ELECTRIC VEHICLE : NEED OF THE HOUR

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ABSTRACT

Pollution is becoming a worldwide phenomenon which India is also facing. This problem is resulting in a plethora of problems like breathing and lung diseases, global warming, changes in weather cycles and extremes of temperature among others. Vehicular pollution is one of the major contributing factors for the same. To take care of this rising vehicular pollution, the Ministry of Road Transport and Highways and NITI Aayog has announced that we should increase the share of sold electric vehicles from 1% to 30% by the end of 2030. Electric vehicles (EV) will not only result in a reduction in vehicular pollution but will also reduce the running cost to the vehicle owner. Despite these two major advantages of EVs, India is not seeing an increase in the manufacture and sale of these vehicles. There are a number of problems faced by consumers like very high vehicle cost, no charging infrastructure, etc. For manufacturers it is a capital-intensive project, there is a lack of trained personnel, etc. The study aims to find out government's policies in support of EVs. The focus of the study is how government policies like FAME I & II, PLI, technology innovation platform under the capital goods scheme, concessions in customs duty on imports and softer loans can be used to resolve the issues currently being faced. India needs to become aatmanirbhar in the manufacturing of EVs. Measures like setting up of organisations for research and development with all EV start-ups as members who can divide the cost of research and development amongst themselves are suggested. The paper also throws light on Government initiatives to increase the demand of EVs by giving subsidies, tax concessions and building the infrastructure of charging stations.

INTRODUCTION

Pollution is becoming a worldwide phenomenon which India is also facing We who are living in Delhi experience this problem tremendously. Generally the AQI is more than 250 and at times especially during Diwali the AQI is more than 400. This problem of pollution is resulting into plethora of problems like breathing diseases, lung diseases, global warming, change in weather cycles, extremes of temperature etc. Very soon earth will not be a suitable place to live in and soon maybe we have to carry oxygen cylinders with us. Vehicular pollution is one of the major contributing factor for the same.

To take care of this rising vehicular pollution Ministry of Road Transport and Highways and NITI Aayog announced that we should increase the share of electric vehicles from 1% to 30% by the end of 2030. This is also in consonance with the Paris Treaty adopted by 196 countries including India to limit carbon emissions and there by reduce global warming.

Electric vehicles will not only result into reduction in vehicular pollution but will also reduce the running cost to the vehicle owner. The petrol prices in Delhi in last three months on an

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average is almost ₹100 per litre and a person has to shell out Rs 12,000 to Rs14,000 per months if he/she is commuting a distance of an average 30 km per day for work. The EV car will cost only Rs 2900 per month to travel a similar distance. Despite so much of cost saving these EV cars at present make up only 1.5% of total automotive sales. Other advantages of EVs are no cabin noise, less maintenance cost and ease of driving.

OBJECTIVE OF THE STUDY

Despite so many advantages of EV the world including India is not witnessing a spurt in the manufacturing and sales of these vehicles. The objective of this study is to look into the problems and challenges being faced by manufacturers in the making of these EVs. Also, a study has been conducted regarding the reasons for low acceptability by consumers. The study aims to find out government's policies in support of EVs. The focus of the study is how government policies can be used to resolve the issues currently being faced. The study has suggested how budding entrepreneurs can make use of government policies to promote EVs. India needs to become aatmanirbhar in the manufacturing of EVs. Furthermore, the study has suggested what more can be done by the government to support its vision of having 30% EVs on the road by 2030.

This research paper is based primarily on the secondary data collection method. The study's data came from the websites of the "Ministry of Micro, Small, and Medium Enterprises," "Ministry of Heavy Industry," journals, research articles, and other published sources.

LITERATURE REVIEW

"Electric vehicles in India: a literature review" by **Singh *et al*. (2021)** concluded that the higher cost of these vehicles is the major reason for the slower development of EVs in India. This high cost is due to imports, but the article is of the opinion that this cost will be lowered soon by FAME , a government policy on EVs and due to the reserve of lithium found in Bengaluru.

