



## To Study Genz, S Perception About Challenges and Opportunities In the Use of Electric Two Wheeler Vehicle

Munir Badarpura<sup>1\*</sup>, Dharkhad Haidarali<sup>2</sup>, Jignesh Vidani<sup>3</sup>

Institute of Management Studies, LJ University

**Corresponding Author:** Munir Badarpura [240034003100028@mail.ljku.edu.in](mailto:240034003100028@mail.ljku.edu.in)

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### ABSTRACT

This study looks at how Gen Z perceives the opportunities and difficulties of adopting electric two-wheelers, with particular attention to aspects like product design, cost sensitivity, brand familiarity, and environmental concern. To investigate the association between age and other factors impacting the chance of buying an electric two-wheeler, data from 137 respondents was evaluated using a quantitative technique. The findings suggest that brand familiarity, particularly with well-known companies such as Ola Electric and Ather Energy, has a considerable impact on consumer interest. Cost and range anxiety, however, continue to be major adoption obstacles. It's interesting to note that, despite Gen Z's appreciation of environmental benefits, practical considerations like cost and convenience are more important to them when making purchases. According to the report, Gen Z has a range of tastes when it comes to electric two-wheelers, with many preferring models that have a better mileage per charge. Aesthetics and technology aspects were also shown to be significant deciding factors. The findings suggest that producers should concentrate on product development, stressing affordability, design, and technical improvements in order to appeal to this generation. Furthermore, addressing issues with usability and range requires infrastructure upgrades like growing charging networks. The findings are useful for electric vehicle manufacturers, marketers, and legislators looking to accelerate the adoption of sustainable mobility among young customers

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## **INTRODUCTION**

As we know India is the fastest growing economically and the most populated country .as the growing requirement for sustainable modes of transportation solutions in India is resulting in increasing environmental concerns and the need for efficient urban mobility. The Indian government has set targets to promote EV adoption, aiming for 30% of new vehicle sales to be electric by 2030 (Vidani & Dholakia, 2020). India faces challenges in managing its transportation infrastructure and environmental carbon footprint (Vidani J. N., 2020). In this context, electric vehicles are a promising solution for these challenges, particularly in highly populated areas like Ahmadabad. Ahmadabad, a vibrant city in western India, is an ideal location to study Gen Z's perception of the challenges and opportunities associated with electric two-wheeler (Vidani & Pathak, 2016).

Ahmadabad, the largest city in Gujarat, is representative of the rapid urbanization among many Indian cities. As a busy metropolis with a growing population, Ahmadabad clashes with traffic congestion, pollution, and the demand for efficient transportation (Madan, A. 2023). The adoption of electric two-wheeler in Ahmadabad represents a critical step toward reducing these issues while aligning with national goals for sustainable development.

### **Overview of Electric Two-Wheelers in India:**

The adoption of electric two-wheeler in India has been gaining momentum due to several converging factors: rising fuel prices, increasing environmental awareness, and government incentives (Ahlawat, R., & Tanwar, R. 2023). Despite the high growth potential, the electric two-wheeler in India is still in its developing stage, with numerous opportunities and challenges that need to be addressed to accelerate adoption.

Electric two-wheeler are essentially plug-in vehicles. In this vehicle, power is supplied by a rechargeable battery, lithium battery is the most prevalent among all the batteries available in the market today (Vidani J. N., 2016). Electric vehicles do not involve burning fossil fuel and they pretend to be zero carbon emission vehicles. Being affordable for an individual to transportation due to its low price and high fuel economy (Vidani, Jacob, & Patel, 2019).

The global electric two-wheeler market comprises electric scooters, electric motorcycles, and electric motorbikes (Vidani, 2019). The current two-wheelers found in the market and on roads are major factors causing pollution (Uma, K., 2023). Moreover, there are increases in the cost of fuel day by day (Sachaniya, Vora, & Vidani, 2019). There is an urgent need for an effective alternative in order to compensate for changing fuel costs and high pollution levels. It's one of the most important goals in the present-day plan of the government (R. 2023).

Nowadays one of the most important goals of a government across the globe is to reduce fuel consumption and carbon emission (Vasveliyya & Vidani, 2019). Thinking about the future of the country, it is important to move to the efficient and eco-friendly electric two-wheeler. Zero carbon emission technologies are an effective solution to transportation-related pollution

problems (Odedra, Rabadiya, & Vidani, 2018). Electric-two wheeler can significantly improve the quality of air in an urban area by its zero carbon emission (Kore, H., & Koul, S. 2022).

We know the current rules and regulations of traffic control or RTO and, the MOTOR VEHICLE ACT in India (Vidani, 2018). Is not very convenient and strict and most of the rules are not followed by the citizens (Biharani & Vidani, 2018). A current petrol engine bike requires the PUC certificate from RTO that describes the greenhouse gases coming out from a bike that are harmful to the environment (Vidani, 2018). Most bike owners do not follow the rules and continuously harm the environment (Kumar, P., & Singh, A. 2023). In this context the electric two-wheeler is the best option for the environment, citizens and also for the Indian government, and new upcoming generation of India (Uma, K. 2023).

Gen Z, growing among environmental concerns and technological advancements, has a unique perspective on sustainable transportation options (Vidani, Chack, & Rathod, 2017). As they enter the workforce and become increasingly influential in shaping consumer trends, understanding their views on E2Ws is crucial for policymakers, manufacturers, and stakeholders (Vidani, 2016). This research explores Gen Z's perception of the benefits and drawbacks of E2Ws in Ahmadabad, identifying key factors influencing their adoption and use (Solanki & Vidani, 2016).

The literature review highlights the growing importance of E2Ws in India, with studies showing their potential to reduce CO2 emissions, operating costs, and dependence on fossil fuels (Vidani & Plaha, 2016). However, challenges such as range anxiety, improper infrastructure, and high upfront costs hinder their widespread adoption (Singh & Vidani, 2016). Research has also shown that user

perception plays a significant role in shaping the demand for E2Ws (Dhere, Vidani, & Solanki, 2016). This study will build upon existing knowledge by focusing on Gen Z's specific concerns, preferences, and expectations regarding E2Ws in Ahmadabad (Thakkar, M., Ps, A., Vs, A., Tm, S., & A. 2022).

