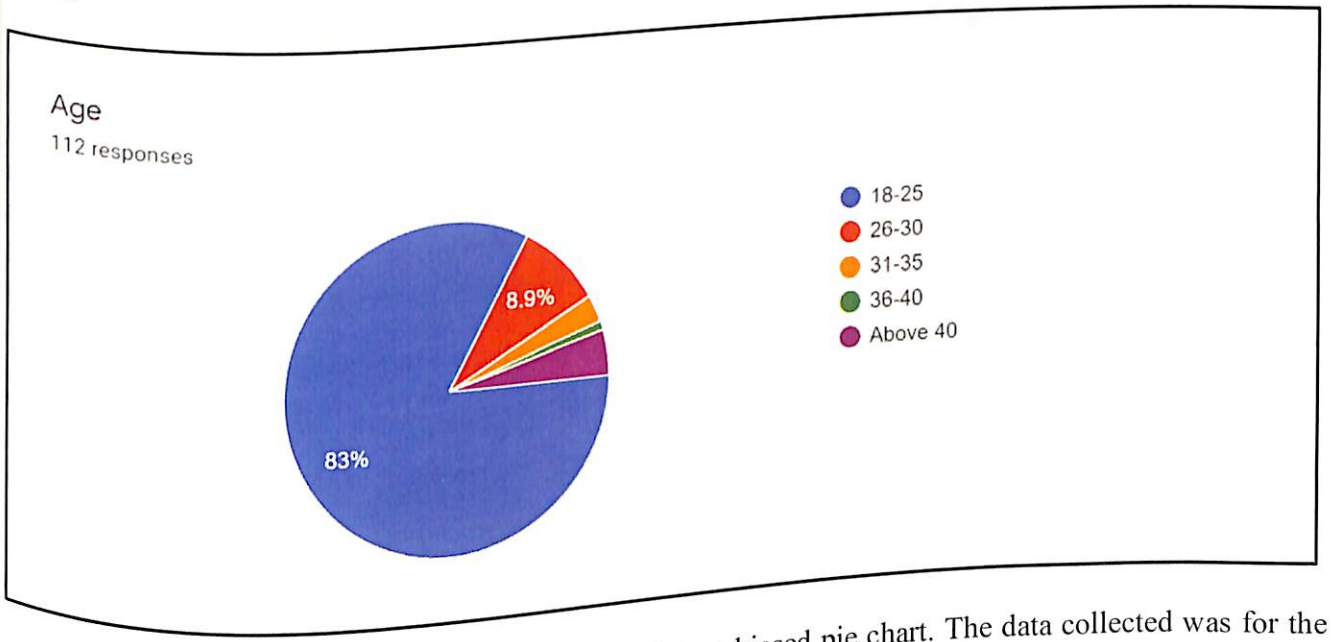
Findings:-

Data which was collected via the questionnaire had a sample size of one hundred and twelve (112) respondents. The respondents belonged to an assortment of age groups which involved teenagers & adults from various fields of occupation. The data collected also shows the clarity and comfortless of respondents in regards to "**Study of consumer's purchasing behaviour towards Electric Vehicles"**

Overall the responses were positive and accurate. Almost everyone of them knew what an Electric Vehicle is. Though they don't have an EV now but many are expected to buy them in the near future. 80 % of them are thinking about its advantage and the perks of buying an EV. Most of the respondents think this will help reduce pollution and will be safe for the environment of India.

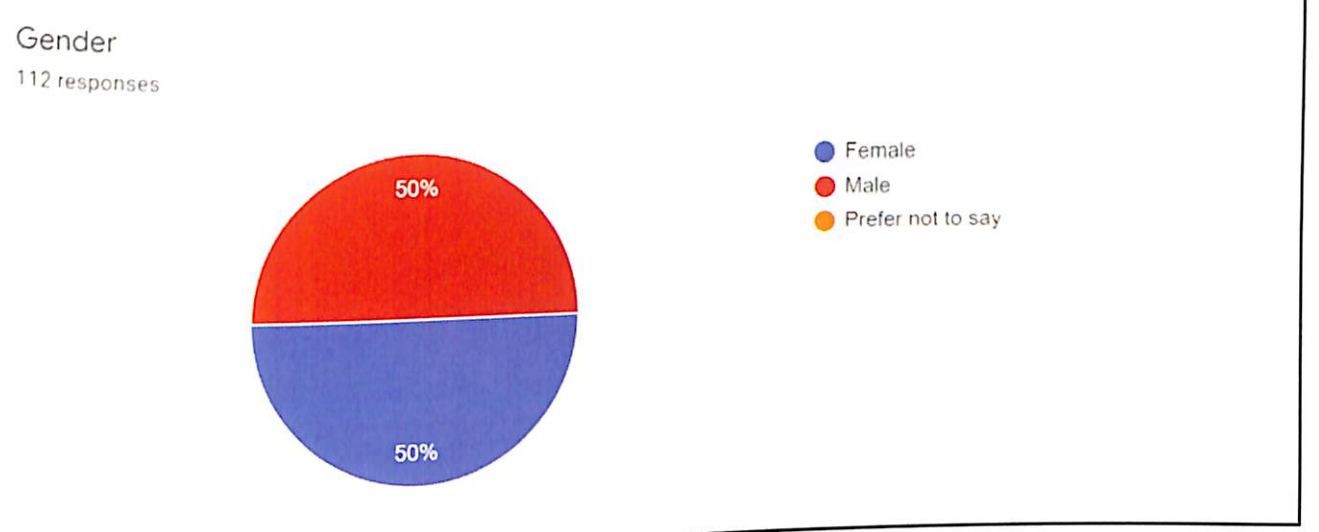
The question's asked in survey and the responses are as follows:

1) Age



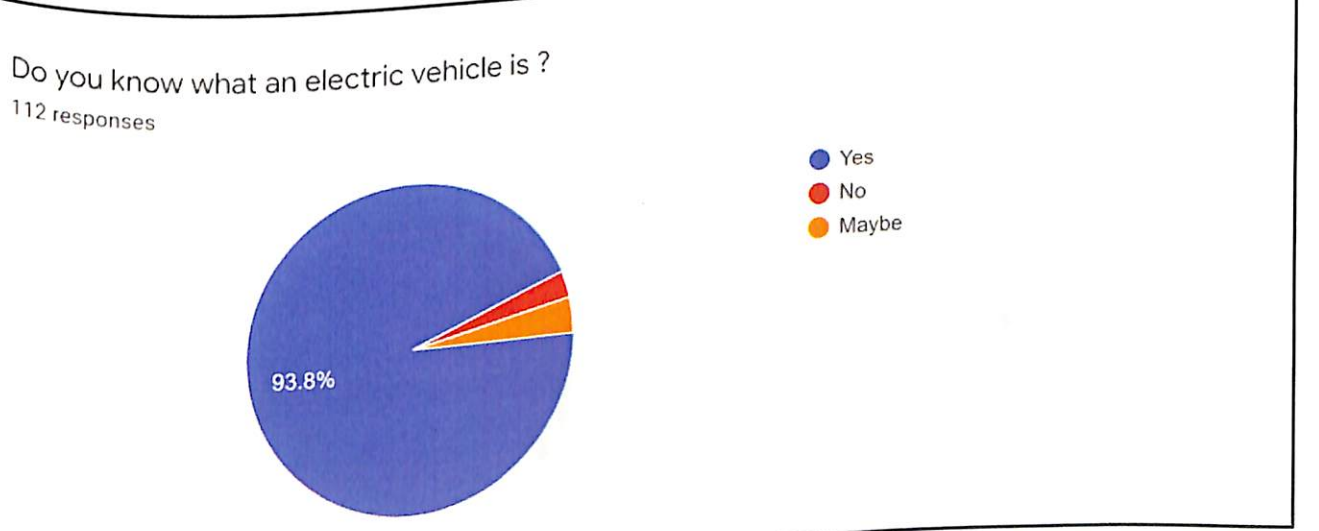
The data collected for age of respondents resulted into a biased pie chart. The data collected was for the determination of the age of respondents. The result displays a majority of 93 respondents (83%) belonging to one major age group 18-25 years. Additionally, it shows that 26-30 years age group has 10 respondents (8.9%) in the pie chart along with 31-35 years age group showing only 3 respondents (2.7%). Further it also has an age group of 36-40 years which shows only 1 person (0.9%) and remaining 5 respondents (4.5%) of the pie chart are of the age group of above 40 years of age.