Predicting electric vehicle (EV) buyers in India: a machine learning approach; **Dixit & Singh (2022)** has found the challenges faced by Indian consumers with electrical vehicles. They have also developed a predictive machine learning model that can classify whether an Indian consumer will "buy" or "won't buy" an electric vehicle. Their conclusion was that local conditions and regional variations have a major effect on EV purchases. According to them, charging infrastructure and government subsidies do not affect the purchases of electric vehicles.

A study by **Abhyankar *et al*.(2017)** titled 'All Electric Passenger Vehicle Sales in India by 2030: Value proposition to Electric Utilities, Government, and Vehicle Owners' compared cost of battery electric vehicles compared to ICE vehicles, the reduction in Co2 emissions , the increase in electricity load, impact on the power sector investments ,impact on the crude imports, smart charging capabilities in EVs etc. The study concluded that there can be a reduction of 35% to 37% in C02 emissions in case of cars and 50% in case of 2 Wheelers; crude oil imports will be reduced by 8% by 2030 and 28% by 2050. Also if smart charging is done cost of electricity generation will also go down significantly.

A study was done by **Mishra & Malhotra (2019)** titled "Is India Ready for e-Mobility? An Exploratory Study to Understand e-Vehicles Purchase Intention' to study the purchase intention of Indian buyers. The sample size was 228. The study concluded that Indian buyer is

dissuaded by cost of the vehicle and infrastructure problem. According to them only sensitisation of consumer towards environmental benefits can increase the use of E vehicles.

PROBLEMS FACED BY MANUFACTURERS

- The manufacturers have to shift from manufacturing internal combustion engine (ICE) to batteries and electric motors which is very tough. Though all major automakers like BMW, Ford, General Motors and Volkswagen have announced there plans to manufacture EVs due to need of the hour; yet most of them are planning for in- house production due to high intellectual property costs. The process of production is very complex and to develop it is an arduous task. The project is capital-intensive too.

- Manufacturing of electric motors may require more robots. Robots will be required to assemble smaller parts and subassemblies, making connections, pressing the rotor shaft, welding and gluing, plus bolting the body together. Since manufacturing electric motors requires continuous testing & inspection this task may also require robots due to very tight tolerances. Use of robots is not only expensive but may also lead to unemployment in a country like India.

- The startups cannot think of entering the industry because it requires lot of Research and Development, is capital intensive and have to make frequent changes in technology to suit to the needs of consumers. The only silver lining being not having any earlier set up and can easily develop the new systems and technology.

- The manufacturers may develop an indigenous technology by Research and Development. But that too is an arduous task as it requires components like motor test benches mixed signal oscilloscopes, cell battery cyclers. The cost of these components may range from 3 to 5 crores each.

- Another problem being faced by the manufacturers is the vehicle weight because vehicle weight effects the driving range of the vehicle considerably. The electric drive trains and batteries are much heavier than the ICE power trains. This increased weight of vehicle can be counteracted by reducing the weight of vehicle body. This can be done by using lightweight material into the vehicle body but doing this may affect the safety of the vehicle.

PROBLEMS FACED BY CONSUMERS

- **Cost of vehicle**

The cost of an EV vehicle is much higher as compared to ICE vehicle. Following chart shows the comparative price.

S No.	Name of the vehicle EV	Similar ICE Vehicle	Price EV Rs in Lakhs	Price ICE Rs in lakhs
1	Mahindra eKUV	Mahindra KUV100	8.25	6.18
3	Tata Nexon EV	Tata Nexon	14.54	7.6
6	Mercedes Benz EQS	Mercedes Benz EQB	175	60
7	Motor cycle EV	Motor cycle ICE	1.25	0.51
8	Bus EV	Bus ICE	75	28.36

The cost of an EV is two to three times the cost of ICE vehicle. Secondly after elapse of certain years the battery requires a change which costs around 3-4 lakhs for a car.

- **Range of EV**

The main problem is of range of an EV on a full charge. For example Car's range is 200 to 300 kms that too in ideal conditions. If the vehicle is loaded the range will be lesser. Also if there is bumper to bumper traffic there are chances that EV owner might be stranded in between.

