

# A Study on Customer's Perception and Awareness towards electric two-wheelers in the capital of Odisha

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**Abstract-** Sustainable development is need of hour, striving for survival of today's generation together with saving for future generation. Every industry must implement several green efforts in order to save and protect the environment. According to the Petroleum Federation of India and the Ministry of Petroleum & Natural Gas, the transportation industry uses 70% of gasoline and 99% of diesel. In this regard, the transportation industry is moving towards environmentally friendly automobiles, specifically electric vehicles that will cut down on harmful emissions and toxins in the environment. The goal of the current study is to investigate and analyse how people in the capital of Odisha feel about hybrid vehicles. With the convenience sampling technique, responses are gathered using the sample size of 102. To collect responses, a structured questionnaire is created. Based on criteria found through a literature search, the questionnaire was created. To accomplish the study's goals, chi-square hypothesis testing was done in IBM SPSS 21.

**Key Words:** Environment Consciousness, Performance, efficiency, government, Odisha

## 1. INTRODUCTION:

The world's fifth-largest auto market is geared up for a stunning transformation moving completely towards electric vehicles (EVs) by 2030. The Indian automotive industry is the fifth largest in the world and is slated to be the third largest by 2030. Catering to a vast domestic market, reliance on the conventional modes of fuel-intensive mobility will not be sustainable. To address this, federal policymakers are developing a mobility option that is "Shared, Connected, and Electric" and have projected an ambitious target of achieving 100 percent electrification by 2030. By making the shift towards electric vehicles (EVs), India stands to benefit on many fronts: it has a relative abundance of renewable energy resources and availability of skilled manpower in the technology and manufacturing sectors. This is part of the Honourable Prime minister Narendra Modi government's vision to helm a renewable energy revolution in the country. The present government expects that the automobile sector's massive conversion will cut its oil bill, reduce emissions, and curb the upcoming demand for road infrastructure for the next 12 years. Many of our cities are among the World's most polluted, suffering utter degradation over the years and vehicular pollution is one of the major causes of air pollution. India is Asia's third-largest country imports the oil requirement of fossil fuels by 82%. The Government of India acknowledges the pressure to look at sustainable mobility solutions to reduce dependency on imported energy sources, reduce greenhouse gases (GHG) emissions, and mitigate adverse impacts from transportation. Present India's road transport minister Nitin Gadkari said "We should move towards alternative fuel...I am going to do this, whether you like it or not, "shift to alternative fuels and technologies including biofuels, electric vehicles, and overall system efficiency of infrastructure. The National Electric Mobility Mission Plan (NEMMP 2020) was announced recently to incentivize the use and production of electric vehicles (EVs) in India to diminish adverse environmental impacts of vehicles and to enhance energy security. The electricity that powers your EV can come from many sources, which include low-emission sources like natural gas and zero-emission sources like wind, solar, hydro, and nuclear power, which enable EVs to dramatically reduce gaseous emissions. In this context, EVs are expected to play a significant role in the low-carbon transition of India and it will be a large impact on the future passenger car market.

In the global vehicle market, battery electric vehicles (BEVs) have been considered as new alternatives to gasoline-based vehicles, leading to an increase in BEV sales in many countries. From 2005 to 2020, global sales of new BEVs increased from 1,890 to 2.1 million vehicles globally in 2019 (Virta Global, [WR 6] 2021). In line with this global trend, BEV sales in India have also increased enormously. Since 2010, when BEVs were first introduced with 600 vehicles, the sales of new BEVs increased. Responding to this opportunity, leading players like OLA Electric Mobility Pvt, Ather Energy, and Mahindra Electrics are rapidly growing their market presence. Moreover, certain states like Karnataka and Tamil Nadu are rolling out innovative and timely investor-friendly policies besides building the necessary infrastructure. Recently, the American electric vehicle and clean energy company Tesla Inc. marked its entry into India by incorporating its subsidiary, Tesla India Motors, and Energy Pvt Ltd, in Bangalore. The E-bikes originated in Japan in the early 1980s. Improved battery and motor technology, component modularity, as well as the economics of scale improvements, have meant E-bikes can now travel longer distances, are faster, and are more affordable than ever. In the past decade more than 150 million E-bikes have been sold, the largest and most rapid uptake of alternative-fuelled vehicles in the history of motorization. The E-bikes are highly advanced with cruise control technology, a theft braking system, Lock braking, international styling, keyless entry, No number plate, No licensee, and a lot of other features. E-bikes are easy to use, lightweight, and maintain free providing a stress-free experience.

