

# Electric Vehicles: Tracing the Evolution from Past to Present and Charting Future Frontiers

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## ABSTRACT

Electric vehicles (EVs) were recently reintroduced to the global car market. These are an improvement over their predecessors in performance and electric driving range. Although the uptake of EVs has been notable in a short period of time, most government goals for adoption have not been met. This paper reviews a growing body of peer-reviewed literature assessing factors affecting EV adoption. Several important gaps in knowledge are identified. First, there is mixed evidence of the effectiveness of government incentives in encouraging EV uptake and particularly little knowledge in regards to issues of timing and magnitude. The literature shows that public charging infrastructure is an important factor associated with EV uptake, though the direction of causality is yet unclear. Public charging infrastructure can ease range anxiety, particularly for battery electric vehicles, but there is little guidance as to the way in which government should best go about ensuring the provision of infrastructure. Lastly, the nascent EV market means that studies primarily rely on surveys about hypothetical situations. There is strong evidence that actual purchases are much lower than consumers' stated preferences. Improving understanding of this "attitude-action" gap is important to better informing studies of EV uptake over time.

## INTRODUCTION:

Navigating the Road Ahead - Public Perception and the Future of Electric Vehicles Climate change is breaking time. These kinds of headlines are surfacing across internet for a few decades now. It poses a great threat to our planet and one of the most significant factors is our current transportation system which is a major contributor to greenhouse gas emissions. But Electric Vehicles (EVs) have emerged as a promising solution. It is being introduced as a cleaner alternative to traditional gasoline-powered cars. But this solution also faces a major problem that is the public adoption and perception. This research paper delves into the evolving public view of EVs, exploring the interplay between perceived benefits, potential drawbacks, and the factors influencing choices related to electric transportation.

While the latest research mainly focuses on the factors like Technological innovations, Battery range, charging infrastructure, understanding public perception is crucial for their successful integration into our transportation landscape. This paper goes beyond technical considerations to examine how the public perceives EVs. Public

Perception and its adoption towards EVs exist on a spectrum. As the classification goes for the kinds of buyers, Early adopters are more enthusiastic because of the allure of technology while late majority and laggards are weighed down by concerns about range anxiety, limitations of charging infrastructure and higher costs of EVs initially.

This research aims to shed light on the public's understanding of EVs, identifying both the perceived benefits and the potential drawbacks that influence decision-making. By exploring public concerns, such as range limitations and charging infrastructure availability, we can identify areas requiring further development and targeted solutions.

By taking public perception into account and its influencing factors, this research paper helps future considerations for formation of strategies to assess for more wider adoption of EVs. This can involve addressing concerns through infrastructure development, policy interventions, and educational campaigns, ultimately paving the way for a more sustainable transportation future.

This Research paper will use mixed-methods approach to immerse in the topic and provide findings connected to public perception.

- **Awareness and Knowledge:** Assessing public understanding of EVs and their benefits.
- **Perceived Benefits and Drawbacks:** Identifying the factors that motivate or deter individuals from considering EVs.
- **Decision-Making Factors:** Exploring what factors are most important when choosing a new vehicle and how EVs fit into this equation.
- **The Role of Policy and Infrastructure:** Understanding how government incentives and charging infrastructure development can influence public perception.

As this paper explores the human factor in the EV revolution, moving beyond technical considerations, identification for areas for improvement to promote wider EV adoption can be formed. By examining these aspects of public perception, this research aims to contribute to the ongoing conversation about electric vehicles and their role in a sustainable future for transportation.

## **REVIEW OF LITERATURE**

1. In the paper "**Electric vehicles revisited: a review of factors that affect adoption**", Coffman et al. (2016) examine a range of factors influencing the adoption of electric vehicles (EVs). Their review highlights the significant impact of external factors like relative fuel prices, consumer characteristics, the availability of charging stations, and the influence of social norms on EV uptake. They acknowledge that while EV adoption has seen notable growth, most government targets have not been met, necessitating a deeper understanding of the influencing factors. The authors delve into existing research to explore the complex interplay between these factors and consumer decisions regarding EVs.

