



“ELECTRIFYING THE ROAD: A CASE STUDY ON THE LAUNCH OF ELECTRIC VEHICLES BY AUTOMOBILE COMPANY XYZ”

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Abstract

The case study explores the launch of electric vehicles by a leading automobile company, XYZ in India. The company had been facing increasing pressure from stakeholders to adopt sustainable practices and reduce their carbon footprint. In response, they decided to launch a line of electric vehicles to cater to the growing demand for eco-friendly transportation options. The company's decision to enter the Indian electric vehicle market was also driven by the government's push towards electrification and rising consumer demand for eco-friendly vehicles. The case study delves into the various challenges that the company faced during the launch, such as the need for significant investments in research and development, the establishment of a robust charging infrastructure, and consumer skepticism around the reliability and performance of electric vehicles. Despite these challenges, the company successfully launched their electric vehicle line and managed to generate significant buzz and interest from consumers and the media. They also established partnerships with key stakeholders to facilitate the adoption of electric vehicles, such as government agencies, utility companies, and charging station providers.

Keywords: electric vehicles, eco-friendly vehicles, challenges, charging infrastructure, carbon emissions

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INTRODUCTION:

India's transportation sector is a major contributor to carbon emissions and pollution, with over 90% of vehicles running on fossil fuels. India, the world's third-largest oil importer, is focusing on reducing its dependency on fossil fuels and promoting the use of electric vehicles (EVs) to cut emissions and improve air quality. The Indian government has set an ambitious goal of having only electric vehicles on its roads by 2030. India has taken a big leap towards the adoption of electric vehicles (EVs) to reduce carbon emissions and fossil fuel consumption. Many companies have begun to invest in this emerging technology, with some even focusing solely on the production and distribution of electric vehicles. XYZ company, a leading manufacturer of fuel-based vehicles, is also interested in entering the electric vehicle market with the goal of developing and commercializing electric vehicles.

The company aims to offer high-quality and affordable electric vehicles that can compete with traditional gasoline-powered vehicles in terms of performance and convenience. The launch EV section of XYZ Company has been met with much anticipation and interest from consumers, investors, and industry experts. India is one of the fastest-growing automobile markets in the world, and the electric vehicle segment is expected to grow at a CAGR of 43.13% during the forecast period of 2021-2026. The Indian government is actively promoting the adoption of electric vehicles by offering incentives to promote EV adoption, such as subsidies on EV purchases, lower taxes on EV components, and exemption from road taxes for both manufacturers and customers.

In recent years, there has been a significant increase in the number of electric vehicles on the market, and the trend is expected to continue. According to a report by the International Energy Agency, the number of electric vehicles on the road is projected to reach 145 million by 2030, up from 11 million in 2020 (IEA, 2020). This growth in the electric vehicle market presents a significant opportunity for companies like XYZ Company to capture market share.

LITERATURE REVIEW:

Several studies have highlighted the benefits of EVs, including reduced greenhouse gas emissions, lower operational costs, and improved energy security. One such study by Burke et al. (2021) found that EVs have the potential to significantly

reduce carbon emissions in the transportation sector. The study used a scenario analysis to model the potential impact of EV adoption in the United States, showing that a 100% EV fleet could reduce greenhouse gas emissions by 60-90%.

Another study by Gao et al. (2021) examined the cost-effectiveness of EVs compared to gasoline vehicles. The study found that, although EVs have higher upfront costs, their operational and maintenance costs are significantly lower than gasoline vehicles. This cost-effectiveness, combined with the potential for reduced emissions, makes EVs an attractive option for consumers.

Despite the benefits of EVs, several challenges hinder their widespread adoption. One of the most significant challenges is the limited driving range and lack of charging infrastructure. A study by Guo et al. (2021) examined the impact of charging infrastructure on the adoption of EVs in China. The study found that a lack of charging infrastructure significantly hinders the adoption of EVs, and government policies that promote charging infrastructure development are essential to increasing EV usage.

Another challenge of EVs is their limited availability and affordability in some regions. A study by Wong et al. (2021) examined the barriers to EV adoption in Southeast Asia, where EVs are less prevalent than in other regions. The study found that high upfront costs, limited availability of EV models, and a lack of government incentives are the primary barriers to adoption in the region.

