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RISE OF ELECTRIC VEHICLES IN INDIA

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Abstract- The emergence of electric cars (EVs) in India has positive implications for the future of the transportation business. India is one of the globe's marketplaces for automobiles that are expanding at a rapid pace, and the adoption of electric vehicles (EVs) there could have a major impact on the economics, environment, and energy security of the entire country. India dominates the world in EV usage for many causes. By 2030, the Indian government wants to electrify 30% of all vehicles on the road. The government has made several pronouncements to that effect, including tax rebates, financial aid, and expenditures in infrastructure for charging. In addition, EVs offer a number of benefits over conventional internal combustion engine (ICE) cars, including reduced operating costs, fewer pollutants, and increased energy efficiency. These benefits are particularly important in India, where fuel costs fluctuate and air pollution is a serious public health issue. The introduction of EVs in India still encounters a number of issues. They involve a dearth of infrastructure for charging, a small variety of EV models, and expensive initial expenses for EVs. The Indian government continues to attempt to boost the nation's charging infrastructure, encourage indigenous EV production, and offer incentives for EV usage to resolve these problems. In conclusion, India's increasing adoption of electric vehicles has the potential to completely transform the country's transportation sector and clear the way for a more flourishing and environmentally friendly future. Even though there are still issues to be resolved, the Indian government's commitment to electric transportation and consumers' growing interest in EVs indicate that the technology has a promising future. The introduction of EVs in India still encounters a number of issues. They involve a dearth of infrastructure for charging, a small variety of EV models, and expensive initial expenses for EVs. The Indian government continues to attempt to boost the nation's charging infrastructure, encourage indigenous EV production, and offer incentives for EV usage to solve issues.

1. INTRODUCTION

The client will be one who has keen interest in the electric vehicles and knows how much potential it has in the market for future transportation. 09% by 2022-2027, contributing to sustainable development as electric vehicles eliminate exhaust emission, decrease the use of fossil fuels and improve health of the community by reducing pollution. The clients who are interested in electric vehicles will go through on the current state of EV in India, what are the challenges and opportunities for their development, the policy and regulations by government on their custom duties and the social impact of adoption. The major reasons why there is a need for electric vehicles in the future are: - 1. Ecological Problems: Emissions produced by Electric vehicles are slightly lesser than the traditional gasoline or diesel-powered vehicles. On the other hand, noise generated by electric vehicles is very less than the diesel-powered vehicles. 2. Availability of Renewable Energy Sources: Electric vehicles are powered by electricity and there are plenty of renewable energy sources present around us such as solar, geothermal, wind etc. This is the major advantage over the vehicle which runs on the non-renewable energy sources 3. Economic Benefits: The cost of transportation in electric vehicles is slightly lesser than the vehicle powered by gasoline or diesel for the long term as it is cost effective and requires less maintenance over traditional vehicles. 4. Government Policies: Governments around the world are offering various policies such as tax incentives, subsidies etc.. One of the greatest energy consumers, the transportation industry relies excessively on liquid fossil fuels on a worldwide scale. In 2010, oil-based fuel accounted for 93% of all fuel utilized in the industry. This industry contributes 22% of all worldwide CO emissions connected to energy and is a significant source of GHG emissions. Significant advancements in fuel and vehicle technology have been made as a response of worries about climate change, energy security, and air quality. One such choice for reducing CO from the fleet of light-duty vehicles is electric vehicles (EVs). Three-fourths of all light duty cars sold in 2050 would need to be EVs in order for the world to reach the 2° C target by that year. With decreased battery prices and the decarbonizations of power, mitigation costs for EVs should decrease dramatically in the future while providing the lowest emissions intensity of all available light duty vehicle choices. The National Electric Mobility Mission Plan (NEMMP) was introduced by the Indian Prime Minister in 2013 with the goals of improving national energy security, reducing negative environmental effects (particularly carbon monoxide), and increasing local production capacity for electric vehicles. In this paper, the role of EVs is specifically discussed as it relates to future passenger transport scenarios in India.