) Gender



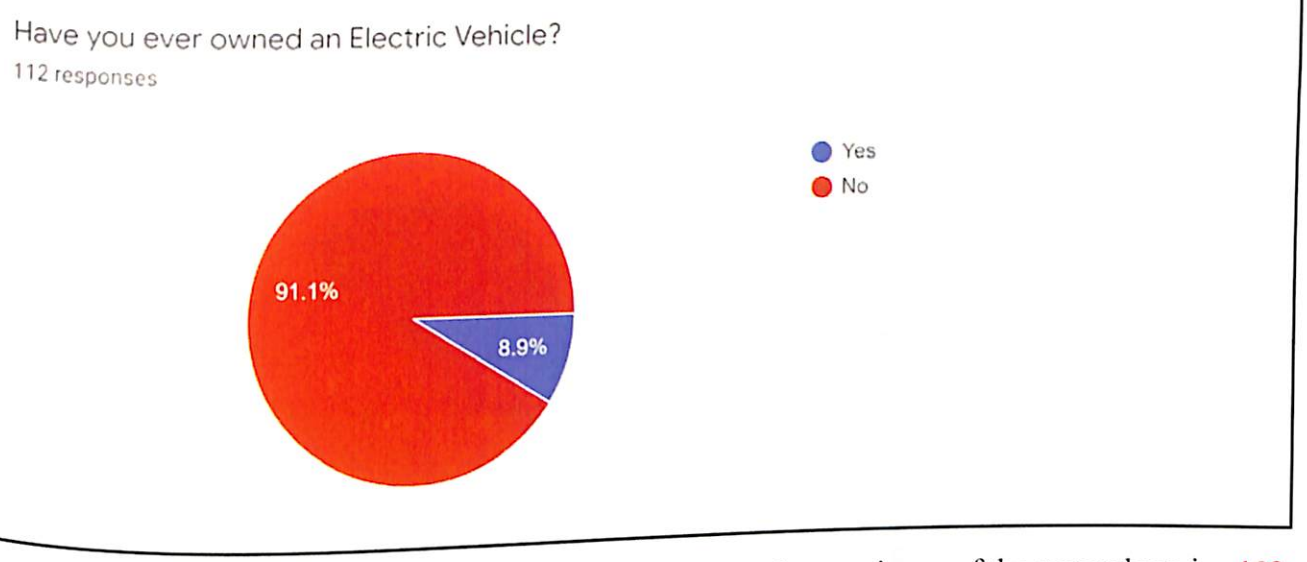
The data collected for gender of the respondents resulted into a balanced pie chart. I passed on my survey form to equal number of men and women because I wanted to know the perceptions of both the genders equally. It shows that 50% of the respondents are male and 50% of respondents are female which is the exact equal ratio. There were none of them who did not prefer to say about what gender they are.

3) Do you know what an Electric Vehicle is ?



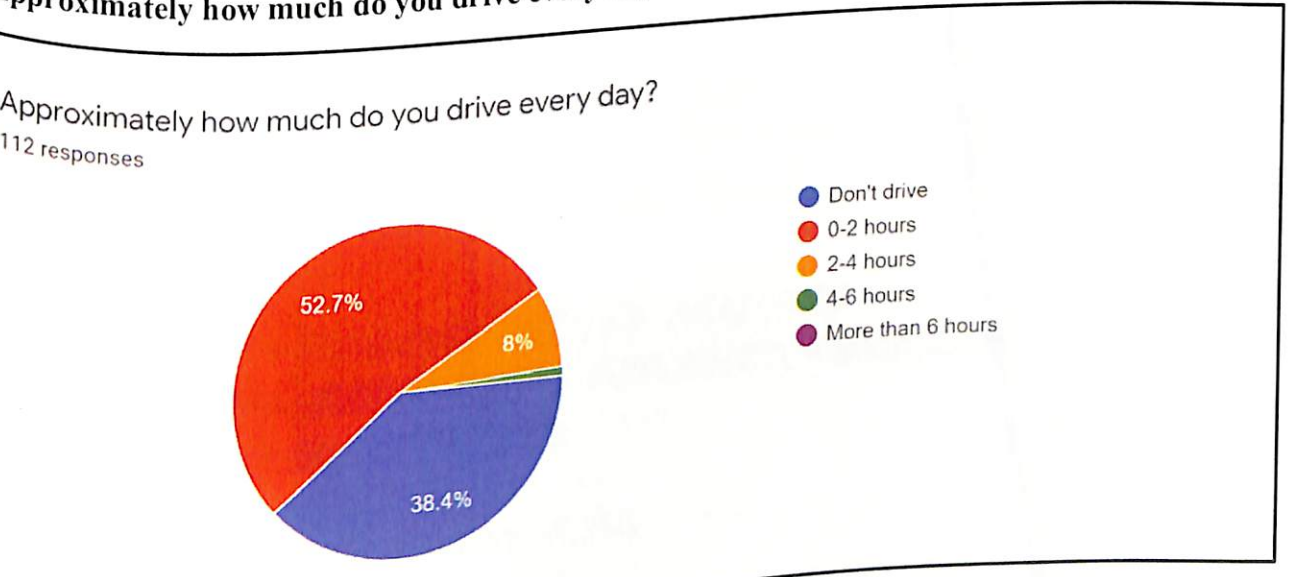
This survey shows that maximum respondents i.e. 105 respondents out of 112 (93.8%) know about the electric vehicle which is quite impressive to know. Respondents are keeping up with the trends going on in the country and the world. Only 3 respondents (2.7%) don't know what an Electric Vehicle is. The remaining 4 respondents (3.6%) are not sure whether they know about the electric vehicle.

4) Have you owned an electric vehicle ?



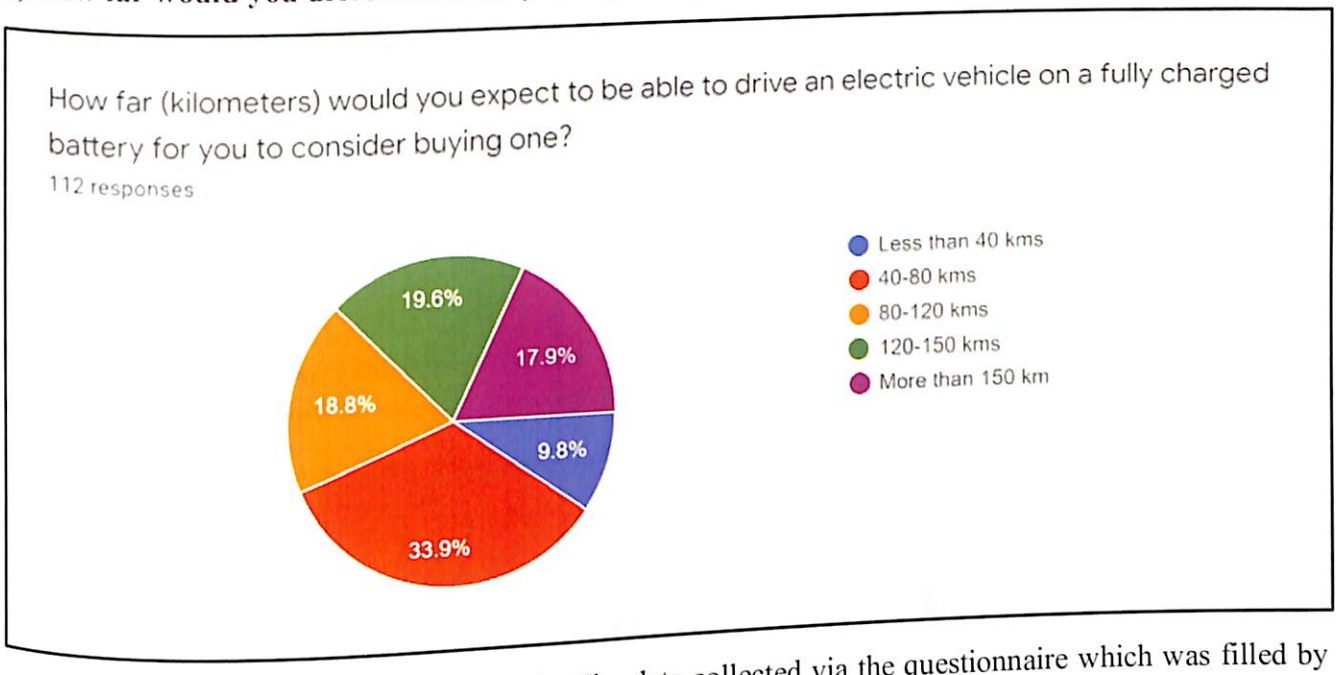
This also results in a biased pie-chart. The survey results depict that maximum of the respondents i.e. 102 respondents (91.1%) do not own an electric vehicle. As just as only 10 respondents out of 112 (8.9%) own the electric vehicle. In the near future, people will start understanding that there are more advantages of electric vehicle than conventional vehicles as they are safe and does not require gas, even the cost is low, more respondents can own this vehicle. I hope to see the opposite result in few years where maximum of them will own an Electric Vehicle.

5) Approximately how much do you drive every day ?



