

A STUDY ON FACTORS AFFECTING THE PURCHASE OF TWO-WHEELER EV IN LUDHIANA

Damandeep Singh Bhatia

Assistant Professor, Department of Business Management, Punjab College of Technical Education, Ludhiana

ABSTRACT

The usage of electric vehicles (EVs) are playing crucial role for reducing greenhouse gas emissions and de-carbonizing India. However, the adoption rate of two-wheeler EVs in Ludhiana, a major industrial hub in Punjab, remains comparatively low. This study finds the factors affecting the purchase of two-wheeler EVs in Ludhiana, with a focus on consumer behavior and preferences. A mixed-methods approach is used, combining both qualitative and quantitative data collection and analysis methods. The results show that consumer awareness and mindset, economic factors, subsidies from government are significant factors influencing the purchase decision of two-wheeler EVs. The study also reveals that demographic factors, such as age and income, also plays an important role in shaping consumer preferences for two-wheeler EVs. The findings of this study provide insights into the factors driving the adoption of two-wheeler EVs in Ludhiana and inform strategies for promoting sustainable transportation options in the city. The study's results have implications for government, manufacturers, and seeking to promote the adoption of two-wheeler EVs in India.

Keywords: Electric Vehicles (EVs), Two-Wheeler EVs , Sustainable Transportation , Consumer Behavior , Adoption Rate

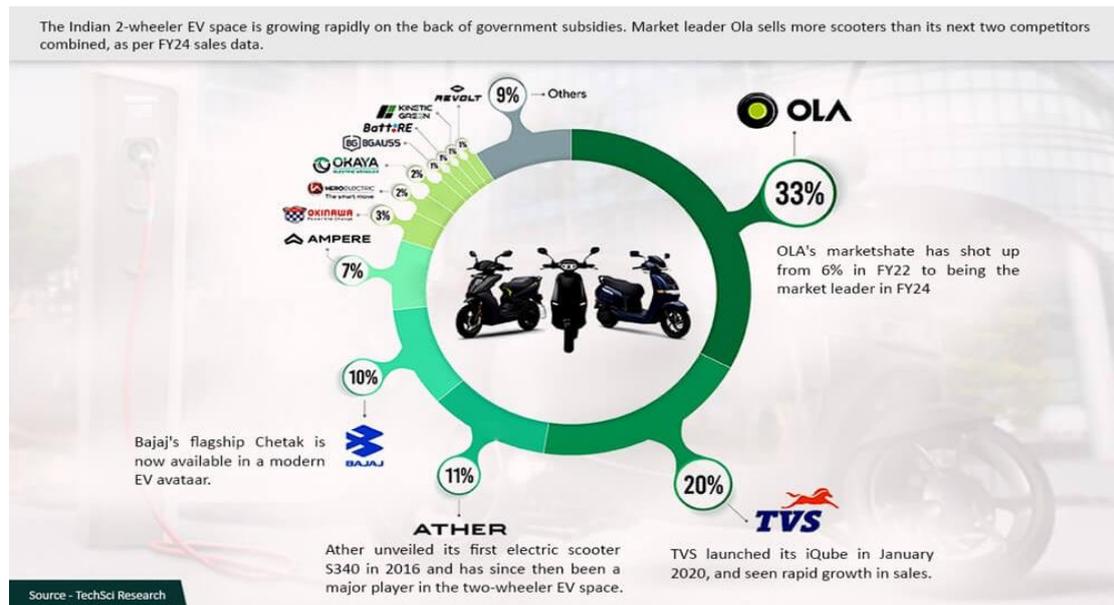
INTRODUCTION

The world is witnessing a significant shift towards sustainable development and environmentally-friendly transportation options, with electric vehicles (EVs) emerging as a promising alternative to traditional internal combustion engine vehicles. In India, the government has set ambitious targets to promote the adoption of EVs, with a focus on reducing greenhouse gas emissions and reducing dependency on fossil fuels. Two-wheeler EVs, in particular, have gained popularity in recent years due to their affordability, convenience, and environmental benefits.

- What are the key factors influencing the purchase decision of two-wheeler EVs in Ludhiana?
- How do consumer demographics, awareness, and perception affect the adoption of two-wheeler EVs?
- What role do economic factors, infrastructure availability, and government policies play in promoting the adoption of two-wheeler EVs?

By exploring these questions, this study aims to provide insights into the factors driving the adoption of two-wheeler EVs in Ludhiana.

1.2 KEY PLAYERS AND CATEGORIES IN TWO WHEELER EV



Source: TechieSci Research, 2024

Understanding the Reasons for Growth:

As discussed earlier, there are a number of contributing factors to the growth of India's electric two-wheeler segment. A few of the fundamental reasons are discussed below:

Environmental concerns and sustainable measures: With ever-growing concerns over the impact of fossil fuel-powered vehicles on the environment, sustainable approaches to mobility have become essential.

Successful government incentives: With successful schemes such as FAME and FAME II encouraging electric and hybrid vehicle purchases with financial support, ETWs have become more affordable and accessible to the general public.

Rising fuel prices: In India, the cost of petrol and diesel has been rising steadily, making it expensive for people to travel using conventional vehicles.

