*International Journal of Social Science and Economic Research*

ISSN: 2455-8834

Volume:08, Issue:09 "September 2023"

# ELECTRIC TWO WHEELERS GROWING FAST IN INDIA: A SUMMARY OF INDIA'S ELECTRIC TWO-WHEELER MARKET TRENDS, OPPORTUNITIES AND CHALLENGES

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DOI: 10.46609/IJSSER.2023.v08i09.019 URL: https://doi.org/10.46609/IJSSER.2023.v08i09.019

Received: 10 September 2023 / Accepted: 22 September 2023 / Published: 25 September 2023

## ABSTRACT

India today, is among the fastest growing economies globally and will soon become the world's most populous country. Even though road transport expansion and improvement has served as a catalyst for socio-economic development, it has unleashed several negative environmental problems in India, making it the world's second most polluted country. Air pollution is the major cause of the deteriorating health conditions of the people. Road transport presently accounts for 12% of India's energy-related $CO_2$ emissions and is a key contributor to urban air pollution. Electric vehicles are the key technology to decarbonize road transport. Due to the significant growth in population, increased environmental concerns, and rising fuel prices, there is a growing desire for economical and sustainable transportation solutions, and Electric Two Wheelers (E2W) are the best-suited option. This research paper aims to provide a comprehensive analysis of the electric two-wheeler market in India with focusing on the key opportunities and challenges being faced by it currently. Through this paper we can closely examine the growth trajectory and the factors driving the expansion of the E2W market as well as the hindrances in reaching its potential. A close examination of the key trends, regulatory measures and technological advancements made in this sector provides a clear insight into the future prospects of the two-wheeler market in India.

## Introduction

A significant growth is being experienced by the global electric two wheeler market. This growth is driven by the many factors such as, rise in cost of fuel, the desire for more efficient transportation solutions, the urgent need to reduce carbon emissions and declining battery prices in the global lithium-ion battery market. Globally, governments are enforcing laws and

  

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implementing policies to encourage prospective users to opt for electric vehicles, thereby boosting the market's expansion.

Electric two wheelers are essentially plug-in electric vehicles. In these vehicles, power is supplied by a rechargeable battery, the lithium battery being the most preferred out of the many battery options available in the market today. Since these vehicles do not involve the burning of fossil fuels, they are considered to be zero emission vehicles. Being an affordable form of individual transportation due to low prices and greater fuel economy, and with the recent environmental regulations in place along with government initiatives, the two-wheeler segment is all set for a complete positive transformation.

The global electric two-wheeler market comprises electric scooters, electric motorcycles, and electric motorbikes. The current two wheelers found in the market and on roads today are a major factor causing pollution. Moreover, there is a significant increase in the cost of fuel day by day. In other words, even though the traditional vehicles with an Internal Combustion Engine (ICE) provide good performance, they are the major cause for poor efficiency and environment pollution across the country. There is an urgent need for an effective alternative in order to compensate the changing fuel cost and curb down the high pollution levels.

One of the most important goals among the present-day plan of the government across the globe is to reduce fuel consumption and carbon emissions. Thinking about the future of the country, it is imperative to move to the efficient and eco-friendly electric two-wheeler. Zero tailpipe emission technologies are an effective solution to transportation-related pollution problems. Electric two wheelers can significantly improve urban air quality due to their zero tailpipe emissions.

Thus, in the sphere of research, investments and financial acquisitions, the electric two-wheeler segment seems to be a lot more promising, compelling the two-wheeler OEMs to explore beyond the conventional internal combustion engine in two wheelers.

**Electric Two -Wheeler versus Internal Combustion Engine Two -Wheeler**

The Electric Two-Wheeler has undoubtedly been the dominating mode of transportation in the space of Electric Vehicle technology. India has seen the sales of battery-powered scooters even before the onset of the Electric Vehicle hype in the country. Until now, electric scooters have been unable to over-power the supremacy of petrol scooters. However, now, with growing awareness and realization of the need to take responsibility towards the environment, the transition from ICE vehicles to EV vehicles is being seen.