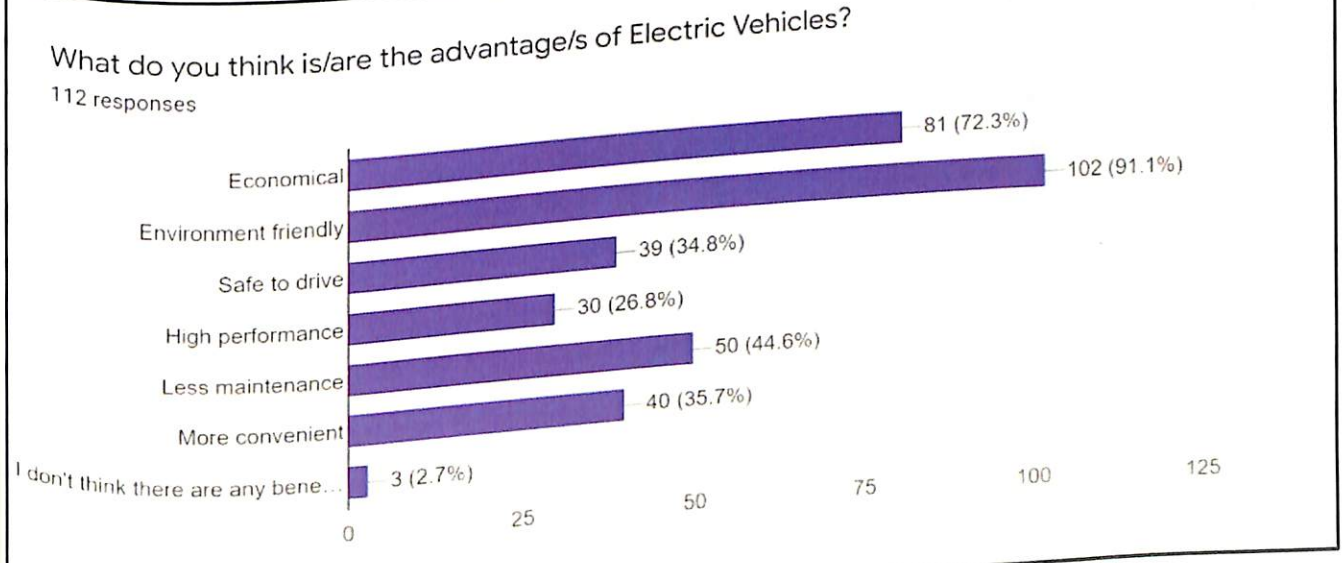
This results in a colorful pie-chart. Respondents have mixed answers.The data collected shows only 1 respondent (0.9%) who drives about 4-6 hours daily. Further, about 9 respondents (8 %) drive from 2-4 hours every day and a maximum of 59 respondents out of 112 (52.7%) drive about 0-2 hours daily. And 43 respondents (38.4%) respondents do not drive at all. There were none who drives more than 6 hours.

6) How far would you drive with a fully charged electric vehicle ?



The pie-chart is beautifully colorful in this. The data collected via the questionnaire which was filled by 112 respondents is quite diversified. It potrays those 11 respondents (9.8%) would drive less than 40 kms followed by 38 respondents (33.9%) who are expected to drive between 40-80 kms. The other 21 respondents (18.8%) would drive from 80-120 kms with a fully charged battery of an electric vehicle. The pie chart also shows 22 respondents (19.6%) to drive from 120-150 kms and the remaining 20 respondents (17.9%) would drive more than 150 kms on a full charged battery. The picture is not clear to the respondents.

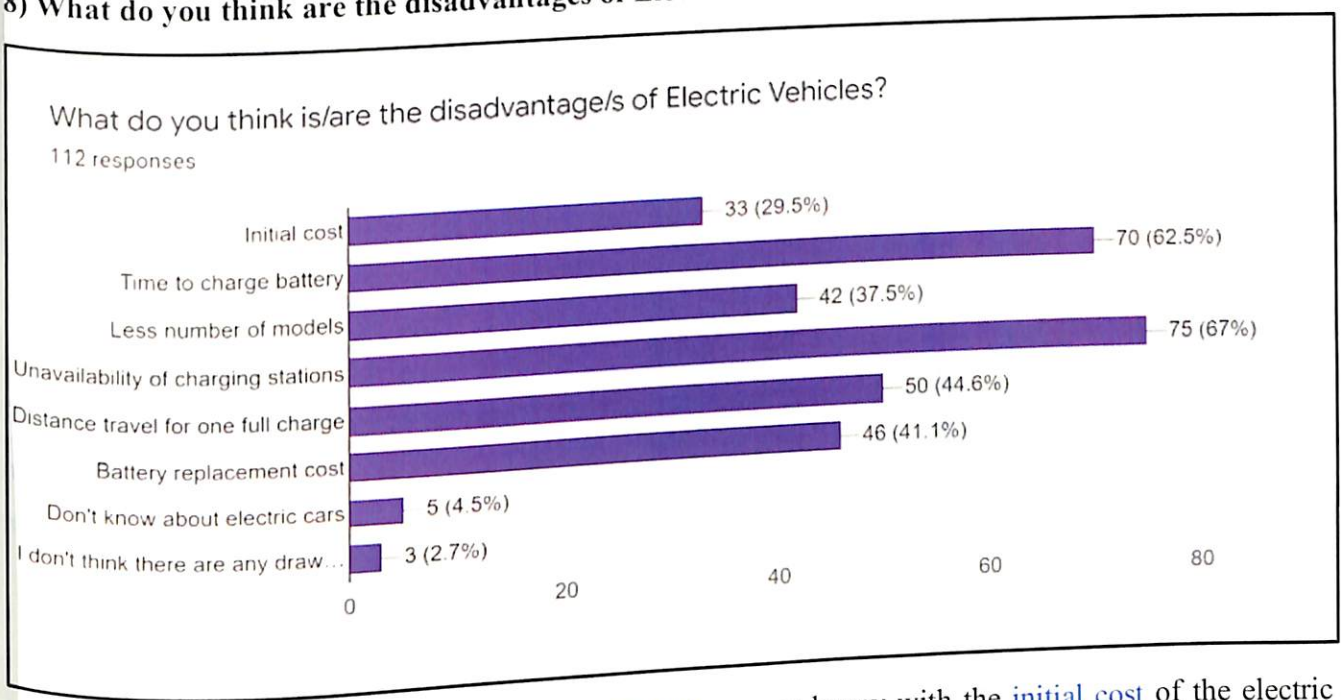
7) What do you think are the advantages of Electric vehicles ?



The results depict those 81 respondents (72.3%) find the electric vehicles economical and easy to own. About 102 respondents (91.1%) find the vehicle environment friendly which is necessary in today's life. A total of 39 respondents (34.8%) states that this vehicle is safe to drive. Further, 30 respondents (24.8%) are happy by its high performance.

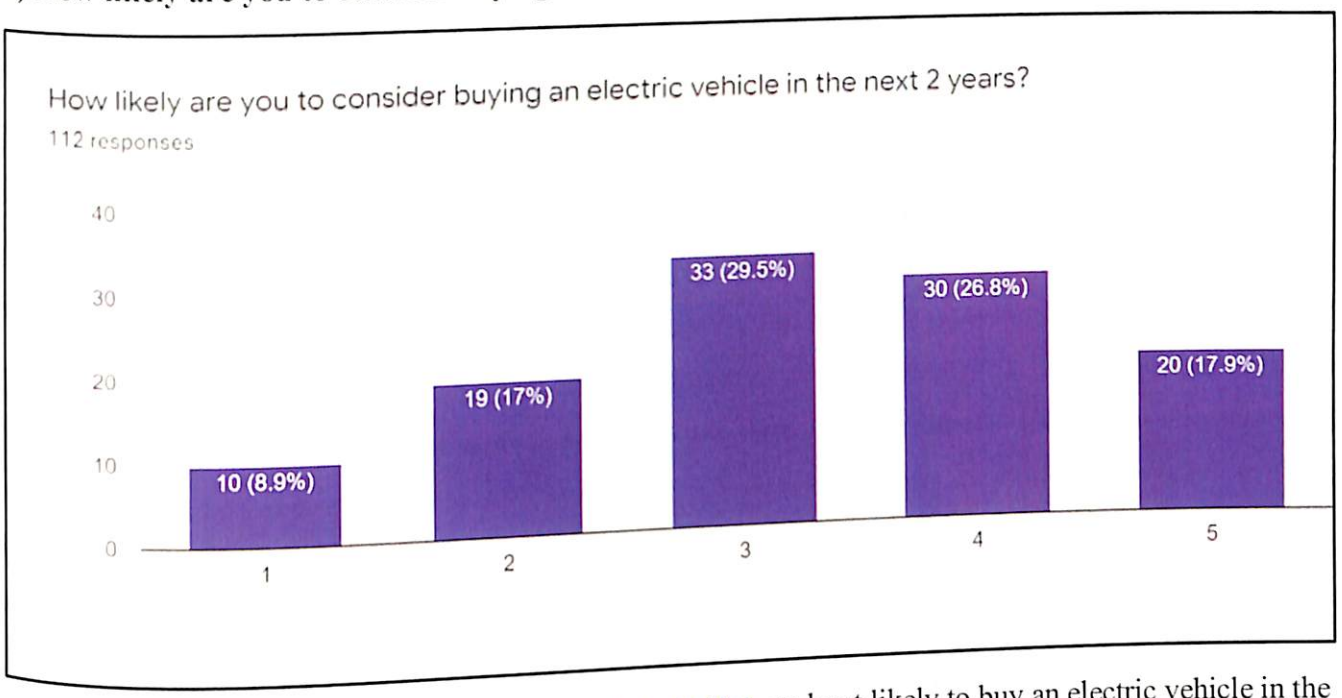
This vehicle gives less maintenancee which is stated by 50 respondents (44.6%). And 40 respondents (35.7%) respondents find it more convenient. The remaining 3 respondents (2.7%) don't find it beneficial.