## 2. Review of Literature:

Research concludes that the longer-term uptake of EVs will depend heavily on progress in battery technology, to bring down costs and increase energy density, and on the provision of a suitable recharging infrastructure. (Marcello Contestabile, 2012). India should invest in small scale reinforcements to manage the load issues locally rather than going for an enormous change. Home charging should be encouraged. Proper planning of place, population, traffic density and safety should be considered before implementing the massive scale charging infrastructure. The integration of activities within the energy and transport fields is important. Development goals through different innovative policies and programs, for instance, drivers of electrical cars are offered a financial consumer incentive, like tax credits, purchase subsidies, discounted tolls, free parking, and access to restricted highway lanes will help the market to grow. (Dash P. K., 2013). Freight transport has a major impact on urban movement. Researcher explored the possible integration of electric vehicles in urban logistics operations. A fleet with different technologies has the opportunity of reducing the costs of the last mile. Researcher presented a fleet size and mix vehicle routing problem with time windows for EVs. The main contribution of the authors was considering the variability of the range of EVs. In the segments of small vans, EVs are often the most competitive technology. In the segment of large vans, diesel has seen the most interesting solution from a financial point of view as electric vehicles would need to cover a longer distance to be cost-competitive. Hybrid vehicles are chosen in the segment of trucks as its running costs and fixed costs are lower than the diesel truck. (Philippe Lebeau, 2015) Widespread adoption of EVs may contribute to lessening of problems like environmental pollution, global warming, and oil dependency. However, this penetration of EV is comparatively low despite governments implementing strong promotion policies. They presented a comprehensive review of studies on consumer preferences for EV aiming to convey policy-makers and give direction to further research. They compared the economic and psychological approach towards consumer preference for Electric vehicle. The impact of financial and technical attributes of EV on its utility is generally found to be significant, including its purchase and operating cost, driving range, charging duration, vehicle performance and brand diversity on the market. The density of charging stations also positively affects the utility and promotion of EV. The impact of incentive policies, tax reduction is quite effective. (Fanchao Liao, 2017). The early market growth for electric vehicles continues, but several barriers prevent their widespread uptake. These barriers include the additional cost of the new technology, relative inconvenience of technology considering range and charge times, and consumer understanding about the availability and viability of the technology. This last point, typically referred to as “consumer awareness,” is crucial. (Lingzhi Jin, 2017). The replacement of ICE with electric engines will reduce pollution to a great extent and be profitable to consumers. Many countries have implemented this technology and are contributing to the improvement of the environment. The researcher saw the opportunities and challenges faced in India over implementing EVs. Opportunities like Government Initiatives, Batteries, Industries, and Environment have been considered. With these challenges like cost of EVs, efficiency of EVs in India and demand for EVs were taken into consideration. The implementation of EVs in India aims primarily to scale back greenhouse emissions and cut oil expenses. The govt. should make the foremost out of the opportunities available and find suitable ways to tackle the challenges. (Mohamed M, 2018). Indian Scenario is different because the current market share of EV/PHEV is around 0.1%. Presently almost all vehicles consider fossil fuel-based transportation. These pollute the atmosphere by the emission of greenhouse gases & causes global warming. The gap between domestic petroleum production and consumption is widening. India imports around 70% of oil required per annum. Hence there is an urgent need to investigate factors and challenges for sustainable and cleaner alternatives. (Pritam K. Gujarathi, 2018). India contributes around 18% in transport sector alone in terms of carbon emission. The Electric Vehicle (EV) is one of the foremost feasible alternative solutions to beat the crises. Several automotive companies are introducing EVs and are expanding their portfolio. Promoting EVs can help reduce fuel dependence and pollution and beneficial for both consumers and the nation. The education of people has significantly higher influence over their awareness level on EVs. Apart from manufacturers, Government should strive hard to spread awareness and influence positive perception among potential customers. (Masurali.A, 2018). Choice of cars depends upon environmental concern, cost, comfort, trust, technology, social acceptance, infrastructure availability. These arguments have been tested for both conventional cars and EVs. They assume that these factors have direct influence on individual choice of vehicle. They found that EV manufacturers and Government must invest more in social acceptance of the vehicle by creating more infrastructural facilities, putting more thrust on technology to create trust. The analysis depicts that the population is aware of the environmental benefits. The responsibility lies on the shoulders of the Government and manufacturers to investing in the manufacturing of vehicles. (Pretty Bhalla, 2018). Global pollution is on the rise and each effort made, is to cut back the CO<sub>2</sub> emissions and save the earth. One such effort is the introduction of EVs. The transport sector is one in all the largest emitter of CO<sub>2</sub> and hence it is important to reduce it. The government has come up with ambitious plans of introducing EVs to the Indian market and confine pace with the event of EVs globally. The National Electric Mobility Mission Plan 2020 has included an in-depth report on the EVs. India encompasses a huge challenge in shifting the transportation sector from ICE engines to EVs. This needs lots of planning along with R&D. Charging infrastructure must be adequately build to deal with range anxiety. It is vital to form demand generation by making all government buses electric and offering tax exemptions for personal EV owners. (Mr. A. Rakesh Kumar, 2019). Developing an aggressive strategy for the adoption of EVs in India and ensuring a well-executed implementation is a challenge but vital for government. The geography and diversity of India will present problems that require thoughtful solutions. Public procurement is expected to be an important driver of growth of EVs, with the purchase of four-wheeled vehicles for government offices, three-wheeler vehicles and buses for public transport. Investments by fleet operators such as Ola and Uber, and operators of food distribution services, are also expected to boost the initial growth of two- and four wheeled electric vehicles. However, the private EVs may take 5-6 years to gain popularity and acceptance. (Janardan Prasad Kesari, 2019). Users of scooters, who need only to travel short distances, may consider an EV, but those, who need to travel longer distances and already own bikes like a Hero Splendor, may find it difficult to move to an e- 2W. For cars, it is relatively simple to improve the range with increased battery size. For electric 2Ws though, every increase in kWh may provide an extra 30km in range, but the increase in weight is around 10kg, approximately a 10% increase in the total weight of the bike. This weight issue is even more pronounced in smaller bikes (less than 150cc). (Yogesh Aggarwal, 2019)