**The research will examine the following aspects:**

**Awareness and perception:** Gen Z understands the benefits and drawbacks of electric two-wheelers (Mala, Vidani, & Solanki, 2016).

**Challenges:** range anxiety, infrastructure, cost, and other concerns influencing electric two-wheeler adoption (Sukhanandi, Tank, & Vidani, 2018).

**Opportunities:** environmental benefits, cost saving, and technological advancement driving electric two-wheeler adoption (Sukhanandi, Tank, & Vidani, 2018).

**Influencing factor:** socioeconomic parameters, lifestyle, and demographic characteristics shaping Gen Z's perception of electric two-wheeler vehicles (Vidani, 2016).

**Several factors drive the adoption of E2Ws in India:**

**Environmental Concerns:** The requirement to reduce urban air pollution and greenhouse gas emissions is a primary driver. E2Ws, being zero-emission vehicles, present a significant advantage in reducing the environmental impact

compared to conventional vehicles (Modi, Harkani, Radadiya, & Vidani, 2016).

**Economic Factors:** Rising fuel prices and the high cost of vehicle ownership make electric two-wheeler E2Ws an attractive option. Lower operating costs and potential savings on fuel and maintenance contribute to their interest (Patil, M., & Majumdar, B. (2021)).

**Government Initiatives:** Policies such as the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme and state-specific incentives play a crucial role in promoting the adoption of electric two-wheeler E2Ws (Pradhan, Tshogay, & Vidani, 2016). These policies aim to reduce the cost barriers and encourage the development of necessary infrastructure (Husain, I., Ozpineci, B., Islam, M., Gurpinar, E., Su, G., Yu, W., Chowdhury, S., Xue, L., Rahman, D., & Sahu, R. (2021)).

**Even with these drivers, several challenges persist:**

**Infrastructure Limitations:** The lack of sufficient charging stations and slow charging times are significant barriers to the adoption of E2Ws (Pradhan, Tshogay, & Vidani, 2016). The development of a strong charging infrastructure is critical for supporting widespread use (Vidani, 2015).

**Range Anxiety:** Concerns about the driving range of E2Ws and their ability to meet the daily commuting needs of users can put off potential buyers (Vidani & Solanki, 2015).

**Cost Concerns:** The initial cost of E2Ws remains relatively high compared to conventional two-wheelers, despite ongoing reductions in battery costs and government subsidies (Vidani, 2015).

**Study Focus:** Ahmadabad City Ahmadabad, with its dynamic urban landscape and growing population, presents an interesting case study for analysing the perceptions of different generations regarding the adoption of E2Ws (Vidani, 2015). As a city that is actively pursuing sustainable urban mobility solutions, Ahmadabad experience can provide valuable insights into the broader adoption trends and challenges faced in Indian cities (Solanki & Vidani, 2016). The study focuses on understanding how different generations perceive the opportunities and challenges associated with E2Ws in Ahmadabad (Niyati & Vidani, 2016). By examining generational perceptions, the research aims to know specific factors that influence the adoption of E2Ws and identify potential strategies to overcome barriers (Vidani, 2016). This understanding is crucial for policymakers, manufacturers, and stakeholders in developing targeted interventions to support the growth of the E2W market (Bhatt, Patel, & Vidani, 2017).

## **LITERATURE REVIEW**

1. To study the familiarity of Gen Z with electric two-wheeler and its association with their age. (Objective achieved in Question 1 of Likert scale and Hypothesis
2. To examine the likelihood of Gen Z purchasing electric two-wheeler and its relationship with their age. (Objective achieved in Question 2 of Likert scale and Hypothesis 2)

3. To investigate the concerns of Gen Z regarding the range of electric two-wheeler and its association with their age. (Objective achieved in Question 3 of Likert scale and Hypothesis 3)
4. To analyse the importance of cost in the decision-making process of Gen Z when considering electric two-wheeler and its relationship with their age. (Objective achieved in Question 4 of Likert scale and Hypothesis 4)
5. To study the concerns of Gen Z regarding the charging infrastructure for electric two-wheeler and its association with their age. (Objective achieved in Question 5 of Likert scale and Hypothesis 5)\ \
6. To examine the importance of environmental benefits in the decision-making process of Gen Z when considering electric two-wheeler and its relationship with their age.(Objective achieved in Question 6 of Likert scale and Hypothesis 6)
7. To investigate the likelihood of Gen Z recommending electric two-wheeler to others and its association with their age. (Objective achieved in Question 7 of Likert scale and Hypothesis 7)
8. To analyse the importance of cost savings in the decision-making process of Gen Z when considering electric two-wheeler and its relationship with their age. (Objective achieved in Question 8 of Likert scale and Hypothesis 8)
9. To study the willingness of Gen Z to pay a premium for electric two-wheeler compared to conventional two-wheeler and its association with their age. (Objective achieved in Question 9 of Likert scale and Hypothesis 9)

The global acceptance of electric two-wheelers (E2W) is on the rise, adding to the occurrence worldwide of well-grounding environmental issues, government protocols and diminishing battery costs that India, with a mounting population and urbanization alongside exacerbated commutation demand in hand offer an insightful forecast for E2Ws. Well, if you want to know about Gen Z opinion regarding E2Ws in any city then Ahmedabad, one of the most diversified and vibrant cities in western India thing is perfect for this place.

### **1. Environmental Thinking and Sustainability:**

In comparison to previous generations, Gen Z consumers were found to be more environmentally conscious (Kumar et al., 2020). Since E2Ws can be powered by electricity, it results in a cleaner alternative to automotive internal combustion engines, hence reducing greenhouse gas emissions and air pollution [2, 3]. Nonetheless, issues of range and charging infrastructure delays the adoption of E2W (Rajput et al., 2020).