Competitive Landscape

Electric Vehicles (EVs) are gaining popularity in India due to the increasing focus on sustainable mobility and reducing the country's dependence on oil imports. However, the EV market in India is still in its nascent stage, and the competitive scenario is evolving. The competitive landscape of the electric vehicle market in India is as follows: Tata Motors: Tata Motors is one of the leading players in the EV market in India. They have launched several electric vehicles, including the Tata Tigor EV and the Nexon EV. They are also investing in developing charging infrastructure across the country, making them a formidable player in the EV market.

1. Mahindra Electric: Mahindra Electric is a subsidiary of the Mahindra Group and is focused on developing and manufacturing

electric vehicles in India. They have launched several electric vehicles, including the Mahindra e2o and the e-Verito. Mahindra Electric is also collaborating with several other companies to develop new technologies and products for the Indian market.

2. Hyundai: Hyundai is a global player in the automotive industry and has made a significant entry into the Indian EV market with the Kona EV. The Kona EV is a premium electric SUV that has received positive reviews from customers and critics alike. Hyundai is also investing in charging infrastructure to support the growth of EVs in India.
3. MG Motor: MG Motor is a relatively new entrant in the Indian market, but they have made a strong start with the launch of the MG ZS EV. The MG ZS EV is a compact SUV that has received positive reviews for its performance and features. MG Motor is also partnering with several companies to develop charging infrastructure and other related technologies.
4. Ola Electric: Ola Electric is a subsidiary of Ola Cabs, one of the leading ride-hailing companies in India. They have recently launched the Ola S1 and S1 Pro electric scooters, which have received a lot of attention from customers. Ola Electric is also investing in setting up a massive charging network across the country, which could give them an edge in the market.
5. Hero Electric: Hero Electric is a home-grown electric vehicle manufacturer and is one of the oldest players in the Indian market. They have a wide range of electric scooters and motorcycles and are focused on delivering affordable EVs to the masses. Hero Electric has a strong distribution network across the country, making them a formidable player in the market.

The Indian electric vehicle market is highly competitive, with both domestic and international players vying for a share of the pie. Some of the prominent players in the market include Tata Motors, Mahindra & Mahindra, Hyundai, and MG Motors.

The electric vehicle (EV) industry in India has been gaining momentum in recent years, with the government's push for cleaner mobility solutions and the increasing demand for environmentally-friendly transportation.

XYZ Company, a leading automobile manufacturer, is planning to launch a new electric vehicle in the Indian market. XYZ Company has made a substantial investment in the electric vehicle industry in India. The company has invested in a manufacturing plant that produces electric vehicles and their components. The investment has enabled the company to enter the EV market in India, which is poised for significant growth in the coming years.

Location:

The manufacturing plant of XYZ Company is located in Bangalore, the capital city of Karnataka, a state in southern India. Bangalore is a hub for technology companies, and the city has a robust ecosystem for electric vehicles. The city's infrastructure and policies are conducive to the growth of the EV industry, making it an ideal location for the company's investment.

Organizational Structure:

To diversify into electric vehicles, XYZ Company would need to consider changes to its organizational structure. It may consider creating a separate division or subsidiary for the production of electric vehicles or integrating the production of electric vehicles into existing divisions. The new division or subsidiary would require a dedicated team of employees to manage and oversee the production of electric vehicles.

Capabilities of Employees:

To successfully diversify into electric vehicles, XYZ Company would need to evaluate the capabilities of its current employees and identify any gaps in skills and knowledge. It may need to provide training and development programs to ensure its employees are equipped with the necessary skills to design, manufacture, and maintain electric vehicles.

Some key capabilities required for the production of electric vehicles include:

1. Knowledge of Electric Vehicle Technology: Employees should have a good understanding of the technology behind electric vehicles, such as battery technology, charging infrastructure, and electric motor systems.
2. Electrical Engineering Expertise: Employees with electrical engineering expertise would be valuable in the design and development of electric vehicle components, such as battery management systems, power electronics, and electric motors.
3. Manufacturing Expertise: Manufacturing processes for electric vehicles are different

from those for traditional vehicles, so employees with experience in manufacturing electric vehicles would be valuable.

4. **Software Development:** Electric vehicles require complex software systems for battery management, regenerative braking, and vehicle control. Therefore, employees with software development expertise would be essential.
5. **Sales and Marketing:** As electric vehicles are a relatively new technology, employees with expertise in sales and marketing would be essential to educate and convince potential customers of the benefits of electric vehicles.

