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## India @ 75: Charging the Future by Paving E-Lanes for Electric Vehicles

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### Abstract

The Indian automobile industry is aptly known as the sunrise sector of the economy. Due to its forward and backward linkages, it has a strong multiplier effect. It is a barometer to measure how well the economy is performing. Future market augmentations are projected to be driven by new trends including the electrification of vehicles. Electric vehicles have hit the Indian market, but their penetration is less than satisfactory. Against this backdrop, the paper is an attempt to study the advantages of adopting cleaner technology. The paper concludes that India can achieve its true potential by pushing the accelerator and addressing the hurdles in EV's progress.

Keywords: Electric Vehicles, Indian Market, Automobile Industry.

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## Introduction

Post-liberalisation, the Indian automobile industry has taken rapid strides of progress. It has travelled miles of rough terrain from restrictive and protective to the liberal and open economy. This sector is rightly addressed as the sunrise sector is growing. In the past few years, the automobile industry has experienced drastic changes and numerous government initiatives which has brought the country to leading positions. India @ 75 witnessed the Indian passenger car market valued at USD 32.70 billion in 2021 and is expected to reach a value of USD 54.84 billion by 2027. The sector will register a CAGR of over 9% between 2022-27.

India has committed to reducing carbon emissions to net zero by 2070 at the 26th Conference of the Parties (COP26) in November 2021. India has set a goal to achieve its electric vehicle sales accounting for 30% of private cars, 70% of commercial vehicles, and 80% of two and three-wheelers by the end of 2030. This is an ambitious target and rigorous steps need to be taken to accomplish it.

## Review of Literature

Goel et al., (2021) are of opinion that the various government schemes to push electric vehicle does not appeal to Indian consumers. The paper reveals that consumers are concerned with the availability of maintenance mechanism post purchasing the vehicle.

Dua et al., (2021) highlight the fact that India will miss its 30% EV sales target by 2030. The lack of domestic electric vehicle batteries and the paucity of adequate supply chain management will be the major hurdle in achieving the 2030 target. Shortage of land and towering land rent are major barriers to the establishment of charging infrastructure.

Bharti Motwani and Abhishek Patil are of the opinion that policies need to be framed to discourage the purchase of gasoline

vehicles and better schemes need to be implemented by the government to make electric vehicles a better option.

Chalia et al., (2021) summarise the various charging standards which are developed by different countries. The paper highlights the fact that every standard which is identified with charging infrastructure is in accordance with European ambient conditions. A tropical country like India needs to consider the enveloping temperature before settling on a comprehensive charging standard.

## Statement of the Problem

Though India has adopted electric vehicles as its future mobility options, it is lagging behind other countries. It is a reality that Electric vehicles (EVs) have not got the desired impetus. The paper is an attempt to study electric vehicles in the context of the Indian Market and intends to highlight the barriers to India's electrifying mission.

## Objectives of the Study

The objectives of the study are as follows,

- 1) To study the advantages of adopting Electric Vehicles.
- 2) To understand the hindrances to the adoption of Electric Vehicles in India.

## Research Methodology

The study is an attempt at exploratory research which is based on required secondary data. Secondary data was collected from journals, magazines, newspapers, media reports, and government and other websites keeping into consideration the objectives of the study.

## Scope and Significance of the Study

The paper is an attempt to explain the challenges and point out the opportunities for adopting EVs on a massive scale. The paper is relevant in the context of India's commitment to reducing carbon footprints and thereby achieving the goal of net zero by 2070.

### Limitations of the Study

The study is limited to finding the benefits of adopting e-vehicles, identifying the hurdles, and giving suggestions to tide over them. Secondary data was used for an in-depth understanding which has its own drawbacks. A further detailed study, understanding consumers' perceptions and apprehensions about adopting the cleaner technology have to be undertaken.

### Tracking the E-Lane

Vikram SAFA was the first electric vehicle manufactured by Scooters India Pvt. Ltd., Lucknow. This 3-wheeler ran on a 72-volt lead acid battery and made a mark of the first zero-emission 3-wheeler of the world. This 3-wheeler was showcased to former US President Clinton during his visit to the Taj Mahal in India.

