



Electronic Vehicle: Impending Future of Indian Market

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Abstract

Pollution of the environment is currently a global concern. Toxic emission from internal combustion engines is one of the primary air pollutants. In order to mitigate the effects of fossil fuel emission and address environmental concerns (ECs), electric vehicles (EVs) are being promoted aggressively all over the world. Electric vehicles (EVs) are growing in popularity and certainly in mind space. They are cleaner and more efficient, and even fun. Their growth, however, is still considered just a market problem: The end user should choose on the basis of what it costs to buy and run, or how it performs, etc. Markets matter, but there is also a need for government and policy inputs. EVs, after all, operate within broader energy and transportation ecosystems with their own distortions. This paper examines the scope and opportunities of Electric Vehicles in India, various policies and frameworks in place by the Government of India.

Keywords: Environment, Global Concern, Electronic Vehicles, Government Policies.

Introduction

Driven by powerful environmental, macroeconomic and technological factors, the global transportation sector is in a period of historic transition. New business models such as mobility as a service and the increasing economic viability of technologies such as electric vehicles will soon change the way we travel. According to research by the International Energy Agency (IEA), the global fleet of electric vehicles has increased from just five thousand vehicles in 2008 to more than two million in 2016. This is due to fundamental trends, including growing environmental concerns, a decrease in battery prices and the growing availability of charging infrastructure. All of this has led experts to predict rapid growth in EV use over the next decade - growth forecasts for the current year range from 27% to 33% until 2030. Also Indians are famously value conscious. This is why consumers love diesel cars, despite their higher MRP and pollution relative to petrol counterparts. For an average Indian consumer, all they care about are two main things – The cost and vehicle quality. Afterward, they want the maintenance cost to be a little cheaper as the maintenance of the existing car costs quite a lot. The technology is growing at a faster rate, and at the same time, it's getting adopted at even faster speeds. So, driving an Electric Vehicle by an average Indian wouldn't be a big problem. The strategy for growing electric vehicles in India revolves around two basic assumptions: aggregating demand for types similar to EESL can help scale up quickly and the battery exchange model can

help reduce initial costs of electric vehicles and improve the charging experience. Electric vehicles are not just the wave of the future, they are saving lives today.

Electric vehicles are an increasingly common sight on our nation's roadways and not just personal passenger cars. Electric school, transit buses, and trucks are ready to hit the road. Electric vehicles now include cars, transit buses, and trucks of all sizes, and even big-rig tractor trailers that are at least partially powered by electricity.

Electric vehicles fall into three main categories:

- Battery electric vehicles are powered by electricity stored in a battery pack.
- Plug-in hybrids combine a gasoline or diesel engine with an electric motor and large rechargeable battery.
- Fuel cell vehicles split electrons from hydrogen molecules to produce electricity to run the motor.

Need of Electronic Vehicle:

India's commitment to containing pollution and reducing carbon footprint is also increasing. The country prepares to shift towards EVs by 2030. The government desires the car manufacturers to migrate to EV production, which will curtail the oil bill by US\$60 billion, cut emissions by 37 per cent and reduce the dependence on the imports of fuel, thus acting as a shield from vulnerability against crude prices and currency fluctuations. The government is examining the battery swapping option model to overcome the challenges in EV adoption.

Situation of EV Market in India:

The Indian automotive segment has also taken the first step towards its autonomous future. With the right mix of such hype and incentives, we might witness EVs becoming more popular. It was not long ago when there were questions on the viability of autonomous and electric vehicles in India, especially in the backdrop of insufficient infrastructure and lack of favourable policies. However, things seem to be changing rapidly now. 2021 seems to be the year that may witness an upward trajectory in the market for autonomous vehicles and EVs. There are several reasons for a positive outlook despite 2020 being the year when growth in the EV market slowed globally, largely due to the pandemic-induced lockdown. Irrespective of its smaller share of autonomous and EVs in the Indian market, the government is betting big on the sector.