The Relevant Contemporary Issues: -

1. Infrastructure: As we know for the charging of electric vehicles there should be availability and accessibility of charging stations which are the key factors in determining the viability of electric vehicles in India. Creating charging station is a big challenge especially in remote areas with a low population density. To promote the rise of electric vehicles both public and private sectors must make investments in the building of a charging infrastructure.

2. Affordability: We know that due to low domestic production and high import taxes on EVs part, the initial cost of electric vehicles in India is high. The government should offer incentives, such as tax breaks, subsidies and lowered import taxes on electric vehicles, to promote the use of electric vehicles.

3. Battery technology: We know that battery is the backbone of the electric vehicles. But the raw materials used for making batteries like lithium, graphite, cobalt and manganese are few and there is low infrastructure for battery recycle in India as well. Hence to encourage the growth of electric vehicles the government and business sector must invest in the betterment of the battery technology and recycling infrastructure.

4. Consumer Awareness: Most of the Indian consumer doesn't know the benefits of EVs and are have wrong perception about their performance and affordability. For this government had started awareness program Shoonya, which is the consumer awareness campaign to reduce air pollution by adopting the use of electric vehicles in India, with this government has the objective to reach 30% sales share of EV by 2030.

2.0 LITERATURE SURVEY

(Ashok Jhunjunwala & Mutagekar, 2015) Due to their effects on the environment and energy use, electric vehicle erases a game changer. We must expand the energy system overall and the power sector to do this. Based on social, economic, technical, environmental, and governmental aspects, this research examined the Indian market for electric cars. The switch to electric cars is crucial for lowering greenhouse gas emissions and improving air quality, but doing so necessitates infrastructure investment as well as a move towards renewable energy sources.

In 2018, Carin A, Sund R, Lahkar for even light duty vehicles, available battery capacity will need to be multiplied by hundreds of times due to the daily rise in global transportation energy consumption. The study is centred on the energy generation for battery production and the effects of not using IC automobiles.

Due to the mixing of particles and toxic gases like nitrous oxide and sulphur oxides, among others, the production of energy and mining for metals would have an impact on the quality of the air. There is a loss of gasoline tax revenue as a result of the suspension of IC automobiles. Future outcomes may be worse if the energy used to generate electricity is not effectively decarbonized.

(Muratori et al., 2021) Due to the advancement of the technology and reduction in the costs has led to the rise in popularity of clean transportation system i.e., electric vehicles. This paper provides an overview on various aspects of EV to be used as future vehicles. It provides the status of light duty EV for future adoption in India. It reviews the cost and performance of batteries, electric machines, and power electronics for EV success in India. It reviews the about the impact of EV charging on multiple scales i.e., bulk power system to voltage supplied in housings. Its insights on the maintenance cost of EV and emission related studies. It provides status about the EV and other emerging trends and technologies in India. At the end it shows its research to support the cleaner, efficient and affordable transportation for the future.

(Eccarius & Lu, 2020) In many countries there has been seen rapid increase in demand of electric vehicles. The consumer adoption of alternative fuel powered two-wheelers has not been the subject of as much study as passenger car. In particular, studies of consumer adoption of electric motorcycles, which are a rapidly emerging and an environmentally more sustainable alternative to conventional powered two-wheelers, are few. This study explores the extent of this research gap. The development of motorcycles is analysed with a focus on Asia, which accounts for 80% of the global fleet.

(Gujarathi et al., 2018) The paper presents the current scenario of the EVs in the Indian market. Its growth, policies required for the selection of feasible options along with global scenarios. Indian Gov has taken initiative and declared national mission of electric mobility with objectives of national energy security and growth of domestic manufacturing capabilities in light weight and heavy-duty vehicles in India. It discusses the issue of electricity tariff rates for consumers charging EVs in residential complex to be less as 6-8 rupees per KWH to industrial consumer with rates of 9-11 rupees per KWH for fast charging. It discusses the retrofitting conversion of electric transportation in India. It also discusses the adoption of electric propulsion systems; its manufacturing and recycling. The research also shows the challenges related to the cost of EVs as they are quite more expensive than traditional vehicles with less range over EVs.