- **Depleting Battery Range**

The batteries are Lithium Ion Batteries which become weak with usage. The charging time increases and range decreases and eventually has to be replaced after 8-10 years. This adds to the cost to the owner.

- **EV Battery Insurance**

50% of the cost of EV is battery and none of the insurance companies cover 100% of the battery. They cover just 50%

- **Lack of charging stations**

There is a lack of charging stations in India at present. There is no dependable infrastructure. As per the report of The Central Electricity Authority (CEA) India has 927 charging stations nationwide as of June 2020 as compared to the 57,000 petrol pumps in the country. Hence the owner can recharge EV only if charging station is available. Even if charging station is available, the charging will take on an average 3 to 4 hours. On the other hand in case of ICE vehicles it just takes 5 minutes to refuel it.

- **Lack of charging facilities at home**

EV owners not only face the problem of lack of charging stations they also face the problem of charging at home if they do not have reserved parking.

- **Lack of Standardisation of EV charging ports**

Every EV manufacturer is having its own type of charging port which is creating trouble both for the consumer and owners of charging stations. it is difficult to set up an ecosystem with proper charging stations for 2 and 3 Wheelers. As far as cars are concerned there is standardization of charging port(CCS-2).

- **Lack of mechanics and skilled labour for EVs**

The EV technology is in a nascent stage and still there is dearth of manpower to handle any breakdown of any EV. This also effects the decision of buying EVs because if the consumer buy an ICE vehicle he is sure to find a mechanic in case of breakdown which is not the same in case EVs.

- **Not suitable for all parts of the country**

An EV vehicle has ideal performance in the temperature range of 15 to 40 degrees. Therefore, it is unsuitable for regions like Jammu and Kashmir, Himachal Pradesh, Meghalaya, etc which are very cold and Rajasthan, Kerala, etc where the temperatures are very high.

GENERAL CONCERNS

- **Increase in the demand of electricity**

If most of the vehicles on road will be EVs definitely there will be an increase in the demand of electricity. This increase in demand for electricity, if it is fulfilled by generation of electricity by burning fossil fuels as is the case now then the very idea of going green is not met. At present most of the charging stations are using diesel generators to generate electricity which is polluting the environment more than an ICE vehicle.

- **Extraction of Lithium and Disposal of Batteries**

The EV car batteries are made up of Nickel, Cobalt and graphite which are extracted through mining. The mining of these minerals itself is a highly polluting process. Another problem when these batteries reach there end of life; there disposal is a challenge. If during disposal these batteries leak they give toxic gases which is very harmful for the environment.

MAJOR POLICY INITIATIVES BY THE GOVERNMENT

The Ministry of Heavy Industries (MHI) is continuously making efforts that India becomes atma nirbhar in auto sector. To support electric vehicles government has taken steps both to increase the demand of the electric vehicles and also to provide support and various schemes for development of automobile manufacturing units and it's components.

1. FOR INCREASING THE DEMAND

A) FAME India Scheme: Faster Adoption & Manufacturing of Hybrid & Electric Vehicles: This scheme was launched in 2015 to promote EVs in the country. After success of FAME I scheme FAME II scheme was launched and the same was extended till 2024. This scheme has a budget outlay of Rs 10,000 crores and will support 1 million e-two-wheelers, 0.5 million e-three -wheelers, 55,000 e-passenger vehicles and 7,000 e-buses. 10 % of the outlay of this scheme will be used for charging infrastructure. It is envisaged that there should be at least one charging station in 3 kilometre X 3 kilometre grid in the cities and 25 kilometres on highways. The focus areas under this scheme are technology development, pilot projects and infrastructure for charging.

The Ministry of road transport has already invited expression of interest from city municipal corporations discoms oil companies, etc and have selected 2636 charging stations (1633 charging stations will be fast charging stations) in 62 cities after ensuring the availability of land. These entities have to put the charging stations in a time bound manner.