  

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**Price**: Since new technology comes at a premium, electric scooters come at a huge premium over their ICE counterparts. The difference ranges anywhere from Rs.10,000 to Rs.50,000. However, despite all additional features like connectivity, advanced hardware and swift electric motors, the consumer may not necessarily find it to be a smart value proposition keeping the steep pricing in mind. Over the years, if manufacturers are able to reduce prices in accordance with the subsidies being offered by the government, then electric scooters will have the ability to turn around the two-wheeler market.

**Running Cost**: Electric vehicles are more economical as compared to vehicles that run on fuel. With a consistent escalation in the fuel prices, filling up the tank of a two- wheeler is more expensive as compared to charging the battery of the electric two-wheeler as the electricity rate per unit is much less than the price of petrol.

**Maintenance Cost**: A mechanical internal combustion engine and the other components in an ICE two-wheeler have many more moving parts as compared to an electric two-wheeler. These parts are prone to constant wear and tear and may also require a replacement from time to time. However, an electric two-wheeler has fewer components and hence, maintaining an electric two-wheeler is more economical and hassle-free as compared to an ICE two-wheeler.

**Recharging vs Refueling Infrastructure:** The lack of a widespread network of charging infrastructure is one of the main reasons for consumers avoiding investing in an Electric vehicle. A conventional petrol fueling station can be readily and easily found in an urban locality, making it much more convenient for consumers to refill the vehicle. The apprehension arises from the fact that if one runs out of charge midway, it is very unlikely that the person will be able to spot an electric charging station nearby.

**Range:** Electric scooters, in the current Indian market do not offer a range of more than 60-80 km on a single charge. Compared to scooters with internal combustion engines that provide a range of 150-200 km on a full tank, an Electric Scooter's range does not provide much confidence for daily commutes. This is due to the fact that Electric two-wheelers as compared to electric cars, cannot offer enough space to equip big, high-capacity batteries to have an abundant riding range.

**Specifications:** Let us consider the specifications of the two most successful scooters from the respective segments: Honda Activa 6G (traditional two-wheeler) and the At her 450 (electric two-wheeler).

  

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| Specifications | Honda Activa 6G | Ather 450 |
|---|---|---|
| Powertrain | **109.51 cc, four-stroke SI engine** | **Brushless DC, Belt-driven motor** |
| Power | **5.73 kW** | **5.4 kW** |
| Torque | **8.79 Nm** | **20.5 Nm** |

An electric scooter's 'torque-on-demand' attribute definitely makes it a thrilling and fun ride as compared to a traditional two-wheeler. However, even if the initial response is exciting, the punch tends to deplete once greater speeds build up.

**Features:** In comparison of features between a standard ICE scooter and a modern-day electric, the latter seems to be superior. An electric scooter is equipped with features like Geo-fencing, Navigation, regenerative braking, smartphone connectivity and a few more. Compared to this, an ICE scooter has nothing more than a TFT display and basic connectivity features as its features.

**Challenges faced by India's Electric Two-Wheeler Market**

According to the ET Auto report, the electric two-wheeler industry has optimistic plans to increase its manufacturing capacity to over 30 million units annually by 2026. This is a 50% increase from the highest annual sales of two-wheelers in India to date. The realization of this goal could result in an oversupply of electric vehicles even in an optimistic scenario where all two-wheelers sold are electric by 2030. While on one hand the market scenario is projected to be an ambitious one, on the other hand, India's electric bike market is facing significant challenges. Some of these challenges are:

**Lack of Charging Infrastructure**

One of the primary challenges faced by the electric bike market in India is the lack of charging infrastructure. While petrol stations are readily available, charging stations are not widely available across the country. Due to this, electric bike owners have very limited options when it comes to charging their vehicles. Moreover, the charging time for electric bikes is longer than that of petrol vehicles. These factors can be a deterrent for potential buyers.