Mahindra and Mahindra is an eminent and leading player in producing battery-operated 4 Wheeler in India. E2O – Mahindra's Electric car uses lithium-ion phosphate instead of lead acid batteries making it safer and more long-lasting. But due to a lack of charging stations, E2O met with limited success. Mahindra Reva which was proclaimed as the largest electric car maker could roll out 30,000 units a year, but a paucity of government support had added to their worries. Mahindra Reva was also high priced in comparison with petrol and diesel versions of cars making it less attractive for buyers. This resulted in stagnant demand for Reva, which sold less than 500 cars in a year.

### Government Push for Electric Vehicles

The faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME India) scheme is formulated by the Ministry of Heavy Industries in 2015. The aim was to speed up the adoption of electric/hybrid vehicles in the country. At present, phase-2 of Fame India is being implemented for a period of aggregate 5 years with effect from 1st April 2019. Internal combustion engines (ICE) are significant contributors to air pollution.

Conversion of a conventional vehicle to an electric vehicle is the need of the hour as the latter are more eco-friendly and will reduce carbon emissions. The shift from traditional to electric vehicle poses a considerable challenge. There are various hurdles on the road of bringing India on the e-lane which must be addressed to achieve the Electric Vehicle Mission 2030. Issues of climate change are a pressing Global Concern. To overcome these challenges, the government of various countries has been endorsing the electric vehicle industry. India has also joined this mission of converting internal combustion vehicles to electric. With huge budgetary support of Rs.10,000 crores, policy Fame II intends to support the electrification of public and shared transportation and to render support through providing subsidies. To tackle range anxiety among users of e-vehicles, Fame-II supports the creation of charging infrastructure. A substantial reduction in the purchase price of the EVs intends to further boost the sale of EVs which is linked to battery capacity. The incentive subsidies are Rs.10,000/kwh for E-3 Wheeler and 20% of the cost of an E-4 Wheeler vehicle and Rs.15,000/kwh for an E-2 Wheeler vehicle.

Battery swapping is at an early stage in India. It is an option available in which discharged batteries are exchanged for fully charged ones, it is an attempt to detach the charging battery and battery usage and keeps the vehicle in running mode with insignificant time out. Charging the battery takes considerably more time than refuelling an ICE vehicle. Battery swapping can save the space required to park the vehicles during the charging process. The batteries can be stacked over each other and the space constraint in urban areas can be addressed. This policy intends to give an upsurge to e-commerce delivery and the three-wheeler transport service sector. Standardisation and common designs of batteries across the segment are essential to guarantee the success of the battery swapping policy.

The government of India intends to set up Special E-Mobility Zones across India for Electric Vehicles. These zones will exclude traditional ICE vehicles. This is a step to stimulate the transition from ICE to EV. In the union budget 2023-24, the government has announced a disbursement of Rs.35,000 crore for capital expenditure towards energy shift and net-zero goals by 2070. The reduction of customs duty on lithium cells and subsidy extension was a well-appreciated move by the electric vehicle industry. Customs duty reduction from 21

percent to 13 percent on lithium cells was a much-needed boost for the acceleration of the transition towards electric vehicles. Manufacturing lithium-ion batteries will be cheaper.

### Key Findings of the Study

Several initiatives roped in by the government have not generated the expected results.

Category	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23 (till 9th Jan 2023)	Grand Total
E-2 Wheelers	1981	27478	26512	44394	249615	525013	874993
E-3 Wheelers	90411	114136	140754	88497	178169	285825	897792
E-4 Wheelers	2433	2460	2740	5952	20172	31737	65494
E-Buses	27	53	363	217	1066	1617	3343
<b>Grand Total</b>	<b>94852</b>	<b>144127</b>	<b>170369</b>	<b>139060</b>	<b>449022</b>	<b>844192</b>	<b>1841622</b>

Source: Vahan

Table 1 highlights the growth of E-2 wheelers from 1981 in 2017-18 to 525013 in 2022-23 till Jan 9th, 2023. E-3 wheelers have shown modest growth from 90411 units sold in 2017-18 to 285825 units sold for 2022-23 till 9th Jan 2023. E-4 wheelers and E-buses have recorded sluggish growth. E-4 wheelers have increased to only 31737 units sold and 1617 units of E-buses in 2022-23 till 9th Jan 2023.