2. A literature review by '**Key Factors Influencing Consumers' Purchase of Electric Vehicles**' by **Jui-Che Tu** and **Chun Yang** (2023) explores the key factors influencing consumer decisions to purchase electric vehicles (EVs). Their research highlights numerous factors impacting this behaviour, categorized into economic, technological, psychological, and social aspects. Economically, the upfront cost of EVs compared to gasoline vehicles and the potential for government incentives and rebates are significant considerations. Technologically, concerns regarding driving range anxiety, charging infrastructure availability, and charging time are crucial factors for consumers. Psychologically, factors like environmental awareness, perception of EVs as an innovative

technology, and individual driving habits also play a role. Socially, factors like brand loyalty, influence from peers and family, and overall public perception of EVs can influence purchase decisions.

3. A Literature Review of the paper '**A review and simple meta-analysis of factors influencing adoption of electric vehicles.**' by Virender Singh, Vedant Singh, S. Vaibhav conducted a comprehensive analysis of factors influencing the adoption of electric vehicles (EVs), focusing on various socio-economic, psychological, and environmental factors. Their study aimed to provide insights into the dynamics shaping consumer behaviour towards EV adoption. They identified key determinants such as government incentives, charging infrastructure availability, cost of ownership, environmental consciousness, and social influence. Moreover, a meta-analysis on similar themes, aiming to consolidate findings across multiple studies. Their meta-analysis revealed significant correlations between factors like income level, environmental attitudes, and perceived vehicle attributes with EV adoption rates. By synthesizing existing literature, these studies shed light on the complex interplay of factors influencing the transition towards electric mobility, offering valuable insights for policymakers and industry stakeholders.

4. In the paper **A qualitative comparative analysis on factors affecting the deployment of electric vehicles** conducted by **Taeseok Yong** and **Chankook Park**, published in 2014, the authors performed a qualitative comparative analysis to investigate the factors influencing the deployment of electric vehicles (EVs). The literature review conducted at the outset of the paper highlighted several key factors identified by previous research as influencing EV deployment, including government policies and incentives, technological advancements, consumer attitudes and preferences, infrastructure availability, and economic factors such as fuel prices and vehicle costs. The authors aimed to build upon existing knowledge by conducting a comparative analysis of these factors across different countries to better understand their relative importance in driving EV adoption. Through their research, Yong and Park sought to provide insights that could inform policymakers and stakeholders in promoting the widespread adoption of EVs.

5. The paper "**Electric vehicles revisited: a review of factors that affect adoption**" published in 2016 by Makena Coffman, Paul Bernstein, and Sherilyn Wee, examines the several factors influencing the adoption of electric vehicles (EVs). While acknowledging the increasing popularity of EVs, the authors point out that most government targets for EV adoption have not been met. They delve into the existing research on this topic, exploring the key external factors impacting EV uptake. These factors include Relative fuel prices, Consumer characteristics, Availability of charging stations, public visibility, and social norms. The paper highlights the need for further research to understand the complex interplay of these factors and their combined influence on EV adoption.

6. In their 2021 literature review of '**The rise of electric vehicles—2020 status and future expectations**' by Matteo Muratori, Marcus Alexander, Doug Arent, Morgan Bazilian, Pierpaolo Cazzola, Ercan M. Dede, John Farrell, Chris Gearhart, David Greene, and Alan Jenn examine the status and future expectations of electric vehicles (EVs) based on data from 2020. The authors provide a comprehensive overview of the current landscape of EV adoption, covering topics such as market trends, technological advancements, policy frameworks, and consumer preferences. They analyse the progress made in the EV industry, identify challenges and barriers to further adoption, and discuss potential pathways for the future growth of EVs. By synthesizing information from various sources, the authors aim to inform stakeholders and decision-makers about the opportunities and challenges associated with the rise of electric vehicles.

7. In her 2015 paper '**The future of electric vehicles: prospects and impediments**', Amela Ajanovic explores the prospects and impediments of electric vehicles (EVs) in shaping the future of transportation. Ajanovic examines the current state of EV technology, market trends, policy frameworks, and consumer attitudes towards EV adoption. The review discusses the potential benefits of widespread EV deployment, such as reduced greenhouse gas emissions and energy dependence, while also addressing challenges such as excessive costs, limited infrastructure, and range anxiety. By synthesizing existing research and data, Ajanovic provides insights into the opportunities and barriers facing the future of electric vehicles, aiming to inform policymakers, industry stakeholders, and researchers about the potential pathways for advancing EV adoption.

