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A STUDY ON THE ELECTRIC VEHICLES OPPORTUNITIES AVAILABLE FOR INTERNATIONAL BUSINESS

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ELECTRIC VEHICLE'S POLICIES AND IT'S IMPACT PART – I GENERAL INFORMATION

Introduction

The electric vehicles industry at a nascent stage in India. It is less than 1% of the total vehicle sales however has the potential to grow to more than 5% in a few years. At present there are more than 5 lac electric two-wheelers and few thousand electric cars on Indian roads. The industry volumes have been fluctuating, mostly depending on the incentives offered by the government. Many serious players (Hero Eco, Ather, Electrotherm, Avon, Lohia, Ampere, etc) are continuing with the mission and trying to enforce the positive change under the banner of SMEV.

More than 90% of electric vehicles on Indian roads are low-speed electric scooters (less than 25km/hr) that do not require registration and licenses. Almost all electric scooters run on lead batteries to keep the prices low, however, battery failures and low life of batteries have become major limiting factors for sales besides government subsidies. Many manufacturers have taken initiatives to install the charging station with limited success. Players like Lohia and Electrotherm have developed Electric three-wheelers. Ampere and Hero have entered Electric Cycles segments. There are numbers of E-Rickshaw players mushrooming across the country and selling good numbers of E rickshaw for last-mile connectivity.

The industry is almost ready for take-off but for the incentives. It is expected that with FAME-2 the industry may witness a quantum leap in volumes and technology. SMEV sees a great opportunity with EVs in reducing the Carbon footprint, dependence on Crude oil imports, creating jobs and building a new Technology knowledge hub in India.

1. ABOUT THE COMPANY / INDUSTRY / SECTOR:

1.1 ABOUT THE INDUSTRY

What Are Electric vehicle cars?

Electric vehicles have low running costs as they have less moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel). While some EVs used lead acid or nickel metal hydride batteries, the standard for modern battery electric vehicles is now considered to be lithium-ion batteries as they have a greater longevity and are excellent at retaining energy, with a self-discharge rate of just 5% per month. Despite this improved efficiency, there are still challenges with these batteries as they can experience thermal runaway, which have, for example, caused fires or explosions in the Tesla model S, although efforts have been made to improve the safety of these batteries.

It can cost as little as £7.80 to fully charge an electric car from home and can even be free in public car parks.

There are **two main types** of electric vehicles (EV); fully electric and plug-in hybrids:

Battery Electric Vehicles (BEV)

Compared to an internal combustion engine, battery powered electric vehicles have approximately 99% fewer moving parts that need maintenance.

Advantages of a BEV:

- Creates very little noise
- No exhaust, spark plugs, clutch or gears
- Doesn't burn fossil fuels, instead uses rechargeable batteries

BEVs can be charged at home overnight, providing enough range for average journeys. However, longer journeys or those that require a lot of hill climbs may mean that the fuel cells require charging before you reach your destination, although regenerative braking or driving downhill can help mitigate against this by charging the battery packs.

The typical charging time for an electric car can range from 30 minutes and up to more than 12 hours. This all depends on the speed of the charging station and the size of the battery.

In the real world, range is one of the biggest concerns for electric vehicles, but is something that is being addressed by industry.

Plug-in Hybrid Electric Vehicles (PHEV)

Rather than relying solely on an electric motor, hybrid electric vehicles offer a mixture of battery and petrol (or diesel) power. This makes them better for travelling long distances as you can switch to traditional fuels rather than having to find charge points to top up the battery.

Of course, the same disadvantages that apply to combustion engine vehicles also apply to PHEVs, such as the need for more maintenance, engine noise, emissions and the cost of petrol. PHEVs also have smaller battery packs, which means a reduced range.

1.2 OVERVIEW OF WORLD MARKET

The global electric vehicle market is segmented on the basis of type, vehicle type, vehicle class, top speed, vehicle drive type, and region. By type, it is divided into battery electric vehicle (BEV), plug-in hybrid electric vehicle (PHEV), and fuel cell electric vehicle (FCEV). By vehicle type, it is classified into two-wheelers, passenger cars, and commercial vehicles. By vehicle class, it is classified into mid-priced and luxury class. On the basis of top speed, it is segmented into less than 100 MPH, 100 to 125 MPH, and more than 125 MPH. By vehicle drive type, it is segmented into front wheel drive, rear wheel drive, and all-wheel drive. By region, the market is analyzed across North, Europe, AsiaPacific and LAMEA.

Companies have adopted product development and product launch as their key development strategies in the electric vehicle market. The key players operating in this market are Ampere Vehicles, Benling India Energy and Technology Pvt Ltd, BMW AG, BYD Company Limited, Chevrolet Motor Company, Daimler AG, Energica Motor Company S.p.A., Ford Motor Company, General Motors, Hero Electric, Hyundai Motor Company, Karma Automotive, Kia Corporation, Lucid Group, Inc., Mahindra Electric Mobility Limited, NIO, Nissan Motors Co., Ltd., Okinawa Autotech Pvt. Ltd., Rivain, Tata Motors, Tesla, Inc., Toyota Motor Corporation, Volkswagen AG, WM Motor, and Xiaopeng Motors.

COVID-19 Impact on EV Market:

The COVID-19 pandemic has had an adverse effect on the overall automotive industry and thereby electric vehicle industry as well. As per the data released by Society of Electric Vehicle Manufacturers (SMEV), new EV registration of all types of electric vehicles during FY21 dropped by 20 percent compared with the number of new EV registrations in FY20.

In addition, amid pandemic many different players are trying to devise different approaches in order to keep up with the condition by using electric vehicles for medical supplies as it provides affordable transportation with excellent maneuverability. For instance, Omega Seiki Mobility recently launched Rage+frost, a refrigerated load carrier three-wheeler, which is specifically designed for vaccine, pharmaceutical, and food delivery in these hard times

Increase in demand for fuel-efficient, high-performance, and low-emission vehicles

Gasoline being a fossil fuel is not a renewable source of energy, and is anticipated to get exhausted in the future. To support sustainable development, it is important to develop and use alternative sources of fuel. This involves use of electric vehicles, which do not use gas and are more economical than conventional vehicles. An electric vehicle converts over 50% of the electrical energy from the grid to power at the wheels, whereas the gas-powered vehicle only manages to convert about 17%– 21% of the energy stored in gasoline. The demand for fuel-efficient vehicles has increased recently, owing to rise in price of petrol and diesel. This is attributed to depleting fossil fuel reserves and growth in tendency of companies to gain maximum profit from these oil reserves. Thus, these factors give rise to the need for advanced fuel-efficient technologies, leading to surge in demand for electrically powered vehicles for travel.

Electric Vehicle Market

By Type

Battery Electric vehicles is projected as the most lucrative segments

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Stringent government rules and regulations toward vehicle emission

With the growing environmental concerns, governments and environmental agencies across the world are enacting stringent emission norms and laws to reduce vehicle emission. Major regulatory measures are stringent emissions targets for the reduction of nitrogen oxides (NOx) and carbon dioxide (CO₂) in air. High

amounts of greenhouse gases being emitted from vehicles and federal and state governments in the U.S. are stepping up efforts to make transportation cleaner.

For instance, the U.S. Environmental Protection Agency (EPA) announced that they are working on new rules to decrease emissions of nitrogen oxide (NOx) and other pollutants from heavy-duty trucks. In addition, the California Air Resources Board (CARB) is adopting heavy-duty Low NOx Omnibus Regulation, aims to achieve a 90% reduction from current NOx emissions limits by 2027. Moreover, in Europe, European Union (EU) committed within the Paris agreement (COP21) to achieve its 20% greenhouse gas reduction target in 2020 for the second phase of the Kyoto Protocol. The EU has also set the target to achieve 40% greenhouse gas reduction by 2040 and net-zero by 2050.

Electric Vehicle Market

Therefore, with enactment of the emission regulations for fossil fuel-powered vehicle, the burden on vehicle manufacturers, especially on commercial vehicle manufacturers, has further increased. This, in turn, is expected to drive the demand for electric vehicles. Thus, stringent emission norms imposed on fossil-fuel powered commercial vehicles significantly driving growth of the electric vehicle market.

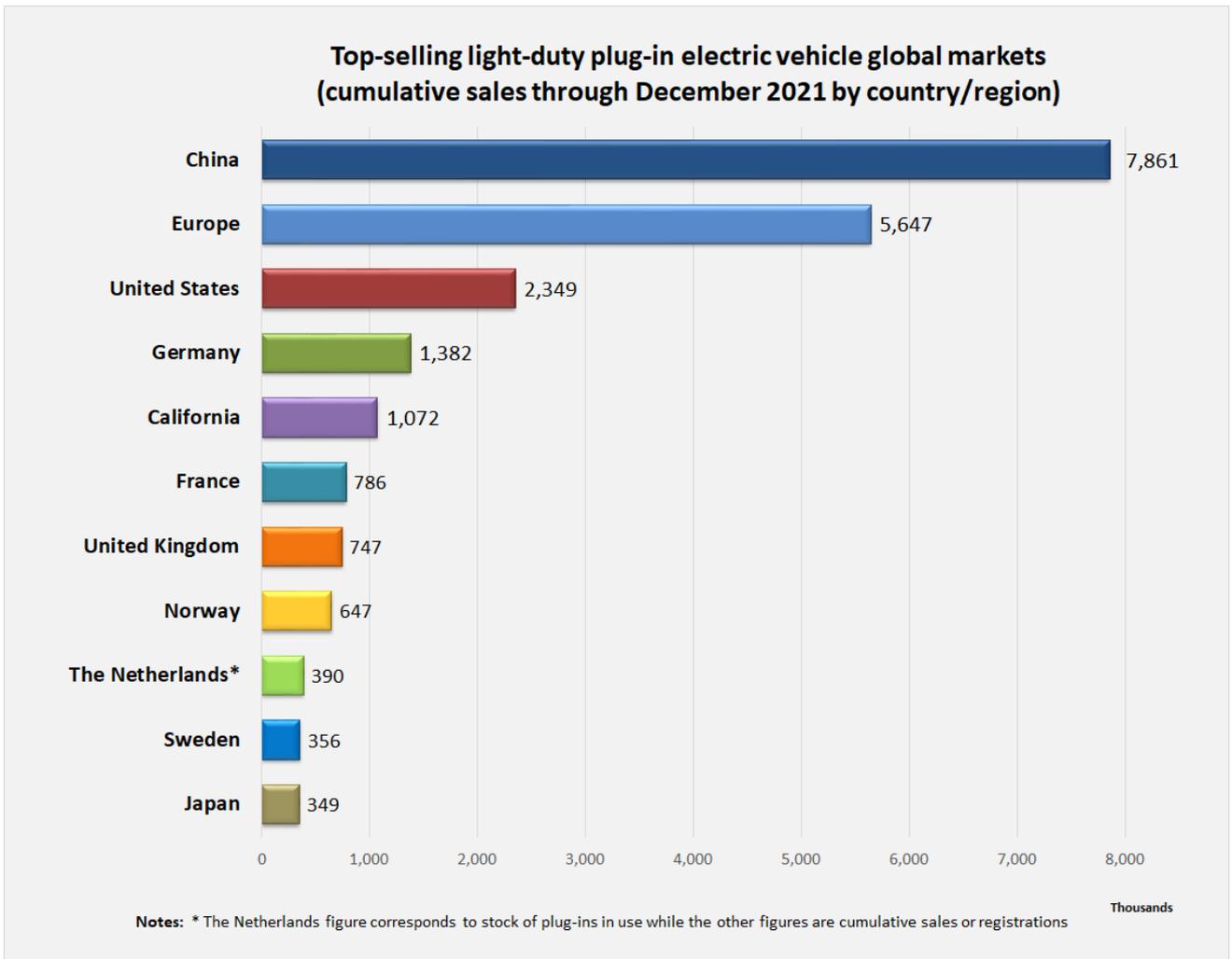
Lack of charging infrastructure

Governments of various countries are promoting adoption of electric vehicles for commercial purpose to reduce emission of greenhouse into environment. However, lack of charging infrastructure for electric vehicles acts as an obstacle for the electric vehicle market. For instance, the Government of India is aiming to have only electric vehicle on roads by 2030. However, creation of robust electric vehicle infrastructure is one of the key requirements to ensure the adoption of electric vehicles. Unfortunately, EV charging infrastructure in most of developing countries is inadequate at present and yet to catch up to meet the requirement, which in turn is hampering the growth of the electric vehicle market. In addition, though China is one of the biggest markets for electric vehicles, the country is struggling to support the sufficient electric vehicle charging infrastructure to recharge electric fleets, which is anticipated to hindering the market. Thus, lack of charging infrastructure is restraining the growth of EV market.