### 3. Statement of Problem

The introduction of electric vehicles in India will have the massive conversion of fossil fuel to electric vehicles; its impact will be on the automobile sector which will influence the customer's perception and customers buying behavior, manufacturer, dealers, bankers, and petrol bunks. Due to current environmental problems caused by vehicles, the global aim is to protect our environment and diminish greenhouse gas emissions. However, the launch of Electric two-wheelers is still in the initial stage and is hesitant. The factors which are important to customers need to be identified when making product and consumer-related buying decisions related to vehicles. "This industry (EV) is starting to take off and it's still a tiny percentage of the overall vehicle market but it's starting to reach an inflection point where it can have a very significant impact globally," Keep in mind the researcher eager to know the perception and awareness of customers and their buying behavior for electric two-wheelers in the changing environment.

### 4. Objectives of the Study

Based on past studies and the gap identified through extensive literature review, the objectives of the current study are framed. The main objective of the study is to understand the awareness and perception of people towards Electrical two-wheelers in the capital of Odisha. Moreover, the current study also focused on a qualitative understanding of how the people of Bhubaneswar city are environmentally conscious and willing to expend on Electrical two-wheelers.

### 5. Research Methodology

To explore awareness about Electrical two-wheelers, the present research was conducted among car users in Bhubaneswar city. To achieve objectives, a descriptive research design has been utilized for this study. The convenience sampling method has been used for data collection. Data was collected from a structured online questionnaire to know the perception and awareness about Electrical two-wheelers. The sample size of the study is 102. Though the questionnaire was distributed to more than 150 Electrical two-wheelers users only 102 questionnaires were useful for this study. Overall, the study has been divided into two parts. In the first phase, the public outlook has been analyzed in terms of awareness about Electrical two-wheelers, contemplating plans towards environment sustainability, and investment by them to purchase the Electrical two-wheelers. In the second phase of the study, hypothesis testing has been performed to validate the effect of independent variables Environment Consciousness, Performance of Electrical two-wheelers in terms of mileage, efficiency, and government support on the dependent variable factors Intention to buy Electrical two-wheelers. The independent and dependent factors have been taken from past studies as discussed in the literature review section.