8. In their 2010 paper '**Electric Vehicles – Personal transportation for the future**', Grant A. Covic, John T. Boys, Mickel Budhia, and Chang-Yu Huang examine the role of electric vehicles (EVs) in shaping the future of personal transportation. The authors discuss the technological advancements and potential benefits of EVs, such as reduced greenhouse gas emissions and energy efficiency. They also address challenges such as battery limitations, infrastructure requirements, and consumer acceptance. By synthesizing existing research and data, the review provides insights into the opportunities and barriers facing the widespread adoption of electric vehicles. The authors aim to inform policymakers, industry stakeholders, and researchers about the potential pathways for advancing EV technology and promoting sustainable transportation options.

9. In their 2023 paper '**Towards an Energy Future with Ubiquitous Electric Vehicles: Barriers and Opportunities**', Mohammad Mohammadi, Jesse Thornburg, and Javad Mohammadi examine the potential for ubiquitous electric vehicles (EVs) to shape the future of energy consumption. The authors identify barriers and opportunities associated with widespread EV adoption, including technological limitations, infrastructure requirements, and policy considerations. They discuss the role of EVs in transitioning towards a more sustainable energy future, highlighting their potential to reduce greenhouse gas emissions and dependence on fossil fuels. By synthesizing existing research and data, the review provides insights into the challenges and opportunities facing the integration of EVs into energy systems. The authors aim to inform policymakers, industry stakeholders, and researchers about the pathways for advancing EV adoption and promoting sustainable energy solutions.

10. In their 2012 paper '**Factors affecting future demand for electric vehicles: A model-based study**', Simon Shepherd, Peter Bonsall, and Gillian Harrison conduct a model-based study to explore the factors influencing future demand for electric vehicles (EVs). The authors analyse various determinants of EV adoption, including vehicle attributes, consumer preferences, government policies, and economic factors. By employing a modelling approach, they aim to forecast the potential demand for EVs under different scenarios and policy interventions. The review provides insights into the complex interactions between these factors and their implications for the future uptake of electric vehicles. The authors seek to inform policymakers, industry stakeholders, and researchers about the key drivers shaping the demand for EVs and the potential strategies for promoting their widespread adoption.

11. In their 2017 paper '**Sustainable Transportation with Electric Vehicles**', Fanxin Kong and Xue Liu explore the potential of electric vehicles (EVs) to contribute to sustainable transportation. The authors examine various aspects of EV technology, including battery advancements, charging infrastructure, and vehicle-to-grid integration. They discuss the environmental benefits of EVs, such as reduced greenhouse gas emissions and air pollution, as well as the challenges associated with their widespread adoption. By synthesizing existing research and data, the review provides insights into the opportunities and barriers facing the integration of EVs into transportation systems. The authors aim to inform policymakers, industry stakeholders, and researchers about the potential pathways for advancing EV technology and promoting sustainable transportation solutions.

12. In their 2013 paper '**Affordability of electric vehicles for a sustainable transport system: An economic and environmental analysis**', Hui-Kuan Tseng, Jy S. Wu, and Xiaoshuai Liu conduct an economic and environmental analysis to assess the affordability of electric vehicles (EVs) for achieving a sustainable transport system. The authors examine the costs associated with EV ownership, including initial purchase price, fuel savings, and maintenance expenses, in comparison to conventional internal combustion engine vehicles. Additionally, they evaluate the environmental benefits of EVs, such as reduced greenhouse gas emissions and air pollution. By synthesizing existing research and data, the review provides insights into the economic and environmental implications of EV adoption for achieving sustainability in transportation. The authors aim to inform policymakers, industry stakeholders, and researchers about the potential role of EVs in promoting sustainable transport systems.