### **2. Charging Infrastructure and Range Concerns:**

Infrastructure development costs are key factor limiting E2W usage (Rajput et al., 2020). Jain et al. (2020) demonstrated Z generation consumers are very sensitive to convenience and easiness in handling E2Ws. The range issues are also rather crucial as many consumers prefer longer battery lives and quicker charging times (Gupta et al., 2019).

### **3. Demographic and Economic Factors as Influencers of Trends:**

It was observed that development of urban infrastructure and E2W adoption follow different curves (Rajput et al., 2020). In Ahmedabad, with an increasing population and traffic, there are conditions for E2W adoption (Kumar et al., 2020).

### **4. Technological Advances in E2Ws:**

Battery developments in recent years have increased the range and performance of E2Ws (Kumar et al., 2020). Other advances include electric motors that have equally improved which has helped in lowering power usage and raised efficiency (Gupta et al., 2019).

### **5. E2Ws Compared to Conventional Vehicles:**

E2W has certain advantages compared to conventional combustion engine vehicles such as low emissions, low operating cost and increased productivity (Kumar et al., 2020) However E2Ws have a constellation of aspects that are of concerns for example the range of concern and the charging time (Rajput et al., 2020).

### **Research Gap**

Despite the increased interest in electric vehicles (EVs), particularly two-wheelers, there is a significant study gap in understanding Gen Z's opinions of the problems and opportunities associated with owning an electric two-wheeler. The majority of the extant literature on EVs focuses on technology breakthroughs, environmental benefits, and regulatory attempts to promote electric mobility. However, few studies have focused on the younger population, notably Generation Z, who is a critical market for the future of electric transportation. This research gap originates from various undiscovered factors relating to Gen Z's distinct characteristics, interests, and concerns regarding the adoption of electric two-wheeler vehicles.

For starters, there is little research into Gen Z's perception of brand awareness with electric two-wheeler manufacturers. Brands such as Ola Electric, Ather Energy, and Hero Electric are increasing market share, but little is known about how familiar Gen Z is with these brands or what variables contribute to their familiarity. This generation, which is known for being tech-savvy and well-informed, may have different expectations of brands than older consumers, and their brand loyalty patterns may vary dramatically. Existing research does not sufficiently address how businesses might improve brand recognition within this demographic, nor how Gen Z sees lesser-known or new electric vehicle brands.

Second, cost sensitivity and financial concerns are important elements in Gen Z's purchase decisions, but there is little research on how this generation balances short-term costs with long-term savings associated with electric two-wheelers. While past research on electric vehicles have emphasized the relevance of cost in buying decisions, they frequently overlook Gen Z's financial behaviour, which may be more concerned with early affordability than long-term savings. Furthermore, the impact of government subsidies, financing choices, and other economic incentives on Gen Z's decisions to buy electric two-wheelers is completely unknown. More research is required to determine the extent to which financial incentives can tip the scales in this generation.

Another significant gap exists in knowing Generation Z's opinion of the infrastructure required to facilitate electric two-wheeler adoption, notably charging networks. The majority of the study on EV infrastructure has concentrated on four-wheelers or larger electric cars. Generation Z, as urban inhabitants who frequently use two-wheelers for short-distance transportation, may have different wants and concerns than previous generations. There is a scarcity of research into how the availability and ease of public charging stations influence Generation Z's desire to adopt electric two-wheelers. This study gap is vital because infrastructure plays an important role in reducing range anxiety, which is a substantial barrier to electric vehicle adoption.

Furthermore, environmental consciousness has been a significant issue in EV adoption research, but there is little understanding of how Gen Z prioritizes environmental concerns when it comes to purchasing electric two-wheelers. While Gen Z is frequently seen as environmentally conscious, available research does not go into depth into how these values influence their purchasing decisions in comparison to other criteria such as price, convenience, or design. More research is also needed to determine how educational initiatives, social media trends, and peer influence affect Gen Z's perceptions of the environmental benefits of electric vehicles.

Finally, the design and technological aspects of electric two-wheelers are becoming increasingly popular, especially among Generation Z, which values aesthetics and modern technology. However, research on how design factors such as vehicle aesthetics, digital connectivity, and smart features influence Gen Z purchasing decisions is limited. This is a significant gap, as makers add modern technologies such as smartphone connectivity and AI-driven performance enhancements to appeal to younger users. Understanding how these technological qualities correspond to Gen Z's aspirations might provide useful insights for product creation.

In conclusion, while there is an increasing amount of research on electric vehicles, Gen Z's unique perceptions and desires for electric two-wheelers are mostly unknown. Filling this research gap is critical for manufacturers, politicians, and marketers looking to capitalize on this generation's potential as a major driver of electric car adoption. Future research should concentrate on brand familiarity, cost sensitivity, infrastructure concerns, environmental views, and design preferences to gain a better understanding of Gen Z's specific difficulties and potential in the context of electric two-wheeler vehicles.