### 6. Hypothesis

H1: The degree of environmental consciousness has no significant influence on buying Electrical two-wheelers.

H2: There is no significant relationship between efficiency and the influence on buying Electrical two-wheelers.

H3: There is no significant relationship between the performance of Electrical two-wheelers and influence on buying Electrical two-wheelers.

H4: There is no significant influence of Government action and influence on buying Electrical two-wheelers.

### 7. Data Analysis & interpretation

Table 1: Awareness about existence of Electrical two-wheelers

Awareness about Electrical two-wheelers	Yes	No	May be
	76	18	8

The data given in table 1 shows the awareness of public towards Electrical two-wheelers. Around 74% of the target population is aware about Electrical two-wheelers whereas 18% are not aware about any kind of Electrical two-wheelers in India. Rest 8% is confounding about the Electrical two-wheelers.

Table 2: Awareness about no. of Electrical two-wheelers.

No. of Electrical two-wheelers am aware of.	1-2	3-5	More then 5
	66	27	9

Table2 represents the responses received for awareness about number of Electrical two-wheelers. The responses having "Yes" are further asked about number of Electrical two-wheelers they know. 9% were aware of more than 5 Electrical two-wheelers in India. 66% of the population was aware at most 1- 2 Electrical two-wheelers and around 27% people were aware about 3-5 Electrical two-wheelers.

Table 3: Need of Electrical two-wheelers.

Need of Electrical two-wheelers	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

	55	25	15	6	4
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Table 3 represents the perception of respondents about the need of Electrical two-wheelers in Odisha. Majority of responses agree to the need of Electrical two-wheelers. People are becoming more environment conscious day by day therefore in view of this fact people are agreeing to the need of Electrical two-wheelers. Very less percentage of people have the belief that there is no need of Electrical two-wheelers in Odisha.

Table 4: Electrical two-wheelers effective initiative towards environmental sustainability

Electrical two-wheelers will help in environmental sustainability	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	55	30	9	6	2

The percentage of people who are environmental conscious and are with the thought that trend of Electrical two-wheelers should be brought in India are taken into consideration from table 4 and responses are collected based on the question whether Electrical two-wheelers will help in environment sustainability. Based on 5-point scale, 55 % of the people strongly agree and 30% Agree to the fact that Electrical two-wheelers can be one of the effective initiatives towards environmental sustainability.

Table 5: Efficient government initiative towards environmental sustainability

Government initiatives towards controlling the pollution in the form of Electrical two-wheelers	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	50	25	18	6	3

The table 5 shows the perception of people about the government initiatives towards controlling the pollution in the form of Electrical two-wheelers. Around 50% of the people strongly agree and 25% agree that government is working for controlling the pollution therefore government is working towards promoting Electrical two-wheelers. Very less no. of people disagrees with this statement.

Table 6: Respondents family income for purchasing capacity.

Family annual income	less than 1 lakh	1-3 lakh	3-6 lakh	6-9 lakh	exceeding 9 lakhs
	9	20	28	15	30

To identify electrical two-wheeler purchase affordability the annual family income is asked from the sample. Considering family annual income as one of the personal factors, it can be certainly elucidated there exists very small gap between the income groups i.e., between 3 lakhs - 6 lakhs and the family income above 9 lakhs with 28% and 30% respectively as shown in table 6.

Table 7: Investment outlook of respondents towards Electrical two-wheelers

Desired budget of people who are ready to invest on similar model but on an electrical two-wheeler	up to 2 lakhs	2-4 lakh	4-6 lakh	6-8 lakh	8-10 lakh	more than 10 lakhs
	10	23	36	19	5	9

Around 9% of people are there who have very low family income. To identify the investment outlook, the analyses, carry forwarded with the percentage of people who are ready to invest for a new or used Electrical two-wheelers and shown in table 7.