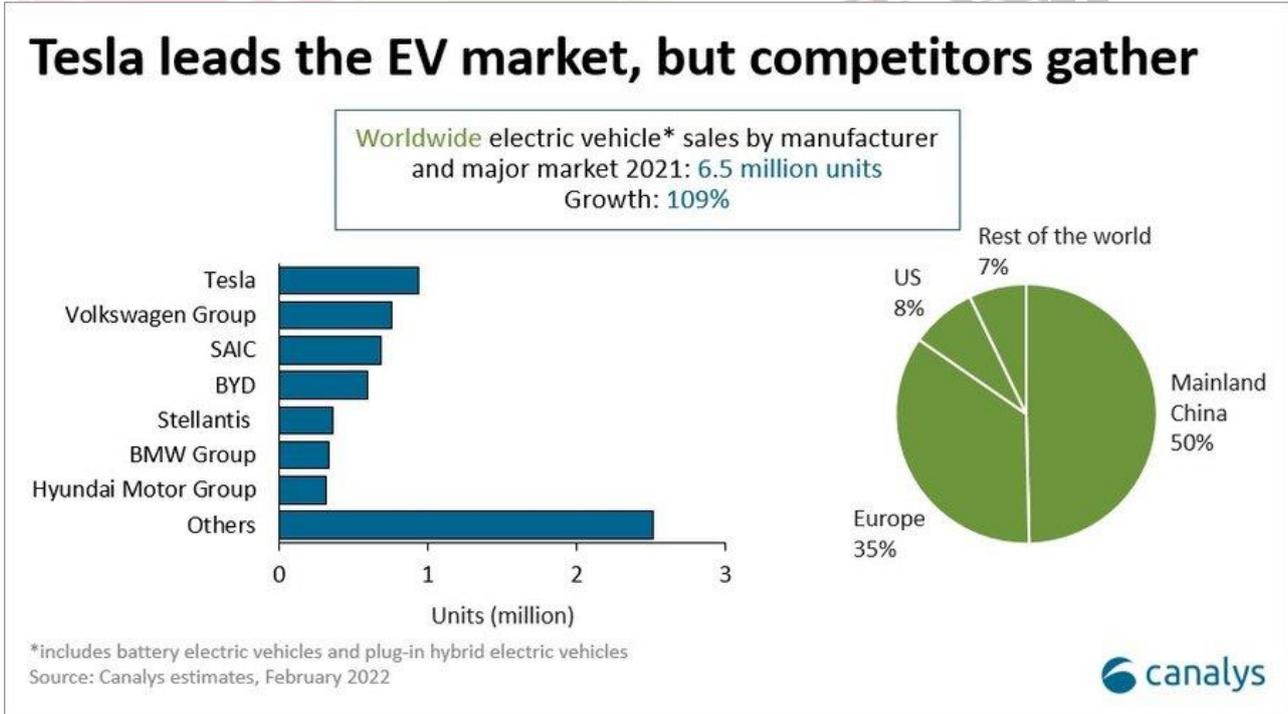
Development of self-driving electric vehicle technology

The electric vehicle market will be affected by the recent trend of self-driving trucks. Top OEMs such as Tesla, Volvo, Vera, Daimler among others have been developing self-driving electric vehicles for the market. Startups such as Waymo, Uber, Embark, Einride, TuSimple, and Ike have also started developing self-driving electric vehicles. For instance, Tesla announced a plan to launch its selfdriving electric truck by the end of 2022.

For instance, Waymo has started testing its self-driving trucks since January 2020. Similarly, TuSimple plans to operate autonomous routes between Pheonix and Tucson in Arizona and some areas in Texas. Further, in May 2019, Einride had started its testing for driver-less trucks. In January 2019, Daimler announced an investment of \$570 million for self-driving electric vehicles. Thus, selfdriving technology will increase demand for electric vehicles in the long run due to the various advantages such as reduced accident risk, easy use, and presence of value-added features.



Leading industries in world]



1 Volkswagen

2 Tesla

3 BMW

4 Ford

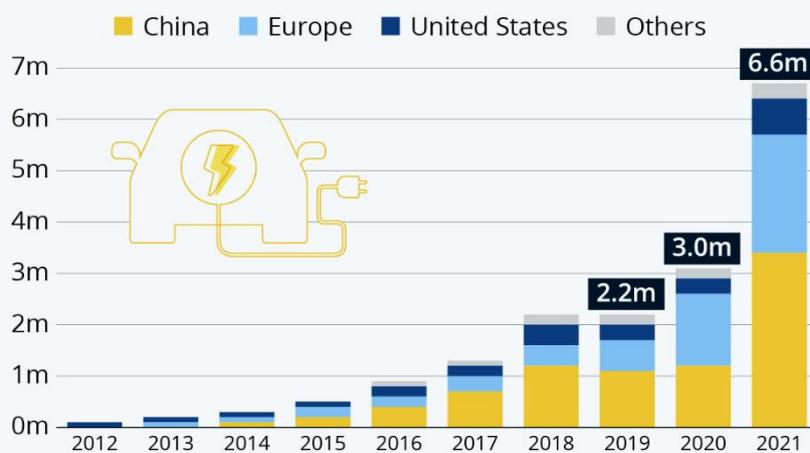
5 Kia

6 BYD

7 Hyundai

Global Electric Car Sales Doubled in 2021

Global registrations of electric vehicles (incl. plug-in hybrids), by region*



* incl. passenger cars and light commercial vehicles (vans, light trucks)

Source: EV-volumes.com via IEA



statista

1.3 OVERVIEW OF INDIAN / GUJARAT MARKET

The Indian EV market's evolution can be measured by noting the growing number of EV startups — manufacturing everything — from two-wheelers to four-wheelers, hybrid and electric vehicles, e-carts and heavy EVs.

The year 2020 was a rough year for industries worldwide, especially for electric vehicles (EVs), which saw limited domestic production.

However, as the pandemic started getting under control, restrictions eased, and people became more environmentally conscious, the EV manufacturing industry also witnessed confident growth, poised to emerge as one of the leading EV markets globally.

According to reports, the Indian EV market, valued at \$1,435 billion in 2021, is expected to reach \$15,398 billion by 2027, registering a CAGR of 47.09% during 2022-2027.

The continuous hike in fuel prices is a big motivator for vehicle owners and new buyers to look at cheaper options, and EVs fit the bill. In India, electric mobility will create new electricity demand, helping with a wider introduction of renewable energy in the transport sector. Besides the more popular benefits — including reducing carbon dioxide emissions and air and noise pollution — EVs also create substantial efficiency gains and could emerge as a storage source for various renewable energies.

The Indian EV market's evolution can be measured by noting the growing number of EV startups — manufacturing everything — from two-wheelers to four-wheelers, hybrid and electric vehicles, e-carts and heavy EVs.

Through policies, subsidies, and initiatives, several state governments are contributing to boosting EV startups, besides venture capitalists and private equity players, who invest huge funds in automotive startups.

An interesting facet about technology is that once a new technological invention happens in one corner of the world, it soon spreads as others start to adopt the same.

The first-ever automobile was built in the 1800s in Germany and France, but it took virtually no time for the technology to reach America and the rest of the world.

China has now moved quickly to secure a stronghold in the EV market, understanding that EVs would offer a clear course to becoming the foremost player in the global automotive market. A robust battery manufacturing sector, extensive charging infrastructure, and favourable government policies have propelled European countries like Sweden and Germany to the top. In India, EV companies have received a huge boost from the government with the introduction of the FAME I and II schemes, the enhancement of e-charging infrastructure, reduction of Goods and Services Tax (GST) on EV purchases, and offering Rs 10,000 crore worth subsidies. Alongside Production Linked Incentive (PLI) schemes, scrappage policy, and the Make in India initiative, these schemes lay the roadmap for widespread EV manufacturing and adoption in the country.

1.4 GROWTH OF THE COMPANY / INDUSTRY / SECTOR

Factors such as growing demand for low emission commuting and governments supporting long range, zero emission vehicles through subsidies & tax rebates have compelled the manufacturers to provide electric vehicles around the world. This has led to a growing demand for electric vehicles in the market. Countries around the world have set up targets for emission reductions according to their own capacity.

Increasing investments by governments across the globe to develop EV charging stations and Hydrogen fueling stations along with incentives offered to buyers will create opportunities for OEMs to expand their revenue stream and geographical presence. The EV market in Asia Pacific is projected to experience steady growth owing to the high demand for lower cost efficient and low emission vehicles, while the North American and European market are fast growing markets due to the government initiatives and growing high-performance Passenger vehicle segment. However, relatively less number of EV charging stations and hydrogen fuel stations, higher costs involved in initial investments, and performance constraints could hamper the growth of global electric vehicle market.

COVID-19 Impact on the Electric Vehicle Market:

There was a moderate impact on the EV charging business due to the pandemic in early 2020 due to lockdowns. Due to the growing demand for EV market during the pandemic due to incentives from governments worldwide, the demand for EV charging stations increased in 2021. However, the outbreak of the COVID-19 pandemic had affected the extraction of materials such as steel, copper, and aluminum. The prices of raw materials such as copper continued to rise, with the copper price hitting USD 10,000 per ton for the first time in 10 years, in May 2021. On the other hand, top EV manufacturers have increased their EV sales rapidly over the past 2 years. Tesla for instance laid off employees in October 2020 due to deteriorating sales. However, its overall revenue increased due to its earlier expansion to China. In 2021, the company fared well and did not have much impact due to COVID-19. In early 2022, its sales again declined due to lockdowns in China. With the strong push from governments around the world to phase out ICE vehicles, this EV market was less impacted during the pandemic.

Dynamics for Electric Vehicle Market / EV Market:

Driver: Reducing cost of EV batteries to support demand for cost-effective EVs EV Market: The cost of EV batteries has been decreasing during the past decade due to technological advancements and the production of EV batteries on a mass scale in large volumes. This has led to a decrease in the cost of electric vehicles as EV batteries are one of the most expensive components of the vehicle. In 2010, the price of an EV battery was approximately USD 1,100 per kWh. However, by 2020, the price fell to approximately USD 137 per kWh, and it reached as low as USD 120 per kWh in 2021. The price of these batteries are as low as USD 100 per kWh in China. This is because of the reducing manufacturing costs of these batteries, reduced cathode material prices, higher production, etc. The prices of EV batteries are expected to fall to approximately USD 60 per kWh by 2030, which is expected to significantly reduce the prices of EVs, making them cheaper than conventional ICE vehicles.

Restraint: Insufficient EV charging infrastructure

There are a low number of EV charging stations in various countries around the world. This leads to the lower availability of public EV charging for electric vehicles, thus reducing adoption. Although various countries are in the process of installing EV charging infrastructure, most countries have not been able to install the required number of EV charging stations except in some states. The demand for EVs is expected to increase with a well-developed EV charging network across the world. Most countries are yet to develop such charging networks. The Netherlands has the highest EV charger density per 100 Km. The Netherlands has the highest density of around 1920 charging stations per 100 km. China is the next best, with around 3-4 charging stations per 100 km. The UK has around 3 charging points per 100 km, but the country is rapidly expanding its charging stations with its 2030 plans to phase out sales of ICE vehicles. Germany, UAE, Japan, Singapore, South Korea, Sweden, France, US, and Russia have also stepped up the shift to EVs by setting up a large number of charging stations.

Electric Vehicle Market Opportunity: Government initiatives pertaining EVs

Countries around the world have set targets to reduce vehicle emissions by 2030-2050. They have started promoting the development and sales of EV market and related charging infrastructure. For instance, the US government invested USD 5 billion in 2017 to promote electric vehicle infrastructure such as charging stations. Several governments are providing various incentives such as low or zero registration fees and exemptions from import taxes, purchase taxes, and road taxes to adopt EVs.