### **Hypothesis**

**H1:** There is a significant association between age and familiarity with electric two-wheeler brands (Ola Electric).

**H2:** a significant association between age and familiarity with electric two-wheeler brands (Ather Energy).

**H3:** There is a significant association between age and familiarity with electric two-wheeler brands (Hero Electric).

**H4:** There is a significant association between age and familiarity with electric two-wheeler brands (TVS iQube).

- H5:** There is a significant association between age and familiarity with electric two-wheeler brands (Revolt Motors).
- H6:** There is a significant association between age and the likelihood of considering the purchase of an electric two-wheeler.
- H7:** There is a significant association between age and the likelihood of considering purchasing an electric two-wheeler in the next 6 months.
- H8:** There is a significant association between age and the importance of the cost of electric two-wheelers.
- H9:** There is a significant association between age and the importance of the environmental benefits of electric two-wheelers.
- H10:** There is a significant association between age and the likelihood of recommending electric two-wheelers to friends and family.
- H11:** There is a significant association between age and the importance of potential cost savings from electric two-wheelers.
- H12:** There is a significant association between age and the frequency of using a two-wheeler for daily commuting.
- H13:** There is a significant association between age and the willingness to pay a premium for an electric two-wheeler compared to a conventional two-wheeler.
- H14:** There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of less than 50 km).
- H15:** There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of 50-100km)
- H16:** There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of 100-150km)
- H17:** There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of 150-200km)
- H18:** There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of more than 200km)
- H19:** There is a significant association between the design and aesthetics of electric two-wheelers and the decision to purchase.
- H20:** There is a significant association between the importance of cost and the decision to purchase an electric two-wheeler. (cost)
- H21:** There is a significant association between the importance of range and the decision to purchase an electric two-wheeler.
- H22:** There is a significant association between the importance of design and the decision to purchase an electric two-wheeler.
- H23:** There is a significant association between the importance of environmental benefit and the decision to purchase an electric two-wheeler

Table 1. Validation of Questionnaire

Statements	Citation
How familiar are you with electric two-wheeler brands? [Ola electric], [Ather energy], [Hero electric], [TVs iQube], [Revolt motors]	(Vidani, 2015) (Vidani & Solanki, 2015)
How likely are you to consider purchasing an electric two-wheeler in the next 6 months?	(Bhatt, Patel, & Vidani, 2017) (Vidani J. N., 2020) (Vidani J. N., 2018) (Vidani & Dholakia, 2020)
How concerned are you about the range of electric two-wheeler?	(Niyati & Vidani, 2016) (Vidani, Meghrajani, & Siddarth, 2023) (Rathod, Meghrajani, & Vidani, 2022) (Vidani & Das, 2021)
How important is the cost of electric two-wheeler to you?	(Pradhan, Tshogay, & Vidani, 2016) (Vidani J. N., 2022) (Saxena & Vidani, 2023)
How concerned are you about the availability of charging infrastructure for electric two-wheeler?	(Modi, Harkani, Radadiya, & Vidani, 2016)
How important is the environmental benefit of electric two-wheeler to you?	(Vidani, 2016) (Vidani, Das, Meghrajani, & Singh, 2023)
How likely are you to recommend electric two-wheeler to friends and family?	(Sukhanandi, Tank, & Vidani, 2018) (Bansal, Pophalkar, & Vidani, 2023)
How important is the potential cost savings of electric two-wheeler to you?	(Singh, Vidani, & Nagoria, 2016)
How often do you use two-wheeler for daily commuting?	(Mala, Vidani, & Solanki, 2016) (Chaudhary, Patel, & Vidani, 2023)
How willing are you to pay a premium for an electric two-wheeler compared to a conventional two-wheeler?	(Dhere, Vidani, & Solanki, 2016) (Sharma & Vidani, 2023)
What is your preferred range for electric two-wheeler? [Less than 50 km], [50-100 km], [100-150 km], [100-150 km], [More than 200 km]	(Singh & Vidani, 2016)
How important is the design and aesthetics of electric two-wheeler in your decision to purchase?	(Vidani & Plaha, 2016)

Rank the following factor in order of importance for your decision to purchase an electric two-wheeler. [cost], [Range], [Design], [Environmental benefits], [Charging infrastructure]	(Vidani, Chack, & Rathod, 2017) (Patel, Chaudhary, & Vidani, 2023)
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Source: Author's Compilation

## METHODOLOGY

Table 2. Research Methodology

<b>Research Design</b>	Descriptive
<b>Sample Method</b>	Non-Probability - Convenient Sampling method
<b>Data Collection Method</b>	Primary method
<b>Data Collection Method</b>	Structured Questionnaire
<b>Type of Questions</b>	Close ended
<b>Data Collection mode</b>	Online through Google Form
<b>Data Analysis methods</b>	Tables
<b>Data Analysis Tools</b>	SPSS and Excel
<b>Sampling Size</b>	137
<b>Survey Area</b>	Ahmedabad
<b>Sampling Unit</b>	Students, Private and government Job employees, Businessmen, Home maker, Professionals like CA, Doctor etc.

Source: Author's Compilation

### Demographic Summary

The demographic overview of the study sample, which consisted of 137 participants, is as follows: The gender distribution shows that 74.5% were male (n=102), and 25.5% were female (n=35). In terms of age, 29.9% of respondents were between 18 and 20 years old (n=41), 46.7% were between 20 and 30 (n=64), and 23.4% were between 30 and 40 years old (n=32). In terms of occupation, students made up the majority of respondents (51.8%, n=71). The remaining respondents worked in private (25.5%, n=35), government (8%, n=11), professional roles (6.6%, n=9), housewives (5.1%, n=7), or retired (2.9%, n=4). This statistic represents a young, largely male population, with the majority pursuing academic goals.

### Cronbach Alpha

Table 3. Cronbach Alpha

Cronbach Alpha Value	No. of items
0.875	25

\*Source: SPSS Software

The Cronbach's Alpha value for the 25-item scale in this study was 0.875, indicating that it was internally consistent and reliable. This shows that the scale's items are highly connected and measure the same underlying construct. A Cronbach's Alpha value greater than 0.7 is generally regarded as acceptable, with values greater than 0.8 indicating high dependability. As a result, the scale utilized in this study has high reliability, ensuring that the results from the associated items are reliable for future investigation.