  

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**High Cost of Electric Bikes**

In a price-sensitive economy like India, one of the major factors that discourage potential customers from purchasing an electric two-wheeler is the high cost as compared to petrol bikes. Even though the operating cost of electric bikes is lower than that of petrol bikes, the upfront cost of purchasing an electric bike is significantly higher.

**Limited Range of Electric Bikes**

Another challenge faced by the electric bike market in India is the limited range of electric bikes. Most of the electric bikes that are currently available in the market have a range of around 60-70 km on a single charge. This may be insufficient for long-distance travel. Moreover, it can be a deterrent for potential buyers, especially those who rely on their bikes for daily commutes.

**Lack of Awareness Amongst Consumers**

Even though there is increasing awareness about the environmental benefits of electric vehicles, many consumers are still not aware of the cost savings and other benefits of electric bikes. According to a survey conducted by YouGov, only 31% of Indians are aware of e-bikes. This lack of awareness makes it difficult for companies to market their products and reach potential customers.

**Government initiatives / Steps being taken to overcome the Challenges**

**Increase in Charging Stations**

The government of India has launched the FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles**)** scheme, with an objective to establish a robust charging infrastructure across the country. Through this scheme, financial incentives are being provided to both individuals and organizations for the purchase of electric vehicles and the installation of charging stations.

**Increase in Affordability**

In order to make electric two-wheelers more affordable for the general public, the government of India has launched several initiatives, including the FAME scheme and GST (Goods and Services Tax) reduction on electric vehicles. Several key announcements have been made by the finance minister during the 2023 budget announcements held on February 1, 2023 towards India's automotive and growing electric mobility. The finance minister highlighted the measures being taken by the Indian government to promote the use of cleaner transportation options. The exemption of custom duties to the import of capital goods and machinery required for the

  

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production of lithium-ion cells used in electric vehicle (EV) batteries is an example of one such measure. The aim of this initiative is to encourage the adoption of cleaner mobility alternatives. Further, the customs duty on lithium-ion batteries has been reduced from 21 percent to 13 percent. The intent of these actions is to accelerate the growth of the EV industry in India and support the country's transition to a low-carbon economy.

With the aim of making their products more accessible to customers several electric bike manufacturers have also started offering financing options to customers.

**Increase in range**

Several initiatives are being taken to address the issue of the limited range of electric bikes. The development of fast-charging infrastructure, advancements in battery technology, and regenerative braking systems will play a crucial role in increasing the range of electric bikes and accelerating their adoption. Additionally, the government of India is also providing incentives for research and development in this area to enhance innovation.

**Electric Two-Wheeler Progress in India**

A significant increase in customers who are actively switching to electric two-wheelers has been witnessed in the recent years, in India. The Indian EV ecosystem has seen marked growth due to the increasing awareness about the environmental benefits of electric vehicles, the rising cost of petrol over the past few years, the focus of the government on promoting electric vehicles and rising customer awareness. Key steps such as various schemes and policies, tax benefits, push to domestic manufacturing, setting up of sustainability targets like achieving net zero by 2070 and 30 percent of the country's vehicles by 2030 and many other factors have resulted in a steady growth of India's electric two-wheeler market.

According to Autocar India, electric two-wheeler sales were up 305% on 2021 figures. The top 3 producers in this sector have been Ola Electric, Okinawa Autotech, and Hero Electric. Electric Vehicle sales constituted 4 percent of overall two-wheeler sales in 2022. Statista estimates that demand for two-wheel EVs in India may be as high as 8.2 million a year. Initiatives from the Indian government to enhance e-mobility in the country are the reason behind this growth.

A significant decline was seen in the sales of electric motorcycles and scooters due to Covid. However, the market witnessed a rapid recovery in the second half of 2020 and ever since then, the demand has been rapidly increasing.

The sales of E-scooters are higher than e-motorcycles due to lower upfront costs and the availability of more models in the market, which provide ample options for buyers. A significant

  

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number of start-ups are beginning to flood major metropolitan areas of the country with hundreds of 'rent by minute' scooters.