Norway and Germany are investing significantly in promoting sales of EV market. Thus, due to the high incentives and subsidies in Europe, a high growth rate in the sale of electric vehicles is observed. This has led to the growth in demand for components and equipment associated with EV charging, such as charging cables, connectors, adapters, and portable chargers. As part of a partnership between the US energy and transportation departments, a new vision for a national fast-charging network is expected to be developed, with potential longer-term innovations that include up to 350 kW of direct current fast charging. Stringent CO2 emission norms have increased the demand for electric vehicles. Governments are investing significantly in providing incentives and subsidies to encourage the sales of EVs. These steps undertaken by governments around the world are expected to help increase demand for EVs during the coming decade. China, Canada, and US have set up regulations for EVs, while all countries have set up fuel economy standards. They also provide incentives and subsidies for EV manufacturers and buyers. The US provides incentives of up to USD 7,500 for buying new EVs. Most of these countries also provide incentives for the setup of EV charging points. Europe is expected to be the first region with plans to fully shift to EVs. Most countries in the region have announced plans to stop ICE vehicle sales in the coming decades. The UK aims at dominating the entire vehicle market with EV sales by 2030. Norway plans to undertake the same initiative and complete it by 2025. The Netherlands, Israel, Ireland, Iceland, and Denmark have made plans to adopt EVs by 2030. China and Japan also plan to stop ICE vehicle sales by 2035.

Attractive Opportunities in the Electrical Vehicle Market



1.5.ABOUT MAJOR COMPANIES OF THE INDUSTRY

Top 10 EV manufacturers in India

1) Tata Motors



Tata Motors was one of the first automotive brands in India to hop onto the electric vehicle bandwagon. It was quick in assessing the EV space way before the competition and currently enjoys a slight first-mover advantage. Tigor EV was the manufacturer’s first electric vehicle for personal buyers which came at a hefty

price in 2019. This particular car accounted for 95 percent of total electric car sales in February 2022. Apart from that, the Ziptron technology at the helm of Tata electric cars ensures the smooth performance of the battery and motor for the long term. It also allows Tata to easily offer EV versions of its existing ICE cars such as Tigor and Nexon.

TATA Motors EVs in India

- TATA Nexon EV
- TATA Tigor EV

2) Hyundai



Hyundai started its electric vehicle campaign in India with the launch of the Kona SUV in 2019. At the time, it was one of the first foreign brands to come up with an electric car for the Indian market despite the segment being at its early stages. After properly analysing the Indian EV market and factoring in various aspects, the South Korean car manufacturer is said to launch 6 new electric cars across various price points by 2028. It plans on making this possible with its sister brand, Kia Motors where both the companies will share resources and target different kinds of audiences in the market.

Hyundai EVs in India

- Hyundai Kona electric

3) Hero Electric



Hero Electric currently holds the topmost position in the electric two-wheeler segment. As it's been a well-known brand in the industry for over 14 years, consumers have built a sense of faith and trust. This of course goes in hand with the increased awareness of electric vehicles in India. That said, Hero Electric is able to sell thousands of electric two-wheelers every month with record-high sales. It aims to manufacture over 1 million EVs by 2025 whilst expanding its plant and charging stations. Currently, the brand has 2000 charging stations across the country with 20,000 more in the pipeline which will make it much easier for its customers to quickly charge their two-wheelers at various standpoints. Hero Electric's lineup of e-scooters includes Optima HX, Photon HX, NYX HX, Flash LX and Atria LX. Its sales figure shows the company has sold over 46,260 units of electric scooters in 2021.

Hero EVs in India

- Hero Eddy
- Hero Electric Photon HX
- Hero Electric NYX HX
- Hero Electric Optima LX
- Hero Electric Flash LX
- Hero Electric Atria LX
- Velocity

4) Ola Electric



Ola Electric Mobility, a division of Ola cabs has taken the market by storm with its Ola S1 and Ola S1 Pro electric scooters. The company's electric two-wheeler manufacturing takes place in its 500acre automated factory in the Krishnagiri district of Tamil Nadu. Currently, Ola produces 1000 electric scooters and claims to become the largest two-wheeler brand in the world with an annual production of 10 million units in the coming years. The S1 and S1 Pro e-scooters have been able to gain all the limelight due to the high-end features such as keyless ignition, large boot space, external charging port and loads of smart features accessible via the large LED display. Both these scooters are also able to provide impressive performance outputs.

Ola EVs in India

- Ola S1
- Ola S1 Pro

5) Ather Energy



Ather Energy is the maker of India's first smart electric scooter called S340. Launched in 2016, the scooter brought in never seen features on a two-wheeler such as a capacitive touch screen, userbased profiles and even an app to control various settings of the e-scooter. Being an avid player in the EV space, Ather has managed to build its charging infrastructure across 21+ cities and 220 locations in India, called Ather Grid. It currently manufactures two electric scooters, namely Ather 450X and Ather 450 Plus, with both of them boasting features like reverse assist, a high-end suspension system and tons of smart features such as Bluetooth connectivity and monthly riding stats. Ather Energy has received several investments from Hero MotoCorp in the past couple of years, which itself is a forefront player in the two-wheeler automotive sector.

Ather Energy EVs in India

- Ather 450x
- Ather 450 Plus

6) Mahindra Electric



Mahindra Electric Mobility Limited is the electric vehicle venture under the Mahindra Group. The company has several EVs in its portfolio including commercial, personal and passenger vehicles. Being a prominent player in the automotive sector for a couple of decades just like Tata Motors, Mahindra Electric has made fast progress by quickly understanding the need for electricity-run vehicles and taking action accordingly. Its history can be dated back to 2001 with the launch of the Mahindra Reva, which is considered to be one of the world's first electric cars that even sold in international markets such as the United Kingdom, Germany, France etc. As of today, apart from building cars such as eVerito, eSupro, Treo Zor and e2o plus, Mahindra Electric also focuses on the manufacturing of batteries and improving the EV infrastructure in the country.

Mahindra Electric EVs in India

- Mahindra eVerito
- Mahindra e2o plus
- Mahindra eSupro
- Mahindra Treo
- Mahindra eAlfa mini

(7)Olectra Greentech



Olectra Greentech is the largest electric bus manufacturer in India. It has bagged several orders from state governments to supply buses for public transport use. Olectra currently enjoys a share of 40 percent in the electric bus market and also plans to produce electric three-wheelers and commercial trucks in its 150-acre manufacturing facility situated in Hyderabad. Touted as pioneers of electric buses in India, Olectra Greentech buses include the K6 E-Bus, K7 E-Bus and K9 E-Bus with all of them boasting great mileage and sheer indoor silence as compared to ICE counterparts.

Olectra Greentech EVs in India

- K6 eBus
- K7 eBus
- K9 eBus

8) Ashok Leyland



Commercial vehicle giant Ashok Leyland has also entered the EV space where it manufactures passenger electric buses. However, just recently it has transferred its EV business to its step-down subsidiary, Switch Mobility Automotive Ltd (SMAL) to focus on its core business of commercial trucks and buses. That said, Ashok Leyland is still a major shareholder of the newly formed subsidiary and will be responsible for making strategic decisions in the company. In its fleet are several passenger buses such as Circuit, Solo, Metrocity and Metrodecker which are even being supplied to foreign cities such as London. The company has received orders and contracts from various state governments to deliver electric buses and commercial vehicles.

9) Okinawa



Okinawa is a popular electric two-wheeler brand among youngsters. The Gurugram based company founded in 2015 makes sporty-looking e-scooters that are often associated with speed and performance. As of February 2022, Okinawa held the second position among the top two-wheeler brands in India. It has been able to capture a good chunk of the market share by providing two-wheelers in various price brackets which gives it a competitive edge. It manufactures its vehicles in a plant situated at Bhiwadi, Rajasthan which is responsible for the production and supply of six electric two-wheelers in its portfolio such as Okinawa R30, Ridge Plus, Praise, i-Praise, and OKHI-90 which will directly rival the feature-packed Ola S1 Pro. As for the sales, Okinawa sold a total of 29,945 units in 2021 and in January 2022 alone it has sold 11,536 units of electric two-wheelers.

Okinawa EVs in India

- Okinawa Dual
- Okinawa Okhi-90
- Okinawa Lite
- Okinawa iPraise+
- Okinawa PraisePro
- Okinawa Ridge+
- Okinawa R30

(10) Ampere EVs



Ampere Vehicles is currently the third largest two-wheeler EV brand in the country as of February 2022. Founded in 2008, the company was initially into supplying vehicles for the differently-abled on a government contract basis. After years of innovation, it came up with the V60 electric scooter in 2010 and later on introduced indigenized charger and IQ battery. Over the years, it has backed several investments from personalities like Shri Ratan N Tata. It currently has four electric scooters in its fleet namely Magnus EX, Magnus, Zeal EX and Reo Plus all ranging from Rs 45,000 to Rs 80,000. As for sales, the company has managed to sell a total of 4303 units in February 2022.

Ampere EVs in India

- Ampere Magnus EX
- Ampere Magnus
- Ampere Zeal EX
- Ampere Reo Plus

(11)MG



MG recently upped the game by equipping it with a larger battery and a new motor, thus boosting its overall performance and practicality. The company advertises a range of 461km on a full charge, which is a jump from the previous iteration's 419km. We put this new ZS EV through our test cycle to find out how it performs.