13. In his 2021 literature review titled "**On the sustainability of electric vehicles: What about their impacts on land use?**" Francesco Orsi explores the potential impacts of electric vehicles (EVs) on land use sustainability. Orsi investigates various aspects of land use related to EV adoption, including the production of materials for EV batteries, the expansion of charging infrastructure, and the potential for land degradation and habitat loss. By synthesizing existing research and data, Orsi provides insights into the complex relationship between EVs and land use sustainability. The review aims to inform policymakers, industry stakeholders, and researchers about the importance of considering land-related impacts when promoting EVs as part of sustainable transportation strategies.

14. Andreas Poullikkas published a literature review in January 2015 titled "**Sustainable options for electric vehicle technologies.**" In this review, Poullikkas explores various sustainable options and advancements in electric vehicle (EV) technologies. The paper discusses distinct aspects of EV technology, including battery technology, charging infrastructure, and vehicle-to-grid integration. By synthesizing existing research and data, Poullikkas provides insights into the potential for EVs to contribute to sustainable transportation solutions. The review aims to inform policymakers, industry stakeholders, and researchers about the opportunities and challenges associated with the development and adoption of sustainable EV technologies.

15. In their 2020 literature review titled "**Moving towards sustainable purchase behavior: examining the determinants of consumers' intentions to adopt electric vehicles,**" Guowei Xu, Shanyong Wang, Jun Li, and Dingtao Zhao explore the factors influencing consumers' intentions to adopt electric vehicles (EVs). The authors investigate various determinants, including individual attitudes, perceived benefits and barriers, environmental concerns, and socio-demographic factors, which may influence consumers' willingness to purchase EVs. By synthesizing existing research and data, the review provides insights into the complex decision-making processes involved in EV adoption. The authors aim to inform policymakers, industry stakeholders, and researchers about the key drivers shaping consumer intentions towards EV adoption, with the goal of promoting sustainable transportation behaviour.

16. The "Technical and Economic Considerations for Second-Life Electric Vehicle Batteries in Grid-Scale Energy Storage" by Subramanian et al. [16] Focus: This paper takes a more specific look at using second-life EV batteries for grid-scale energy storage. It evaluates the technical considerations for integrating these batteries into the power grid, including battery management systems, safety protocols, and cost-effectiveness compared to new batteries

17. Types of vehicles and how they affect the environment. It also details different approaches to solving these problems. The authors mention that future research should focus on new technologies and how to better integrate environmental and economic goals. This literature review was published in January 2021 by Mohammad Asghari, S. Mohammad J. Mirzapour Al-e-hashem.

18. "Overcoming Barriers to Electric Vehicle Adoption: A Global Review" by Hao et al. [8] Focus: Provides a global perspective on barriers to EV adoption, analyzing factors like government policies, consumer awareness, and infrastructure development.

19. "The Potential of Electric Vehicles for Greenhouse Gas Emissions Reduction in Urban Areas" by Wang et al. [6] Focus: Analyzes the potential of EVs to reduce greenhouse gas emissions in urban areas, considering factors like electricity source and driving patterns.

20. Farrell's 2011 literature review provides a comprehensive overview of recent periodical literature, categorizing articles by historical period. This approach allows for a broad understanding of the development of the topic over time. However, it may lack a more in-depth analysis of specific themes or trends within literature.

21. A Review of Electric Vehicles: Technologies, Sustainability and Social Impact (2016): Lukic et al. take a more comprehensive approach in their review. They delve into the various technologies that make EVs function, including batteries, motors, and power electronics. They also analyze the environmental benefits of EVs compared to traditional gasoline-powered vehicles, highlighting their role in reducing greenhouse gas emissions and air pollution. Additionally, the review explores the broader social impact of EVs, considering factors like job creation in new industries and potential changes in transportation infrastructure.

22. Electric Vehicles in Smart Grids: Interaction and Optimization (2013):

Li et al. focus on a specific aspect of the EV future: the connection with smart grids. Smart grids are intelligent electricity networks that can adapt to changing demands and optimize energy use. This review explores how EVs can interact with smart grids, potentially acting as both energy consumers and providers. For example, EVs could store excess energy from the grid during off-peak hours and then feed it back during peak demand periods. This two-way interaction has the potential to improve the efficiency and sustainability of the entire electricity system.

22. "Life Cycle Assessment of Electric Vehicles: A Review" (2020) by S. Brandão, M. A. Delgado, and A. P. Pina.