Situation of EV's in 2020:

"In 2020, we might see the re-birth of electric cars, with their positive image driving sales. It could become part of a customer's lifestyle statement. Though the numbers could be less, the excitement among citizens would be more," hoped Gill.

In the two-wheeler category, there was entry of Bajaj, TVS and Revolt in the market, hitherto driven by established players like Hero Electric and Ather. People could become more brand conscious. The e-rickshaw market seems likely to remain dominated by the unorganised sector. Authentic players in the three-wheeler segment might partner with municipal bodies, battery manufacturers or fleet operators. It would be a test year for e-buses. "Overall, we anticipate the market to grow by 100 per cent," said Gill.

BIS Research says the EV market is anticipated to grow at a compounded annual rate of 43.1 per cent, charging infrastructure at 42.4 per cent and the battery market at 60.1 per cent during the period from 2019 to 2030.

Future Aspects of Electrical Vehicles:

At present, EVs represent less than one per cent of the total vehicle sales in India. The industry body SMEV projects it to become five per cent a few years down the line. However, if we take the on-ground developments into consideration, it could happen sooner than expected. In a big push for the sector, the union minister for road, transport, and highways Nitin Gadkari in November 2020 had announced that the government will be setting up at least one EV charging kiosk at each of the 69,000 petrol pumps across the country.

The government has previously formulated favorable plans for EV adoption including the National Electric Mobility Mission Plan (NEMMP), Faster Adoption and Manufacturing of (Hybrid) and Electric Vehicles (FAME) Scheme, loan subventions, and income tax rebates alongside similar relaxations on the state-level. More state governments are coming up with incentives to prompt people to go with EVs.

At the same time, we are witnessing the participation of more players within the segment. Now, with the latest buzz around Tesla which is setting up a manufacturing unit in the country, there is a renewed momentum within the sector. Tesla Model 3 has seen considerable tractions across global markets including the U.S. and China. Its luxury brand status adds to popularity. The foray of Tesla in India will also increase the competitiveness within the segment and make EVs more accessible to people. With the right mix of such hype and incentives, we might witness EVs becoming more popular.

Problems faced by Electric Vehicles:

Launching Electric Vehicles is a dream that is turning into reality with many companies boldly launching their EV vehicles and most of them getting success. But still there are some major problems that EV vehicles faces are:

Infrastructure for electric vehicles:

The most talked-about point related to EVs is the infrastructure support provided by the country for them to be convenient. This mainly leads us to the charging points that are to be very essentials for EVs. Right now electric vehicles practically cannot be used on highways as there are no charging points across highways in the country.

Charging time:

Charging time is a big drawback in electric vehicles as most of the Indian consumers are impatient and would not like to wait for long to charge their vehicles. Although there is fast charging available on most of them, it usually takes an hour to charge about 80% of the vehicle, which is indeed a long wait.

Service of electric vehicles:

The exact servicing costs are yet unknown for these kinds of vehicles. Many service centres are known for duping the customers citing false problems on their cars. EVs will only lead to causing more problems in this area.

Breakdowns and awareness:

If there is a breakdown in electric vehicle, One cannot just call a normal mechanic like for a normal vehicle. A call has been made to company authorized service personnel only which will lead the vehicle to the next point. There is a general lack of awareness about EVs and their mechanical systems..

No assured government policy:

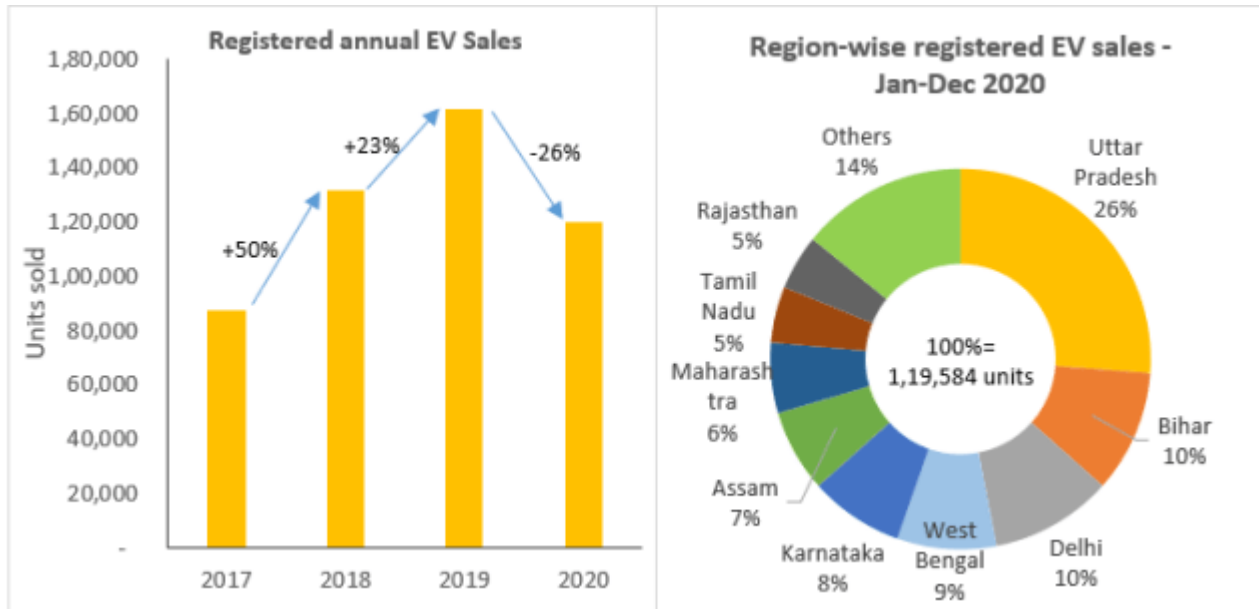
For years in many European countries, governments have welcomed electric vehicles to their country by reducing their tax rates and also providing subsidies in certain ways. They have clear rules and policies made especially for Electric vehicles to encourage buyers. With some even planning to allow only EVs to be sold eventually. In India though it is a different story, as the government has never been clear from the start about their policies on EV vehicles. This has left automakers confused about their plans for electric vehicles. How this translates to the consumers is that you usually end up paying more for electric vehicles.

Limitations and Suggestions for Future Research:

The limitation of the current study offers enough scope for future research. This study empirically tested the proposed conceptual model in India. It is advisable to undertake similar studies under different conditions and in different regions. Further studies could examine the influences of other covariates. These may include perceived consumer effectiveness, information, scepticism, safety, risk, interest and experience. In the future, it would be meaningful to test this model with actual EV owners. With global concerns on environment increasing every day, this area offers immense scope for future research.

Since 2010, EVs started becoming popular apart from public transports. The most surprising fact is that by 2016 September, almost 1 Million electric vehicles were delivered globally. This was the turning point of the global acceptance of electric vehicles. The speed to acceptance was so good that by 2019, almost 4.8 million cars were sold, and by 2020, it reached 10 million units. As the cost of batteries got down by 73% since 2010, electric cars started to gear up their growth speed. The coming decade is considered as the decade of electric vehicles. The overall registered EV sales Pan-India in 2020 dropped by 26% from 2019 sales. The year 2019 continues to be landmark year for highest annual sales for registered EVs yet, achieving the 1, 60,000+ milestone. Prior to Covid-19, the market growth had been on a decline for about 12-18 months, on account of weakening demand amidst an ailing economy. Furthermore, the EV sales were severely hampered during April-May 2020 on account of covid-induced lockdown. However, with EV sales resurging beyond May-2020 at an average month-on-month growth rate of nearly 70%, the year 2020 saw sales crossing the 1,00,000 mark.