8) What do you think are the disadvantages of Electric vehicles ?



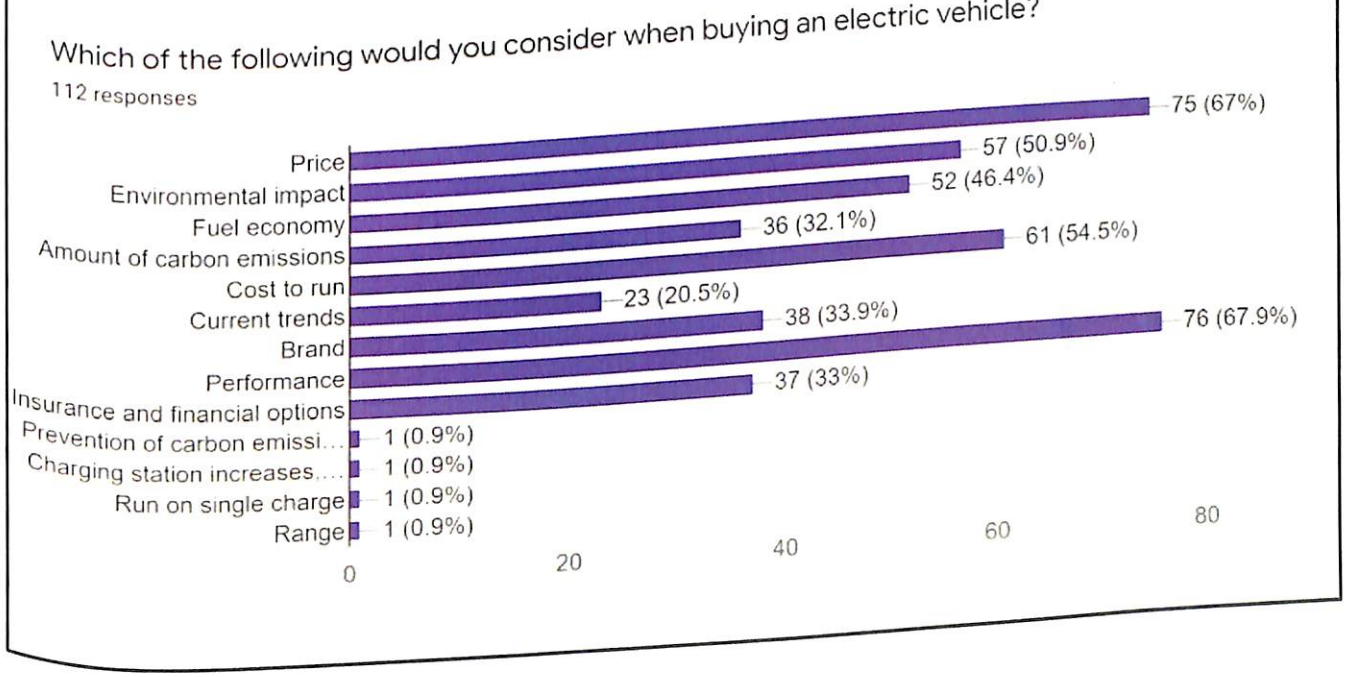
The survey results show that 33 respondents (29.5%) are not happy with the initial cost of the electric vehicle. The other 70 respondents (62.5%) think that it takes much time to charge the battery. A total of 42 respondents (37.5%) talk about less number of models available in the market so there are few choices to select the model. A majority of 75 respondents (67%) state that there is unavailability of charging stations everywhere which can become troublesome for them. Further, 50 of the respondents (44.6%) feel the distance travelled by one full charged vehicle is very less as compared to coventional vehicles. A total of 46 respondents (41.1 %) think that the battery replacement cost is too high. Lastly, 5 respondents (4.5%) don't know about electric vehicles and only 3 respondents (2.7%) think there are no drawbacks.

9) How likely are you to consider buying an electric vehicle in the next 2 years ?



From the survey, we can predict that 10 respondents (8.9%) are least likely to buy an electric vehicle in the next two years whereas 20 respondents (17.9%) are most likely to buy an Electric Vehicle within the next 2 years from now. A total of 19 respondents (17%) are less likely to purchase an Electric Vehicle in the near future and 30 respondents (26.8%) are more likely to purchase. Further, 33 respondents (29.5%) are neutral about their choices.

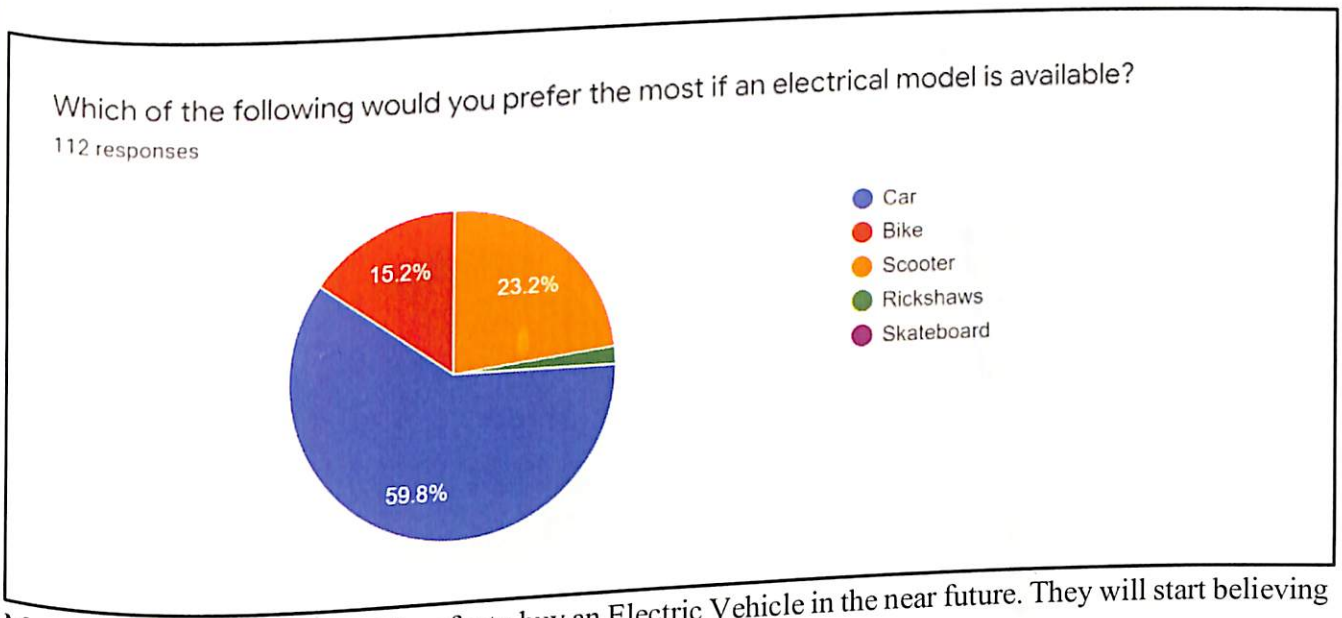
10) Which of the following would you consider when buying an electric vehicle ?



The survey shows that majority of respondents would first consider the performance and price of the vehicle. And least majority of the respondents would consider carbon emission, chargin station, single chare, range.

A total of 75 respondents (67%) look upon the price and 76 respondents (67.9%) would focus on the performance. No or least consideration is given by 1 person each to the following such as prevention of emission of carbon, range, running of vehicle charging only once and about clarity on charging stations. Further, 57 respondents (50.9%) would get influenced by the environmental impact and 52 respondents (46.4%) would consider about the fuel economy. Number of 61 respondents (54.5%) would consider the cost to run the electric vehicle. It is interesting to know that 38 respondents (33.9%) would rather pay interest in brand name of the vehicle. 37 respondents (33%) believe that the insurance and financial options are limited for the same.

11) Which of the following would you prefer the most if an electric model is available ?