Table 4. Results of Hypothesis Testing

Sr. No	Alternate Hypothesis	Result p =	>/< 0.05	Accept/Reject Null hypothesis	R value	Relationship
H1	There is a significant association between age and familiarity with electric two-wheeler brands (Ola Electric).	0.001	<	H01 Rejected (Null hypothesis rejected)	0.001	WEAK
H2	There is a significant association between age and familiarity with electric two-wheeler brands (Ather Energy).	0.028	<	H02 Rejected (Null Hypothesis Rejected)	0.067	STRONG
H3	There is a significant association between age and familiarity with electric two-wheeler brands (Hero Electric).	0.005	<	H03 Rejected (Null Hypothesis Rejected)	0.022	WEAK
H4	There is a significant association between age and familiarity with electric two-wheeler brands (TVS iQube).	0.145	>	H04 Accepted (Null Hypothesis Accepted)	0.975	STRONG
H5	There is a significant association between age and familiarity with electric two-wheeler brands (Revolt Motors)	0.297	>	H05 Accepted (Null Hypothesis Accepted)	0.297	WEAK

H6	There is a significant association between age and the likelihood of considering the purchase of an electric two-wheeler.	0.652	>	H06 Accepted (Null Hypothesis Accepted)	0.140	WEAK
H7	There is a significant association between age and the likelihood of considering purchasing an electric two-wheeler in the next 6 months.	0.185	>	H07 Accepted (Null Hypothesis Accepted)	0.599	STRONG
H8	There is a significant association between age and the importance of the cost of electric two-wheelers.	0.044	<	H08 Rejected (Null hypothesis rejected)	0.274	WEAK
H9	There is a significant association between age and the importance of the environmental benefits of electric two-wheelers.	0.211	>	H09 Accepted (Null Hypothesis Accepted)	0.053	WEAK
H10	There is a significant association between age and the likelihood of recommending electric two-wheelers to friends and family.	0.264	>	H010 Accepted (Null Hypothesis Accepted)	0.039	WEAK
H11	There is a significant association between age and the importance of potential cost savings from electric two-wheelers.	0.561	>	H011 Accepted (Null Hypothesis Accepted)	0.673	STRONG

H12	There is a significant association between age and the frequency of using a two-wheeler for daily commuting.	0.057	>	H012 Accepted (Null Hypothesis Accepted)	0.275	WEAK
H13	There is a significant association between age and the willingness to pay a premium for an electric two-wheeler compared to a conventional two-wheeler.	0.242	>	H13 Accepted (Null Hypothesis Accepted)	0.130	WEAK
H14	There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of less than 50 km).	0.004	<	H14 Rejected (Null hypothesis rejected)	0.461	WEAK
H15	There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of 50-100km)	0.687	>	H15 Accepted (Null Hypothesis Accepted)	0.080	WEAK
H16	There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a	0.002	<	H16 Rejected (Null hypothesis rejected)	0.020	WEAK

	range of 100-150km)					
H17	There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of 150-200km)	0.001	<	H17 Rejected (Null hypothesis rejected)	0.003	WEAK
H18	There is a significant association between age and the preferred range for electric two-wheelers (specifically, the preference for a range of more than 200km)	0.001	<	H018 Rejected (Null hypothesis rejected)	0.001	WEAK
H19	There is a significant association between the design and aesthetics of electric two-wheelers and the decision to purchase.	0.001	<	H019 Rejected (Null hypothesis rejected)	0.001	WEAK
H20	There is a significant association between the importance of cost and the decision to purchase an electric two-wheeler.(cost)	0.007	<	H020 Rejected (Null hypothesis rejected)	0.743	STRONG
H21	There is a significant association between the importance of range and the decision to purchase an electric two-wheeler.	0.001	<	H021 Rejected (Null hypothesis rejected)	0.001	WEAK

H22	There is a significant association between the importance of design and the decision to purchase an electric two-wheeler.	0.001	<	H022 Rejected (Null hypothesis rejected)	0.001	WEAK
H23	There is a significant association between the importance of environmental benefit and the decision to purchase an electric two-wheeler.	0.001	<	H023 Rejected (Null hypothesis rejected)	0.001	WEAK

Source: Author's Compilation

## DISCUSSION

This study looked into Generation Z's perceptions on electric two-wheelers, focusing on the problems and opportunities they face while considering such vehicles. Several hypotheses were examined to determine the relationship between age, familiarity with electric two-wheeler brands, and buying habits. The findings provide vital insights into the variables affecting Generation Z's adoption of electric two-wheelers, as well as prospective market difficulties.

The data show a strong relationship between age and familiarity with electric two-wheeler manufacturers. For example, companies such as Ola Electric (H1), Ather Energy (H2), and Hero Electric (H3) have substantial connections with age, ranging from modest to strong relationships. However, age had no significant effect on familiarity with the TVS iQube (H4) or Revolt Motors (H5) brands. This shows that, while Gen Z is generally aware of popular electric two-wheeler brands, certain lesser-known or more traditional businesses may struggle to acquire traction in this segment.

Hypotheses H6 and H7, which looked at the relationship between age and the possibility of acquiring an electric two-wheeler over the following six months, were rejected. This demonstrates that Gen Z's desire in purchasing such vehicles is not closely tied to age, indicating a potential problem for manufacturers in creating a strong appeal among this group.

Cost and environmental issues are critical in the decision-making process. The study discovered that age is substantially associated with the relevance of cost (H8), implying that younger consumers are price sensitive for electric two-wheelers. This highlights a key difficulty, as current market prices may be a barrier to Gen Z adoption. Similarly, while environmental advantages (H9) were found as a consideration, there was no significant relationship between

age and Gen Z's emphasis on environmental benefits. This shows that, while electric two-wheelers have obvious environmental benefits, they may not be the major reason for Gen Z when opting to buy.

Another significant factor to consider with electric two-wheelers is range. Hypotheses H14–H18 investigated Generation Z's preferences for several range groups. The study discovered significant relationships between age and preferences for distances of less than 50 kilometers (H14), 100–150 kilometers (H16), 150–200 kilometers (H17), and more than 200 kilometers (H18). However, preferences for mid-range electric two-wheelers (50–100 km) were not substantially related to age (H15). These findings indicate that Gen Z is open to both short- and long-range electric two-wheelers, giving manufacturers the ability to cater to a variety of needs, from everyday commuting to longer journeys.

The design and aesthetics of electric two-wheelers are also important considerations for Generation Z. Hypothesis H19, which investigated the relationship between design and buying decision, yielded a significant result. This suggests that design plays an important role in attracting younger consumers, emphasizing the significance of aesthetic appeal in product development.