Overall, to diversify into electric vehicles, XYZ Company would need to assess the capabilities of its current employees and consider hiring new employees with expertise in electric vehicle technology and manufacturing processes. It may also need to provide training. XYZ Company's plans to have organizational structure for its electric vehicle manufacturing plant in Bangalore as follows:

1. **Board of Directors:** The board of directors oversees the overall operations of the company and provides strategic direction.
2. **CEO:** The CEO is responsible for implementing the board's directives and overseeing the daily operations of the company.
3. **Department Heads:** The company has separate departments for research and development, production, marketing, and finance. Each department is headed by a department head who reports to the CEO.
4. **Employees:** The company employs a team of skilled professionals in various fields, including engineering, production, marketing, and finance.

XYZ company, a leading automobile manufacturer in India, is currently selling vehicles running on petrol and diesel. However, with the government's push towards EVs, the company is looking to diversify into electric vehicles.

Challenges:

The transition to EVs poses several challenges for XYZ company, including:

1. **High initial investment:** Developing and manufacturing electric vehicles require significant investments in research and development, manufacturing facilities, and charging infrastructure.
2. **Lack of charging infrastructure:** India currently has limited charging infrastructure, which

poses a significant barrier to the adoption of EVs.

3. **Range anxiety:** Electric vehicles have a limited driving range, which can cause range anxiety among potential buyers.
4. **Battery technology:** The cost of batteries, which are the most expensive component in an electric vehicle, remains high. Additionally, the technology is still evolving, and there are concerns around the sustainability of raw materials used in batteries.
5. **Competition:** Several global players, including Tesla, are eyeing the Indian market, which could pose significant competition to XYZ company.

Opportunities:

Despite the challenges, the transition to EVs also presents several opportunities for XYZ company, including:

1. **Early mover advantage:** By diversifying into electric vehicles, XYZ company can establish itself as an early mover in the market, giving it a competitive edge over rivals who are slower to adapt.
2. **Government incentives:** The Indian government has announced several incentives to promote the adoption of EVs, including tax benefits, subsidies, and exemptions from toll charges and parking fees.
3. **Growing demand:** With concerns over air pollution and rising fuel prices, the demand for electric vehicles is expected to increase rapidly in the coming years.
4. **Strategic partnerships:** XYZ company can form strategic partnerships with charging infrastructure providers, battery manufacturers, and other stakeholders to overcome some of the challenges in the EV ecosystem.
5. **Brand image:** By transitioning to electric vehicles, XYZ company can enhance its brand image as a company that is committed to sustainability and reducing its carbon footprint.

One of the key challenges that electric vehicle manufacturers face in India is the high cost of production. To overcome this challenge, the Indian government has introduced various incentives and subsidies to promote the adoption of electric vehicles in the country. These incentives and subsidies have helped to reduce the cost of electric vehicles, making them more affordable for the average consumer.

XYZ company has taken advantage of these incentives and subsidies to reduce the cost of its

electric vehicles, making them more competitive in the market. The company has also invested in developing a robust charging infrastructure across the country, which has further encouraged the adoption of electric vehicles among Indian consumers.

To promote the adoption of electric vehicles in India, the government has also introduced various policies and regulations that favor electric vehicles over traditional fossil fuel-based vehicles. For instance, the government has introduced a zero-emission vehicle policy, which mandates that a certain percentage of all new vehicles sold in the country should be electric or hybrid vehicles.

XYZ company has benefited from these policies and regulations, which have helped to create a favorable environment for electric vehicles in the country. The company has also collaborated with various stakeholders in the industry, including battery manufacturers, charging infrastructure providers, and government agencies, to further promote the adoption of electric vehicles in the country.

Overall, the investment made by XYZ company in electric vehicle technology know-how and infrastructure, coupled with the subsidies and incentives provided by the government, has helped to drive the adoption of electric vehicles in India. As the country continues to shift towards a more sustainable future, electric vehicles are expected to play a significant role in reducing carbon emissions and promoting a cleaner environment.

XYZ company has also conducted a combination of primary and secondary research. The primary research involved interviews with industry experts and consumers to understand the current market trends, consumer preferences, and challenges faced by EV manufacturers. The secondary research included analyzing reports and publications on the Indian EV market, government policies, and technological advancements.

RESULTS:

The analysis shows that the Indian EV market is in its early stages of development, with only a few players dominating the market. Mahindra Electric and Tata Motors are the leading EV manufacturers in India, with Mahindra Electric holding a market share of over 50%. The electric two-wheeler segment has shown the highest growth potential, with start-ups such as Ather Energy and Ola Electric gaining traction. However, the high cost

of EVs and lack of charging infrastructure are major challenges for EV adoption in India.