(Weinert et al., 2008) The paper shows its research on key forces driving and resisting future electric two wheelers market growth, root causes behind these forces. It shows the regulatory support by banning gasoline vehicles and enforcement of Electric two wheelers standards. It shows the innovation in technology related to batteries shift from lead-acid to li-ion batteries. It also shows the concern related to the safety in electric two wheelers as there are some cases of EVs catching fire in urban areas. It shows the forces resisting electrification i.e., inherent complications with large battery system, charging infrastructure.

3.0 Problem statement

With 23% of all CO₂ emissions connected to energy coming from the worldwide transportation industry, it is one of the biggest contributors to greenhouse gas emissions. A shift to sustainable and low-carbon transport systems is necessary to lessen the consequences of climate change. Moving away from traditional fossil fuel-powered cars and towards alternate forms of transportation like electric vehicles, hybrid electric vehicles, and fuel cell vehicles is a necessary step in the transition to sustainable transportation systems. The switch to sustainable transportation is a difficult task with many facets that calls for the participation of several stakeholders, including governments, automakers, investors, and consumers. The high cost of electric cars is one of the primary hurdles in the transition to sustainable transportation. The high cost of EVs is a significant impediment to their adoption, particularly in developing nations with low-income levels. A lack of infrastructure, such as charging stations, hydrogen refueling stations, and battery recycling facilities, is another barrier to the shift to sustainable transportation. The availability of such infrastructure is important for EV and FCV adoption. Furthermore, the adoption of sustainable transportation necessitates a shift in consumer behavior. Consumers must be informed on the benefits of sustainable mobility and encouraged to switch to low-carbon modes of travel. A key difficulty that must be addressed is a lack of knowledge and understanding of the benefits of sustainable transportation. The transition to EVs and FCVs necessitates major investment in R&D as well as a reform

of the automotive supply chain. The transition towards sustainable transport is a complex challenge that requires the engagement of various stakeholders. The high cost of EVs, lack of infrastructure, policy interventions, consumer behavior, and industry restructuring are some of the major challenges that need to be addressed to facilitate the transition towards sustainable and low-carbon transport systems. Plötz et al. (2020) conducted comprehensive survey of the literature on electric vehicles (EVs) research undertaken over the last three decades. The analysis identified a number of difficulties and possibilities related with the introduction and integration of electric vehicles into the transportation system. However, the authors discovered that EV research is fragmented, and an integrated strategy to addressing the issues associated with EV adoption is required. As a result, the issue statement might be worded as follows: Despite substantial study on electric cars over three decades, a lack of an integrated strategy and fragmented research has hampered EV uptake and integration into the transportation system. Sammer et al. (2021) The shift to sustainable mobility is critical for lowering greenhouse gas emissions and minimizing the effects of climate change. However, the adoption of sustainable fuels, such as bio-fuels and hydrogen, is hampered by a number of factors. Lack of regulatory backing, high production costs, restricted infrastructure, and poor consumer knowledge are some of the major challenges to broad use of sustainable fuels in the transportation industry. The purpose of this review paper is to identify the drivers and constraints to the adoption of sustainable fuels in the transportation sector, as well as to give insights into policy frameworks for supporting sustainable transportation.

Survey on the Electric Vehicles of Two-wheeler and Four-wheeler

Introduction of the Four-Wheeler

Electric and hybrid vehicles have gained popularity in response to environmental concerns, and the development of new technologies has led to significant improvements in vehicle efficiency and performance. Four-wheelers, also known as cars or automobiles, play a crucial role in the transportation sector, providing a convenient and comfortable means of transportation for individuals and families. The trend towards electric and hybrid vehicles has also influenced the development of four-wheelers, with manufacturers investing heavily in research and development to improve the performance, range, and charging times of their electric models. In addition to technological advancements, the growing awareness of environmental issues has led to a shift in consumer preferences towards sustainable modes of transportation. Governments around the world are offering incentives for the adoption of electric and hybrid vehicles, and initiatives are being taken to develop the infrastructure necessary to support these vehicles. As a result, many leading car manufacturers are now offering electric and hybrid models, with some even phasing out the production of fossil-fuel-powered cars altogether. The future of four-wheelers is promising, with the industry moving towards sustainable and innovative solutions. However, challenges remain, including the need for improved charging infrastructure, affordable prices, and widespread consumer awareness and adoption of electric and hybrid vehicles. Despite these challenges, the automotive industry is committed to developing new technologies and improving the efficiency and performance of four-wheelers to meet the needs of modern consumers while also addressing environmental concerns.