### EV – A Clean Choice for a Green Planet

Electric vehicles have low running costs as they have fewer moving parts as compared to traditional internal combustion engine vehicles (ICVs). Secondly charging an electric vehicle is cheaper than refuelling ICV with petrol or diesel. The cost of electricity can be reduced considerably if

renewable sources are tapped like solar energy for the generation of electricity. Zero tailpipe emissions is a priceless advantage of the switch to electric vehicles. Adoption of EVs can considerably reduce our carbon footprints and maintain ecological balance. Even in the efficiency index EVS score more than petrol and diesel vehicles. EVs can convert 60% of electrical energy to power the wheels but petrol and diesel cars have a capacity of converting 17% to 21% of the energy stored in fuel to wheels. There is a waste of around 80% of energy in petrol and diesel-driven vehicles. Therefore, the switch is justifiable. Electric vehicles don't have gears and that makes them more convenient to drive. In absence of controls and only accelerator, brake, and steering it is an

amazing experience. Also charging electric vehicles at home can cut down long waits in the busy fuel station during peak hours. Electric vehicles also cut down on noise pollution as they are quieter than traditional vehicles.

India enormously relies on imports for nearly 85% of its domestic oil consumption and disburses one-third of its total import values on crude oil alone. The country has a massive need for 5.5 million barrels a day. Any sudden fluctuations in global prices have a disadvantageous impact on the economy. Every USD 10 per barrel rise in brent crude prices punches the country's GDP by 16-20 basis points. If electric vehicle occupies 30% share of new vehicles sold, India's oil imports can reduce considerably by 15% by around INR 1.1 lakh crores in 2030 alone.

Despite various schemes for augmenting the sale of EVs, Indian consumers are apprehensive about the shift, and the mission EV have met limited success.

### **E-Lane – A Rough Terrain**

The Indian consumer is price sensitive, and cost remains the topmost concern for an Indian buyer. There are many incentives offered by state and central governments but are applicable up to a certain number of vehicles. After a certain saturation point, buying electric cars becomes no more lucrative. The Li-ion battery in electric vehicles can last hardly 8 years and after its decay, there is no option left for a user, but to discard it and buy a new battery which costs exorbitantly.

The electric vehicle market is quite immature and is at an infant stage. The technology as well as makers are new. To make a complicated product like an automobile with perfection at the first attempt is next to impossible. Seasoned players in the automobile market like Revolt Motors and Tata Motors had to update their vehicles several times after customer reviews and feedback. Therefore, buying EVs from the company's first batch

of creations is risky and there are huge chances for a buyer to get a bad experience. One of the pressing concerns while opting for EVs is poor infrastructure facilities. Inadequate charging stations pose a serious threat to achieving the high target which India has set. Poor infrastructure does not include charging stations only but also includes a lack of proper set-up and facilities at home like powerful MCB, Wire, and Earthing.

Temperature can impact the efficiency of the EV battery considerably. The performance of EV batteries gets affected by too-cold or too-hot temperatures. It can give ideal performance between the range of 15 – 40 degrees. In a too-hot region like Rajasthan or too cold region like Uttarakhand. The electric vehicle can give a lot of performance issues. The demand for electric vehicles will put tremendous demand for electricity. India cannot capture the benefits of the EV revolution until and unless it taps solar energy for electricity generation instead of burning fossil fuel. The burning of an enormous amount of fossil fuel can create environmental concerns and other sets of issues to tackle.