Discussion: To enter the EV market in India, XYZ company needs to focus on developing affordable EVs that cater to the Indian consumer's needs. The company can leverage its expertise in fuel-based vehicles to develop more efficient and reliable EVs. XYZ company should also invest in building charging infrastructure to address the charging challenges faced by EV users in India. The company can also partner with start-ups such as Ather Energy and Ola Electric to gain market insights and develop a better understanding of the Indian EV market.

Perception of Customers towards EVs:

The perception of customers towards EVs in India is slowly changing. Initially, there was a lot of skepticism regarding the performance and reliability of these vehicles. However, with the launch of several EV models in the market and the government's push towards electric mobility, customers are slowly warming up to the idea of EVs.

One of the major concerns for customers is the high upfront cost of EVs compared to traditional vehicles. So the significant challenges before XYZ company is the need for a different manufacturing process for EVs. EVs require different components such as batteries, electric motors, and power electronics, which are different from conventional fuel-powered vehicles. The company needs to invest in new manufacturing processes, technology, and expertise to produce EVs. This is mainly due to the high cost of batteries, which are a crucial component of EVs. However, the Indian government has announced several subsidies and incentives to make EVs more affordable for customers. For example, customers can avail of a subsidy of up to Rs. 1.5 lakh for purchasing an EV under the FAME-II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme. So the company needs to find innovative ways to reduce the cost of production and make EVs more affordable for customers.

Another concern for customers is the lack of charging infrastructure for EVs in the country. While the government has announced plans to set up charging stations across the country, the infrastructure is still in its nascent stage. This has led to a range anxiety among customers, as they are not sure about the availability of charging stations during long journeys. So XYZ company

needs to invest in the development of a robust charging infrastructure to promote the adoption of its EVs.

Electric vehicles are relatively new in India, and the perception of customers towards EVs is mixed. Some customers view EVs as an eco-friendly and sustainable alternative to conventional fuel-powered vehicles. They are attracted to the lower operating costs and the potential for long-term savings. However, some customers are still skeptical about the performance and reliability of EVs, especially when it comes to long-distance travel and the availability of charging infrastructure.

CONCLUSION

In conclusion, India's EV market presents a huge opportunity for XYZ company to diversify its product portfolio and cater to the growing demand for sustainable transportation solutions. XYZ's decision to diversify into EVs is a positive move towards sustainable energy and aligns with the government's push towards clean energy. The company has set up a dedicated R&D department to research and develop EV technology, and the prototype EV developed by the team has shown promising results. However, XYZ will need to differentiate itself from its competitors to be successful in the EV market, and pricing will be a key factor in this regard. Overall, the move towards EVs is a step in the right direction for XYZ, and the company is well positioned to succeed in this growing market. The company needs to focus on developing affordable and reliable EVs, building charging infrastructure, and partnering with start-ups to succeed in the Indian EV market.

Discussion Questions:

1. Why is the Indian government pushing for the adoption of electric vehicles in the country?
2. What are the potential benefits of electric vehicles for the Indian economy and society?
3. What are the major concerns for customers when it comes to adopting electric vehicles in India?
4. What are the potential opportunities and challenges for XYZ company in diversifying into the electric vehicle segment in India?
5. What is the perception of customers towards EVs in India?
6. What is the Indian government doing to promote the adoption of EVs in India?

7. What are the capabilities of employees and organisational structure required for the production of electric vehicles?
8. What can the XYZ company do to overcome the challenges of entering the EV market?
9. How can the XYZ company reduce the cost of production of EVs and make them more affordable for customers?
10. How can the limited charging infrastructure in India be addressed to promote the adoption of EVs?

Teaching Notes:

1. The rise of electric vehicles and the challenges faced by traditional automobile manufacturers in India.
2. The potential of electric vehicles in the Indian market and the government's push towards electric mobility.
3. The perception of customers towards electric vehicles in India and the factors influencing their decision to purchase an EV.
4. The challenges faced by customers in adopting EVs, including the high upfront cost and the lack of charging infrastructure.
5. The role of government policies and initiatives in promoting the adoption of electric vehicles in India.
6. EVs are relatively new in India, and the perception of customers towards EVs is mixed. Some customers view EVs as an eco-friendly and sustainable alternative to conventional fuel-powered vehicles, while others are skeptical about the performance and reliability of EVs.