Comparison of the electric Vehicle of the Morris Garages (MG) and Tata

Introduction of the electric cars of the Morris Garages (MG): -

With the release of its first electric vehicle, the MG ZS EV, British automaker Morris Garages, often known as MG, just joined the market for electric vehicles. The Tesla Model Y, Hyundai Kona Electric, and Kia Niro EV are just a few examples of electric SUVs that the MG ZS EV competes with. The MG ZS EV has the following characteristics and specifications Design: With a dynamic front grille and angular lines that give it a distinctive appearance, the MG ZS EV boasts a contemporary and svelte design. 5 kWh lithium-ion battery and an electric motor work together to power the MG ZS EV. Charge the MG ZS EV using a typical 7 kW home charger, which takes the battery roughly 6-7 hours to completely charge. Morris Garages intends to add more electric vehicles to its range in addition to the MG ZS EV. A 70-kWh battery will power the MG Marvel R, which can go up to 300 kilometers on a single charge. With its focus on affordable electric cars with good performance and features, Morris Garages is poised to make a significant impact in the electric vehicle market in the coming years.

One of the famous Car of the Morris Garages (MG) in electric that is MG Hector: -

The British automaker Morris Garages produces the MG Hector Electric, sometimes referred to as the MG ZS EV, an electric SUV. The vehicle was first introduced in the UK in 2019 and has subsequently been sold in Australia and India. A 44.5 kWh lithium-ion battery pack drives the electric motor in the five seat SUV MG Hector Electric, which can generate 141 horsepower and 353 Nm of torque. The MG Hector Electric's cutting edge infotainment system is one of its standout features. A 10. Both automotive experts and buyers have given the MG Hector Electric favorable evaluations. The vehicle won the 'Best Value EV' honour at the Auto Express New Car Awards in the UK in 2020. The MG Hector Electric has garnered favorable reviews from clients in India. The vehicle's affordable price has also received acclaim, making it a desirable choice for those searching for an electric SUV in the mid-range market. Australia, where the MG Hector Electric was introduced in 2020, has also shown success with the vehicle. The vehicle has received accolades for its cutting-edge features, including its entertainment system, safety systems, and its roomy, pleasant interior. In conclusion, the MG Hector Electric is a stylish and practical electric SUV that has been well received in markets around the world. With its spacious cabin, advanced features, and competitive pricing, the car is an attractive option for buyers looking for an electric SUV in the mid-range segment.

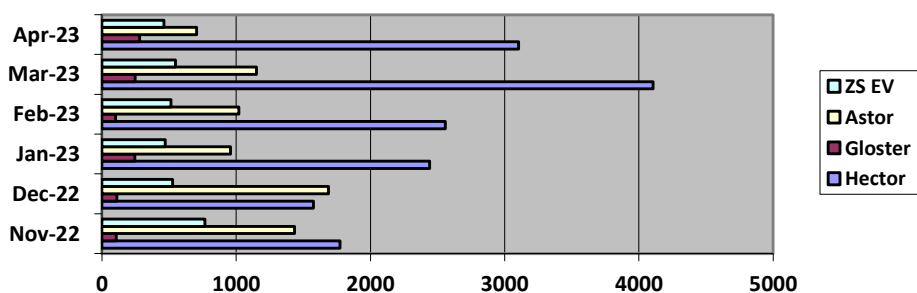


Figure 1.1

Manufacturer-wise Electric 4 Wheeler Sales performance

OEM Manufacturer	Jan-22	Feb-22	Difference	% Change	% Market Share Feb 2022
1 Tata Motors	2,892	2846	-46	-2	97.03
2 MG Motors	57	38	-19	-33	1.30
3 Mahindra & Mahindra	31	12	-19	-61	0.41
4 BYD India	10	10	0	0	0.34
5 Hyundai	7	7	0	0	0.24
6 Audi	9	6	-3	-33	0.20
7 Others	17	14	-3	-18	0.48