Economic Advantage and Lower Ownership Costs: Electric scooters have a lower cost of ownership than gasoline-powered scooters. While the cost of ownership may be higher initially, the long term savings are significant. Electric scooters have fewer moving parts, therefore less maintenance is required that save the significant maintenance cost.

Reducing Import Dependency: Fossil fuel import poses a significant concern for India, our import dependency is 82.8% on crude oil and 45.3% on natural gas. it values 17 lakh crore Indian rupees. An escalating trend in oil import, as seen in recent years. Electric vehicles not only reduce import dependency but also contribute to the development of renewable energy sources, fostering economic growth.

Technological advancements in electric mobility: Electric two-wheelers are now more dependable, effective, and practical to use thanks to the rapid advancements in electric vehicle technology in recent years. The range and performance of electric two-wheelers have also improved due to advancements in battery technology. (Source: EV-Chronicle)

TWO WHEELER ELECTRIC VEHICLES IN LUDHIANA

This study aims to keep check into the key factors that impact the purchase decisions of Ludhiana's residents regarding two-wheeler EVs. These factors are such as:

Environmental Awareness: Increasing awareness of environmental issues and concerns about air quality play a pivotal role in influencing consumers to opt for electric two-wheelers as a cleaner and more sustainable mode of transportation.

Government Incentives: The availability of government incentives, subsidies, and policies that promote the adoption of electric vehicles can significantly sway consumer decisions. Ludhiana's residents may consider factors such as tax breaks, reduced registration fees, and access to charging infrastructure.

Total Cost of Ownership (TCO): Consumers evaluate the TCO of electric two-wheelers, which includes not only the purchase price but also maintenance costs, electricity costs, and potential savings on fuel expenses.

Charging Infrastructure: The accessibility and convenience of charging infrastructure, such as charging stations and home charging solutions, can greatly affect the willingness of consumers to adopt electric two-wheelers.

Range and Performance: The range of the vehicle on a single charge and its overall performance, including speed and acceleration, are critical factors that consumers consider when choosing an electric two-wheeler.

Brand and Model Options: The availability of diverse brands and models in the electric two-wheeler market provides consumers with choices that align with their preferences and needs.

Social Influence: Peer recommendations, social trends, and the perception of electric two-wheelers as a status symbol can sway consumer behaviour.

Economic Considerations: Economic factors like rising fuel prices and the potential for long-term savings through electric vehicle ownership may drive consumers towards EVs.

Infrastructure and Traffic Conditions: The state of road infrastructure and traffic congestion in Ludhiana can influence the choice of electric two-wheelers due to their agility and suitability for urban commutes.

Resale Value: Consumers may consider the resale value of electric two-wheelers as they weigh their options, particularly if they plan to upgrade or change vehicles in the future.

REVIEW OF LITERATURE

Bhatia et al. (2022) This paper examines the impact of variables, viz., Environment Friendliness, Cost Efficiency, High Charging Time, Willingness to Pay Premium, Low Maintenance Charge, Willingness to Compromise Speed, Safety as Compared to Normal 2-Wheeler, and Comfort to Switch to Electric 2-Wheeler on the Purchase Intention of respondents towards Electric 2-Wheeler. For this purpose, data about customer perception towards these variables were collected and analysed.

Dixit, Singh (2022) After carrying out the literature review, it can be concluded that the electric vehicle industry in different regions and countries is at different levels of evolution. Many countries are making serious efforts in the development of electric vehicles and related infrastructure. Governments are also providing right policy, environment, and financial support to increase electric vehicle uptake. From the text analysis, it can be concluded that

people are talking about electric vehicles in India, but the issues they are discussing on the internet and social media platforms are not very serious or deep.

Gabhane et al. (2022) This study reveals that, economic factors the most important factor that influences consumer's purchase decision towards EVs followed by environmental, technological and infrastructural in Maharashtra, India. Vehicle manufacturers should focus their efforts on developing batteries at least with a range similar to Internal Combustion Engine (ICE).

Murugan, Marisamynathan (2023) This study found the following findings. Indian road users prefer to use TW for short and long daily commuting purposes because it is easy to ride in nature, low maintenance, fast and convenient travel experience, and high fuel efficiency. Lesser air pollution is the most significant factor that encourages the user to adopt E-TW over F-TW.

Shaikh et al. (2023) The study contributes to the existing literature through a comparative discussion on PV and EC in predicting the behavioral intentions to adopt EMs and enhances the current understanding of EM adoption in the context of Pakistan, which was not highlighted in previous research. Pakistan's National Electric Vehicle Policy targets shifting 50% of two-wheeler sales to the EMs. This study aims to suggest implications and marketing strategies for enhancing the EMs' market penetrations to achieve EV policy goals.

Digalwar, Rastogi (2023) Results shows that although the financial and the infrastructure factors have positive impact on rate of adoption of EVs in India; the vehicle performance factors have a negative impact on EVs adoption, implying that the respondents of the survey who feel that the vehicle performance factors are the most imperative have a more passive mind-set towards the EVs adoption.

K K, Aswathy and K N, Ushadevi (2024) Tahis research deals with the the problems faced by the consumers while buying and using the electric two wheeler. and how this study gives marketers the ability to create and carry out their marketing strategies effectively, giving them a stronger competitive edge.