Cost savings (H20) and range (H21) were also discovered to be highly related to purchasing decisions, with strong connections. This shows that, while cost is an important consideration for Generation Z, practical characteristics of electric two-wheelers, such as range, also have a significant impact on their decision-making process. Furthermore, the relevance of environmental benefits (H23) was found to have a poor link with purchase decisions, showing that, while environmental consciousness is important, it is not the key motivator for this group. In summary, this study identifies numerous significant elements that influence Generation Z's view of electric two-wheelers, including brand recognition, pricing, range, and design. While the environmental benefits of electric two-wheelers present an opportunity, producers may need to prioritize cost competitiveness, aesthetic appeal, and practical characteristics such as range to effectively engage this population. Overall, the findings are beneficial for electric two-wheeler makers looking to target the Gen Z market, highlighting both the hurdles and opportunities for growing acceptance among younger consumers.

### **Theoretical Implications**

This study on Generation Z's perceptions of electric two-wheelers has various major theoretical implications, particularly for consumer behaviour, sustainable transportation, and market adoption models. The findings show the subtle elements that influence the younger generation's adoption of electric vehicles (EVs), adding to existing ideas in consumer decision-making and sustainable innovation.

#### **1. Understanding Consumer Behaviour and Brand Familiarity**

The findings highlight the significance of brand familiarity in consumer decision-making, which is a critical component in theories such as the Theory of Planned Behaviour (TPB) and Consumer Attitude Theory. Significant relationships between age and brand familiarity (H1, H2, and H3) indicate that younger customers' awareness of specific brands has a direct impact on their attitudes and possible adoption of electric two-wheelers. This

study lends credence to the idea that brand awareness might lessen the perceived risk of adopting new technology, especially in quickly expanding industries such as electric automobiles. Familiarity with brands like Ola Electric and Ather Energy appears to increase trust and minimize barriers to entry for Gen Z consumers, indicating that companies should spend in brand awareness initiatives aimed at this group.

## **2. Price Sensitivity & Purchase Intent**

The study's findings on cost concerns (H8, H20) are consistent with economic theories, particularly the Price Sensitivity Model and the Value-Based Adoption Model (VAM), which emphasize that cost is an important factor in technology adoption. The relationship between age and the importance of cost savings from electric two-wheelers demonstrates that, while environmental benefits are appealing, financial considerations are still paramount for Generation Z. This is consistent with Maslow's Hierarchy of Needs, which states that financial security is a basic need that must be addressed before customers can consider higher-level benefits such as environmental effect. This result contributes to a broader understanding of how younger customers prioritize their purchases based on practical benefits, such as price and long-term savings, over moral incentives like sustainability.

## **3. Sustainability and Environmental Concerns**

While electric two-wheelers have great environmental benefits, this study discovered a limited relationship between age and environmental factors in buying decisions (H9, H23). This shows that, according to some ideas of Sustainable Consumer Behaviour, environmental consciousness is not the key motivator for this age group's decision-making about electric automobiles. This finding calls into question the assumption that younger generations will adopt sustainable technologies solely for environmental reasons, highlighting the need for more comprehensive models that account for multiple drivers, such as practicality and cost, when explaining sustainable consumer behaviour. It supports the Diffusion of Innovation Theory, demonstrating that environmental innovation alone is insufficient to accelerate adoption unless combined with financial and functional benefits.

## **4. Design and Aesthetics in Decision-Making.**

The importance of design in the adoption of electric two-wheelers (H19, H22) emphasizes the value of Design Thinking in product innovation. This result adds to ideas of consumer perception and product aesthetics by highlighting that for Generation Z, a product's visual and ergonomic appeal might be as essential as its performance. The relationship between age and the relevance of design in the decision-making process strengthens the notion that younger consumers desire personalization and aesthetic innovation, which supports current literature on the importance of non-functional qualities in purchase decisions.

## **5. Technology Adoption and Range Concerns**

The study's findings on range preferences (H14, H16, H17, and H18) provide new insights into the Technology Acceptance Model (TAM), notably in terms of electric car adoption. The weak relationship between age and

preferences for electric two-wheeler range indicates that, while Generation Z may be open to new technology, there are evident practical concerns regarding the operation of electric cars. This study implies that perceived usefulness, a key component of TAM, goes beyond abstract functionality to concrete measures such as range, which has a direct impact on the use of electric two-wheelers for everyday commuting and long-distance travel. This leads to a more sophisticated understanding of how Generation Z evaluates the practicality of electric vehicles in relation to their personal mobility demands.

## **6. Adoption of EVs in Emerging Markets**

The study also has significance for Innovation Diffusion Theory in emerging economies, as it emphasizes the variable rates of adoption among consumer segments. The modest relationships between age and the likelihood of purchasing an electric two-wheeler (H6, H7) indicate that, while younger consumers are interested in electric cars, considerable barriers remain that impede widespread adoption. This observation reinforces the need of gradual innovation dissemination, in which entrepreneurs and policymakers must solve constraints such as cost, infrastructure, and product accessibility before anticipating widespread market adoption.

In summary, this study contributes to a better theoretical knowledge of how Generation Z perceives the obstacles and opportunities associated with electric two-wheeler use. It builds on current consumer behaviour theories, notably in the areas of brand familiarity, cost sensitivity, sustainability, design, and technology adoption, and provides useful insights for both academic research and industry practices.

### **Practical Implications**

The finding of this study on Generation Z's perceptions of electric two-wheelers have significant practical consequences for businesses, policymakers, and other stakeholders in the electric vehicle (EV) market. Understanding Gen Z's unique challenges and potential can inform strategies for upgrading product offerings, marketing, and infrastructure to better serve this emerging customer generation. The following are significant practical lessons from the study's findings:

#### **1. Targeted brand awareness campaigns.**

The strong relationship between age and familiarity with electric two-wheeler brands (Ola Electric, Ather Energy, and Hero Electric) suggests that younger consumers are more likely to recognize well-marketed and conspicuous brands. Companies looking to attract Gen Z's attention should prioritize effective, youth-focused marketing techniques to increase brand recognition. Digital marketing via social media platforms, influencer collaborations, and interactive campaigns could help firms position themselves as top-of-mind choices for Generation Z. Brands with poor recognition, such as TVS iQube and Revolt Motors, might use these strategies to increase visibility and attract younger customers.