Figure1.2

Introduction of the electric vehicles of the Tata: -

The electric vehicle (EV) revolution in India has been led by the multinational Indian car manufacturer Tata Motors. The corporation has been aggressively funding EV development and advocating for green mobility options in the nation. India's first passenger EV was introduced by Tata Motors in 2001 with the debut of the Indica EV. Since that time, the business has advanced significantly and has introduced a number of EV models, including the Tata Tigor EV, Tata Nexon EV, and the impending Tata Altroz EV. A small automobile called the Tata Tigor EV was introduced in 2017. It has a 21.5 kWh battery that offers up to 142 kilometers of range on a single charge. The car is powered by a 40 hp electric motor that delivers 105 Nm of torque. The Tigor EV has a top speed of 80 km/h and can accelerate from 0 to 60 km/h in 12 seconds. The Nexon EV, which is Tata Motors' first long-range EV, was introduced in 2020. A 30.2 kWh battery powers the Nexon EV, a small SUV with a range of up to 312 km on a single charge. A 127-horsepower electric motor with 245 Nm of torque powers the vehicle. The Nexon EV can go from 0 to 100 km/h in 9.9 seconds and has a peak speed of 120 km/h. The popular Altroz hatchback from Tata will be available as an all-electric vehicle starting in 2022. The 30.2 kWh battery that will power the Altroz EV is anticipated to have a range of up to 300 kilometers on a single charge. A 134 hp electric motor with 245 Nm of torque is anticipated to power the vehicle. The Altroz EV is anticipated to have a peak speed of 150 km/h and a 0 to 100 km/h acceleration time of less than 10 seconds. The expansion of Tata Motors' EV charging infrastructure in India has been a top priority. To put up EV charging stations all around the nation, the business has teamed up with Tata Power. It has also tied up with HPCL to set up charging stations at its petrol pumps. Tata Motors has also developed a range of home charging solutions for its EV customers. By collaborating with numerous governmental entities and organizations, the business has also been encouraging EV adoption in India. To provide EVs to various government agencies, Tata Motors has partnered with the Energy Efficiency Services Limited (EESL) of the Indian government. In order to supply EVs for its fleet, the business has also teamed with Ola, India's top ride-hailing service. Tata Motors has been working on electric commercial vehicles (CVs) in addition to its electric vehicles for use by passengers. As India's first intermediate commercial vehicle (ICV) with a refrigerated container, the business has introduced the Tata Ultra T.7 electric truck. Additionally, Tata Motors has introduced the Tata Ace EV, an electric variation of the company's well-known Ace mini-truck. In conclusion, Tata Motors has been making significant strides in the development and promotion of EVs in India. The company's range of EVs, including the Tigor EV, Nexon EV, and the upcoming Altroz EV, offer a range of options for customers looking to make the switch to electric mobility. Tata Motors' focus on expanding its charging infrastructure and promoting EV adoption in India is a step in the right direction towards a sustainable future.

One of the famous electric cars of the Tata that is Tata Nexon Prime: -

The Indian carmaker Tata Motors creates the Tata Nexon EV, sometimes referred to as the Nexon Prime, which is a small electric SUV. It was introduced in India in January 2020 and has since grown to be among the most well-liked electric vehicles there. We shall discuss the Tata Nexon Prime electric car's manufacturing volume, sales, and operational system in this succinct summary.