Sharma, A. (2024), An exploratory and descriptive study was conducted to understand people's preferences towards EVs in India. Rising environmental concerns and fuel prices have led to the emergence of electric vehicles (EVs) as a sustainable transportation alternative. This study explores the factors influencing EV adoption in India, with a focus on Maharashtra. Through exploratory research, we identify key barriers to adoption, including high costs and inadequate infrastructure. As the EV market evolves, consumers are taking a wait-and-watch approach, awaiting further developments before considering a purchase.

Nagarkar, J., Malik, S., Paul, D., Mishra, D. K., & Raju, A. V. (2024, October) Factors Influencing the Adoption of Electric Two-Wheelers in India's Sustainable Transport Landscape. This study examines the factors influencing Indian consumers' willingness to purchase electric two-wheelers (E-TWs). With India being a significant contributor to global greenhouse gas emissions, understanding the potential for E-TW adoption is crucial. A survey of 199 respondents was conducted to gather data, which was analyzed using descriptive statistics, exploratory factor analysis, and logistic regression. The results identified three key variables affecting E-TW purchase decisions: technical factors and infrastructure, environmental benefits and government incentives, and brand reputation. The study's findings will help public and private organizations effectively promote E-TWs in India.

RESEARCH METHODOLOGY

OBJECTIVES OF STUDY

To study the Demographic characteristics of potential two wheeler EV buyers.

To identify the key factors affecting the purchase of two-wheeler EVs in Ludhiana

To analyze the impact of consumer demographics, awareness, and perception on the adoption of two-wheeler EVs

NEED AND SCOPE OF STUDY

The **scope** of a study on factors affecting the purchase of electric vehicles (EVs) in Ludhiana would encompass a comprehensive examination of the various elements that influence individuals' decisions to adopt or not adopt electric vehicles in this particular region. This study would involve investigating not only the environmental and economic aspects, such as the availability of charging infrastructure and government incentives, but also sociocultural factors, including attitudes and perceptions towards EVs in Ludhiana.

RESEARCH DESIGN

To achieve the study's goal descriptive research method will be used.

Descriptive Research – A study designed to depict the participants in accurate way, Questionnaire and observational study are the main ways to collect information. This type of research is used to define opinion, attitude or behaviour held by people according to demographics.

SAMPLING PLAN

Population – Population is the people of Ludhiana, Punjab.

Sample Size – The sample size for my study is 201 individuals

Sampling Method – Non-Probability Convenience sampling method is used for data collection.

DATA COLLECTION

Data is a critical component of any survey or project's success. It also minimizes the amount of uncertainty in decision making process.

Primary Data – Primary data was gathered through a survey questionnaire including different demographics of people who can and are the buyers of two wheeler EVs.

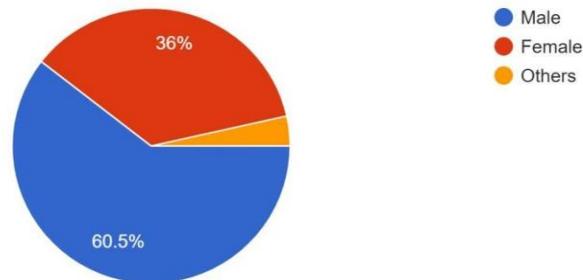
Secondary Data – Secondary data was gathered via internet, government and non-government entities, educational institutes and commercial information sources.

DATA ANALYSIS AND INTERPRETATION

Total number of the respondents - 201

Gender of the respondents

Gender:
200 responses



Analysis:

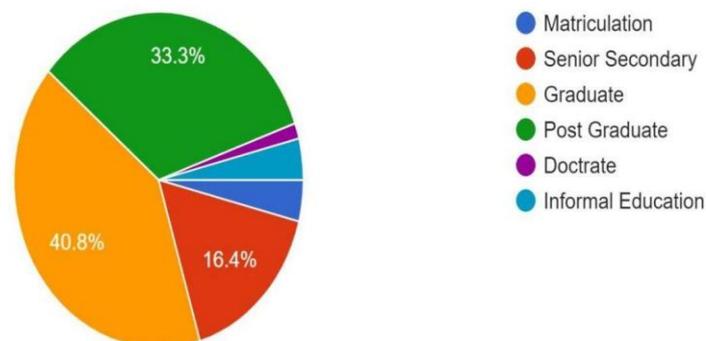
This pie chart depicts that out of 201 respondents **60.5%** of respondents are male, **36%** are female and **3.5%** are others.

Interpretation:

This chart interprets a notable gender distribution among respondents, with a clear majority identifying as male with **60.5%**. However, it's noteworthy that despite being smaller in number, the female respondents still constitute a good portion of the survey sample, comprising **36%**. Their representation shows the importance of considering diverse perspectives within the research conducted in Ludhiana.

Education level of the respondents:

Education Level:
201 responses



Analysis:

This pie chart shows that **40.8%** of respondents are graduate, **33.3%** are post graduate, **16.4%** are senior secondary educated, **4%** have done matriculation and informal education and around **1.5%** are doctrate.