Table 8: Respondents ready to invest on similar model

Desired budget of people who are ready to invest on similar model but on an electrical two-wheeler	up to 2 lakhs	2-4 lakh	4-6 lakh	6-8 lakh	8-10 lakh	more than 10 lakhs
	10	23	46	12	5	6

Furthermore, to explore the view of the people who are ready to invest on similar model but on an electrical two-wheeler the investment outlook is explored and represented in table 8. Around 46% of people are ready to invest the amount ranging from 4 lakhs to 6 lakhs whereas just 6% people are ready to pay above 10 lakhs.

A. H1: The degree of environmental consciousness has no significant influence on buying electrical two-wheeler.

Table 9: Degree of environmental consciousness on buying electrical two-wheeler

	Value	df	Asymptotic Significance (2-sided)
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Pearson Chi-Square	0.945	4	0.041
Likelihood Ratio	0.854	4	0.931
Linear-by-Linear Association	0.725	1	0.395
N of Valid Cases	102		

Table 9 indicates results of first hypothesis i.e., the Chi-square p-value is less than 0.05 which show that the H0 is rejected. Therefore, it can be concluded that degree of environmental consciousness has influence on buying electrical two-wheeler in the capital of Odisha.

B. H2: There is no significant relationship between fuel efficiency and the intention to buy electrical two-wheeler.

Table 10: Degree of efficiency and the intention to buy electrical two-wheeler.

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.854	4	0.037
Likelihood Ratio	3.726	4	0.444
Linear-by-Linear Association	1.621	1	0.203
N of Valid Cases	102		

As per the p-value of Pearson Chi-Square  $p=0.037 < 0.05$  shown in table 10, which signifies that the H2 value is rejected which concludes that there is a significant relationship between efficiency and influence on buying electrical two-wheeler.

C. H3: There is no significant relationship between the performance of car and purchase intention towards electrical two-wheeler.

Table 11: Performance of car and purchase intention towards electrical two-wheeler.

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	110.142	20	0
Likelihood Ratio	89.727	20	0
Linear-by-Linear Association	47.164	1	0
N of Valid Cases	102		

The analysis is carry forwarded to test H3 that shown the results of Chi-square test in table 11. It is found that in this case p-value is less than 0.05 i.e.,  $0.000 < 0.05$ . Therefore, H3 cannot be accepted, which concludes that there is a significant relationship between the performance of electrical two-wheeler and purchase intention towards electrical two-wheeler.

D. H4: There is no significant influence of Government action and influence on buying electrical two-wheeler.

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	8.586	4	0.032
Likelihood Ratio	10.48	4	0.033
Linear-by-Linear Association	0.324	1	0.569
N of Valid Cases	102		



The result of the hypothesis is shown in Table 12. The results of Chi-square test reveals that the p-value = 0.032 > 0.05 which signifies that the H4 is rejected. Therefore, it can be concluded that there is a significant impact of Government action and influence on buying electrical two-wheeler.

## 8. Conclusion

The analysis was done keeping parameters like awareness of electrical two-wheeler, Investment outlook, environment sustainability and government initiatives on the willingness to spend on an electrical two-wheeler through using MS-Excel and hypothesis testing using IBM SPSS 21. It was seen that three-fourth of the sample of respondents were aware of electrical two-wheelers and most of them were environmentally conscious. Half of the respondents agreed that government is working towards controlling pollution. It is revealed from past studies that main factors that contribute to the buying of electrical two-wheelers are environmental consciousness; performance; fuel efficiency and Government action. Considering these factors Hypothesis testing is performed to see the significant relationship of these factors and intention on buying Electrical two-wheelers. From the hypothesis testing, it is found that all the factors show a significant relation with buying intention for electrical two-wheelers. Electrical two-wheeler manufacturers must promote the electrical two-wheelers keeping in view environment effects and advantages of having an electrical two-wheeler in their garage. Big brands are more preferred by customers in buying an electrical two-wheeler so it will generate more sales for them than a new entrant in the automobile market. An electrical two-wheeler with low price with medium size will be bought more than other variants. As more than half of the population is environmentally conscious, a significant impact on environment with marketing of a new technology of an electrical two-wheeler will increase the chances of buying one.

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