Many of the respondents would prefer to buy an Electric Vehicle in the near future. They will start believing that it has more benefits than a conventional vehicle. The data shows that 67 respondents (59.8%) would most likely prefer an electric car. Some of them i.e. 26 respondents (23.2%) would be interested in electric scooter rather than electric bike which would be preferred by 17 respondents (15.2%). The rest 2 respondents (1.8%) would prefer an electric auto rickshaw. None would prefer an Electric Skateboard.

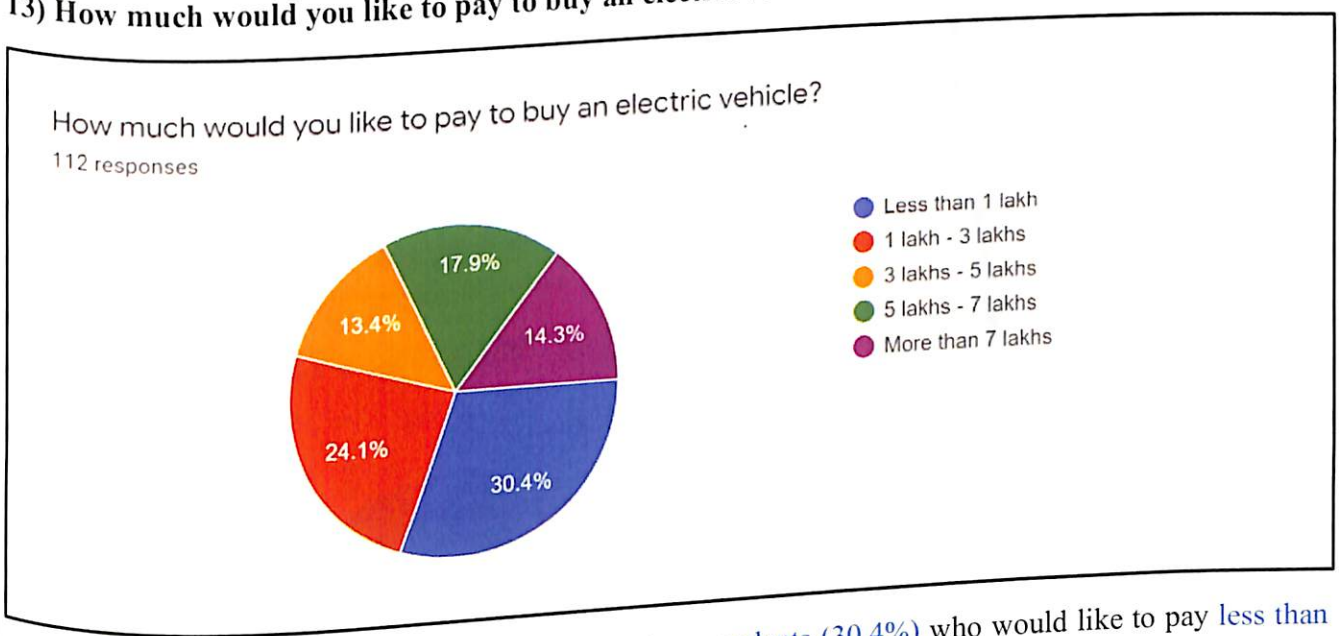
12) How quickly (hours) would it need to take to fully charge an electric vehicle for you to consider buying one?

For this, no chart or graphs is available as this was a short answer question. Everyone was supposed to type their answer for this question.

The result was quite biased as most of them answered two to three hours or less than that. So, averagely people think an Electric Vehicle should take around an hour and 30 mins to be fully charged and ready to travel again. Nowadays, people want everything to done in a hurry and fast paced so it will be a discouragement if the Electric Vehicle takes more than 3 hours to charge. Especially lives in busy cities such as Mumbai, Delhi, etc people can't afford to wait for 3 hours just to charge an Electric Vehicle.

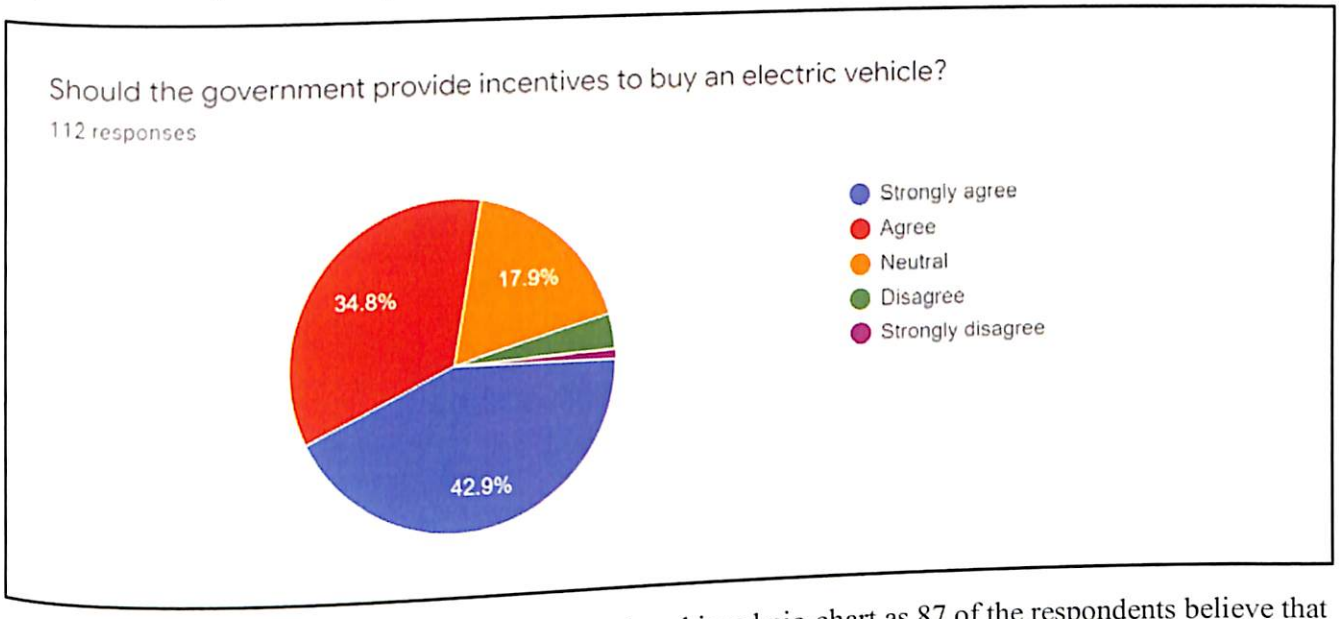
There were many who also wrote answers of 8 to 9 hours. I, myself find this very impractical as people don't want to wait so much and waste their precious time charging electric vehicle

13) How much would you like to pay to buy an electric vehicle ?



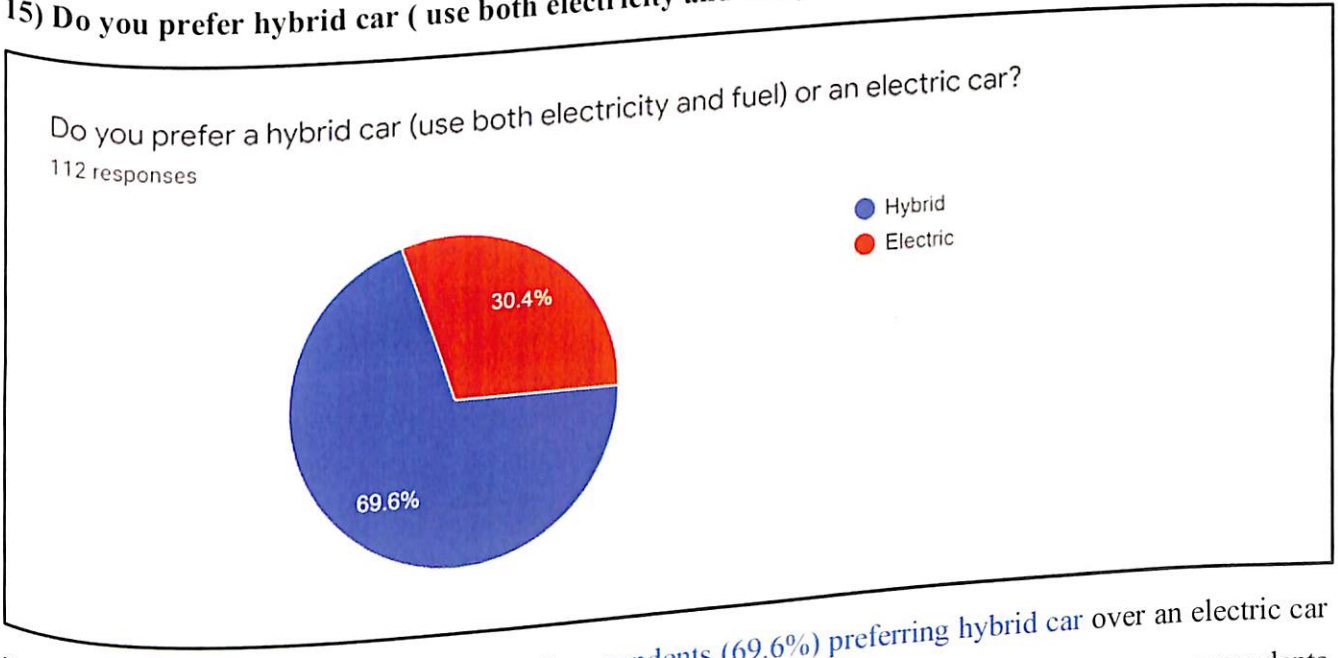
The colourful pie chart portrays a maximum of 34 respondents (30.4%) who would like to pay less than one lakh rupees to buy an electric vehicle. Other than that, 27 respondents (24.1%) are willing to pay from one lakh to three lakh of amount. 15 respondents (13.4%) are likely to pay from three to five lakh. A total of 20 respondents (17.9) would like to pay five to seven lakh rupees and above all 16 respondents (14.3%) are keen to pay more than seven lakh of rupees to buy an electric vehicle which is surprising to know.