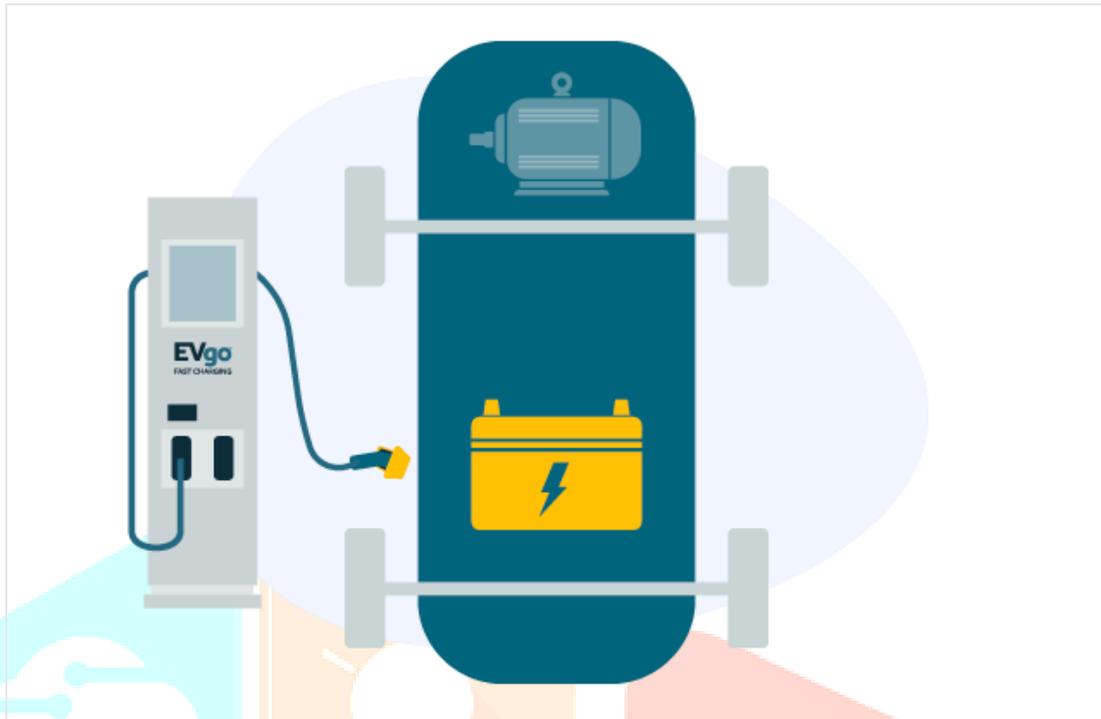
Battery is now 13 percent larger

Claimed range increased from 419km to 461km

Gets three regenerative braking modes

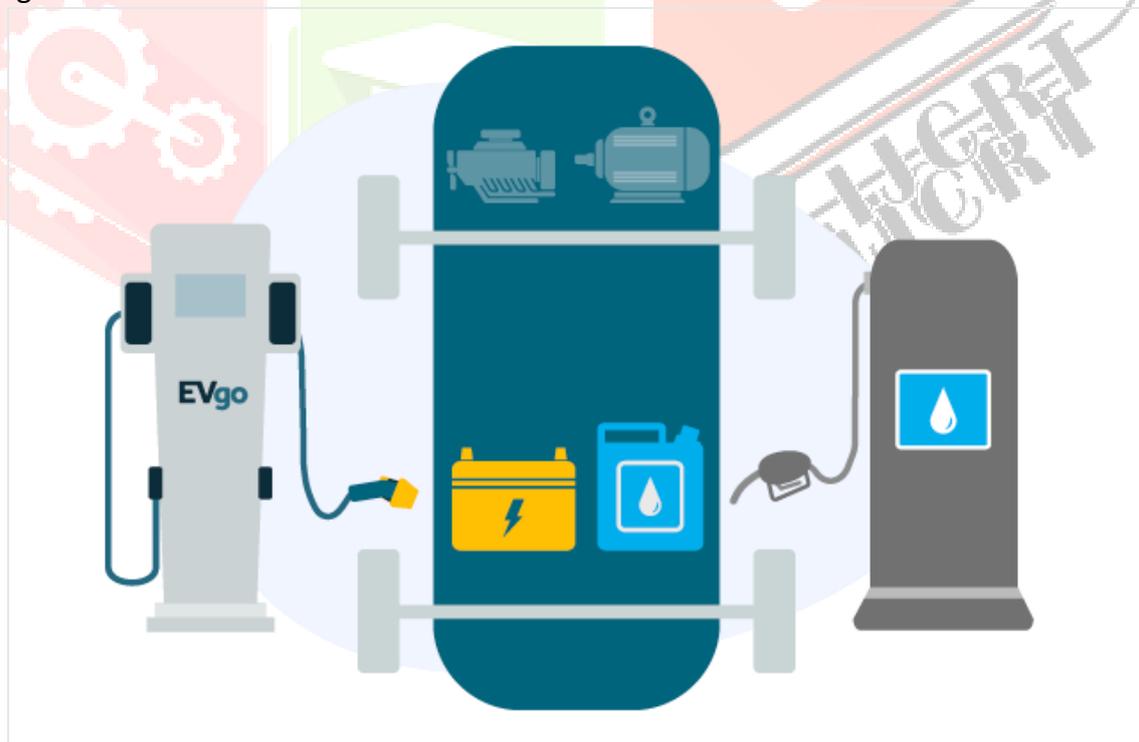
1.6. PRODUCT PROFILE (MAJOR PRODUCTS)

Types of EV options



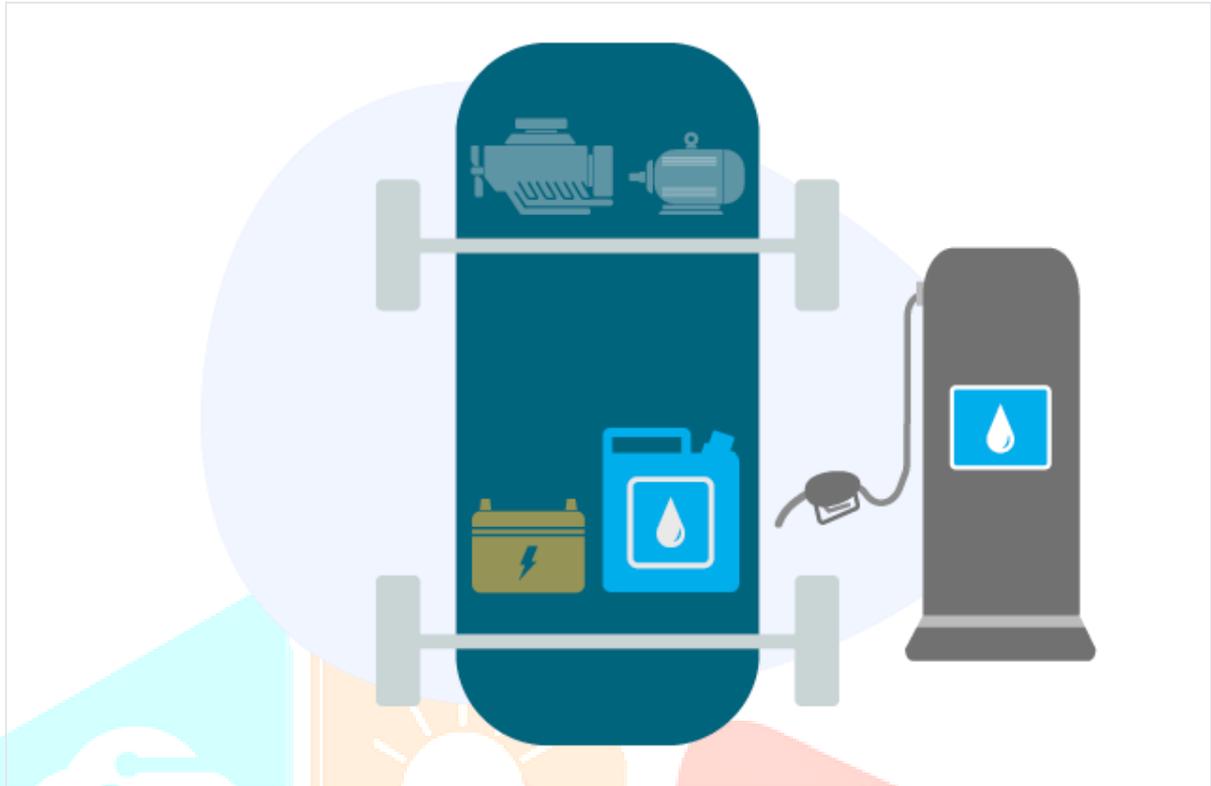
Battery Electric Vehicles (BEVs)

Powered solely by an electric battery, with no gas engine parts. Most BEVs are capable of fast charging and L2 charging. Zero emissions.



Plug-in Hybrid Electric Vehicles (PHEVs)

Similar to a Hybrid, but with a larger battery and electric motor. Has a gas tank and a charging port. Can charge by using L2 chargers.



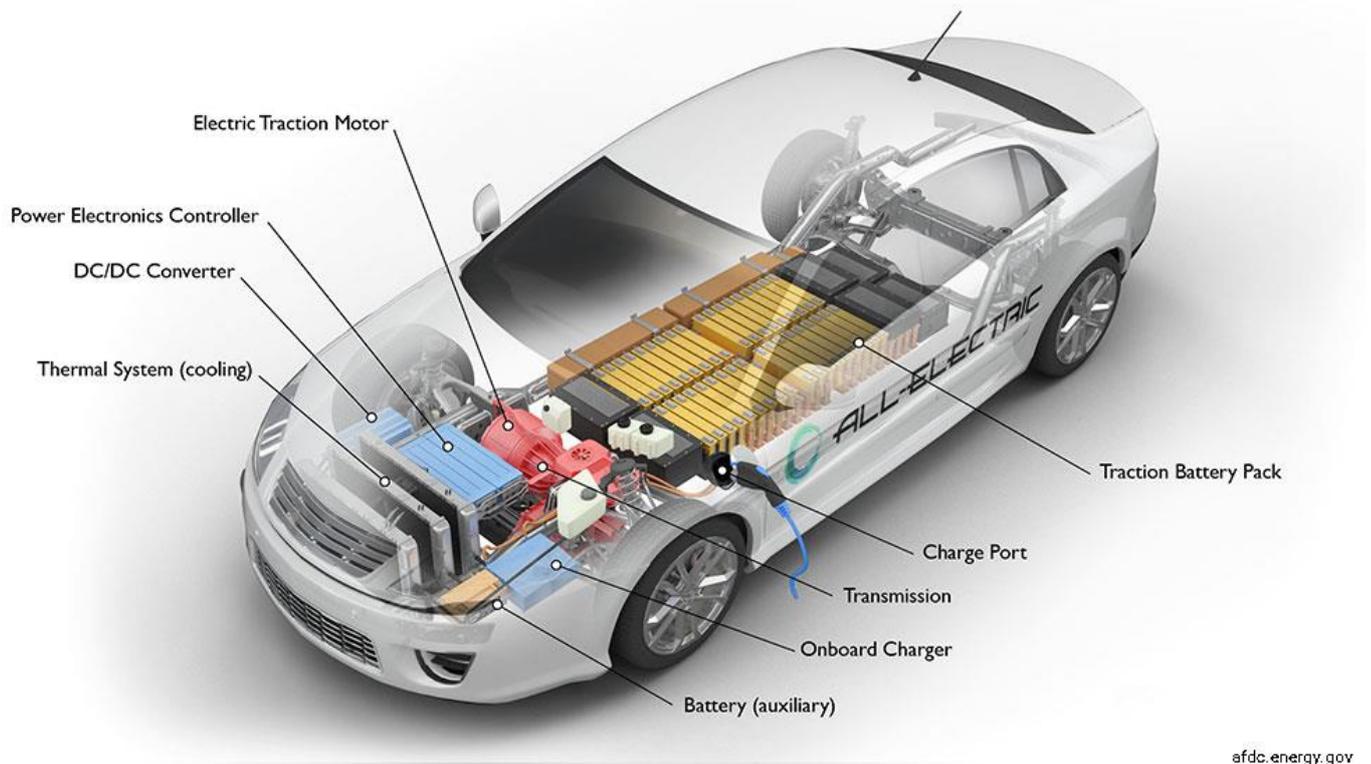
Hybrid Electric Vehicles (HEVs)

Low-emission vehicles that use an electric motor to assist gas-powered engines. All energy comes from gasoline. Cannot charge with EVgo.

IMPORTANT PARTS OF EVs

- Traction battery pack.
- DC-DC Converter.
- Electric motor.
- Power inverter.
- Charge Port.
- Onboard charger.
- Controller.
- Auxiliary batteries

All-Electric Vehicle



Disadvantages of EVs as per Indian market

EV cost and battery cost:

The cost is the most concerning point for an individual when it comes to buying an electric vehicle. However, there are many incentives given off by central and state governments. But the common condition in all policies is that the incentives are only applicable for up to a certain number of vehicles only and after removing the discount and incentives the same EV which was looking lucrative to buy suddenly becomes unaffordable. This tells that buying EV's no more be cheaper after a certain saturation point. At the end of the day fuel and EVs have almost equal range of price.

Battery Cost:

It's no more hidden from anyone that the Li-ion battery in electric vehicles is built to last till 6-7 years or hardly 8 years and after the battery decay period of an electric vehicle battery its user remains with no other choice than to buy a newer battery which costs nearly 3/4 th of the whole vehicle cost. Battery cost is going to be a pressing issue for the EV buyers because electric vehicles are new to both market and customers the battery issue requires at least 5 years to surface this will going to be impacted in a long run.

Beta version of vehicles:

Right now, both the technology and companies are new to the market and the products they are manufacturing are possibly facing real costumers for the first time. And it's nearly impossible to make such a complex product like an automobile perfect for the customers in the first go, and as expected the buyers faced many issues



Poor Infrastructure and range anxiety:

Poor infrastructure is among the most pressing issue among people thinking to opt for electric vehicles. Poor infra doesn't only include a lack of charging stations but also the lack of proper charging set up in their home. Charging a heavier electric car could be a major problem for any electric car owner if he/she lacks proper setup (Powerful MCB, wire, and earthing) near their place.

Range anxiety: This problem of mental pressure comes due to lack of charging infrastructure which is improving day by day but still required to improve a lot in this area.

Many companies are offering mad range for their EVs in ideal conditions like 200, 180, 150 but in real conditions, 150 km is like a dream and if you are from the category of an average Indian male with some luggage and riding in a city like a condition then you should be satisfied with a 100 km driving range. In electric cars, the loading capacity may not have much impact, but for small vehicles like electric scooters or electric bikes, even a small difference in driving conditions can impact your EV range a lot.

No Universal charger and Ecosystem (Lack of standardization):

Every second electric vehicle-making company has its own different charging port which is becoming a hurdle to setting up a proper charging ecosystem.

Also, many EV users complained about facing moral trouble for charging their vehicle in different EV-making company's charging stations which can impact the growth of the EV industry.

Lack of standardization is a curse to the Indian electric vehicle industry; it's damaging the present and future of the EV market. Every second electric scooter has its own different charging port, which affects the charging station infrastructure because no specific charging station can be built that can charge all types of electric vehicles. Also, the lack of standardization reduces the EV adoption rate in society-based communities.



Temperature Issues:

Temperature can affect the performance of an EV battery to a large extent which makes EV's inappropriate for too cold (Uttarakhand, Meghalaya) or too hot regions like (Rajasthan, Kerala). The battery can give its ideal performance when it's in use under the temperature range of 15-40 degrees.

