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Introduction

Electric Vehicles are the newest alternative in the transportation industry to substitute fossil fuel-based vehicles. In this brief, it will be discussed how the Indian government is implementing EVs in the country and how consumers are adopting them. It shows a detailed discussion about the Indian EV market and its future prospects.

Discussion

"Topic of the policy brief and mention the key components covered in the lecture"

The topic of the policy brief is to determine how the implementation of electric vehicles is taking place and the adoption rate for that in India. The country has signed the ***Paris Agreement*** and aims to reduce its carbon emission significantly (Dubash, 2017). In order to achieve that the brief will look at the factor of transportation and will aim to find out how electric vehicles can play a crucial part in the state, and whether the country can stick to its ***goal or not***. The analysation of the EV market needs to consider various factors to state whether Indian consumers are shifting towards the electrification of cars. For analysing any adoption, the research needs to consider the ***"poor purchasing power"*** of the customers (Kumar *et al*. 2020). The willingness of the government to implement a proper EV industry is based on the fact that the government want to remove greenhouse gases and for that, it is making the transportation industry not dependent on fossil fuel. In order to understand the rate of consumer adoption towards EVs, the ***"Unified Theory of Acceptance and Use of Technology"*** has been developed to find out all the risk factors and how they can be mitigated for faster adoption (Jain *e al*. 2022).

Government support is a big factor to reduce the perceived risks and to increase the rate of adoption. For this purpose, the Indian government are pushing this industry to bring new models to entice consumers' interest and ***made regulations*** about the ***old version of vehicle model***. The implications of government policies can be determined by analysing the impact of government policies ***on consumers and the automobile industry.*** Due to this, it can be observed how all these changes are affecting the industry and how the transitioning phase is progressing. One of the key concerns for the buyers of an EV is that the country still ***lacks the charging infrastructure*** (Chakraborty, *et al*. 2021). For this reason, a lot of EV enthusiasts are still not considering buying an EV as a viable option. With the investment made by the EV companies and the government, it is possible to put up the infrastructure for the EV models to increase

adoption. The stakeholders must come to a plan, regarding the process of investing in charging stations. One model suggests that the ***EV company sets up charging stations*** and the ***government is providing subsidies*** to the EV consumers for their purchases of the latest EV model (Chakraborty, *et al*. 2021).

Another model can be envisioned, where the ***government itself sets up charging infrastructure*** and develop a ***subsidy structure*** for the consumers and incentivises them for buying an EV. These two processes are the best for the faster rate of adoption and development of a market in this sector. The major cities in the country, such as ***Delhi and Mumbai*** face a stiff rate of pollution and have significantly ***poor air quality***, which is detrimental for the people of these two places. This makes the government implement various quick fixes if the situation gets severe. Once it has planned to implement an ***"odd-even rule"***, which looks at the number plate and states on which day of the week the odd number car can go and the same for the even number. This reduces the load from the road for some time but does not produce any significant outcome and is not viable for the ***long term***. Therefore, it has been suggested the government along with the manufacturers needs to find a plan to increase the purchasing rate and to remove this obstacle in the adoption process.

"Who are the stakeholders and what are their interests? Why is the topic of interest? What questions would they want to have answered by this brief?"

The advantage to develop an EV market in India can be determined by an analysis of India's microenvironment scenario.

- ***Political:*** India is the ***largest democracy*** in the world and the election is a major event for the country (John Joseph, Nonsiri, 2021). In this country, a ***multi-party system*** has been organised and the voters can choose their candidates across the diaspora of people with different backgrounds. There is a tendency within the ***political parties*** of this government to engage in communalism and castism and to develop ***vote bank politics*** Ahmad, 2013). This has led to an abrupt rise in political violence in the country. The government is through working with the industries and on a mission to make the businesses understand the adequate benefits of producing at lower costs. Therefore, the impact is ***negative***.
- ***Economical:*** India is one of the ***fastest-growing economies*** in the world. It has a vibrant prospect in terms of opportunities and can integrate large business operations. In the case of the automobile industry, it has been considered one of the most important factors of

growth in India (Miglani, 2019). The sector has received a lot of government support at multiple intervals to develop a thriving industry and helps the country get ***Foreign Direct Investment*** (FDI) in the country. The country has also taken the initiative to develop its product and to create a market for the consumers of the country. This provides a thriving market for the manufacturers and thus attracts a lot of suppliers. Hence, the impact of this factor is ***positive.***