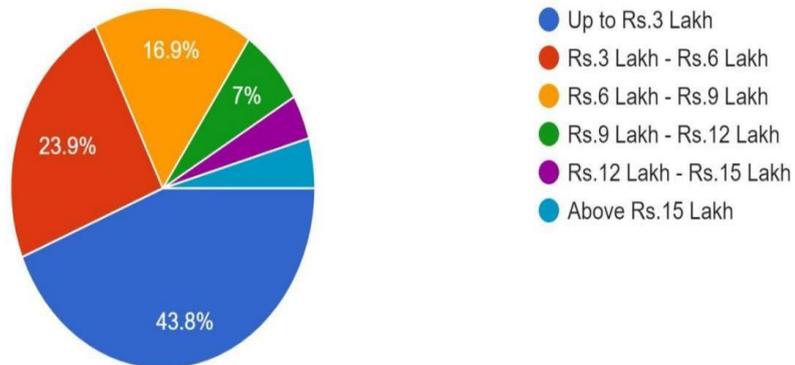
Interpretation:

The pie chart shows the educational level of 201 respondents, with 40.8% being graduates and 33.3% post-graduates, indicating a highly educated population. The majority (74.1%) hold a graduate or post-graduate degree, while smaller percentages have lower levels of education.

Income Level of the respondents:

Income Level (LPA):

201 responses



Analysis:

According to this pie chart, **43.8%** of respondents Income lies in the bracket of up to Rs.3 Lakh, **23.9%** lies between Rs.3 Lakh - Rs.6 Lakh, **16.9%** are between Rs.6 Lakh - Rs.9 Lakh, **7%** are in the bracket of Rs.9 Lakh - Rs.12 Lakh, **4.5%** respondents Income is Above Rs.15 Lakh and **4%** between Rs.12 Lakh - Rs.15 Lakh.

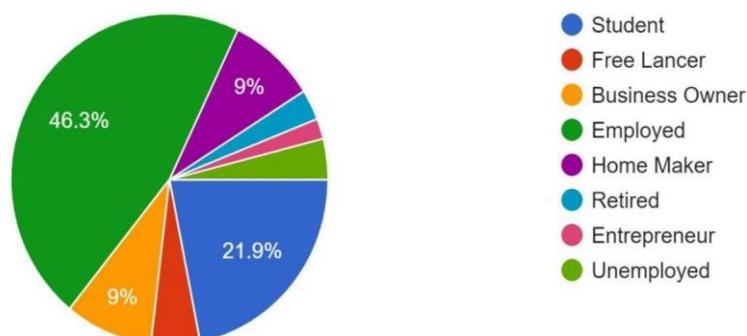
Interpretation:

The pie chart outlines the income level of respondents in Ludhiana. The pie chart shows the income levels of respondents in Ludhiana, with 43.8% earning up to Rs.3 Lakh and 23.9% earning between Rs.3-6 Lakh. The majority (67.7%) fall into lower to moderate income brackets, while a smaller percentage (15.5%) have higher incomes.

Occupation of the respondents:

Occupation:

201 responses



Analysis:

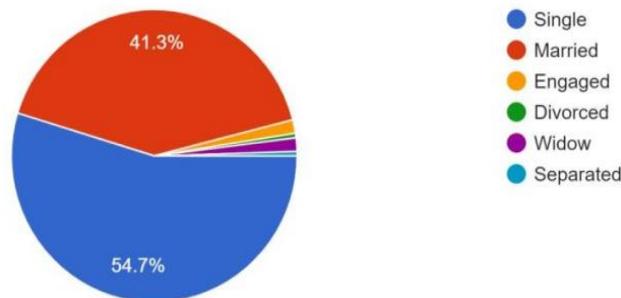
This pie chart depicts that **46.3%** of respondents are employed, **21.9%** of them are students, **9%** are Homemaker and business owners, **5%** are freelancers, **4%** are unemployed, **3%** and **2%** of respondents are Retired and Entrepreneur.

Interpretation:

This chart shows the occupational distribution of the population in Ludhiana. The majority (46.3%) are employed, followed by students (21.9%), homemakers (9%), and smaller percentages of freelancers, unemployed, retirees, and entrepreneurs. The chart provides a snapshot of the various occupations that sustain the population's livelihood.

Marital Status:

Marital Status:
 201 responses



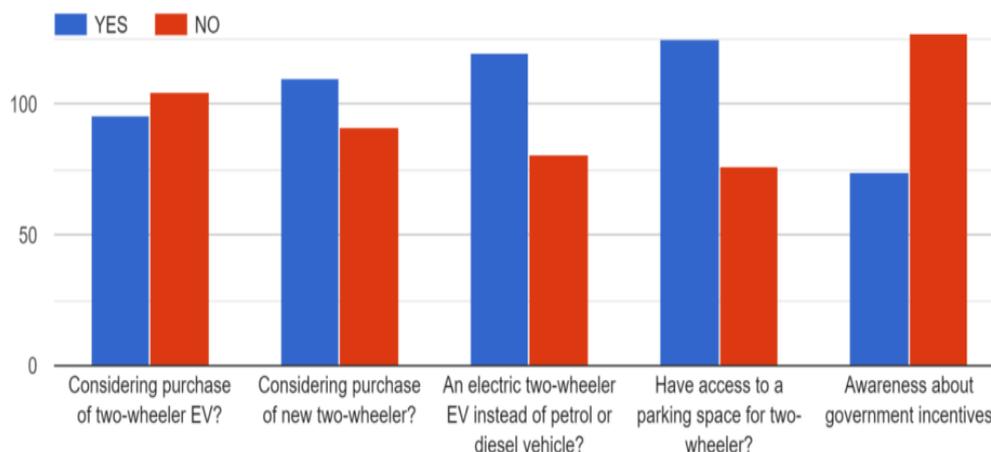
Analysis:

This pie chart shows Marital status of respondents from which **54.7%** of them are single, **41.3%** are married, **1.5%** are Engaged and widowed, **0.5%** are Divorced and separated.