Less performance for ideal economy:

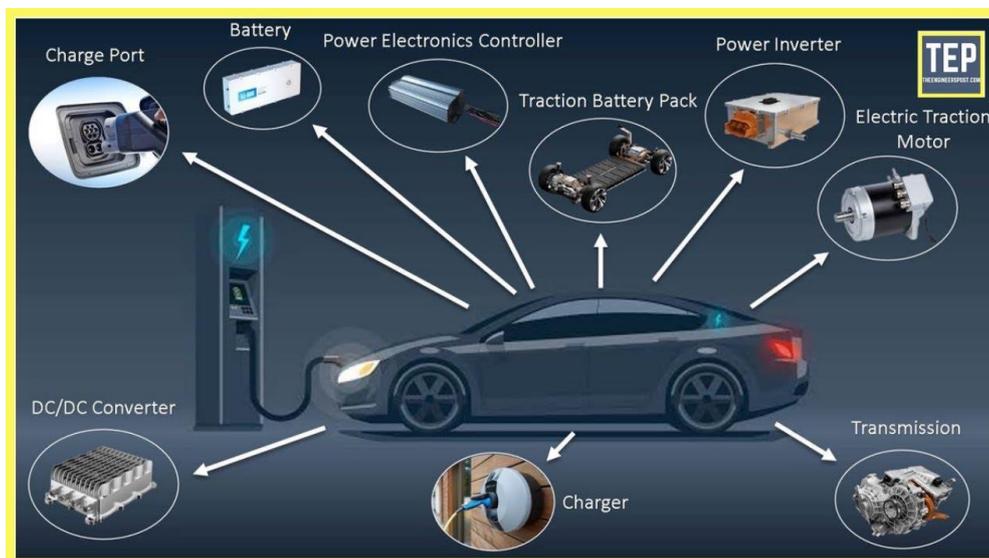
fuel engine-driven vehicles are still way ahead of electric vehicles when it comes to performance.

Environmental concerns:

The EV revolution is necessary for the most populated and polluted parts of India like Delhi, Mumbai, etc. but in such cities the major chunk of electricity is generated through burning fossil fuels which are equivalent to spreading the pollution through the ICE vehicle smoke, even most of the charging stations are reportedly operating upon diesel-driven electricity generator.

Servicing is in danger:

Servicing and spare parts are some of the most important parts for any vehicle, especially for vehicles facing Indian roads. Also, the quality of material offered in new-age electric vehicles are of very low quality and upon which the companies are adding some very high-tech functionalities like onboard GPS, touch screen panels, extremely delicate sensors. In some unfortunate period if even a light or indicators damages, you won't have any other choice than replacing from the company itself



2. LITERATURE REVIEW

The European new vehicle CO2 regulation

(with a mandatory target value of 95 grams of CO2 per kilometer by 2021 for passenger cars) is currently in the process of being extended to 2025. In this context, one of the key questions is at what point a significant uptake of the electric vehicle market is to be expected. In order to help inform this debate about how electric vehicle technology could fit in a lower-carbon 2020–2030 new vehicle fleet in Europe, this paper focuses on collecting, analyzing, and aggregating the available research literature on the underlying technology costs

and carbon emissions. In terms of technologies, this paper concentrates on the three electric propulsion systems: battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hydrogen fuel cell electric vehicles (HFCEVs). The collected cost data is used to estimate the technology cost for automotive lithium-ion (Li-ion) batteries and fuel cells. The cost of battery packs for BEVs declined to an estimated €250 per kWh for industry leaders in 2015. Further cost reductions down to as low as €130–€180 per kWh are anticipated in the 2020–25 time frame. The costs of fuel cell systems are also expected to decrease considerably, but cost estimates are highly uncertain. Furthermore, the application of fuel cells and batteries in HFCEVs, BEVs, and PHEVs is approximated using a bottom-up cost approach. Overall, the different power train costs largely depend on battery and fuel cell costs. This paper concludes that the costs of all power trains will decrease significantly between 2015 and 2030 (Figure S 1). As shown, power trains for PHEVs will achieve about a 50% cost reduction, compared with approximate cost reductions of 60% for BEVs and 70% for HFCEVs. Costs for hydrogen and electricity chargers are estimated separately. Greenhouse gas (GHG) emissions and energy demand for electric and conventional vehicles are presented on a well-to-wheel (WTW) basis, capturing all direct and indirect emissions of fuel and electricity production and vehicle operation. The results are WORKING PAPER 2016-14 Acknowledgements: The authors thank Peter Mock, Uwe Tietge, John German, Vicente Franco, and Joshua Miller from ICCT for reviewing and contributing to this paper, which greatly improved its quality.

Total 2030 Total 2025 Total 2020
Total 2015 BEV-100 BEV-150 BEV-200 BEV-300 PHEV-10

Motor of EVs

PHEV-20 PHEV-30 PHEV-40 PHEV-60 HFCEV (typ) HFCEV (low) ICEV ICE credit Transmission Motor Other EV parts H2 storage Battery Fuel cell Cost increment in € Figure S 1. Cost breakdown of different power trains for a 2030 lower medium car. Circles show total incremental costs over a 2010 internal combustion energy based on former analyses, and are updated and refined with realworld fuel consumption levels. Real-world fuel consumption is commonly about 20%–40% higher than official typeapproval measurements. Finally, WTW estimates for electric and conventional vehicles are put in the context of the 2021 CO₂ standard for European passenger vehicles. It is found that carbon emissions of BEVs using European grid-mix electricity are about half of average European vehicle emissions, whereas HFCEVs and PHEVs have a lower emissions reduction potential. In the 2020 context, electric vehicle WTW emissions are expected to continue offering greater carbon benefits due to more efficient power trains and increasing low-carbon electric power. A lower-carbon grid and higher power train efficiency by 2020 could cut average electric vehicle emissions by one-third again. However, the expected cost reductions and potential CO₂ emission cuts will not be achieved without targeted policy intervention. More stringent CO₂ standards, and fiscal and non-fiscal incentives for electric vehicles, can help the electric vehicle market to grow and costs to fall. Also, efforts need to be combined with activities to decarbonize the grid, or emission reductions will not be as great as they could be. Although the analysis is focused on the European context, similar dynamics with electric vehicle technology, policy, and market development are prevalent across major markets in North America and Asia.

The transport sector plays a significant role in air pollution resulting in climate change due to greenhouse gases (GHG) emissions mostly in urban regions; this has necessitated road transport electrification, whereby replacing internal combustion vehicles with new energy vehicles like electric vehicles (EV) seems to be a promising step towards envisaging urban sustainability. Technologies related to electric-mobility have been changing exponentially; therefore, literature covering these changes have also increased significantly. Studies covering multiple dimensions of EV adoption across countries, including charging infrastructure (Chen et al., 2017; Dorcec et al., 2019), policies and incentives (Sierzchula et al., 2014; Bjerkan et al., 2016; Melton et al., 2017), business models (Wu, 2019; Nian et al., 2019; Yoon et al., 2019), among others. Review articles focused on specific aspects of EV adoption have started emerging. For instance, Hardman (2019), Biresselioglu et al. (2018), and Rezvani et al. (2015) respectively explored the role of reoccurring and nonfinancial incentives for plug-in hybrid electric vehicle (PHEV) adoption, electric mobility in the European context, and the drivers and barriers for EV adoption based on theoretical perspectives.

Introduction to the history of EVs

Electric Vehicles are becoming order of the day due to its various advantages over normally used IC engine vehicle. The bloom of this particular field is making environment more green and causes less pollution. The main part of EV, which makes it function more competitive is the motor propulsion. The design and drive system for such a machine is an area which is to be concentrated more in order to make the EV system an effective one. An EV is the one which is propelled by electric motors and uses energy stored in batteries. Unlike IC engine vehicles, EV does not produce exhaust gases during its operation, which makes this system more environment friendly. The sources of conventional vehicles like fossil fuel will soon get depleted and there will occur a situation where in the consumers are expected to look for any other alternative. So it is better to work on a focussed manner and switch over to the alternative choice which is Electric Vehicle. The sources for making EV possible are more and it will never get depleted. The proposed work is to carry out a literature survey on design of electrical machines and its drive system used for EV based applications.

Mohammed MeerAhmed M. Alia and Anand A Deshmukh

Electric Vehicle (E- vehicle) has emerged as a boon to the world struggling with disastrous environmental impact of consuming fossil fuel and the contribution of present-day vehicle in pollution is massive. Even scarcity of natural resource and recent hike of fuel prices encourages to look at E- vehicle as an excellent alternative to commute with zero impact on environment. Green energy is the need in the present situation of the world and E-Vehicle adoption gives a big drive to reduce pollution. It is an accepted fact that E-Vehicle has a huge scope and hence calls for appropriate marketing tactics to expand the market by creating awareness of the advantages of owning a E –Vehicle and motivating consumers to make their purchasing decisions. There is need to understand the customer’s perception and expectations. This article tries to explore the literature available on E-Vehicle adoption and surface out the consumers perceptions and intensions towards adoption of E-Vehicle.

Plug in EVs

Electric Vehicle (E- vehicle) has emerged as a boon to the world struggling with disastrous environmental impact of consuming fossil fuel and the contribution of present-day vehicle in pollution is massive. Even scarcity of natural resource and recent hike of fuel prices encourages to look at E- vehicle as an excellent alternative to commute with zero impact on environment. Green energy is the need in the present situation of the world and E-Vehicle adoption gives a big drive to reduce pollution. It is an accepted fact that E-Vehicle has a huge scope and hence calls for appropriate marketing tactics to expand the market by creating awareness of the advantages of owning a E –Vehicle and motivating consumers to make their purchasing decisions. There is need to understand the customer’s perception and expectations. This article tries to explore the literature available on E-Vehicle adoption and surface out the consumers perceptions and intentions towards adoption of E-Vehicle.

Nitish sharma-

In present scenario, air pollution has become a serious concern for the India. According to recent global report, many cities in the India are most polluted cities. Major sectors contributing to the air pollution are industrial sector and transport sector. Among this 51% of air pollution is caused by the industrial sector and 27% by the transport

https://www.researchgate.net/publication/353260957_Electric_Vehicles_in_India_A_Literature_Review

KaranMahal1 , Priyadarshini Patil-

With the current depletion of fossil fuels and its rise in pricing there is a need to find an alternate energy resource to run the vehicle. The automobile sector is proceeding towards Electric vehicles as a solution to the industry and environment in India. However, the current market of EVs is relatively low despite governments implementing EV policies. Through this paper ease of Electric vehicles in India will be studied and the compatibility of EVs in India will be analysed.

Lingzhi Jin, Peter Slowik-

Governments around the world are implementing policies to promote electric vehicles to reduce dependence on oil, decrease greenhouse gas emissions, and improve air quality. In the past few years, annual global electric vehicle sales have been firmly on the upswing, from just hundreds in 2010 to over 500,000 in 2015 and over 750,000 in 2016.

Bailey et al. -

Investigation of whether visibility of public chargers has an impact on PEV demand. • There is no significant relationship between perceived existence of one charging station and PEV interest, however there is a weak yet significant relationship between perceived existence of multiple charging stations and PEV interest.

Williams & Johnson-

Analyses the results of a consumer survey from California electric vehicle purchase rebate recipients. • Based on electric vehicle consumer data, the researchers identify who is adopting the technology, what their main sources of information are, and the motivations influencing their decision to select an electric vehicle.

Singer, M-

- Survey and findings that cover consumer awareness, attitudes, and purchase behavior regarding plug-in EVs.
- Fewer than 50% of survey respondents were able to name a plug-in electric vehicle make and model.

Rezvani et al -

- Identifies drivers for and barriers hindering adoption of plug-in electric vehicles. Includes an overview of previous perspectives used to evaluate consumer purchase desire and electric vehicle adoption behaviour.

Carney -

Need at least 10 electric vehicle models on site for sufficient selection, and should have at least 20-30 during periods of peak demand. Having EVs displayed under a solar canopy with charging stations greatly increases consumer interest.

Stock, J. H.

Compare the climatic change with the macroeconomics and also investigated the effect of global warming around the world and its environmental concerns. Also, the to develop the energy sources to overcome the sustainability.

Shuvam Chatterjee -

Electric vehicle (EV) disposition may challenge serious environmental issues such as excessive dependence on oil, especially in the transport sector. Despite this understanding, the adoption intention has been disappointing to date. This review tries to present a comprehensive overview of the methodologies, theories, and variables used in 57 peer-reviewed articles published between 2015 and 2022 covering the main forms of consumer adoption of EVs.