1. Production of Nexon Prime: - The manufacturer of the Nexon EV, Tata Motors, has made large investments in EV manufacturing, including the construction of a new EV manufacturing plant in Pune, India. The brand-new factory is outfitted with cutting-edge machinery and technology and is intended to generate up to 400,000 electric vehicles annually. In order to guarantee a consistent supply chain for EV components, such as batteries, motors, and electronics, Tata Motors has also collaborated with a number of businesses. The business has collaborations with Indian businesses for the supply of motors and electronics as well as with Korean battery manufacturer LG Chem for the supply of lithium-ion cells. Additionally, Tata Motors has taken a number of steps to guarantee the dependability and quality of its electric vehicles. At its engineering centre in Pune, the business has established a special EV testing facility where it performs in-depth testing and validation of all the systems and components of its electric cars. Tata Motors has also utilised cutting-edge manufacturing procedures and technology, such as robots and automation, to guarantee the efficient manufacture of the Nexon EV. To assure the quality of the finished product, the production process makes use of cutting-edge technology and tools for component assembly as well as testing and inspection procedures. Given that there is now less demand for electric cars in India than there is for conventional gasoline-powered cars, the Nexon EV's production capacity is currently constrained. However, Tata Motors has made it clear that it is dedicated to growing its line-up of electric vehicles and production capacity as demand for EVs rises in India and other global markets. Overall, Tata Motors is positioned as a significant participant in the global electric vehicle industry because to its investments in electric vehicle production and technology, as well as its partnerships and dedication to quality.

2. Sales of the Nexon Prime: - After being introduced in January 2020, the Nexon EV has been quite well-liked in the Indian market. Tata Motors reports that the Nexon EV sold more than 2,600 units in the first quarter of 2021, a considerable increase from the 1,715 units sold throughout the full fiscal year of 2020. The Nexon EV's sales have increased more than four times year over year, according to a study from Tata Motors. A lot of factors have allowed the organisation to reach such amazing sales levels. The Nexon EV is an appealing alternative for individuals who wish to transition to electric mobility without

breaking the bank because it is one of the most reasonably priced electric SUVs on the market. Second, Tata Motors has been actively pushing the Nexon EV as a sustainable and environmentally friendly alternative for urban commuters. Tata Motors has been able to capitalise on the rising awareness and demand for electric cars in India. Finally, both consumers and critics have given the Nexon EV favourable feedback, with many applauding its performance, range, and all-around driving experience. Additionally, Tata Motors has been making efforts to boost Nexon EV sales in India. To increase the availability of the Nexon EV to clients across the nation, the firm has been growing its dealer network and servicing facilities. Tata Motors has also been providing customers with tempting financing options and rebates to make the Nexon EV purchase more accessible. Tata Motors has been working to increase the Nexon EV's accessibility in foreign markets in terms of export. The firm is apparently in negotiations with additional nations in South Asia and Africa for potential future export markets. The company has already begun selling the Nexon EV to Nepal and Bangladesh. Overall, Nexon EV sales have been increasing gradually, and Tata Motors appears to be on course to meet its objective of dominating the Indian electric car market. The Nexon EV is well-positioned to become a well-liked alternative among urban commuters in India and worldwide given the rising demand for electric mobility and the government's push towards electric vehicles.

Comparison between the electric Cars of the Morris Garages (MG) and Tata: -

1. Range: - The TATA Nexon EV has a range of up to 312 km on a single charge, whereas the MG ZS EV has a range of up to 419 km.
2. Battery: - The TATA Nexon EV has a 30.2 kWh battery, while the MG ZS EV has a larger 44.5 kWh battery.
3. Charging time: - The TATA Nexon EV takes around 60 minutes for fast charging, while the MG ZS EV takes around 50 minutes for fast charging.
4. Power output: - The TATA Nexon EV has a power output of 129 PS, while the MG ZS EV has a power output of 142 PS.
5. Torque: - The TATA Nexon EV has a torque of 245 Nm, while the MG ZS EV has a torque of 353 Nm.
6. Top speed: -The TATA Nexon EV has a top speed of 120 km/h, while the MG ZS EV has a top speed of 140 km/h.
7. Price: - The TATA Nexon EV is priced at around INR 15-16 lakhs, while the MG ZS EV is priced at around INR 20-23 lakh.
8. Warranty: - The TATA Nexon EV comes with a warranty of 8 years or 1.5 lakh km, while the MG ZS EV comes with a warranty of 5 years or 1.5 lakh km.
9. Charging infrastructure: - TATA has partnered with Tata Power to set up charging stations across India, while MG has partnered with e-Charge Bays for setting up charging infrastructure.
10. Safety features: - Both cars come with standard safety features such as ABS, EBD, airbags, and rear parking sensors.
11. Interior features: - Both cars come with a touch screen infotainment system, climate control, and other standard features such as power windows, electrically adjustable mirrors, and steering-mounted controls.
12. Boot space: - The TATA Nexon EV has a boot space of 350 liters, while the MG ZS EV has a larger boot space of 448 liters.
13. Dimensions: - The TATA Nexon EV is 3994 mm in length, 1811 mm in width, and 1607 mm in height, while the MG ZS EV is 4314 mm in length, 1809 mm in width, and 1644 mm in height.