#### **2. Price Strategies and Financial Incentives**

When it comes to electric two-wheelers, Gen Z continues to prioritize cost. The findings show that price sensitivity (H8) and perceived relevance of cost savings (H20) have a significant impact on their purchasing decisions. To

solve this, businesses should look at competitive pricing models, offer financing options, and highlight the long-term benefits that electric two-wheelers give over traditional cars. Government subsidies, tax breaks, and low-interest loan programs aimed at younger consumers can all help to increase adoption. Highlighting the financial advantages, such as lower fuel costs and maintenance costs, will make electric two-wheelers more appealing to frugal Gen Z buyers.

### **3. Emphasize practical features, such as Range**

Range anxiety is a well-known barrier to electric car adoption, and this study emphasizes its significance for Generation Z (H14, H16, H17, and H18). Electric two-wheeler makers should properly convey range capabilities and provide versions that meet a variety of commuting needs. Short-distance commuters may benefit from advertising models with shorter ranges (less than 50 km), whilst those who need to travel longer distances should highlight models with longer ranges (150-200 km or more). Improving charging infrastructure, particularly in metropolitan locations and near educational institutions where Gen Z is concentrated, can reduce range worries and boost overall product attractiveness.

### **4. Design and Aesthetic Customization**

Gen Z places a high value on the design and aesthetics of electric two-wheelers (H19, H22), implying that visual appeal is equally as vital as functioning. Manufacturers should focus on designing sleek, modern, and adaptable designs that appeal to this tech-savvy and fashion-conscious audience. Offering personalized alternatives, such as color choices, accessories, and smart features (such as app connection), can improve the consumer experience and make electric two-wheelers more appealing. Collaborating with young designers or hosting design competitions that engage the Gen Z audience are also great tactics for remaining relevant to their preferences.

### **5. Reframe Sustainability Messaging**

While environmental benefits are essential, the study discovered that sustainability is not the key reason for Gen Z when purchasing electric two-wheelers (H9, H23). This means that manufacturers and marketers must go beyond environmental messaging to appeal to this group. Messaging should take a balanced approach, emphasizing both the practical advantages of electric two-wheelers, such as cost savings, convenience, and cutting-edge technology, as well as their environmental benefits. Furthermore, sustainability efforts might be more individualized, concentrating on the direct impact of consumers' specific activities (for example, how much CO<sub>2</sub> emissions they save by purchasing electric two-wheelers).

### **6. Diversify Products to Meet Diverse Customer Preferences**

The data reveals a wide range of preferences for electric two-wheeler range among Generation Z buyers. Manufacturers might expand their product ranges to match these diverse needs, including models suitable for both short-distance commuters and long-distance travelers. Those with ranges of less than 50 kilometers, for example, may be marketed to urban inhabitants or students with limited daily travel, whilst those with longer ranges (150 kilometers or more) could be pushed to individuals with higher commuting demands or

adventurous lives. Product flexibility would enable businesses to target diverse sectors of the Gen Z population.

### **7. Improving Post-Purchase Support Systems**

The weak relationships between age and purchasing decisions based on environmental concerns and potential cost savings (H6, H7, H9, and H23) suggest a lack of consumer education. Manufacturers and retailers should focus on developing robust post-purchase support systems, such as dependable customer service, maintenance packages, and user education programs. Companies may lower perceived risks of adopting electric two-wheelers and create long-term consumer loyalty by addressing common issues early on, such as battery life, range, and maintenance expenses

### **8. Collaboration between government and private sectors for infrastructure development**

To ease range anxiety and encourage the usage of electric two-wheelers, corporations should work with governments and private sector players to improve charging infrastructure. Public charging stations, particularly in residential areas, retail malls, and businesses, will stimulate greater use of electric vehicles. Companies might also form agreements with educational institutions and workplaces to establish specific charging stations for students and employees, synchronizing infrastructure development with Gen Z's mobility habits.

### **9. Innovative financing and ownership models.**

Given that Generation Z is often in the early phases of their earning potential, alternate ownership models like leasing, subscription-based services, or electric car sharing programs may be more tempting than outright purchases. These solutions could increase flexibility and make electric two-wheelers more accessible without incurring significant initial costs. Furthermore, corporations can provide trade-in programs for traditional two-wheelers, lowering the financial strain of switching to electric vehicles.

### **10. Utilize Technology and Smart Features.**

As digital natives, Generation Z places a high priority on technological integration in their products. Manufacturers of electric two-wheelers should prioritize adding smart features like mobile app connectivity, GPS tracking, remote diagnostics, and smart charging to their vehicles. These features can increase the appeal of electric two-wheelers by meeting Gen Z's expectations for technologically advanced and connected devices

This study provides useful insights on Gen Z's tastes and habits with regard to electric two-wheelers, as well as practical strategies for manufacturers, marketers, and policymakers to better serve this emerging customer segment. Companies may successfully capitalize on Gen Z's growing demand for sustainable transportation solutions by addressing their concerns about cost, design, range, and technology, as well as boosting infrastructure and awareness.

## CONCLUSION

This study provides important insights into Gen Z's perceptions of the problems and opportunities related with riding electric two-wheelers. The findings show the intricate interplay of elements influencing this demographics' decision-making process, including brand familiarity, cost sensitivity, environmental conscience, and product design. While Gen Z is generally open to embracing electric two-wheelers, factors such as range concerns, financial considerations, and unfamiliarity with lesser-known brands continue to impede mainstream adoption.