Sonali goel

Electric vehicles are an important option for reducing emissions of greenhouse gases. Electric vehicles not only reduce the dependency on fossil fuel but also diminish the impact of ozone depleting substances and promote large scale renewable deployment. Despite comprehensive research on the attributes and characteristics of electric vehicles and the nature of their charging infrastructure, electric vehicle production and network modelling continues to evolve and be constrained. The paper provides an overview of the studies of Electric Vehicle, Hybrid Electric Vehicle, Plug-in-Hybrid Electric Vehicle and Battery Electric Vehicle penetration rate into the market and discusses their different modelling approach and optimisation techniques. The research on the essential barriers and insufficient charging facilities are addressed for a developing country

like India that makes the study unique. The development of new concept of Vehicle-to-Grid has created an extra power source when renewable energy sources are not available. We conclude that taking into account, the special characteristics of electric vehicles are so important in their mobility.

Suvanjan Bhattacharyya

this work, the estimation of the actual CO₂ emission of a conventional IC engine vehicle and an electric vehicle have been studied in different phases and those vehicles are in same segmented also. How much time it would be taken in order to convert an electric vehicle in to a Green Vehicle (**GV**) also been studied. In our work, we compare two similar SUV's in there same segment one is Electric Vehicle (**EV**) and another is conventional IC Engine Vehicle (**ICV**). Both the cars have very similar power output; torque and design in there segment. Although there are many options of fast charging, long refuelling or recharging time is a major problem of the **EV** but this is not our concern study. In science each and every innovation has one good and a bad side, and there is no exception about the **EVs** also.

3.1 Objectives of Research

1. To find out the out come of EVs in Indian market over fuel vehicle.
2. To find the necessary steps for boosting EVs market in India.
3. Necessary steps and subsidies must be introduced and provide by the government to encourage public to switch on EVs.
4. To gain knowledge about customer attitude towards the change of technology.
5. Identify the reasons that why Indian market is not accepting EVs.
6. To identify the awareness level about EVs that customer possess.
7. To encourage government to implement change the policy of public vehicle from fuel to electronic.

Scope of study

The goal of this research is to achieve the views of Indian market of EVs and findings of future of EVs in Indian market that India will be the importer or the leading exporter in future Rectify the reasons of EV model in India and study the developing phase of it. To collect the awareness of public related to EVs and spread the importance to switching form fuel.

Research Design

Since it is basically a market research project along with some marketing and selling of EVs products, various market research methods were used to accomplish its goals. I conducted a market survey to know about the consumer behaviour towards organic foods in Baroda.

The stepwise methodology-

RESEARCH DESIGN USED: **DESCRIPTIVE**

SAMPLE SIZE USED: 70

SOURCES OF DATA: PRIMARY (Questionnaire)

SECONDARY (Newspapers, Brochures, Manual report)

Evaluation and Analysis Process

Studying the company's market share on EVs, questionnaire is designed for that purpose. Analysis is done graphically & evaluated in terms of percentage.

The findings, conclusion, suggestion, analysis of the report is based on the primary data collected through survey method and the secondary data collected by me.

For the survey the questioner was prepared on the base of objectives of research and implemented, for primary around 70 reviews were taken and secondary data was collected by us.

The secondary data is collected through various magazines, books, company's personnel manual, annual reports and the calendar of event published by the various training agencies

1. Data collection was also done with the help of personal observation.
2. After completion of survey the data was analysed and conclusion was drawn.
3. At the end all information was compiled to complete the project report.

SAMPLE AREA: Baroda

Secondary Research: Company description was obtained through websites, business magazines, and journals and from the organization itself

Selecting the sample: Population that was taken as a sample included randomly selected.

Sampling Technique: Simple Random Sampling

Primary Research: Primary research was conducted through surveys via:

By preparing google questionnaire

Preparation and tabulation of data: After the data has been collected, it was entered into Microsoft Excel and was prepared for analysis.

Data Analysis: The data so collected was analyzed in Microsoft Excel with the help of bar diagrams, pie charts, etc.

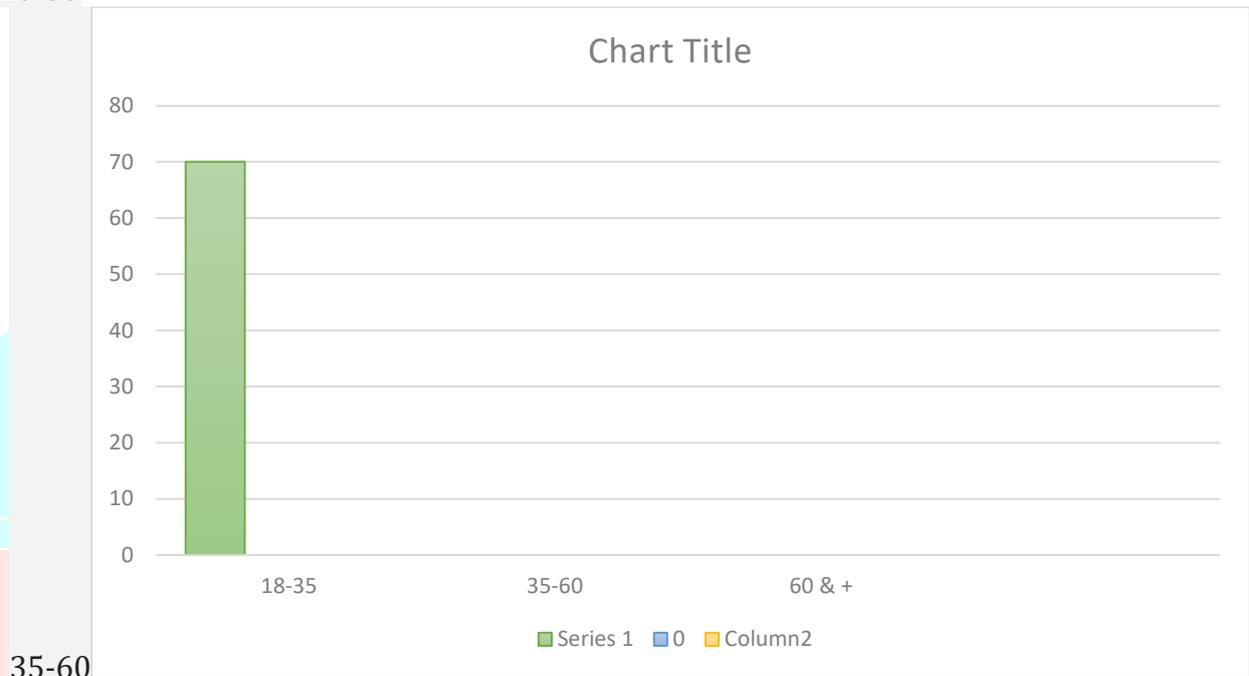
The research is conducted offline mode and the samples we could collect are 70.

The location of the study of the research is conducted in HALOL & VADODARA.

Questionnaire

1. which age group you belong?

- 18-35

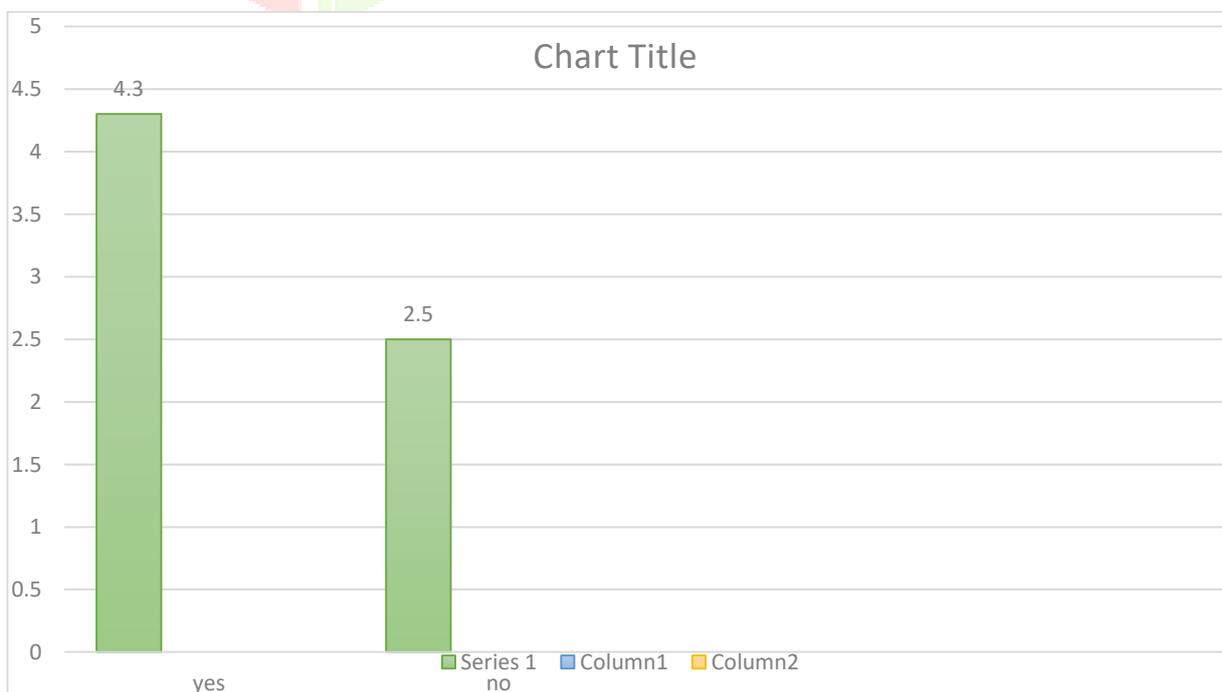


- 35-60

- 60-60+

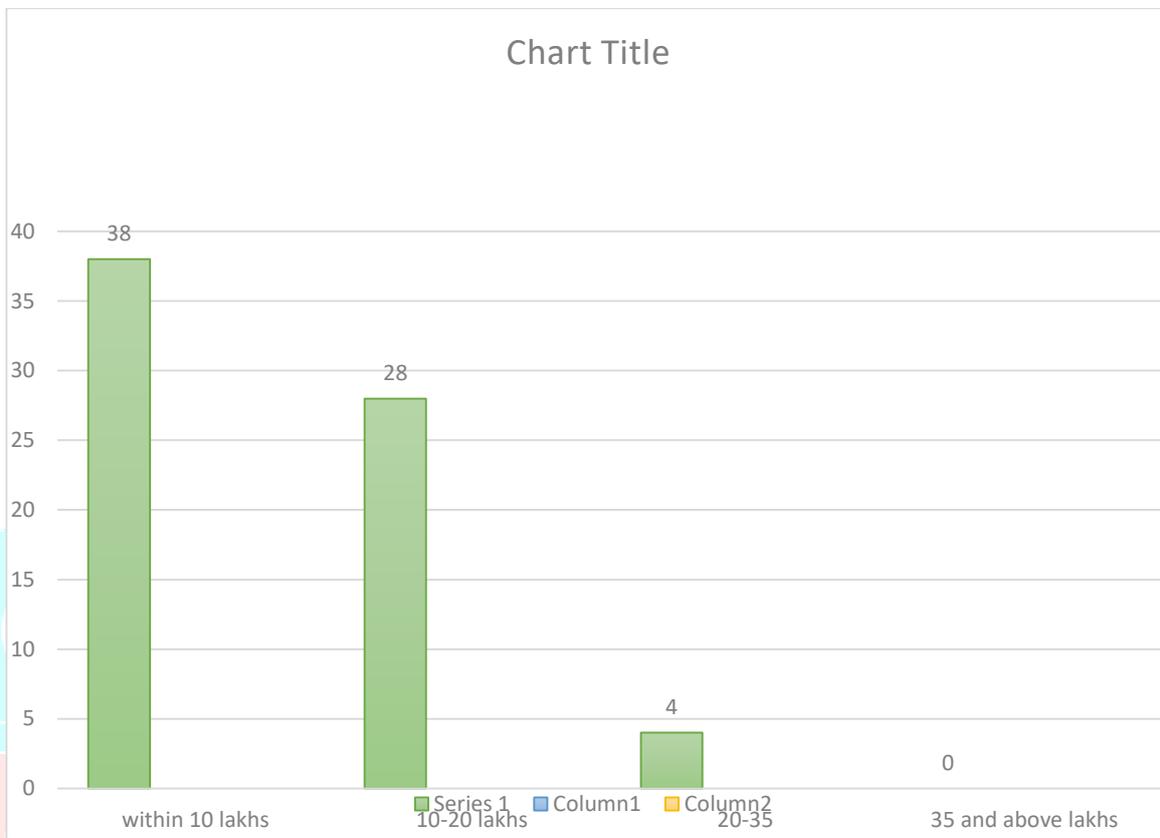
2. Are you interested to switch on EVs (electronic vehicle)?