Major problems Coming on these two companies Morris Garages and Tata in India: -

1. Lack of Charging Infrastructure: One of the major problems faced by both MG and Tata is the lack of charging infrastructure in India. Although the government is taking steps to increase the number of charging stations, the progress is slow, and many people are still hesitant to purchase electric vehicles due to the lack of convenient charging options.
2. High Initial Cost: Another major problem for both MG and Tata are the high initial cost of electric vehicles. While the cost of electric vehicles is gradually decreasing, it is still considerably higher than that of traditional vehicles. This makes it difficult for many people to justify the purchase of an electric vehicle.
3. Limited Range: Many electric vehicles, including those produced by MG and Tata, have a limited range, which is a significant concern for consumers. While advancements in battery technology are increasing the range of electric vehicles, it is still a problem for many people who are hesitant to purchase an electric vehicle due to range anxiety.
4. Lack of Awareness: A significant challenge faced by both MG and Tata is the lack of awareness about electric vehicles in India. Many people are still not aware of the benefits of electric vehicles, and there is a need for increased education and awareness campaigns to change this.
5. Competition from Established Brands: Both MG and Tata are facing stiff competition from established brands in the electric vehicle market, such as Tesla, Nissan, and Hyundai. These brands have a more significant global presence and a reputation for producing high-quality electric vehicles. This puts pressure on MG and Tata to compete on price, features, and quality.
6. Range anxiety: One of the main problems faced by electric cars of both Morris Garages and Tata is range anxiety. Many customers are hesitant to buy electric cars because of the limited range they offer. While Morris Garages and Tata have improved the range of their electric cars in recent years, it still remains a concern for many potential buyers.
7. Battery life and replacement: Another problem faced by electric cars of both Morris Garages and Tata is the limited life of their batteries. Lithium-ion batteries, which are used in most electric cars, have a limited lifespan and will eventually need to be replaced. Battery replacement can be a costly affair and may deter customers from buying electric cars.

4. CONCLUSION

Is it the future of transportation? And also, about the future of electric vehicles in the Indian market. We have analyzed the current state of electric vehicles market in India and predict the growth potential in the future.

We compare the cost and benefits of four and two-wheeler electric vehicles versus traditional gasoline powered vehicles and other possible alternatives like CNGs, Hydrogen in India. We have also compared and identify the key player and stakeholder in the electric vehicles market in India's market. Survey of the Indian market for electric vehicles public interest and awareness and identify batteries adoption. For the adoption of electric vehicles in future there should be proper charging infrastructure, recyclable batteries, there should be several EV versions available in India. Range of EV is very restricted making long travel

difficult, so there should be high-range covering electric vehicles making it suited for long travel also and the most important is awareness so that the electric vehicles can become the future of transportation. The acceptance and expansion of electric cars may be significantly impacted by the rules and laws of the government. Industry Trends and Competition: The market for electric vehicles is seeing a lot of new entrants as well as existing businesses increasing their product lines. Economic Viability: The economic viability of electric vehicles is a key factor in their adoption and growth. Future research could involve analyzing the economics of electric vehicles, including the costs of production, charging infrastructure, and maintenance.

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