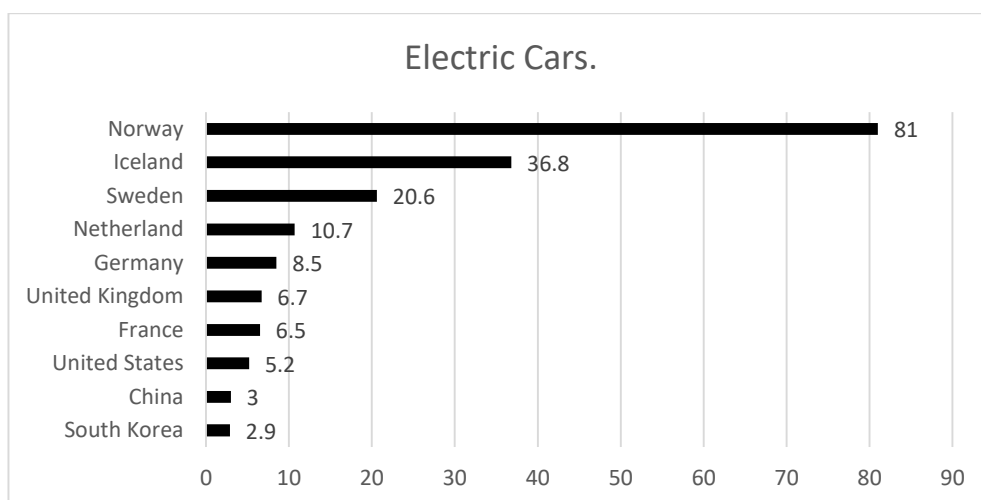
There were several unfortunate cases of Electric vehicles catching fire. Such instances can jeopardize India's mission of electrifying vehicles. It has shaken the faith of the buyer who will prefer internal combustion engines rather than electric ones. There was a probe by the Indian government on these issues which resulted in shocking findings. The expert committee on electric vehicle fires found that the Battery Management Systems (BMS) were below the standard. There was an inefficient venting mechanism that allow overheated cells to vent out heat. Sub-standard quality cells were used in most batteries of vehicles that caught fire. The electric vehicle makers took several shocking shortcuts which endangered the safety of the vehicle as well as the riders/drivers.

## Learnings from Leading Countries

Norway could achieve the top position in EVs not because Norwegians are more environmentally conscious but because of sound government policies which were consistent for a very long time. A high tax on sales of new ICE polluting cars, but no sales tax and road tax on electric cars helped

Top 10 countries with most EVs per capita

(Number of electric vehicles per 1,000 residents in 2020)



Source: Statista

Norway continued to stay in the topmost spot at 81 vehicles per 1000 residents in 2020. Iceland, Sweden, Netherland, and Germany managed to be in the top 5 countries.

## Recommendations to the Government

Indian Government should not be impatient and rushed with its electrifying plans. Companies with no experience in business should not be allowed to be in the business of EV production. Diluting the safety norms is a dangerous choice for accelerating EV plans. Government should systematically strategize to instil faith and confidence in the public to make a green choice. Strict disciplinary actions on automakers who flaunt the basic safety norms, ensuring the safety of the drivers and vehicles will also go a long way to bring back the lost confidence among the general public. To

them achieve this green initiative. Almost 65% of new passenger cars sold in 2021 were electric and 22% were plug-in hybrids which pointed to a remarkable achievement of only 13% of cars sold without plugs. The speed with which the transition has taken place in Norway can be learnings for other countries.

increase the penetration of E-4W, the government should undertake extensive campaigns. Convincing campaigns highlighting the merits of the adoption of EVs and creating awareness can escalate consumer acceptance. Upgrading and adding charging infrastructure is a pre-requisite for the success of the EV mission.

## Suggestions for the EV Industry

Companies manufacturing EVs should not bypass the safety norms. To bring back lost consumer faith due to faulty design of vehicles or due to vehicle engines catching fire will be next to impossible. Companies should spend on Research and Development in crafting viable and quality electric models of cars and other vehicles. Manufacturing companies of Electric vehicles should work for improving the battery range. This is a source of anxiety for electric vehicle users. A convincing battery range can increase the sale of electric

vehicles. EV companies should increase the general awareness among the buyers of various benefits and tax exemptions for making e-choice for cars and other vehicles.

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