- 1) Yes
- 2) No



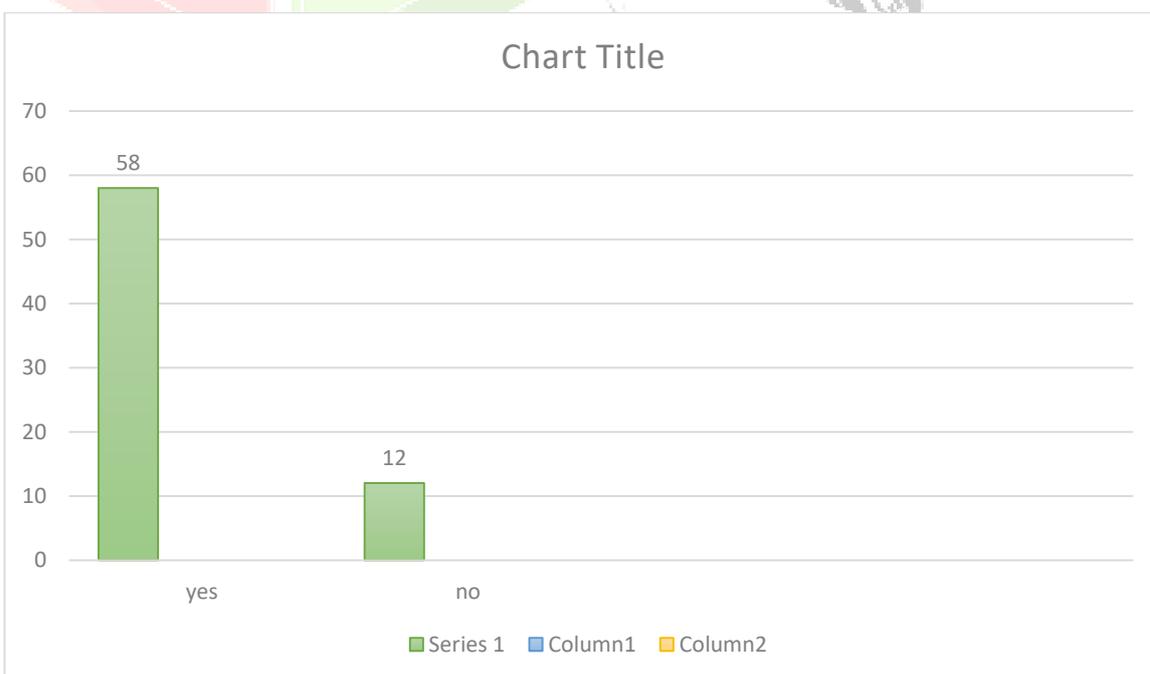
3.what should be the range of 4-wheel EVs as per Indian growing market?

- 1) Within 10 lakhs
- 2) 10-20 lakhs
- 3) 20-35 lakhs
- 4) 35-and above



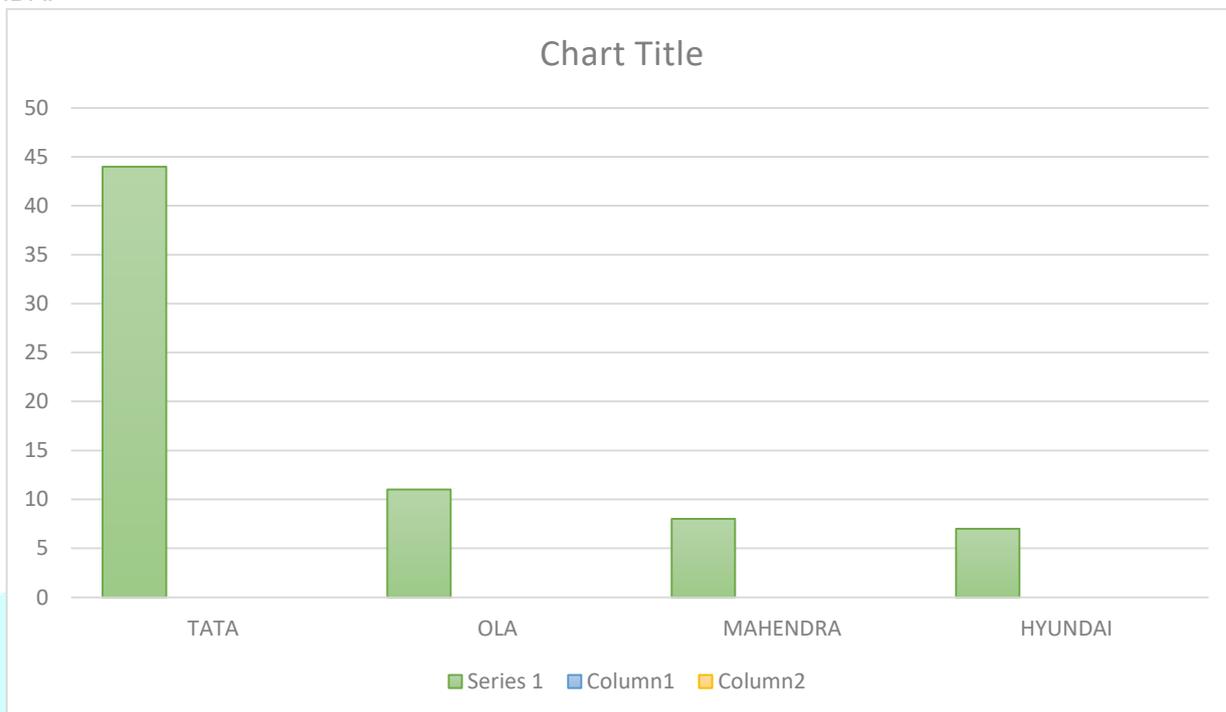
4.Government should adopt the west countries policies?

- 1) yes
- 2) no



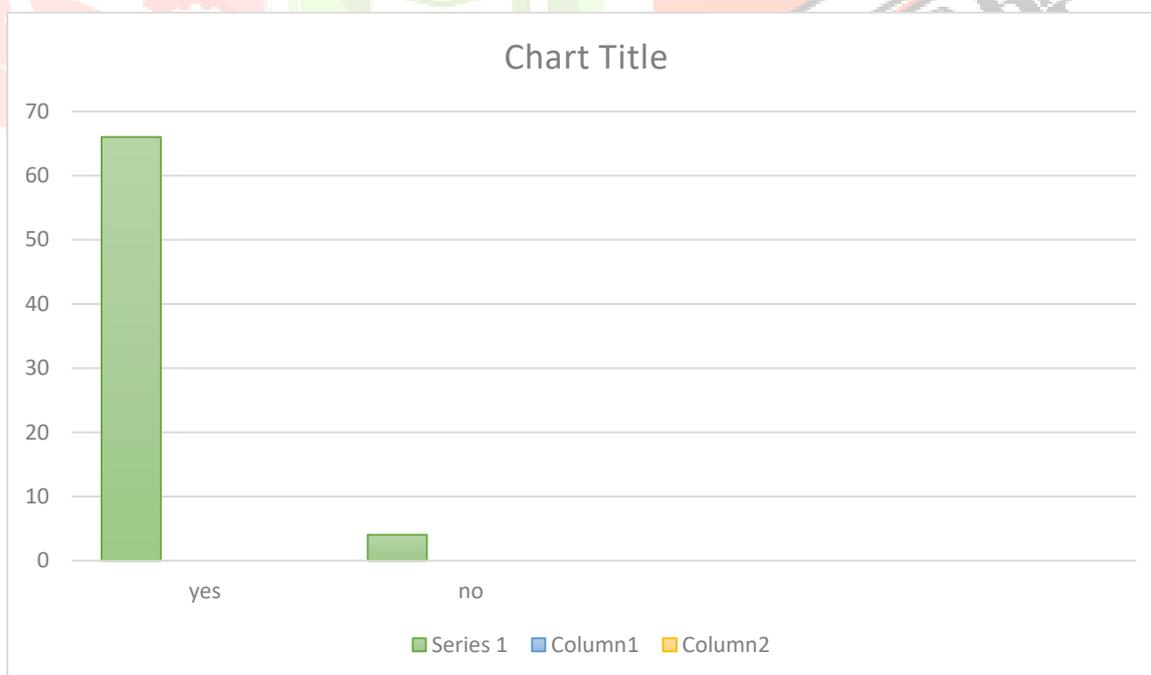
5. which EVs industry Is leading in india?

- 1) TATA
- 2) OLA
- 3)MAHENDRA
- 4)HYUNDAI



6. Indian market will adopt the EVs in upcoming years?

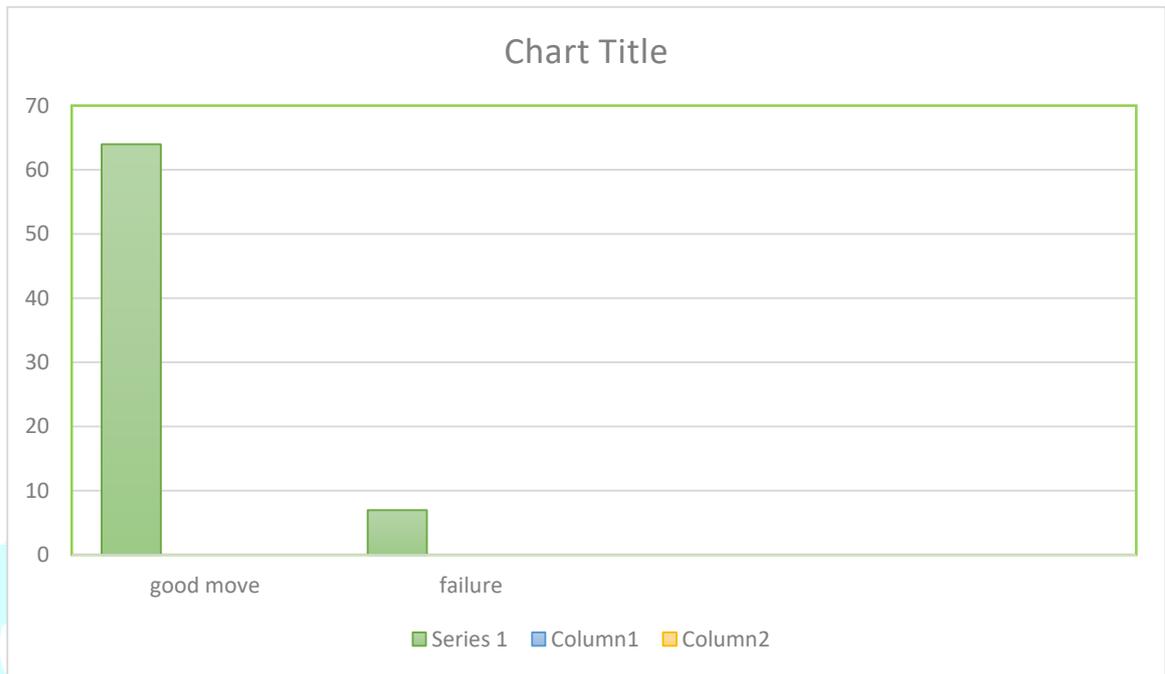
- 1)yes
- 2)no



7) introduction of EVs in India is an?