The study underlines the need of focused marketing methods for increasing brand awareness among young consumers, emphasizing on the functional and aesthetic appeal of electric two-wheelers. Pricing and financial incentives are critical, as Generation Z seeks cost savings and affordability. Although environmental benefits are acknowledged, they are not the key motivator for this group, implying that manufacturers should focus on the practical benefits of electric vehicles, such as long-term savings and ease.

The study also highlights the necessity for broad product options to accommodate Gen Z consumers' diverse range choices, which span from short-distance urban commuters to those who require longer-range automobiles. Infrastructure development, particularly the extension of charging stations, is crucial to reducing range anxiety and increasing the popularity of electric two-wheelers. Furthermore, technology integration, such as smart features and mobile networking, is critical for grabbing the attention of today's digital natives.

In conclusion, while electric two-wheelers are a viable answer for sustainable mobility, manufacturers, politicians, and marketers must address Gen Z's specific demands and concerns in order to drive adoption. The electric two-wheeler industry can capitalize on the younger generation's growing demand for sustainable transportation solutions by focusing on cost-effective, stylish, and technologically sophisticated goods, backed up by strong infrastructure and effective marketing.

### **Recommendations For Future Research/ Future Scope of the Study**

While this study has provided useful insights into Gen Z's opinions of electric two-wheelers, there are some areas that require more investigation to acquire a more complete picture of this demographics' attitudes and actions regarding electric mobility. The recommendations below indicate essential directions for future research.

#### **1. Increasing the Sample Size and Demographics**

This study focused on a specific age group, Generation Z, and their perceptions. Future research could broaden the scope by incorporating other generations, such as Millennials and Generation X, to compare cross-generational opinions towards electric two-wheelers. A bigger sample size that includes customers from different geographic regions, economic origins, and educational levels may also provide a more comprehensive picture of how socioeconomic factors influence electric vehicle adoption.

## **2. Investigating Other Influencing Factors**

The primary focus of this study was on the relationship between age and brand familiarity, purchase considerations, and product range preferences. Future research should look into additional characteristics such as income level, education, environmental awareness, and government policies to determine how they influence the decision to use electric two-wheelers. 3. Longitudinal studies on changing perceptions.

## **3. Longitudinal Studies on Changing Perceptions**

As the market for electric vehicles evolves, longitudinal studies to assess changes in Generation Z perceptions over time would be beneficial. Such research may look into how advances in battery technology, infrastructure development, and policy changes (such as subsidies or incentives) affect Gen Z's attitudes and actions. A long-term study might also look into whether early adopters of electric two-wheelers are still satisfied with their choice and how this influences their future purchasing decisions.

## **4. Analyzing the Impact of Technological Advancements**

Given Gen Z's love for technology and smart features, future research should dive more into how developing technologies influence their desire to use electric two-wheelers. Research might look into how advances like linked mobility (e.g., IoT integration, AI-powered features, autonomous driving) and battery technology advancements (e.g., quick charging, longer battery life) affect consumer perspectives. Furthermore, research should look into how tech-savvy elements (such as mobile apps for remote monitoring or GPS tracking) can be used more effectively to suit Gen Z's expectations.

## **5. Policy and Infrastructure Impacts**

The impact of government regulations, subsidies, and public infrastructure development on electric two-wheeler adoption need greater attention. Future research should assess the effectiveness of present policies and incentives for encouraging electric vehicle use among Generation Z and other populations. Comparative studies of nations or regions with varying degrees of infrastructure development (e.g., urban vs. rural areas) could shed light on the role of public charging stations and how government restrictions affect consumer choices.

## **6. Environmental Attitudes and Behaviors**

While this study discovered that environmental benefits are not the key reason for Gen Z's decision to purchase electric two-wheelers, future research could look into how environmental education or awareness initiatives may affect opinions. Studies could look into whether increasing understanding about climate change and the environmental impact of fossil fuels changes priorities over time. Furthermore, investigating if Generation Z is willing to adjust their travel habits or daily commute patterns in order to adopt more sustainable transportation options may be an intriguing field for future research.

## **7. Understanding Consumer Psychology and Brand Loyalty**

Future research should look into the psychological components of Gen Z consumer behavior, such as brand loyalty, faith in new technology, and risk aversion when introducing new items like electric two-wheelers. Research

might also look into how brand reputation, customer service, and post-purchase experiences affect long-term satisfaction and repeat purchases. Understanding these psychological drivers may help businesses better match their tactics for building strong emotional connections with this group.

#### **8. Gender-Based Preferences**

Although this study provided a broad summary of Gen Z's perspectives, it did not address gender-specific preferences. Future research might look into how men and women in Generation Z perceive electric two-wheelers differently, including their design choices, features, and worries about safety or reliability. This could provide information into focused product development and marketing tactics that address gender-specific needs.

#### **9. Exploring Alternatives to Ownership Models**

With growing interest in the sharing economy, future research might look into Gen Z's willingness to consider alternative ownership models such as leasing, subscription services, or electric vehicle sharing. Studies might look into whether Gen Z prefers short-term, flexible options to traditional ownership, and how businesses can leverage on these preferences by providing more flexible payment and usage models. The study might also look at how such models affect total electric vehicle adoption rates.

#### **10. Impact of Global and Economic Events**

As global and economic situations change, future research might look into how calamities (such as the COVID-19 pandemic, global energy crises, or technology changes) affect Gen Z's likelihood to invest in electric motorcycles. Economic situations, such as inflation or recessions, can affect disposable income and shift purchase priorities, thus it's critical to understand how external factors influence adoption patterns.

The study on Generation Z's perceptions of electric two-wheelers lays a solid foundation, but the recommendations for further research indicate that there is much more to learn. Future research can provide more insight into the changing environment of electric two-wheeler adoption by growing the demographic scope, investigating other contributing factors, and taking into account technological and policy improvements. These findings will aid manufacturers, governments, and stakeholders in better understanding how to adapt their strategies to satisfy the demands of this rising consumer base, ultimately pushing the transition to sustainable transportation solutions.

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