Interpretation:

The data chart shows the marital status of the surveyed people in Ludhiana. Most, about **55%**, are single, meaning they're not married or in a committed relationship. Next, around **41%** are married, indicating they have married and live with their spouse. A small percentage, about **1.5%**, are either engaged to be married or widowed. Rest are divorced or separated from their previous partner. So, the chart gives us a picture of who is single, married, engaged, widowed, divorced, or separated among the surveyed sample in Ludhiana.

Do you Agree with these Statements or not:



Analysis:

According to this bar graph out of 201 respondents

	Yes	No
Have you ever considered purchasing a two-wheeler EV?	97	104
Are you considering purchasing a new two-wheeler vehicle in the upcoming future?	110	91
Would you consider purchasing an electric two-wheeler EV instead of a petrol or diesel vehicle?	122	79
Do you have access to a parking space where you could conveniently charge an electric two-wheeler?	126	75
Are you aware of the government incentives available for purchasing EVs in India?	73	128

Do you Agree with these Statements or not:

Interpretation:

The chart shows two bars for each question, labelled "Yes" and "No"

In the first question, the bar indicates that a significant number of people have considered buying an electric two-wheeler.

The second question has a similar result, with the "Yes" bar being taller than the "No" bar that identifies that people are open to purchasing new two-wheelers.

In the third question, "Would you purchase an electric two-wheeler (EV) instead of a petrol or diesel vehicle," the result is again similar with the "Yes" bar being taller than the "No" bar. It implies that people are aware of electric two-wheelers as an alternative to traditional fuel-powered vehicles

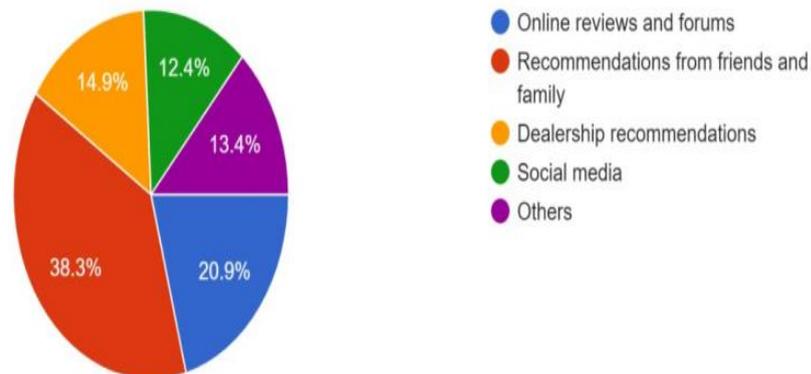
In the Fourth question, the chart shows a different result. This suggests that more people have access to parking for a two-wheeler for charging.

In the last question, "No" bar is taller than "Yes" bar which shows that less population have awarded about the government incentives regarding purchase of Two wheeler EVs.

What sources of information or recommendations influence your buying behavior for two-wheeler EVs?

What sources of information or recommendations influence your buying behavior for two-wheeler EVs?

201 responses



Analysis:

This pie chart shows that according to **38.3%** respondents, recommendations from friends and family influence their buying behaviour for two-wheeler EVs, **20.9%** get influence by online reviews and forums, **14.9%** choose dealership recommendations, **13.4%** of respondents choose other sources and **12.4%** get influence by social media for buying behaviour of two- wheeler EVs.

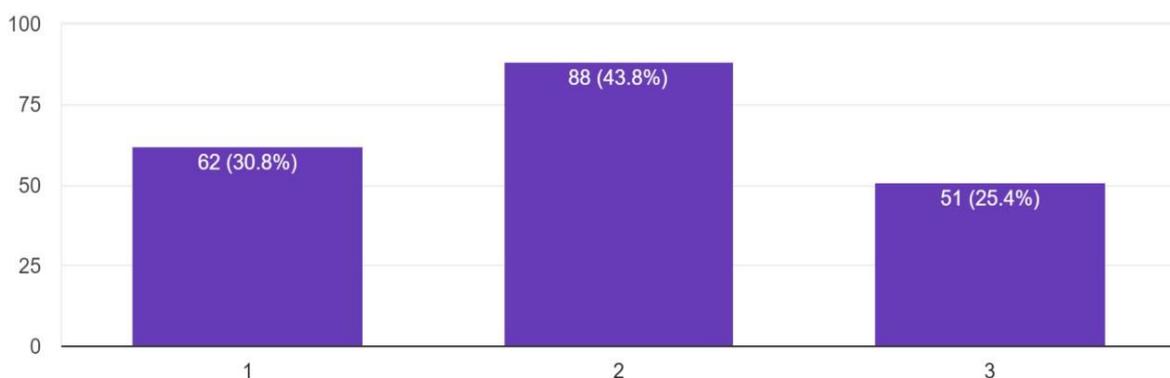
Interpretation:

The pie chart reveals the key influences on people's decisions to buy two-wheeler electric vehicles (EVs). The top factors are recommendations from friends and family (38%), online reviews and forums (21%), and dealership advice (15%). Social media and other sources also play a role, influencing 12% and 13% of people, respectively.