With the increasing demand for low-cost electric 2-wheelers, major players are rolling out plans to launch electric versions of their top selling models and massively increase production. For instance:

- **Ola** claims to have the largest 2-wheeler factory in the world, in India. The company claims to be the world's most advanced two-wheeler manufacturing facility, the Ola Future factory, powered by over 3000 AI-driven robots. It is also the world's most sustainable two-wheeler factory with over 100 acres of forest cover and a carbon negative footprint.

- **Okinawa Autotech,** with its vision to protect the Earth, believes in moving forward without leaving Mother Nature behind by nurturing a lifestyle that isn't just rich from the outside, but is deeply rooted with values that encourages a lifestyle of giving back to nature.

- **Hero** recently announced their plans to increase its production capacity to 5 million units over the next 5 years to meet growing demand. By the middle of this year, Hero aims to increase production capacity to 500,000 two-wheelers at its Ludhiana (Punjab) facility. Last year, in February 2022, Hero announced a partnership with Gogoro which aimed at setting up battery swapping stations across India as well as launch electric scooters in India powered by Gogoro batteries.

Honda Motorcycle and Scooter India also plan to launch an electric version of its best-selling scooter the Activa.

In order to meet the growing demand for its 450X and 450 Plus electric scooters, Ather Energy opened its second manufacturing facility in Hosur, Tamil Nadu. The company intends to increase from its current capacity of 120,000 units to 400,000 units per year.

In November 2021, NIU launched the MQiGT EVO electric scooter. The scooter gets a 6.5kW power electric motor, taking its top speed to100km/h. The company claims that this scooter is capable of achieving a maximum range of 75 km on a single charge.

The Economic survey 2023 conveys the strong sentiment towards EVs through its prediction that between the years 2022 and 2030, India's domestic electric vehicle market will see a 49 percent compound annual growth rate (CAGR). The annual sales are expected to rise to 1 crore by 2030.

  

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The Federation of Automobile Dealers Association (FADA) has collated stats that show E-two-wheeler sales hitting 65,702 units, which are nearly double of the 35,709 units clocked in February 2022 and a higher 2 percent month on month from the 64,363 units sold in January 2023.

Customers are starting to have greater expectations from EV makers. In order to elevate their modern lifestyle, they want futuristic designs and features. Customers who feel responsible about sustainability and are aware of the environmental challenges being faced by the world today, are pushing the demand for EVs.

Advancements in battery technologies have helped eliminate bottlenecks such as safety concerns and range anxiety. The charging infrastructure is also increasing at a rapid pace. Moreover, the introduction of reliable, long-lasting, high performance EV batteries with fast charging options is boosting Electric vehicle adoption in the country.

According to the latest Redseer report, the E2W market is expected to be over 80 percent of the overall 2W market by 2030. The increase in demand, interests and aspirations, especially from the youth, is propelling EV makers to enter the premium electric motorcycle segment. In order to satisfy the market demands and fulfill the expectations of customers, EV makers are ramping up their manufacturing abilities in order to stay ahead of the curve.

**India's electric two-wheeler sales hit a speed bump**

The month of June 2023 witnessed a drop in the monthly sales of electric two-wheelers in the country by over 56%. The primary factor for this drop in sales was the revision of the FAME (Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles)incentive scheme and reduced subsidies to $122 (10,000 Indian rupees) per kWh of battery capacity, with a maximum cap of 15% of the ex-factory vehicle price in May. Previously, the incentive was $183 (15,000 Indian rupees) per kWh for up to 40% of the vehicle price. Customers purchasing eligible vehicles would receive a discount as part of the incentive scheme, and later, the government later would reimburse the manufacturers for the price reduction.