1) good move

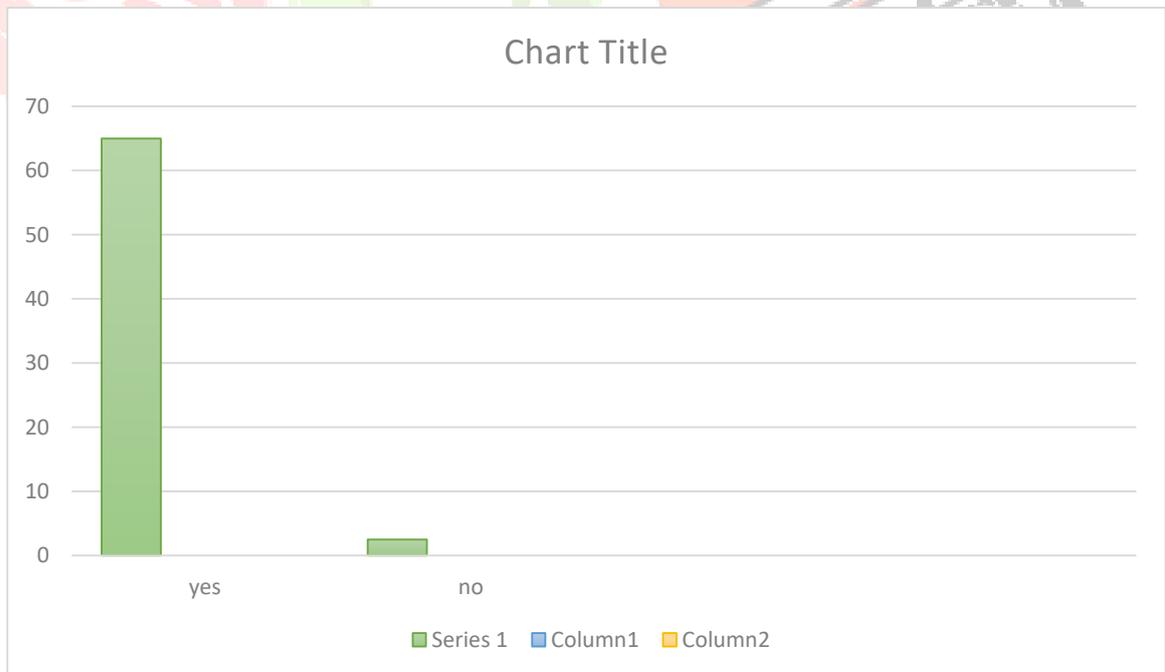
2) failure



8. if government is providing subsidies on EVs the you are willing to switch it?

1) yes

2) no



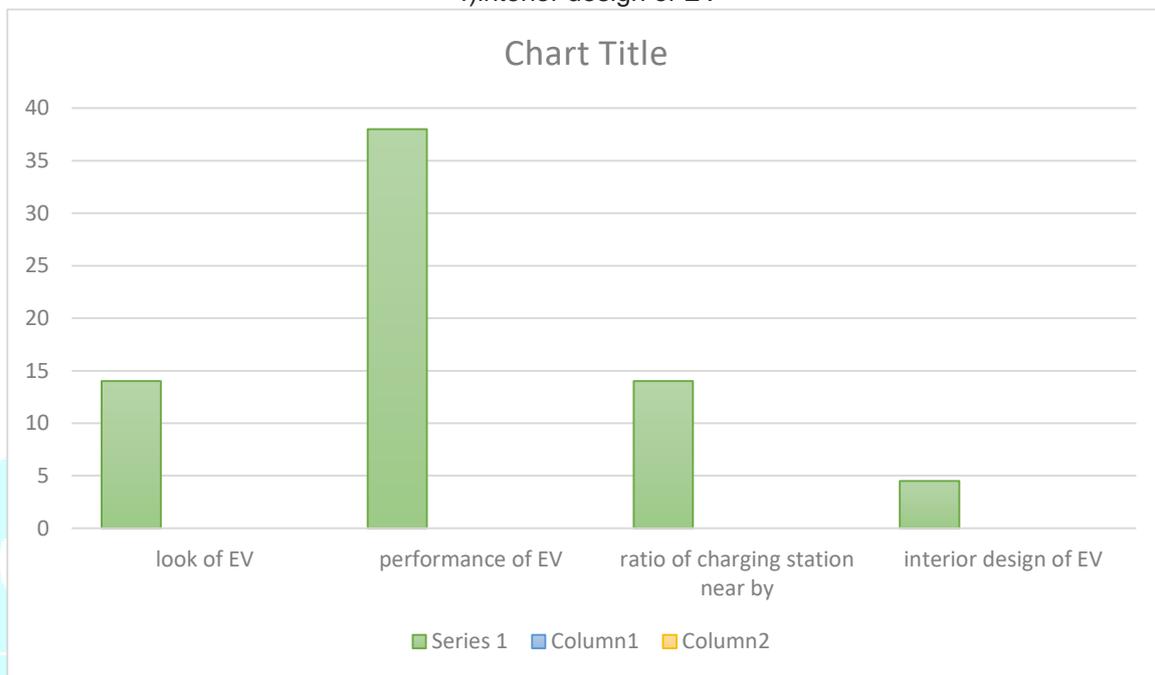
9.what should be the key points to adopt Indian market ?

1)look of EV

2)performance of EV

3)ratio of charging station near by

4)interior design of EV



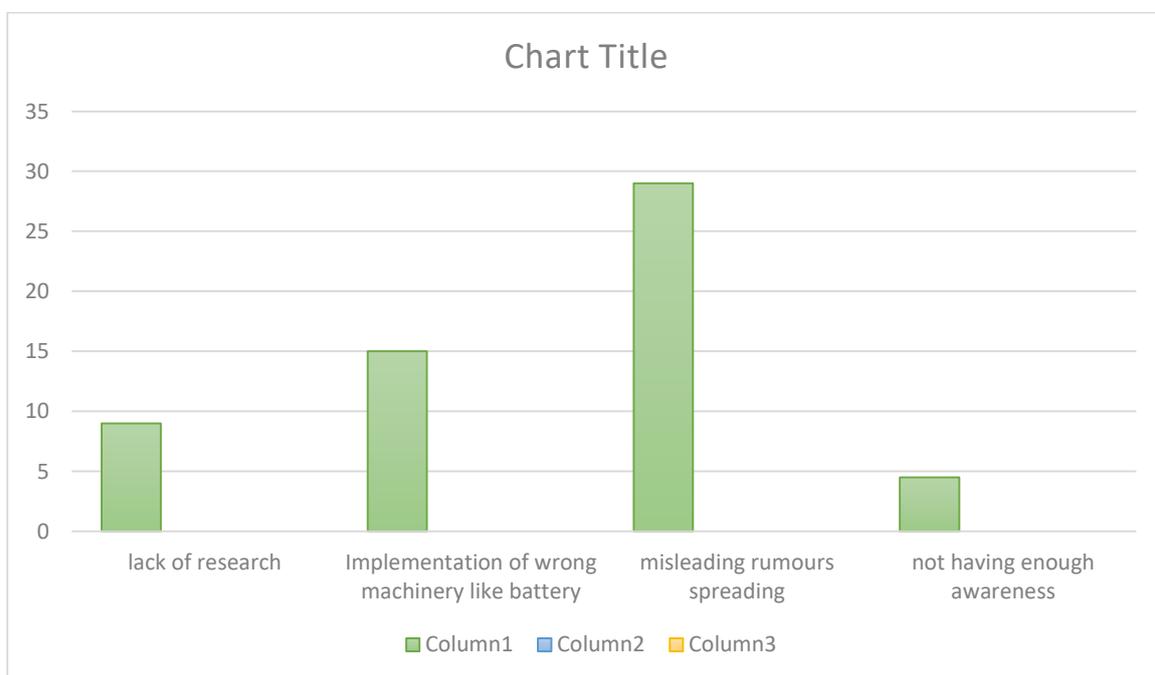
10.the reason behind EVs are not capturing the Indian market?

1)lack of research

2 Implementation of wrong machinery like battery

3)misleading rumours spreading

4)not having enough awareness



PART – II PRIMARY STUDY

4. INTRODUCTION OF STUDY

BACKGROUND OF STUDY

Governments in Europe and other world regions are focused on greatly reducing the transport sector's carbon emissions. The European Union (EU) and its member states are using vehicle and fuel regulations, substantial financial and nonfinancial incentives for consumers, and other policies to replace petroleum with lower-carbon alternatives. The infrastructure for alternative fuels is also being funded to promote lower-carbon mobility. One of the most difficult questions is when EV technology will improve to the extent that it becomes a mainstream competitive option for consumers and automobile manufacturers facing carbon emission requirements.

PROBLEM STATEMENT /RATIONALE / OF THE STUDY

In general, how e-commerce opportunities available for international business accessibility for all the MNC and large players. With the help of e-commerce accessibility may the national players suffer but also they get the opportunity to go global and make new position. All necessary information has been gathered for the research.

OBJECTIVES OF STUDY

Lower running costs

The running cost of an electric vehicle is much lower than an equivalent petrol or diesel vehicle. Electric vehicles use electricity to charge their batteries instead of using fossil fuels like petrol or diesel. Electric vehicles are more efficient, and that combined with the electricity cost means that charging an electric vehicle is cheaper than filling petrol or diesel for your travel requirements. Using renewable energy sources can make the use of electric vehicles more eco-friendly. The electricity cost can be reduced further if charging is done with the help of renewable energy sources installed at home, such as solar panels.

Low maintenance cost

Electric vehicles have very low maintenance costs because they don't have as many moving parts as an internal combustion vehicle. The servicing requirements for electric vehicles are lesser than the conventional petrol or diesel vehicles. Therefore, the yearly cost of running an electric vehicle is significantly low.

Zero Tailpipe Emissions

Driving an electric vehicle can help you reduce your carbon footprint because there will be zero tailpipe emissions. You can reduce the environmental impact of charging your vehicle further by choosing renewable energy options for home electricity

Tax and financial benefits

Registration fees and road tax on purchasing electric vehicles are lesser than petrol or diesel vehicles. There are multiple policies and incentives offered by the government depending on which state you are in. To find out more about electric vehicle incentives, click below

Topic- A STUDY ON THE ELECTRIC VEHICLES OPPORTUNITIES AVAILABLE FOR INTERNATIONAL BUSINESS

1. which age group you belong?

- 1)18-35
- 2)35-60
- 3)60 & +

2. Do you own electronic vehicle?

- 1)yes
- 2)no

3. Are u interested to switch on EVs?

- 1) yes
- 2) no

4. what should be the range of 4-wheel electronic vehicle as per Indian growing market?

- Under 10 lakhs
- 10-20 lakh
- 20-35 lakhs
- 35 lakhs & above

5. government should adopt the west countries policy for adoption of EVs?

- 1)yes
- 2)no

6. which EVs are leading in India?

- 1) TATA
- 2)OLA
- 3)Mahindra
- 4)Hyundai

7. Is Indian market market will adopt the EVs in upcoming years?

- 1)YES
- 2)NO

8. introduction of electronic vehicle in India is an?

- 1) Good move
- 2) Failure

9. what if government provide subsidies on EVs then you are willing to buy it?

- 1) YES
- 2) NO

10. what should be key point of EVs to adopt Indian market?

- 1) Look of EVs
- 2) performance of EVs
- 3) ratio of charging stations near by
- 4) interior design of EV

11) the reason behind EVs is not capturing the Indian market?

- 1) lack of research
- 2) Implementation of wrong machinery like battery
- 3) misleading rumours spreading

CONCLUSION

In India car is not just an machine but they are marked and denoted as an jewellery in society. So, it's hard to change the mindset of the Indian society.

Hybrid, Plug in Hybrid and Electric Vehicles are capable of increasing the fuel economy of vehicles but with an increase in the cost of buying compared to traditional vehicles. In general their decreased consumption of petroleum and increased productivity offers economic benefit to buyers, society, automakers and policymakers over the lifetime. This paper provides a detailed overview of the literature, overview, and guidelines for HEV, PHEV and BEV penetration rate studies into the Indian Market. The recent initiatives and various subsidies by the Indian Government will help push the e-mobility drive in India. The development of a new concept of Vehicle-to-Grid can either deliver power to the grid or can be used to charge the battery when non-conventional energy sources are not available. This technology is an important aspect of energy security, renewable energy, and giving a great scope to deal with global warming issues. This paper provides a summary of an electric vehicle's barriers and problems in the Indian context and is the main novelty of the paper.

As per our observation many new changes are must require and lack of funding have to alter

The most important reason the awareness regarding to the EVs among the society have to create and try to adopt the policies like CHINA,EUROP & USA has adopted

India brand have to develop the products by recognizing the Indian market, temperature, nature of society and buying power of commodity.

BIBILOGRAPHY

References

Aasness M. A., & Odeck J. (2015). The increase of electric vehicle usage in Norway—Incentives and adverse effects. *European Transport Research Review*, 7(4), 34–42.

Ministry of Heavy Industries, *Annual Report 2021–22*

https://www.researchgate.net/publication/353260957_Electric_Vehicles_in_India_A_Literature_Review

https://www.riverpublishers.com/journal_read_html_article.php?j=JGE/8/1/3