- ***Social:*** The country has a young demographic and has the highest population in the world. India's ***human resource base*** has given the country a competitive advantage and has created ***knowledge clusters*** within the country (Dhanaraj*et al*. 2015). This is helpful for the automobile companies to readily train this young population and can hire these employees at a much lower cost.
- ***Technological:*** The companies in the automobile industry are working to develop innovative technologies and aim to develop a better version of electric vehicles. The country is going through ***an "ascending motorisation curve"*** (Digalwar and Giridhar, 2015). This means that the country is witnessing an uprise in vehicles, which causes transportation challenges in the metropolitan cities and for that there is an uprise in ***CO_2 emission*** in the country. This led to an increase in technological innovation and the government is incentivising these companies to bring changes in their, manufacturing process to effectively adapt to the trend of electric vehicles. Therefore, the companies are investing in their ***R&D*** to make far better products, which in general is creating a tailwind n the industry. Hence, the impact is ***positive.***
- ***Legal:*** The government is creating a ***"single window interface"*** for all the legal proceedings, which are essential for a business (Singh and Jaiswal, 2018). The import days have gotten reduced from ***283 days to 265 days***, all these major changes are creating a beneficial moment for foreign companies to set up manufacturing in India. This creates a moment in the country, where ***the ease of doing business*** is getting better. This creates ample opportunity for foreign investors to invest in the Indian market. Hence, the impact is ***positive.***
- ***Environmental:*** For electric vehicles, the government is pushing the agenda of promoting zero-emission transportation. Hence, there are plans to make the public transportation system electric. Therefore, it shows that with zero CO_2 emissions, EVs are

the best alternative for a sustainable future. Hence, advancement in this sector is for the future sustainability plans of the government. This creates a moment, where environmental regulations are in favour of the automobile companies. Hence, the impact is ***positive***.

In order to develop the EV market, the companies also need to ensure that they provide proper servicing to the customers. The perceived service value determines the ***quality of the customers*** (Choudhury, 2013). Therefore, to get more quality customers, the companies need to provide services after the purchases to smoothen the entire process of the buying experience. These are the following things the companies can do to make their customers delighted.

- Providing quality servicing to the vehicle after a certain interval of time.
- Availability of the spare parts and implementation of the technologies to easily repair.
- ***Low-cost EMI*** options are provided to their customers for the purchases of the vehicle.

There is an interest in the government to develop this market, as it can create an automobile boom in the Indian market and therefore can bring economic growth, which leads to a rise in ***the GDP of the country***. There are a few advantages, which the government can achieve for promoting this industry.

- It can stick to its ***lowering emissions targets*** and changing the transportation system in the country can give a big push to its goal.
- It can be the industry champion by promoting development in this new technology and can have knowledge advantage and expertise to ***rent or sell intellectual property*** to other countries.

The current market trend of electric vehicles and its future implications.

- As per the current situation, the government is still lacking in ***incentivisation plans*** for customers to adopt electric vehicles. Whereas, on the other hand, ***China, the USA, Norway and Germany*** are incentivising their population to shift towards EV (Singh *et al*. 2021). The current scenario is that there is no adequate means of charging infrastructure in the country. This is causing an obstacle for customers to adopt electric vehicles.
- ***Future implications of this market*** are such that if developed with proper ***R&D*** and getting a product market fit, the companies can ece customers to buy electric vehicles. This will develop a mature market in India, where customers will shift towards electric vehicles. Since India is a price-sensitive country, it creates a situation, where the

customers need to get incentivised for buying the product. It will create competition in the country, which will be beneficial for the customers as all the automobile companies will strive for getting market share.

"What topics does the brief need to cover? What type of information is of interest to the reader?"