For a clean mobility ,Ministry of Heavy Industries and public enterprises has sanctioned 5595 electrical buses in 64 cities./ state government entities for intra city and intercity transportation under FAME II scheme Expression of interest were invited from million plus cities and 86 proposals accepted. These buses will result into avoidance of 2.6 million tonnes of CO_2 emission.

B)NITI Aayog has released a draft battery swapping policy which will be valid until March 31, 2025. This policy will promote battery swapping which will result in standardistion of batteries.

C)To promote EVs the Delhi government has announced that delivery service providers will be eligible for financial support from the Delhi finance corporation if they convert 50% of their fleet operating in Delhi to electric fleet by 31st March 2023 and 100% by 31st March 2025. This incentive will encourage food delivery, e-commerce logistics providers, couriers to switch to using electric two wheelers. To ensure the switch happens in a time bound manner, all delivery service providers shall be expected to convert 50% of their fleet operating in Delhi to electric by 31st march, 2023 and 100% by 31st March, 2025.The delivery service providers, who commit to achieve these targets shall be eligible for financial support from the Delhi Finance Corporation (DFC).

D) GNCTD (The Government of National Capital Territory of Delhi) has given number of incentives to the purchaser of new electric autos instead of ICE autos . For the purchase of E autos he will be given incentive of ₹30,000 per vehicle on purchase. He will be reimbursed up to Rs7500 for deregistering old ICE auto rickshaw and registering electric auto. The permit to run old ICE auto can be replaced by permit of running of E auto without any charges. Similarly other state Governments have given many incentives.

E) To develop charging points at home and residential buildings Delhi Government has also announced grant of 100% for the purchase of charging equipment up to Rs. 6000/- per charging point for the first 30,000 charging points.

F) Work is initiated to set up charging stations for electric vehicles at more than 30% of petrol pumps all over the country.

G) The Ministry of Road Transport & Highways (MoRTH) has announced that EVs will use green license plates and need not obtain permits in case of commercial vehicle.

H) Most of the states have waived road tax on EVs as advised by MoRTH. GNCTD has also announced that Road Tax and registration fees shall be waived for all Battery Electric Vehicles.

I) Ministry of Housing & Urban Affairs (MoHUA) has amended Model Building Bylaws 2016 to provide for 20% of parking space for charging stations in private and commercial buildings.

J) The loans for EVs will be at lower rate of interest.

K) An individual will get a deduction under section 80EEB of income tax Act,1961 for interest on loan taken for purchase of a 2W or 4W EV upto Rs 1.5 lakh in every financial year.

L) A purchase Incentive of Rs. 30,000/- per vehicle shall be provided by GNCTD to the registered owner of the e-auto. Secondly, an Interest subvention of 5% on loans and/or hire purchase scheme for the purchase of an e-auto will be given. The Registered owner of e-autos will also be eligible for a Scrapping Incentive for scrapping and de-registering old ICE auto rickshaws registered in Delhi of up to Rs. 7,500. Delhi Government has also announced full reimbursement of State Goods and Services Tax (SGST) on the purchase of sophisticated EV batteries.

M) Like Delhi other states have also reduced road tax and have given other incentives.

2.FOR MANUFACTURING

A. A national program on advanced chemistry cell (ACC) was approved by the cabinet in May, 2021 with a total outlay of ₹18,100 crore. This program intends development of manufacturing facilities for ACC in India. At present India is importing ACC. This indigenous production of ACC will reduce the import bills by rupees 1,50,000 crores. Government has already invited proposals from domestic and international manufacturers for setting up ACC manufacturing facilities.

B. PLI Scheme: Production Linked Incentive for Advanced Chemistry Cell Battery Storage (PLI-ACC) scheme: 50% of the cost of EVs consists of batteries. Government has started this scheme to give incentive of 4-6% on incremental revenue to the manufacturers of batteries keeping 2019- 20 as the base year. The scheme has a total outlay of Rs. 18,100 Crores spread over 5 years. The focus of this scheme is to invite Foreign companies to set up factories in India and local companies are encouraged to set up or expand existing factories. Also a subsidy will be given to manufacturers that achieve 60% value added within five years of project commencement.