How likely are you to switch from a traditional fuel-powered two-wheeler to an EV in the next 1-2 years?

How likely are you to switch from traditional fuel-powered two-wheeler to an EV in the next 1-2 years?

201 responses



Analysis:

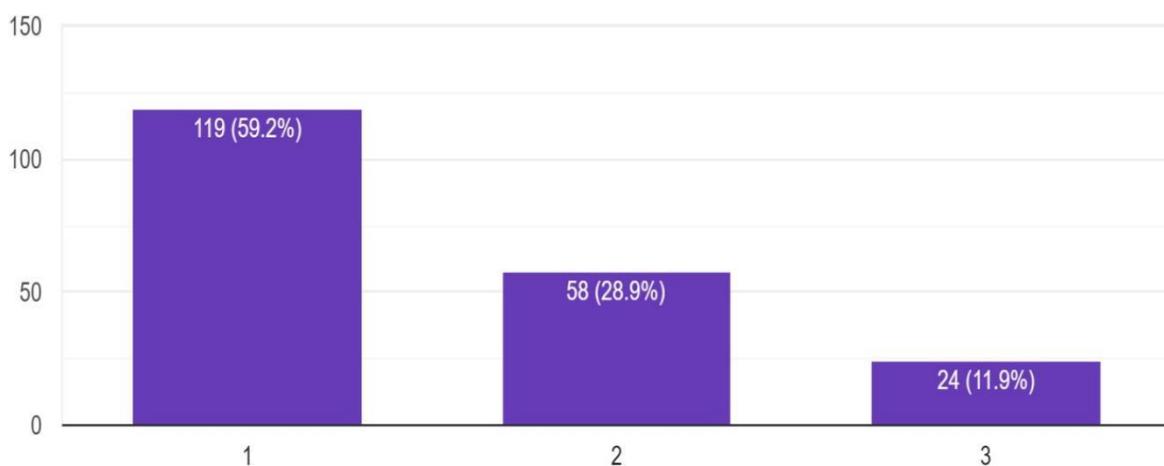
This chart shows that out of 201 respondents, **88** respondents say that they might switch to a Two-wheeler EV in the next 1-2 years. **62** respondents are likely to switch and **51** respondents say that they will not switch to EV two wheeler.

Interpretation:

The chart provides insights into the attitudes of respondents towards the adoption of two-wheeler EV. Among the 201 participants surveyed, **88** individuals expressed a potential interest in switching to a two-wheeler EV within the next 1-2 years. Additionally, **62** respondents indicated a higher level of confidence in making the switch, suggesting they are actively considering it. On other side, **51** respondents stated they will not switch to an EV two-wheeler. Overall, the chart illustrates a spectrum of willingness among respondents, ranging from openness to refusal regarding the adoption of two-wheeler EVs. How concerned are you about the availability of spare parts for two-wheeler EVs in case of repairs or maintenance?

How concerned are you about the availability of spare parts for two-wheeler EVs in case of repairs or maintenance?

201 responses



Analysis:

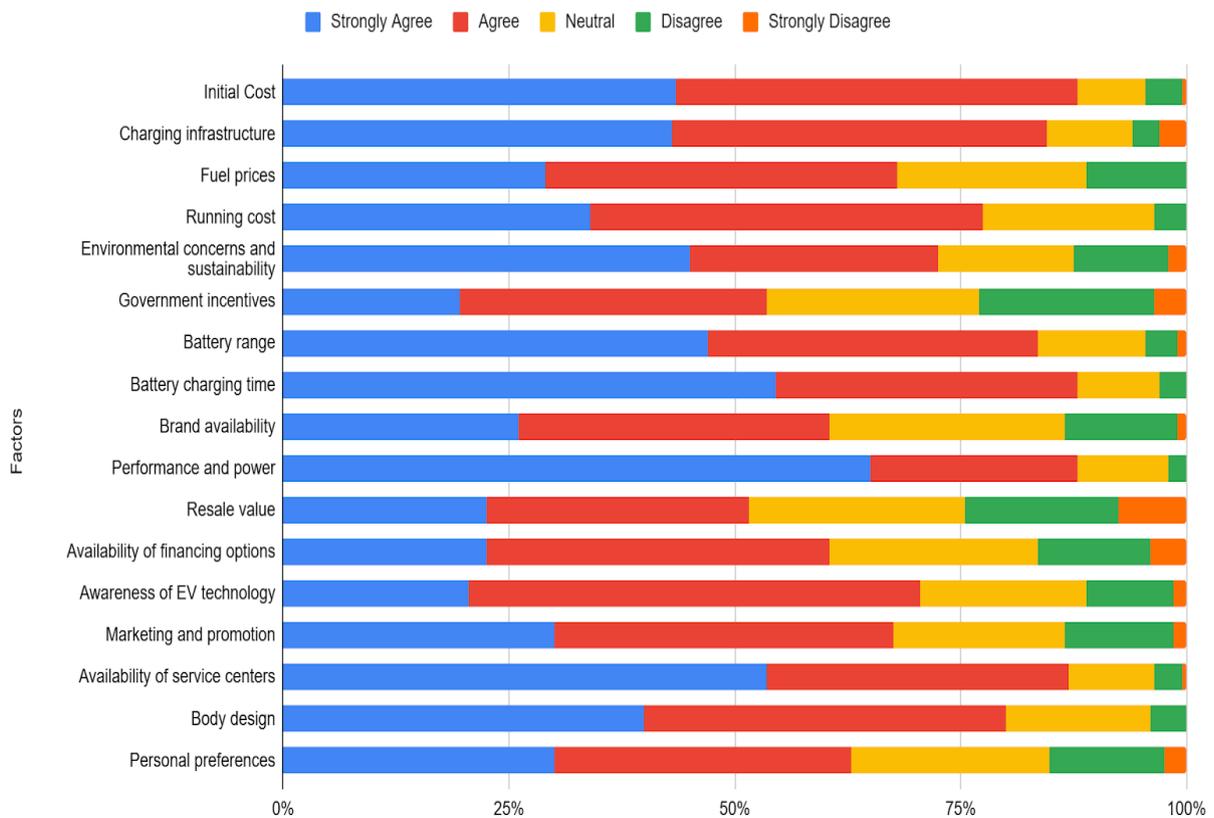
This bar graph shows that **59.2%** respondents are very concerned about availability of spare parts of Two wheeler EV, followed by **28.9%** which are somewhat concerned and very less i.e. **11.9%** respondents are not concerned about spare parts in case of repairs or maintenance.

Interpretation:

The bar graph illustrates respondents' levels of concern regarding the availability of spare parts for two-wheeler electric vehicles (EVs). The majority, **59.2%** expressed a high level of concern about spare parts availability, indicating its significance in their considerations of EV maintenance and repairs. Around **28.9%** of respondents are somewhat concerned. Conversely, **11.9%** are not concerned, indicating a lower level of worry and potentially higher confidence in the existing infrastructure for EV maintenance in Ludhiana region.

Major Factors affecting the purchase of Two wheeler EV?

Major Factors affecting the Purchase of Two-Wheeler EV?



Analysis:

Factors	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Initial Cost	87	89	15	8	1
Charging infrastructure	86	83	19	6	6
Fuel prices	58	78	42	22	0
Running cost	68	87	38	7	0
Environmental concerns	90	55	30	21	4
Government incentives	39	68	47	39	7
Battery range	94	73	24	7	2

Battery charging time	109	67	18	6	0
Brand availability	52	69	52	25	2
Performance and power	130	46	20	4	0
Resale value	45	58	48	34	15
Availability of financing options	45	76	46	25	8
Awareness of EV technology	41	100	37	19	3
Marketing and promotion	60	75	38	24	3
Availability of service centres	107	67	19	6	1
Body design	80	80	32	8	0
Personal preferences	63	69	46	27	5

Interpretation:

The data indicates that people are receptive to using two-wheeler electric vehicles (EVs), citing affordability, environmental benefits, and performance as key factors. They also value good battery life, quick charging, and attractive designs. However, respondents identified areas for improvement, including more charging stations, greater awareness of government incentives, and more EV brand options. Overall, the survey suggests that EVs are gaining popularity, but still require improvements to become a more mainstream transportation choice.

FINDINGS AND RESULTS BASED ON OBJECTIVES:

Findings from Objective 1: To study the Demographic characteristics of potential two-wheeler EV buyers.

Gender: The survey results show a tilt towards male respondents (60.5%) compared to females (36%). However, a significant portion of females are still interested in two-wheeler EVs, highlighting the need for diverse marketing strategies.

Education: A high proportion of respondents have a college degree (40.8%) followed by post-graduates (33.3%). This indicates a well-educated population with potential for technology adoption like electric vehicles.

Income: The majority of respondents fall into the lower to moderate income brackets (up to Rs. 6 Lakh annually). This suggests affordability as a key factor for EV adoption.

Occupation: The working population (46.3%) represents the largest segment, followed by students (21.9%). This highlights the need for EVs that cater to commuting needs.

Marital Status: The majority of respondents are single (55%). This doesn't necessarily affect EV purchase decisions but can be factored into marketing approaches.

Findings from Objective 2: To analyse the factors affecting the purchase of two-wheeler EV and its relation with Demographics.

Interest in EVs: A significant portion of respondents (represented by the taller "Yes" bars in questions 1, 2, and 3) have shown interest in considering electric two-wheelers as an alternative to traditional fuel vehicles. This indicates a positive outlook on EVs.

Awareness of Government incentives regarding electric two-wheeler: While many are open to EVs, a lower percentage (indicated by the shorter "Yes" bar in question 5) are aware of government incentives for EV purchases. This highlights a gap in public awareness that can be addressed through targeted campaigns.

Access to Parking for Charging: More people have access to parking for a two-wheeler for charging.