The alteration in the scheme resulted in a sudden disruption in the electric two-wheeler market in India. According to the recent data from the governments Vahan dashboard, sales dropped by more than 56% to 45,829 units compared to 105,371 units in May. Even though May witnessed higher sales due to customers anticipating price increases after the revised scheme, June reported the lowest sales month of the year. In fact, June's sales dipped below the levels seen in any of the last six months of 2022.

  

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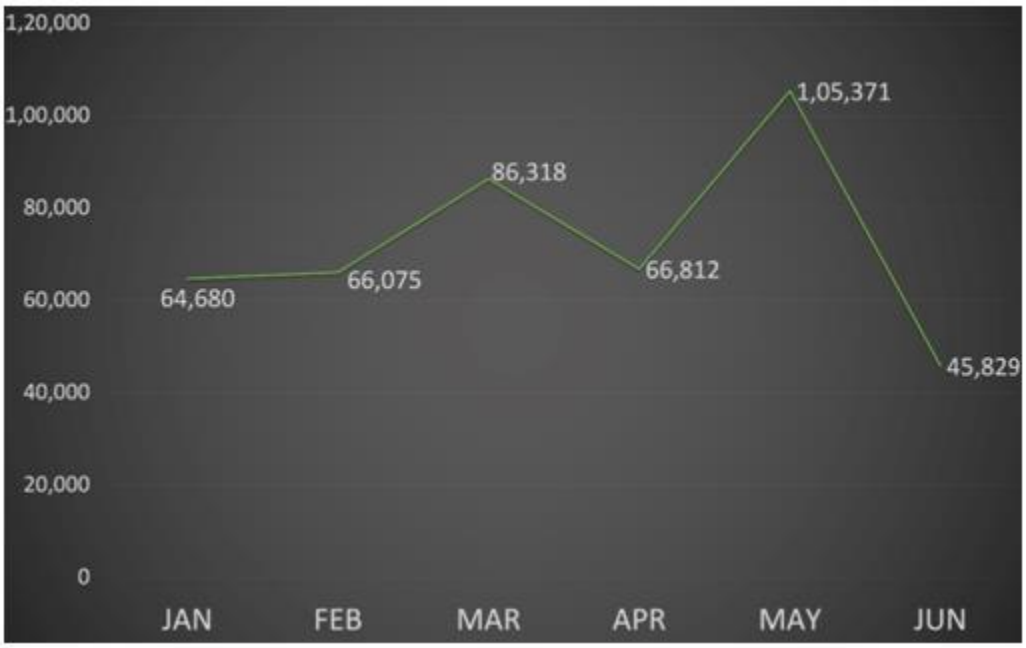
**India's electric two-wheeler sales between January and June 2023, per the data provided by Vahan**




**Interview with MR CHANDRASEKHAR RADHAKRISHNAN, Head of Business growth Emerging Mobility, Hero MotoCorp Ltd.**

**Q1) In the Electric Vehicle Market, where does the Electric Two-Wheeler stand as compared to the other Electric Vehicles? What attracts consumers to Electric Two-Wheelers as opposed to other vehicles?**

Electric two wheelers will lead the electrification in India. Currently, manufacturers have been able to develop credible 2W products with TCO (total cost of ownership) parity being achieved in 2-4 years period.

Also, from a supply side economy of scale, the government benefits only when there is a significant cell utilization. Given more than 70% India travels on 2W's, electrifying this segment would mean accelerated economies of scale across the auto component industry.

**Q2) What are the current limitations of manufacturing Electric Two-Wheelers in India?**

-Higher input material costs such that breaking even with petrol vehicles still take 4 years for a performance vehicle

- Inverted Tax structure on EV's

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- Cells continue to be imported

- for upcoming companies, stringent localization rules can act as deterrent

- high cost of rare earth metal used in permanent magnets in motors

- lack of charging infra supporting high level of penetrations

**Q3) Are you, as a manufacturer satisfied with the support being provided by the government? What are the suggestions or expectations that you as a manufacturer have from the government in terms of support?**

We are satisfied with the Government support. In fact, the FAME policy has been very helpful for the industry.