Figure 1: Registered EV Sales trends in India

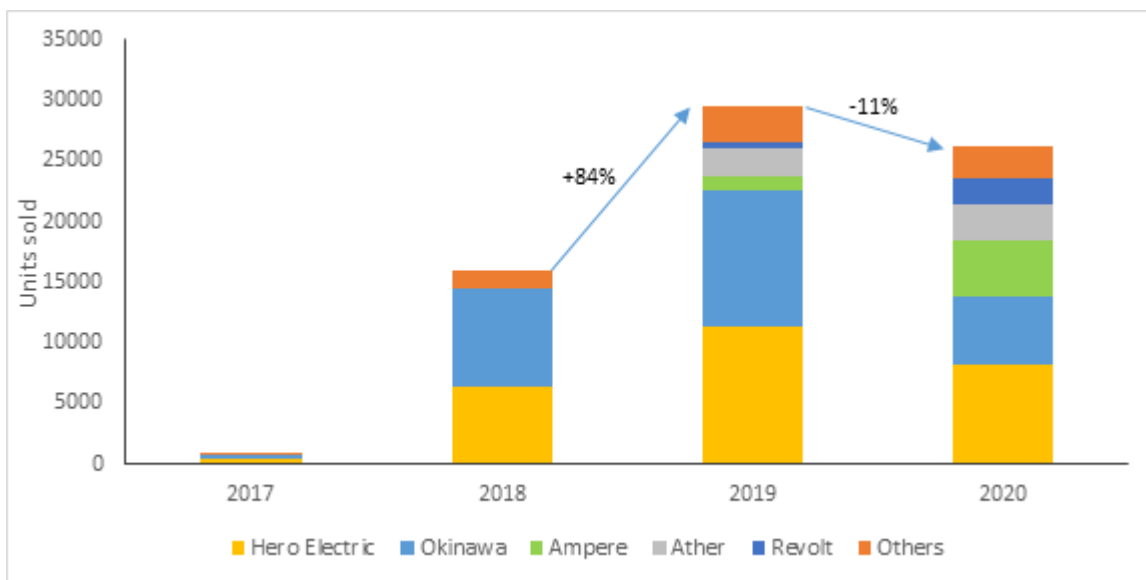


Source: Vahan Dashboard, JMK Research

Note: Sales figure represent EVs registered across 1,269 RTOs in 33 states/ UTs

The sales growth of High Speed (Registered) E2W Sales shrunk to 11% in 2020 relative to sales in 2019. Hero Electric, along with Okinawa, Ampere, Ather have been the leading players in the high speed (HS) electric two wheeler (E2W) segment in the past 4 years. Hero Electric is the leading player with maximum HS E2W sales in 2020. Ampere also showed substantial increase in its sales in 2020 with an annual increase of 277%. Revolt Motors which launched in late 2019 itself has also seen significant surge in its sales from mere 480 units in 2019 to 2,088 units in 2020.

Figure 2: Annual High Speed (Registered) E2W Sales



Source: Vahan Dashboard, JMK research

Note: Sales figure are for only high range E2W models with speed higher than 25kmph.

Sales figure represent E2Ws registered across 1,268 RTOs in 33 states/ UTs.