14) Should the government provide incentives to buy an electric vehicle ?



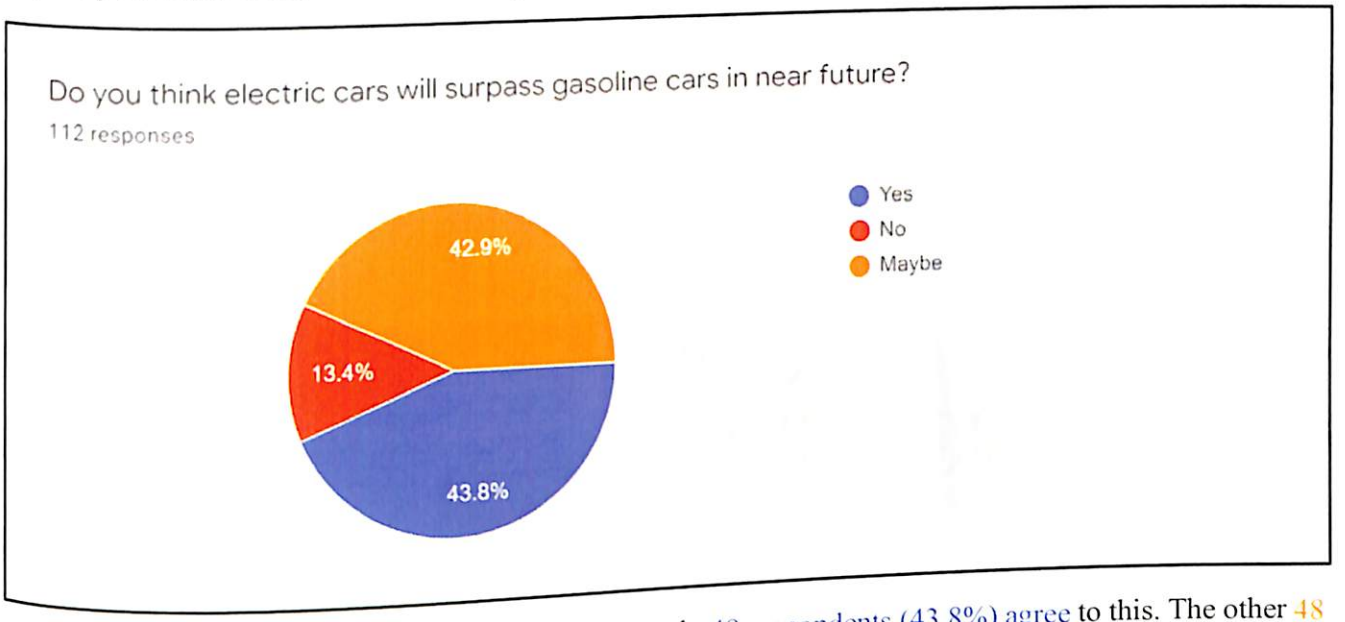
It has a colorful pie-chart. It is still considered to be a biased pie-chart as 87 of the respondents believe that government should provide some incentive on buying an electric vehicle. The data collected from the respondent's states that nearly 48 respondents (42.9%) strongly agree to this idea of providing incentives. 39 respondents (34.8%) agree to this followed by 20 respondents (17.9%) who stay neutral. The rest of 4 respondents (3.6%) disagree to this idea and 1 person (0.9%) strongly disagree.

15) Do you prefer hybrid car (use both electricity and fuel) or an electric car ?



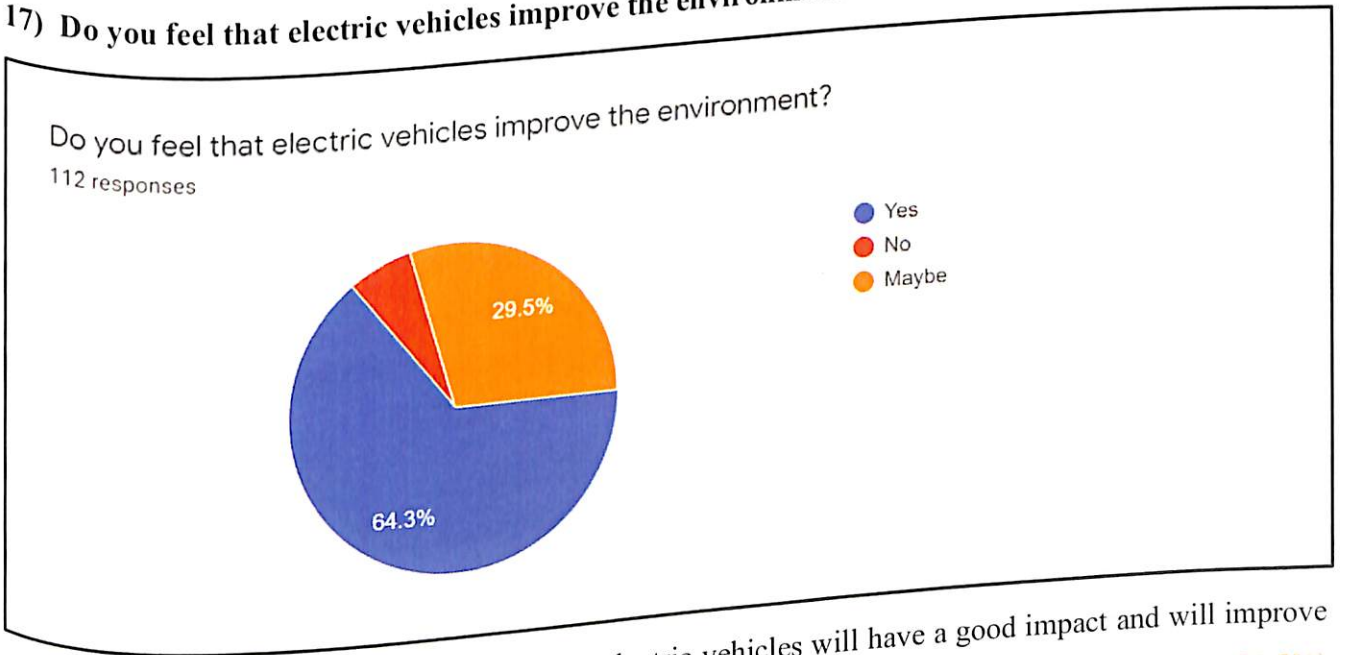
The survey resulted into a maximum of 78 respondents (69.6%) preferring hybrid car over an electric car whereas 30 respondents (30.4%) would prefer an electric car. Because of its advantages more respondents are in favour of hybrid car as it impacts the environment. It reduces the dependence on fossil fuels. It also helps to control our budget as gas prices are getting higher. It helps in financial benefits. The biggest disadvantage is that it is too expensive and also the maintainence cost is much higher.

16) Do you think electric cars will surpass gasoline cars in near future ?