However, it would be great if the government can come up with an extension of FAME for another 3-5 years till the penetration levels reach a significant % post which industry will grow on its own

Also, we would want GST on spare parts to be reduced from current 18% to 5% so as to make the ownership experience of EV's even more value.

**Q4) Where does India stands in the global Electric Two-Wheeler market scenario?**

After China, India is one of the front runners in 2W EV adoption.

India sold 7.27Lakhs electric 2W in FY23 and is geared to easily beat that number this year.

Some of the companies have spread wide across the country.

Expanding at such scale and only then achieving a high penetration is a problem very unique to India and we are solving for it at a brisk pace.

**Q5) Has this been a profitable venture for the manufacturers and what can manufacturers do to incentivize consumers towards electric two wheelers?**

EV profits are to be seen on a long-term basis given most of the manufacturers are currently investing. For incumbents the investment would be lower given they are utilizing their existing scale however for startup's the investment is fresh and significant.

Currently not many OEMs are making profits however some have started making contribution level positive margins.

  

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To incentivize customers, manufacturers are

a) bringing newer and attractive features in the products

b) Financing schemes

c) Extended warranty schemes

d) service at home

e) buy back schemes

f) facilitation in availing state subsidies

g) lower interest cost

And many more.

**Interview with MR. SUDHENDHU J. SINHA, Advisor, Infra Connectivity & E-Mobility, NITI Aayog**

**Q1) What was the aim of the introduction of FAME I and what was the result? Why was FAME II introduced and what were the government's underlying goals in its implementation? What has been the effect of FAME II till now?**

As part of the National Electric Mobility Mission Plan (NEMMP) 2020, Department of Heavy Industry formulated a Scheme viz. Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme in the year 2015 to promote manufacturing of electric and hybrid vehicle technology and to ensure sustainable growth of the same.

Faster Adoption & Manufacturing of (Hybrid &) Electric Vehicles (FAME) Phase-I: The Scheme was launched in April, 2015 with a budget allocation of ₹ 895 Crore over 4 years (till 2019). It supported about 2.8 lakh hybrid and electric vehicles and deployed 425 e-buses across 10 cities.

FAME Phase-II: Following the success of Phase-I of FAME India Scheme and the leanings from it, the FAME Scheme was extended to Phase II initially for a period of three years commencing from 1st April, 2019 with a total budgetary support of ₹10,000 crore to support all ZEVs (Zero Emission Vehicles) fitted with Advanced Chemistry Batteries. This Scheme envisaged supporting 1 million 2W, 0.5 million 3W, 55,000 cars and 7090 e-buses. This scheme provides for ₹1000 Crores for installation of Charging Infrastructure for Electric Vehicles. The Scheme

  

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was remodeled in June 2021 based on experience particularly during Covid-19 Pandemic and feedback from industry and users.

**Q2) What are the current subsidies and support that the government is providing to electric two-wheeler (E-2Ws) manufacturers and incentivize consumers? What have the results of these subsidies and support systems been?**

The government offers different types of financial incentives to make electric two wheelers more affordable. The key mechanisms for getting incentives are:

Purchase Incentives: Direct discount provided to the user on the cost of the electric vehicle

Interest Subventions: Discount offered on the interest rate while availing loan

Road tax exemption: Road tax at the time of purchase is waived off

Registration fee exemption: One-time registration fee applicable on new vehicle purchase is waived off

Income tax benefit: Provided as a deduction on the tax amount payable by an individual to the government

Scrapping incentives: Provided upon de-registering old Petrol and Diesel Vehicles

Others: Incentives such as interest-free loans, top-up subsidies, special incentives on electric three-wheelers, etc. can also be availed.