For an effective understanding of the Indian electric market, it is important to analyse the development so far. From the EV perspective, ***Tata Motors*** has the highest share in the EV market with ***86% of the market*** cornered by them (The Hindu, 2023). Other companies such as ***Mahindra, Hyundai and Maruti Suzuki*** are also investing in this space and are bringing new models into the market. Following these changes in practices from the traditional vehicle to an electric vehicle. This shift change is developing a new perception among the customers, which is encouraging them to buy EV products. There are the following factors, which will state how this entire sector within the industry is getting developed.

- ***Government's initiative to promote electric vehicles:*** In order to develop a phase of the electric public transportation system, the government has launched ***the "FAME II plan"*** in 2019, which promotes the electrification of all three-wheelers transport vehicles, that it plans to make ***7,000 electric buses*** and ***55,000 electric passenger vehicle*** (Corpbiz. 2023). Through these initiatives, the government is providing large orders to private manufacturers, which incentivises them to go for production and create bulk amounts of products, which will be then purchased by the government. The ***"Faster Adoption and Manufacturing of Electric Vehicles" (FAME)***, is the government's flagship program, which will create technologies in partnerships with the automobile companies and will conduct ***"phased manufacturing"*** across the nation to reduce the overall dependence on fossil fuel (GOV 2021). Hence, it shows the shift in the government's agenda to evolve public transport by providing bulk orders to automobile companies.

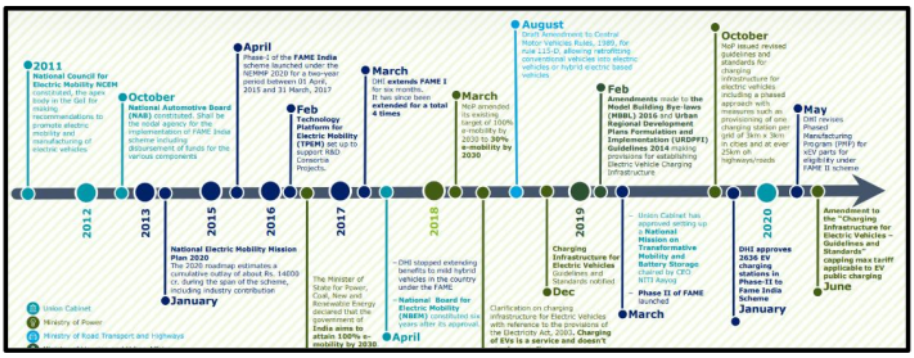

Figure1: Planning of e-amrit

(Source: GOV 2021)

- ***Rate of production for electric vehicles:*** For manufacturing an electric vehicle, the manufacturers, still need to provide more manufacturing costs in comparison with "internal combustion engine" (McKinsey & Company. 2019). The most concerning factors for the EV manufacturers are the battery cost, as it is the single factor, which consumes most of the production cost. However, from the industry experts, it can be estimated that the cost of production will decrease further in ***5 to 7 years*** (McKinsey & Company. 2019). This has creed a moment, where the industry is further investing in R&D to lower the productional costs and to develop a more economically feasible model to manufacture electric vehicles. This will call for the demise of internal combustion engine vehicles as these automobile companies will be more prone to manufacture electric vehicles and have better margins along the way.
- ***Expectations about the adoption of electric vehicles in India:*** The electric vehicle market in India is booming and a major factor to reduce the carbon emissions of the country. The automobile sector will play a key part in developing this market and shaping the consumers' needs. It has been expected that the "domestic electric vehicle" market will grow at 49% at a ***"compounded annual growth rate"*** from ***2022 to 2030*** (The Economic Times, 2023). This creates a situation within the country, where the prospect of having a higher volume of EV sales is higher. Therefore, this will forge a decade-long boom in the automobile industry.
- ***Analysing target market and its economic strength:*** The purchasing power of the Indians are low and this makes the people price sensitive. Companies need to understand this factor before entering the Indian market. Consumers are prone to buy products,

which are at low costs. This makes the situation a little bit troubling for the automobile companies, as in the initial phase the manufacturing costs of the electric vehicle are higher and this creates a situation, where the companies need to keep lower margins for better adoption. Government, therefore, provides bulk orders to the manufacturers to maintain the adoption rate and improve the public transportation infrastructure.