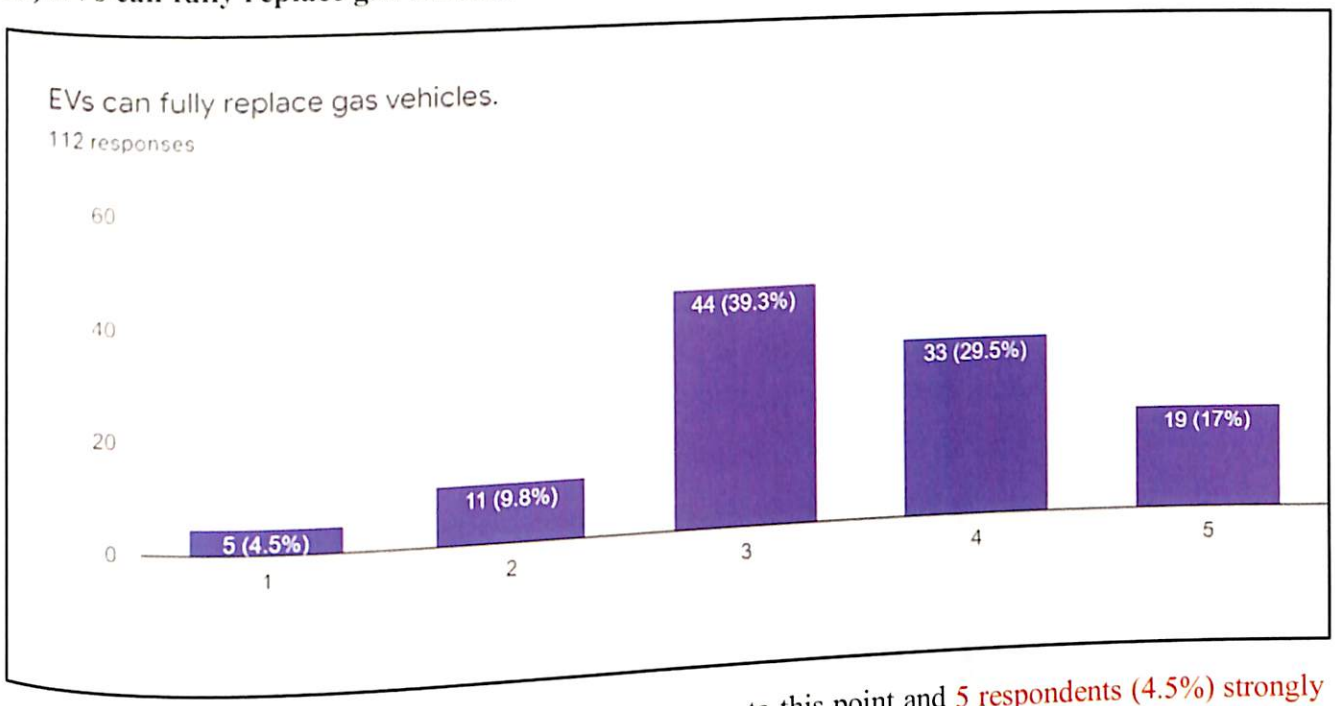
Depending on the pie chart, the result shows that nearly 49 respondents (43.8%) agree to this. The other 48 respondents (43.9%) are not sure about this and 15 respondents (13.4%) do not agree to this. Hence we cannot predict about it in near future. But according to me, I think sooner or later Electric Vehicles will surpass gasoline as it is very beneficial for our environment. The current weather status of India is already miserable and if we continue to use gasoline vehicles then the quality of air will drop further more and people may start dying due to this.

17) Do you feel that electric vehicles improve the environment ?



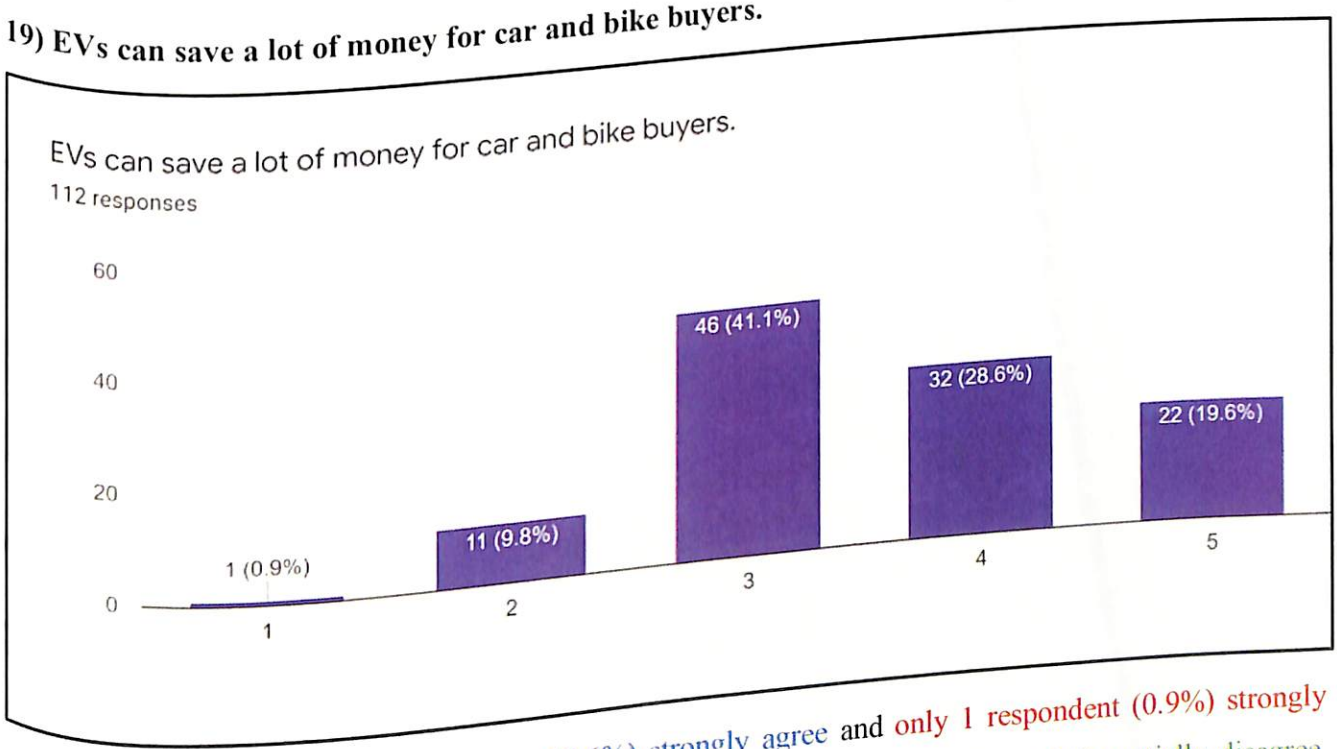
72 respondents (64.3%) says yes and feel that electric vehicles will have a good impact and will improve the environment. There are 7 respondents (6.3%) who says no to this and the rest of 33 respondents (29.5%) are not sure whether electric vehicles will improve the environment or not.

18) EVs can fully replace gas vehicles.



The data shows that 19 respondents (17%) strongly agree to this point and 5 respondents (4.5%) strongly disagree. A total of 33 respondents (29.5%) partially agree and 11 respondents (9.8%) partially disagree. Further, 44 of the respondents (39.3%) out of 112 are neutral about this.

19) EVs can save a lot of money for car and bike buyers.



The survey depicts that 22 respondents (19.6%) strongly agree and only 1 respondent (0.9%) strongly disagree. A total of 32 respondents (28.6%) partially agree and 11 respondents (9.8) partially disagree. Further, 46 respondents (41.1%) are neutral about this.

CHAPTER 5 :-

CONCLUSION AND SUGGESTIONS

CHAPTER 5: CONCLUSION

This study explores the challenges and opportunities of electric vehicles. As market researchers have said, the future of transportation will be replaced by ICs and EVs. Also, the sales of the last few years show that the electric vehicle market is growing day by day. The International Energy Agency (IEA) predicts that global electric vehicle ownership will increase from 3.7 million in 2017 to 13 million in 2020 and eventually reach 130 million in 2030. doing. Meanwhile, sales of electric vehicles are expected to grow by 24%. Average during the forecast period. Sales will increase from 1.4 million units in 2017 to 4 million units by 2020, reaching 21.5 million units by 2030.

Not only should we focus on technical and economic factors, but we should also focus on customer satisfaction based on social factors. Consumers must be informed about the use of electric vehicles. Social factors other than the government are also taking many measures toward the introduction of EVs. Charging infrastructure is one of the main concerns about expanding the EV market. More and more public and private sectors need to build charging infrastructure. There are many challenges to initial investment and start-up, but the EV market will continue to expand due to the opportunities.

Evaluation of EV scenarios shows that direct economic incentives for EV buyers and support for early infrastructure investment can help increase EV's share in India in the short and medium term (2030). Given India's large and developing motorcycle market, it is very likely that the proportion of electric motorcycles will increase in the short term. It could also be a way for India to expand its residential electric vehicle business and create a feasible environment that includes a charging infrastructure that can drive the adoption of large electric vehicles. Given the demand for holes in India's power system today, increasing power demand for electric vehicles is not uncommon. EVs can reduce the need for power supplies due to discrepancies. As lithium factories are no longer widespread in India, it is advisable to build a reliable supply chain and build a domestic battery industry that supports the EV industry.

In the new future, Indian electric cars are not a luxury, but pollution is alarming and the only solution is green source and energy transfer, so it is necessary to survive. Therefore, EVs are unavoidable in critical cases, and it is better to plan and organize how development will take place, rather than avoiding changes.

Undoubtedly, an integrated future mobility policy focused on zero-emission mobility is the order of the day. However, such policies should also take into account the financial position of the industry, government revenues, and millions to millions of employment opportunities. The future of electrical mobility is here, and we will continue to evolve and expand its reach.