Influencing factors: Friends and family recommendations (38%) are the biggest influence on purchase decisions, followed by online reviews (21%). This suggests that social proof and online research play a major role for this demographic.

Adoption Potential: There is a spectrum of willingness to adopt EVs (88 interested, 62 actively considering, 51 not interested). This indicates the need for multi-pronged strategies to address concerns and encourage adoption.

Concerns: A high percentage (59.2%) expressed concern about spare parts availability for EVs. This suggests that a robust service infrastructure is crucial for wider EV adoption, especially for a demographic that might prioritize maintenance ease.

COMBINED FINDINGS

The demographic data suggests that potential two-wheeler EV buyers in Ludhiana are likely to be:

Educated (graduate or post-graduate), Part of the working population or students, Earning a lower to moderate income. These demographics correlate with the factors affecting purchase decisions. They prioritize affordability, are influenced by social proof and online research, and have concerns about maintenance infrastructure. Overall, the survey results indicate a growing openness towards electric two-wheelers in Ludhiana. By addressing concerns about affordability, maintenance, and spreading awareness of government incentives, EV manufacturers and policymakers can accelerate EV adoption in this region.

SUGGESTIONS AND RECOMMENDATIONS:

Awareness Programs:

Conduct awareness programs to educate the public about the benefits of electric vehicles (EVs), government incentives, and financing plans that can make EVs more affordable.

Infrastructure Development:

Invest in developing more charging stations across the city to alleviate concerns about charging accessibility.

Service Centres:

Establish dedicated service centres for EVs to address concerns about maintenance and availability of spare parts.

Diverse Options:

Encourage more EV brands to enter the market to provide consumers with a wider range of options.

Target Marketing:

Given the high percentage of respondents who are influenced by friends and family, word-of-mouth marketing strategies could be effective.

Online Presence:

Enhance online presence considering a significant number of respondents rely on online reviews and social media for information.

Collaboration with Dealerships:

Collaborate with dealerships for promotional activities as they influence a good portion of potential buyers.

Focus on Key Features:

Emphasize key features such as affordability, environmental benefits, performance, battery life, and quick charging times in promotional activities.

Product Development:

Considering the importance of battery life, quick charging times, and easy servicing (mentioned in desirable qualities), recommend manufacturers to focus on these aspects in future EV models.

CONCLUSION

This research provides valuable insights into the potential market for two-wheeler electric vehicles (EVs) in Ludhiana. The demographic characteristics of potential buyers, predominantly educated males from the working population or students with lower to moderate income, indicate a market segment that values affordability, social proof, and easy maintenance.

The interest in EVs among this demographic is encouraging, suggesting a positive outlook towards this technology. However, the lack of awareness about government incentives for EV purchases and concerns about the availability of spare parts highlight areas that need attention.

Addressing these concerns through targeted marketing strategies, public awareness campaigns about government incentives, and ensuring a robust service infrastructure can significantly influence the adoption of two-wheeler EVs.

In conclusion, the future of two-wheeler EVs in Ludhiana looks promising. With the right strategies addressing the identified factors, manufacturers and policymakers can tap into this potential and accelerate the transition towards sustainable transportation in the region. This research provides a roadmap for such an endeavour, contributing to the broader goal of environmental sustainability.

REFERENCES

1. **Techiesci Research** , Top 6 Electric two wheeler ,2024 Retrieved From
2. <https://www.techsciresearch.com/blog/top-electric-two-wheeler-companies-in-india/4512.html>.
3. **Mahajan A., K. N., M. R. (2021)**. *A Study on Factors influencing buying behaviour of fourwheelers electric vehicle in Madhya*.
4. **Digalwar K. A., T. G. A., R. A. (2021)**. 28th CIRP Conference on Life Cycle Engineering. *Evaluation of Factors for Sustainable Manufacturing of Electric Vehicles in India*.
5. **Munshi T., D. S., P. J. (2022)**. *Understanding barriers to electric vehicle adoption*

for personal mobility: A case study of middle income in-service residents in Hyderabad city, India.

6. **Murugan M., M. S. (2022).** A Journal on the world conference on transport research society. *Estimation of two-wheeler users' mode shift behaviour and policy analysis to encourage electric-bike adoption in India.*
7. **Rahul Chakraborty, S.C. (2023).** A Journal on the world conference on transport research society. *Factors affecting acceptance of electric two-wheelers in India: A discrete choice survey.*
8. **Aswathy K. K., U. N. K. (2024).** Kerala, India. Asian Journal of Agricultural Extension, Economics & Sociology. *Problems Faced by the Consumers While Buying and Using the Electric Two Wheeler in Thrissur District.*
9. **Sharma, A. (2024).** Factors Affecting the Adoption of Electric Vehicles: Prospects and Challenges: With Special Reference to Maharashtra. Sustainable Tourism, Part A: Balancing Conservation and Progress in a Dynamic Industry, 149-166.
10. **Nagarkar, J., Malik, S., Paul, D., Mishra, D. K., & Raju, A. V. (2024, October).** Navigating the Evolution: Factors Influencing the Adoption of Electric Two-Wheelers in India's Sustainable Transport Landscape. In IOP Conference Series: Earth and Environmental Science (Vol. 1402, No. 1, p. 012062). IOP Publishing