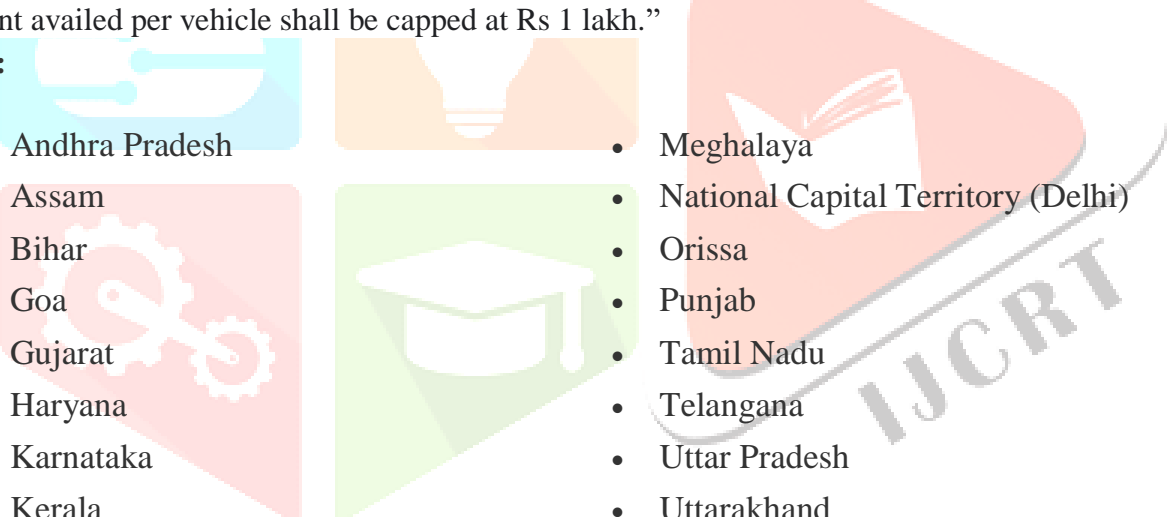
Current Policy of Indian Government

- **FAME Scheme:** The Indian government has created momentum through its **Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles** schemes that encourage, and in some segments mandates the adoption of electric vehicles (EV), with a goal of reaching 30% EV penetration by 2030.
 - If these aims are realised by 2030, they will generate an estimated saving of up to 474 Millions of tonnes of oil equivalent (Mtoe) and 846 million tonnes of net CO₂ emissions over their lifetime.
- **Fiscal Incentives:** Various fiscal demand incentives have been put in place to spur the production and consumption of EVs and charging infrastructure - such as income tax rebates, exemption from customs duties, etc.

States with proposed or adopted EV's policies:

Following are the states which proposed or adopted state-level electric vehicle policies in India. These policies are complementary to national and city-level policies that aim to promote India's transition from internal combustion engine vehicles to electric vehicles. The objectives of these policies vary by state but commonly include improved air quality, climate change mitigation, reduced dependence on oil imports, and the development of India's electric vehicle industry. For example, "The buyers purchasing the EVs before December 31, 2021 shall be eligible for an **'Early bird discount'** of **Rs 5,000/kWh** on the vehicle's battery capacity. This discount shall be provided over and above the demand incentives. The maximum early bird discount availed per vehicle shall be capped at Rs 1 lakh."

States:

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- Andhra Pradesh
 - Assam
 - Bihar
 - Goa
 - Gujarat
 - Haryana
 - Karnataka
 - Kerala
 - Maharashtra
 - Madhya Pradesh
 - Meghalaya
 - National Capital Territory (Delhi)
 - Orissa
 - Punjab
 - Tamil Nadu
 - Telangana
 - Uttar Pradesh
 - Uttarakhand
 - West Bengal

Conclusion:

India has a huge challenge in shifting the transportation sector from ICE engines to EV's. This requires a lot of research and development. Government policies like FAME and few other policies needs to be updated on regular keep in pace with the development throughout the world. India should focus on improving the energy-efficiency. The power electronics, electronic motors should planned for Indian conditions. A battery eco-system needs to be which can support many companies and start-ups developing battery pack up and cell manufacturing. Rapidly increasing pollution has raised new companies regarding the environment. In spite of enthusiastic political targets for the introduction of electric maneuverability, actual sales for electric and plug-in hybrid vehicles stay low. So, the time has finally come to introduce pollution free E.V's. But the

main challenge is customer satisfaction and it will only be obtained when issues like high cost, limited range, etc will be solved through research. Also there is a need to develop the Indian Automobile Industry because the issue regarding the human resources, key technologies, infrastructure problems, etc give a serious blow to the development of E.Vs. India needs to heavily invest in the electricity generation like Hydro-Power Plants, Renewable Energy, Nuclear Energy etc to meet the growing demands of the electricity in our country and also to feed the electric vehicles with the electricity generated. At it becomes necessary to modify the present Indian Industry and Power Generation Sector for the development and commercialization of the electric and hybrid vehicles for the public transportation.

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