While the majority of new car sales are still powered by gasoline, the share of electric vehicle sales is growing rapidly. This is mainly due to lower operating costs for electric vehicles, which is changing consumer purchasing behaviour. As a result, the market share of electric vehicles is growing faster than traditional vehicles. This has led to the development of a charging infrastructure to support the ever-growing number of EVs on today's roads, and the majority of new car owners are willing to invest in EVs over the long term.

Electric vehicle (EV) consumers in many countries show significantly different buying behaviour than non-EV consumers. This is often due to the psychological benefits of driving an electric vehicle, such as perceived freedom and independence, and the convenience and low cost of owning an electric vehicle. However, it has been shown that some of these consumers have a higher level of brand loyalty than usual for the vehicles they choose. This has led to the question of whether such brand loyalty is driven by the vehicle itself or is the result of other factors such as dealership and purchasing experience.

The main conclusion of this paper is that EV owners are not reluctant to pay extra for vehicle charging services. As the number of electric vehicle models on the market increases, so does the number of options available when purchasing an electric vehicle. Over the next few years, we can expect an increase in the number of charging station options and their availability in new locations. Not only will this increase consumer choice, but it will also facilitate the development of new business models that take advantage of the growing demand for EV charging.

However, consumer buying behaviour for EVs is not well understood. The purpose of this document is to understand the customer's buying behaviour of EV charging station operators in relation to charging patterns, charging station usage, and charging preferences. This study was conducted in an urban environment.

The completion of this research project will explore how people buy electric vehicles and how this buying behaviour is affected by the range of vehicles. The range of an electric vehicle is the distance that the vehicle can travel on a single battery charge. The most common range of electric vehicles in the United States is 100 miles, and the longest range is the 2018 Tesla model SP100D with a range of 335 miles. The main way to buy an electric vehicle is through financial incentives sponsored by manufacturers such as: B. Tax credit or loan.

CHAPTER 5: SUGGESTIONS

The electric vehicle (EV) industry in India is still in its nascent stages. The government has a vision to increase the share of green vehicles in the overall vehicle population in the country. The country is currently witnessing the launch of various new models, which are priced competitively, to take on the Indian roads. However, to realise the government's vision, it is imperative that the sales of electric vehicles in the country increase.

It is well-known that in the west, the sales of electric vehicles have been increasing rapidly. In the US, for example, the electric vehicle market has been growing at a rapid pace, and there are a number of companies that are investing heavily in this space. However, in many other parts of the world, the adoption of electric vehicles has been slower; in fact, in many countries, the sales of electric vehicles are still negligible. One of the primary reasons for this slow adoption of electric vehicles in other parts of the world is that consumers have been hesitant to buy electric vehicles, and this is especially true in the case of the automotive industry in India.

We have seen a surge in the sales of Electric Vehicles in India in the recent times. This is primarily because of the government's initiatives such as accelerated depreciation for the same, tax incentives and subsidies for the same. However, with the surge in demand, we have also seen an increased focus on the sustainability aspect. This has led to the introduction of regulations such as range-based incentives and restrictions on the same, which are aimed at encouraging the purchase of Energy Efficient Vehicles (or E-consumption vehicles) over the conventional ones.

India is going to be one of the largest markets for electric vehicles (EVs) in the world. The government has set an ambitious target of selling one million electric vehicles by 2030, which would require a massive shift to EVs. However, at present, EVs are not as popular in India as they are in some other countries. This is mainly because of several factors, such as limited infrastructure and high cost of ownership.

To increase the adoption of EVs in India, would be to improve the current infrastructure. The government should focus on developing charging stations across the country, so that the drivers do not face any difficulty in purchasing the electric vehicles. It should also develop a robust national network of charging stations, so that the consumers do not face any problems in travelling long distances. The government should also incentivise the purchase of EVs, through schemes such as tax exemptions and accelerated depreciation.

One of the challenges that the EV industry in India is facing is the limited range of the same. The batteries in the EVs available in the Indian market are mostly limited to around 200-300 km, which makes them highly unsuitable for extensive travel. The average Indian is a daily traveller, and the limited range of the majority of the EVs currently available in the market make them unsuitable for extensive travelling. It is important that the range of the EVs is increased so that the consumers don't face this difficulty.

In order to increase the sales of electric vehicles in India, we need to ensure that the existing EVs are improved so that they are able to meet the expectations of the Indian customers. The customers would then be more willing to buy the EVs, rather than the conventional vehicles.

The governments of many countries have taken several initiatives to increase the awareness about electric vehicles among the general public. This has helped in increasing the penetration of EVs in those countries. In India, it is necessary to also focus on the awareness level of the people about EVs. People in India are still not very knowledgeable about electric vehicles. This is partly due to the fact that awareness about EVs is low in the country, but it is also because of the lack of information regarding EVs. This can be done by various means, such as organizing various events and programmes, educating the people about the benefits of EVs and the same can be achieved through various media channels.

The government aims to change this by increasing the awareness about EVs in the country. One of the ways in which the government wants to do this is through road shows, where car manufacturers and dealerships conduct shows and educate the people about EVs.

The government of India has launched campaigns such as "Share the Road, Not the Burden" to increase the awareness among people about the advantages of EVs. The government has also set up charging stations at prominent locations in the country, which has helped in increasing the adoption of EVs.

Awareness programs are one of the most effective ways of increasing the awareness about electric vehicles in a particular country. This is because these programs not only create awareness about electric vehicles among the people, but also generate interest among the people regarding the same. Electric vehicles in India are yet to reach the tipping point of mass adoption, which would make them popular among the people. However, with the increasing focus on the sustainability aspect, electric vehicles are gradually becoming more popular in the country.

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APPENDIX

A Survey on Electronic Vehicle (EV) Movement in India

Hello everyone!
Electronic Vehicle movement in the country is going wildfire. If you have purchased a vehicle in the last year or are planning to buy one this year, you would have definitely had a conversation on electronic vehicles v/s. conventional (petrol / diesel / CNG) vehicles.
I expect a response from you regarding your opinion towards electronic vehicles as a daily commuter in India. Please give genuine responses to help me obtain a fair analysis of the same!
Thank you!

Section 1 of 2

1) Full Name

Your answer

2) Age

- 18-25
- 26-30
- 31-35
- 36-40
- Above 40

3) Gender

- Female
- Male
- Prefer not to say
- Other:

Section 2 of 2

4) Do you know what an electric vehicle is ?

- Yes
- No
- Maybe

5) Have you ever owned an Electric Vehicle?

- Yes
- No

6) Approximately how much do you drive every day?

- o Don't drive
- o 0-2 hours
- o 2-4 hours
- o 4-6 hours
- o More than 6 hours

7) How far (kilometres) would you expect to be able to drive an electric vehicle on a fully charged battery for you to consider buying one?

- o Less than 40 kms
- o 40-80 kms
- o 80-120 kms
- o 120-150 kms
- o More than 150 km

8) What do you think is/are the advantage/s of Electric Vehicles?

- Economical
- Environment friendly
- Safe to drive
- High performance
- Less maintenance
- More convenient
- I don't think there are any benefits
- Other:

9) What do you think is/are the disadvantage/s of Electric Vehicles?

- Initial cost
- Time to charge battery
- Less number of models
- Unavailability of charging stations
- Distance travel for one full charge
- Battery replacement cost
- Don't know about electric cars
- I don't think there are any drawbacks
- Other:

10) How likely are you to consider buying an electric vehicle in the next 2 years?

- o 1 Least likely
- o 2
- o 3
- o 4
- o 5 Most likely

11) Which of the following would you consider when buying an electric vehicle?

- Price
- Environmental impact
- Fuel economy
- Amount of carbon emissions
- Cost to run
- Current trends
- Brand
- Performance
- Insurance and financial options
- Other:

12) Which of the following would you prefer the most if an electrical model is available?

- Car
- Bike
- Scooter
- Rickshaws
- Skateboard
- Other:

13) How quickly (hours) would it need to take to fully charge an electric vehicle for you to consider buying one?

Your answer

14) How much would you like to pay to buy an electric vehicle?

- Less than 1 lakh
- 1 lakh - 3 lakhs
- 3 lakhs - 5 lakhs
- 5 lakhs - 7 lakhs
- More than 7 lakhs

15) Should the government provide incentives to buy an electric vehicle?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

16) Do you prefer a hybrid car (use both electricity and fuel) or an electric car?

- Hybrid
- Electric

17) Do you think electric cars will surpass gasoline cars in near future?

- o Yes
- o No
- o Maybe

18) Do you feel that electric vehicles improve the environment?

- o Yes
- o No
- o Maybe

19) EVs can fully replace gas vehicles.

- o 1 Strongly Disagree
- o 2
- o 3
- o 4
- o 5 Strongly Agree

20) EVs can save a lot of money for car and bike buyers.

- o 1 Strongly Disagree
- o 2
- o 3
- o 4
- o 5 Strongly Agree