   This scheme intends creating economies of scale and building up supply chain in automotive products. It is expected that this scheme will attract investment of around 1.5 lakh crores and will also create more than 7,00,000 jobs. The scheme is for both existing automobile manufacturers as well as new investors. The scheme has 2 components namely ‘champion OEM incentive scheme’ and ‘component champion incentive scheme’. Both the schemes are ‘sales value linked’ schemes on various automobile components. The incentives are for a period of 5 years up to FY 2026-27.

C. The Government has allowed 100% FDI in the automobile sector.

D. A Round Table on December 4, 2021 was organised in Goa by Ministry of Heavy Industries to work out strategies to promote adoption of Electric Vehicles in India and attract investment in manufacturing of EVs, batteries and high technology automotive components in India.

E. The automobile industry can make use of technology innovation platform under the capital goods scheme developed by Ministry of Heavy Industries. These are web based platforms which help in identification of technology related problems faced by the Indian industry and find out solutions for the same. These platforms help startups and are a step towards *Aatmanirbhar Bharat* . Six such platforms have been developed by BHEL, HMT, IIT Madras etc.

F. A machine tool park has been developed in Karnataka in over 530 acres of land. The automobile components manufacturers can start their units in this park. It has 158

ready to build industrial plots of various dimensions with concrete roads, footpath, drainage, electricity, water and even bus shelters.

G. Various workshops, webinars seminars are organised by capital goods industry association, Society of automobile manufacturers and other associations for development of automobile industry.

H. Ministry of MSME (micro, small and medium enterprises) has approved a scheme of Micro finance program in association with SIDBI for loan given by it. The MFI/ NGOs which takes the loan has to deposit 10% of loan amount called portfolio risk fund to SIDBI. Under this scheme 75% of security deposit will be provided by Government of India. This scheme is applicable in the underserved states/ underserved districts of other states and is for new industrial estates.

I. Another scheme of MSME is 'Entrepreneurial and managerial development' through incubators. Under this scheme an entrepreneur can apply to a host institution like IIT and develop an indigenous technology or process which can be commercialised in a year. MSME provides financial assistance to such ventures upto ₹62.5 lakh.

J. To meet the credit requirements of MSME units ;it has started with the 'Bank credit facilitation' scheme in collaboration with NSIC (National small industries corporation). Under this scheme the MSME unit can get itself rated by any credit agency which can help it to secure loans easily and at a lower rate of interest.

K. Any registered MSME unit can seek the benefit of 'Raw material assistance' scheme. Under this scheme MSME helps the unit in purchase of raw material both indigenous and imported by providing financial assistance up to 90 days, bulk purchases, cash discount, documentation and issue of letter of credit in case of imports, etc.

L. Another very useful scheme for MSME units is 'Custom duty concession' This scheme is specifically for a manufacturer in automotive sector. Under this scheme the entrepreneur will get concession in customs duty for importing any machinery and equipment for initial setting up of a project. The application has to be sent to 'Department of heavy industry'

M. There are a number of schemes developed by North Eastern Development Finance Corporation Limited (NEDFL) to support development in 8 north eastern states. The schemes are for corporate finance, equipment Finance, Rupee Term Loan , working Capital Term Loan, etc for these states.

N. Self-Employment and Talent Utilisation (SETU) is another scheme for technology driven start-ups. Under this scheme government has given an amount of ₹1000 crores to Niti Aayog to help start-up businesses in technology area.

O. The GST on the electric vehicles is now 5% in place of earlier 12% in case of charging stations.

P. The GST on EV batteries has been reduced from 18% to 5 % in June,2022.

Q. To promote EVs Government has reduced customs duty on nickel ore (key component of lithium-ion battery) from 5% to 0%.

PRESENT STATUS OF EVS IN INDIA

1. A few companies like Battery Smart is providing battery swapping facility for 2 and 3-wheelers, Lohum cleantech is providing facility of recycling of batteries and battery packs using state of the art machines, Nexus Battery is developing nexus solar energy battery, Log 9 Materials is doing research to develop aluminium fuel cells and their lithium battery at present for 2 and 3 wheelers charges in 35 minutes. Several

companies are working on innovation in the field of electric vehicles powered by hydrogen fuel cells and solid-state batteries aside from lithium-ion batteries.