- ***Current charging infrastructure:*** The charging infrastructure of the country is still not industry-wide popular and private companies along with the government are in the phase of implementing charging stations across the country. This develops a situation, where the customers will always find charging points available for their cars. In the workplace and also in the residential complexes, charging stations are getting installed. Hence, it can be stated that within a few years, the charging stations will be adequately available in the country.

"Assemble the evidence: What data and information is needed to answer your questions?"

- ***"The benefits of using Electric Vehicles":*** There are several benefits of using an electric vehicle, one such is that the cost of refuelling is cheaper than petrol and diesel vehicles (GOV, 2022). This means that the maintenance of these vehicles is not so cost-heavy and will be easier for consumers to maintain their vehicles.
- ***"Reports on emission analysis of petrol and diesel vehicles":*** In petrol and diesel-based vehicles, carbon dioxide emission is the most, and along with that there is the emission of methane and other greenhouse gases (Graham *et al*. 2008). This has led to polluting the air and accelerating global warming. The rampant use of fossil fuels for getting energy is affecting the environment hugely. There are various other factors in transportation, which lead to air pollution. Fossil fuel-based public transport and "heavy-duty vehicles" are some of the key emitters of carbon dioxide. Hence, the presence of carbon dioxide in the atmosphere is creating climate change.
- ***Cost-benefit analysis of electric vehicles:*** There are several benefits if a person considers buying an "electric car". Running costs for EVs is low and by doing a cost-benefit analysis, running 30 kilometres daily will cost***Rs. 5,375*** in Indian currency, while for an EV it will cost around***Rs 700*** (The Economic Times, 2020). This shows that there is a significant reduction in prices, thus, making a purchase of an EV beneficial for a

customer. A consumer also has ***"lower maintenance costs"*** once it shifts to electric vehicles. This shows there are cost advantages after an initial purchase of an EV.

- ***"Long-term sustainability targets and how to achieve them":*** In the long-term the government can achieve its long-term sustainability plan by persuading the population of the country to adopt electric vehicles. This will provide a justified solution to stop global warming and ***slow down the effects of climate change***. Climate change is one of the major concerns across the globe and a population like India if manages to reduce its carbon dioxide emissions then it will present the country with ***geopolitical advantages***. In order to achieve this goal, the country needs to bring necessary policies, which will incentivise both the suppliers' side and also on the buyer's side. Through this effort, the government can step by step create positive outcomes across industries.
- ***"Suitability of electric vehicles for Indian cities.":***EVs will be perfect for the Indian cities as in most of the metropolitan cities, it can be observed that the air quality is significantly poor and this is a concerning factor for the local authorities of that particular place. Hence, when it comes to sustainability metropolitan cities are now getting a major boost through charging stations. For increasing adoption, the manufacturers need to ensure the customers for providing better mileage, due to ***the lower number of charging stations***, the cars need to provide a better range for inter-city travel (The Economic Times, 2019). This shows that there is a wider chance for achieving sustainability and getting moulded according to the Indian cities.
- ***"What are the other associated costs with the car purchase":*** When purchasing an electric car, a consumer needs to set up a charging portal in his/her residence. This will provide an additional advantage to the owner to charge their cars in their home. Along with that, it needs to do ***battery servicing*** for keeping the car well maintained.
- ***"Public perceptions of using this technology"***: In the beginning the public perception of EVs was sceptical. As the government and the companies are launching products, the early adopters are now influencing the rest of the customers to buy an electric car. More usage of EVs will lower the costs and will be fully available to the majority of people to make a rational purchase.

Conclusion

It can be stated that the implementation of the electric vehicle in the Indian market is still in the nascent stage. The industry needs more support from the government and innovation on behalf of private companies, to fast-track the growth in this sector. The lower purchasing power is one of the reasons for slower adoption and also not proper infrastructure like charging stations is in place. Hence, the study has analysed both factors to present a reality-based work.

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