Impact:

The FAME-2 scheme has made a significant impact, with approximately 8.5 lakh electric two-wheelers (E2Ws) being supported through the program. This achievement represents an impressive 86% of the scheme's target. From fiscal year 2019 to fiscal year 2022, India witnessed the sale of approximately 10 lakh E2Ws, demonstrating a remarkable compound annual growth rate (CAGR) of 71% over this four-year period. During the past three fiscal years (FY2020-FY2022), the E2W market attracted a substantial investment of INR 8,182 Crore. Notably, 80% of this investment was directed towards the electric two-wheeler original equipment manufacturer (OEM) segment. It is evident that the various subsidy mechanisms implemented have played a pivotal role in accelerating the adoption of E2Ws in India.

**Q3) What is the government's plan to make charging stations more accessible for electric two-wheeler owners?**

  

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The battery-swapping draft policy was released for public consultation in 2022. The draft policy mooted standardized battery dimensions and specifications to be used in vehicles with battery swapping, primarily two- and three-wheelers. The draft policy, can act as a great boon for last-mile logistics space where downtime is a critical factor. Not only will swapping facilitate negligible downtime (~1 minute), it would also eliminate another critical factor of availability of space for parking.

**Q4) What are the challenges being faced by the government in the implementation of the policies for electric two-wheelers?**

The government's pursuit of policies to promote E-2Ws undoubtedly represents a commendable step towards sustainable transportation. However, this endeavor is not devoid of its share of challenges, which require astute attention and strategic planning.

Lack of awareness among consumers: Many potential buyers remain unaware of the benefits of E-2Ws, such as lower operational costs, reduced environmental impact, and government incentives. Bridging this informational gap necessitates concerted efforts through awareness campaigns and educational initiatives to enlighten consumers about the advantages of electric two-wheelers.

Range Anxiety: It poses a significant hurdle to the widespread adoption of E-2Ws. Electric two-wheelers typically have limited battery range compared to their fossil-fueled counterparts. This anxiety discourages potential buyers who fear running out of power during their commute.

Limited Charging Infra: Unlike conventional vehicles with established refueling networks, electric two-wheelers require a comprehensive charging infrastructure to ensure convenience and widespread adoption. Government collaboration with private stakeholders, such as charging station operators and manufacturers, is vital to accelerate the deployment of charging points across urban and rural areas.

To overcome the challenges posed by consumer awareness, range anxiety, and limited charging infrastructure, a multi-faceted approach involving public education, technological advancements, and infrastructure expansion is indispensable. Only through a holistic and well-coordinated effort can these obstacles be effectively addressed, fostering a successful transition to electric two-wheelers and a greener, more sustainable future for transportation.

**Q5) What is your predicted future trajectory of the electric two-wheeler market in the country?**

  

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Electric 2-W penetration sales per year in India is expected to grow from 5.28% in Aug 2023 to 37% of by 2030.

## Conclusion

Even though the challenges being faced by India's electric bike market are significant, yet there is tremendous potential for growth in this sector. The inclination for high performance, premium electric two-wheelers in India is growing fast. Not only do these E2W hold a significance in the country's sustainability missions, but are also satisfying the needs of customers. Ifappropriate policies and initiatives are implemented, India undoubtedly, can become a leader in the global electric bike market. The government of India, electric bike manufacturers, and other stakeholders need to work together to address the challenges and pave the way for a brighter future for electric bikes in India. These measures taken by the government will help combat challenges being faced by the current EV market. The implementation of these measures is expected to accelerate the adoption of cleaner transportation options and assist India in flourishing in the EV market.

## Acknowledgments

I would like to thank my parents and mentors for their constant support and encouragement while writing this paper. Furthermore, I would also like to deeply thank Mr. Chandrasekar Radhakrishnan, Head of Business growth Emerging Mobility, Hero MotoCorp Ltd. , Mr.Sudhendhu J. Sinha, Advisor, Infra Connectivity & E-Mobility, NITI Aayog, Govt. India , and Mr. Sanjeet Singh, Senior Advisor, Trade & Commerce, Economic & Finance, Disinvestment, International Cooperation & G-20 Coordination, National Institution for Transforming India (NITI Aayog) for providing their valuable insights on the topic.

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