BIBLIOGRAPHY

1. Vasiljević, S., B. Aleksandrović, J. Glišović, and M. Maslač. "Regenerative braking on electric vehicles: working principles and benefits of application." *IOP Conference Series: Materials Science and Engineering* 1271, no. 1 (December 1, 2022): 012025. <http://dx.doi.org/10.1088/1757-899x/1271/1/012025>.
2. Ahirrao, Abhishek, Shantanu Metkar, Abhishek Avhad, Dr Swapnil Awate, and Prof Vishal Shinde. "Hybrid Electric AWD Vehicle Kit." *International Journal for Research in Applied Science and Engineering Technology* 10, no. 11 (November 30, 2022): 1566–78. <http://dx.doi.org/10.22214/ijraset.2022.47667>.
3. Li, Yanmei, Ningning Ha, and Tingting Li. "Research on Carbon Emissions of Electric Vehicles throughout the Life Cycle Assessment

- Taking into Vehicle Weight and Grid Mix Composition." *Energies* 12, no. 19 (September 21, 2019): 3612.
<http://dx.doi.org/10.3390/en12193612>.
4. Ginavičienė, Jurgita, and Indrė Sprogytė. "THE STUDY ABOUT ELECTRIC VEHICLES IN LITHUANIA." *SOCIETY.INTEGRATION. EDUCATION. Proceedings of the International Scientific Conference* 6 (May 28, 2021): 255–63.
<http://dx.doi.org/10.17770/sie2021vol6.6323>.
 5. Patale, Jayshri Prakash, A. B. Jagadale, A. O. Mulani, and Anjali Pise. "A Systematic survey on Estimation of Electrical Vehicle." *Journal of Electronics, Computer Networking and Applied Mathematics*, no. 31 (December 5, 2022): 1–6.
<http://dx.doi.org/10.55529/jecnam.31.1.6>.
 6. Kumar, Nitesh, Yashpal Rathod, Shubham Kumar, and S. Vidyasagar. "Wireless Power charging system with Self-Adjusting Charge nodes for Electric Vehicles." *Journal of Physics: Conference Series* 2335, no. 1 (September 1, 2022): 012051.
<http://dx.doi.org/10.1088/1742-6596/2335/1/012051>.
 7. El-fedany, Ibrahim, Driss Kiouach, and Rachid Alaoui. "System architecture to select the charging station by optimizing the travel time considering the destination of electric vehicle drivers in smart cities." *Bulletin of Electrical Engineering and Informatics* 9, no. 1 (February 1, 2020): 273–83.
<http://dx.doi.org/10.11591/eei.v9i1.1564>.
 8. Shroff, Surbhi R. "Review on Electric Vehicle." *International Journal for Research in Applied Science and Engineering Technology* 10, no. 1 (January 31, 2022): 1667–70.
<http://dx.doi.org/10.22214/ijraset.2022.40095>.
 9. Wang, Cheng, Tongtong Ji, Feng Mao, Zhenpo Wang, and Zhiheng Li. "Prognostics and Health Management System for Electric Vehicles with a Hierarchy Fusion Framework: Concepts, Architectures, and Methods." *Advances in Civil Engineering* 2021 (January 15, 2021): 1–11.
<http://dx.doi.org/10.1155/2021/6685900>.
 10. Shakya, Rohit. "A Study on Development of Electric Vehicles in India." *International Journal for Research in Applied Science and Engineering Technology* 9, no. VI (June 15, 2021): 1175–77.
<http://dx.doi.org/10.22214/ijraset.2021.35156>.
 11. Somayaji Y., Mutthu N.K., Rajan H., Ampolu S., Manickam N. (2017). Challenges of Electric Vehicles from Lab to Road. 2017 IEEE Transportation Electrification Conference (ITEC-India),
 12. B. K. Talukdar & B. C. Deka, "An approach to reliability, availability and maintainability analysis of a Plug-In Electric Vehicle", *MDPI World Electric Vehicle Journal*, Vol. 12, No. 34, pp. 1-17, 2021.
 13. W. Khan, F. Ahmad, A. Ahmad, M. S. Alam and A. Ahuja, "Electric Vehicle Charging Infrastructure in India: Viability Analysis". In: Pillai R. et al. (eds) *ISGW 2017: Compendium of Technical Papers. Lecture Notes in Electrical Engineering*, vol 487. Springer, Singapore.
 14. S. Deb, K. Tammi, K. Kalita and P. Mahanta, "Charging Station Placement for Electric Vehicles: A Case Study of Guwahati City, India," in *IEEE Access*, vol. 7, pp. 100270-100282, 2019.
 15. How Electric Vehicles Work?
<https://auto.howstuffworks.com/electric-car2.htm>