2. GreenCell Mobility has started its first intercity e-Bus(NueGo) service with Maharashtra regional state transport corporation (MRSTC)from Pune. Its first electric bus service was launched on 1st June 2022 on the Pune- Ahmadnagar route. The company announced its plans for roll-out of 750 premium AC e-buses across key inter-city routes in southern, northern and western India.
3. Olectra Greentech, the market leader in electric bus manufacturing has developed a truck which is first of its kind with a range of 220 kilometre on a single charge and has a heavy duty boggy suspension tipper.
4. There are many EV startups like Ola, Ather, Pure EV, Hero electric.
5. Revolt RV400 is an electric bike which is gaining good market share.
6. Hyderabad-based start-up BharatMobi have converted a Maruti 800 and Maruti Esteem into electric vehicles. The upgraded vehicle did not affect the overall performance of the vehicles adversely. The cost of conversion is around 5 lacs and other entrepreneurs have follow suit.
7. Another milestone in the development of EVs is the development of e-Amrit web portal by Niti Aayog in November 2021. This portal provides extensive information on EVs. This will help in sensitising the consumers, manufacturers, and service providers.
8. Canadian company Capsolar and German startup Sono Motors are developing a solar powered EV in India.
9. Mumbai-based Atum Charge have installed a self-sustaining solar powered charging station.
10. The setting up of KABIL (Khanij Bidesh India Ltd.), to explore mining agreements with countries rich in these resources, is a beginning. The recent arrangement with Argentina is an encouraging step.
11. ISRO and IIT , Chennai are doing research and have developed a technology to produce electricity from sea water which is a welcome move .

Looking at the various problems faced by the consumers, manufacturers and various Government policies the following measures can help India achieve e Mobility and take care of environmental problems being faced.

SUGGESTIONS

1. It is not possible for a single start-up to buy all the equipment for research ; the material being very expensive , but an organisation can be set up with all EV start-ups as members who can divide the cost of research and development amongst themselves.
2. The manufacturers may make use of government policies like FAME I & II, PLI, technology innovation platform under the capital goods scheme, concessions in customs duty on imports and softer loans.
3. The construction of roof top solar panels and solar-powered EV models is other plausible solution.
4. The Government may do standardisation of batteries and import lithium from smaller countries.
5. Indian Government may also develop Special E-Mobility zones like in European countries and China.
6. Batteries which have reached their end of life should be either reused or recycled.
7. Another method which can be adopted is by putting a surcharge on polluting vehicles and giving a rebate to the efficient ones.
8. Technological changes can be made by research and development and promoting start-ups through more schemes of *atmanirbhar bharat*.
9. India can develop indigenous technologies to replace lithium batteries with aluminium sodium or zinc based batteries. This will not only reduce the cost of EVs but will also reduce the chances of leakage of batteries thereby increasing the pollution
10. The Government has to also update its e-waste management policy.
11. The government can also think of building rooftop solar power roads which can also provide shelter to the roads thereby reducing the maintenance cost as suggested by scientist of Bharatiya scientists at Gujarat Energy Research and Management Institute (GERMI). These roads can be on PPP basis.
12. Another very important suggestion is to create awareness amongst the consumers regarding the cost of EV vehicles in the long run. This can be done by advertising in the radio , TV channels , newspapers and other social media.
13. 2 and 3 Wheelers can have detachable batteries
14. Another option is we can develop the technology of hydrogen fuel battery.

CONCLUSION

Though the path of EVs is fraught with innumerable challenges, there are solutions as well. These teething problems can be resolved by making use of government policies and creating awareness amongst consumers. Our budding entrepreneurs can start making parts for EVs which is an area unexplored till now and help India move towards an atmanirbhar Bharat.
Though the disposal of batteries will be a challenge; yet to conclude EVs are need of the hour and must be promoted.

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