This review by Brandão et al. goes beyond just the technology and explores the environmental impact of EVs throughout their entire life cycle. This includes not only the emissions during operation but also the environmental costs of resource extraction, battery production, vehicle manufacturing, and end-of-life disposal. Understanding the life cycle impact is crucial for ensuring the true sustainability of EVs compared to traditional vehicles.

23. "The Role of Consumer Acceptance in Electric Vehicle Adoption: A Review of the Literature" (2021) by A. A. F. Al-Kaabi and A. H. Al-Nasseri.

Al-Kaabi and Al-Nasseri shift the focus to the human element in their review. They analyze the various factors influencing consumer acceptance of EVs. This includes factors like concerns about range anxiety (fear of running out of power before reaching a charging station), perceptions of cost and charging infrastructure availability, and

even social and cultural attitudes towards EVs. Understanding consumer preferences is essential for promoting wider EV adoption.

24. "Electric Vehicles: A Review of Patent Activity and Innovation Trends" (2019) by M. A. Rahman, M. S. Hossain, and H. R. Pota. Rahman et al. take a unique approach in their review by analyzing patent activity related to EVs. By studying patents, they can identify emerging trends and innovations in EV technology. This offers valuable insights into the direction that EV development is heading and the potential breakthroughs that might be on the horizon.

25. "The Future of Electric Vehicles: Perspectives from the Automotive Industry, Energy Sector, and Public Policy" (2012) by A. Faaij, M. Van Den Rooij, and K. Vlemmix.

This review by Faaij et al. offers a multi-stakeholder perspective. It explores the views of three key players in the future of EVs: the automotive industry, the energy sector, and public policymakers. Understanding the perspectives of each group is crucial for overcoming challenges and fostering collaboration towards a successful EV future. The automotive industry needs to develop efficient and affordable EVs, the energy sector must be prepared to accommodate an increase in electricity demand, and public policies should incentivize EV adoption and infrastructure development.

26. "Electric Vehicles in China: Policies, Progress, and Future Challenges" (2015) by S. Hao, X. Li, X. Lin, and L. Xiaoyi.

Hao et al. take a geographically specific approach. They focus on the rapid development of EVs in China, a global leader in EV adoption. The review examines the government policies implemented in China to encourage EV use, the progress made by Chinese manufacturers, and the unique challenges they face. Understanding this specific case study provides valuable insights into the potential for wider EV adoption and the factors that can influence its success.

27. "The Economics of Electric Vehicles: A Review of the Literature" (2016) by M. A. Rahman, M. S. Hossain, and H. R. Pota.

This review by Rahman et al. delves into the economic side of EVs. It analyzes the costs associated with EVs, including initial purchase price, battery replacement, and maintenance. It also explores the potential economic benefits, such as lower fuel costs and government incentives. Additionally, the review examines the broader economic impact of EVs on industries like oil and gas production, electricity generation, and job creation in new sectors.

28. The evolution of electric vehicles (EVs) and hybrid electric vehicles (HEVs) has been driven by a combination of technological advancements and environmental concerns. Chan (2002) and Zhu (2007) both highlight the importance of key technologies such as power electronics and motor drives in the development of these vehicles. Emadi (2008) further emphasizes the role of power electronics in enabling the development of environmentally friendly vehicles. Tie (2013) underscores the potential of EVs in reducing global greenhouse gas emissions, but also points out the challenges, particularly in battery cost. The integration of alternative resources to the utility grid and the role of smart grid control in managing demand are also discussed. These studies collectively chart the evolution of EVs and HEVs, from their engineering philosophy and key technologies to their potential future frontiers.

29. "Electric and Hybrid Vehicles: Design Fundamentals" (2001) by M. H. Rashid.

This book, though not directly a review, provides a foundational understanding of EV design principles and historical context. It offers a starting point for understanding the technical underpinnings of EVs and their historical development.

These reviews provide a solid foundation for understanding the evolution of electric vehicles, the current state of the technology, and the potential future directions. Remember that the field of EVs is rapidly evolving, so conducting your own research.

#### QUESTIONS:

1. Name
2. Age
3. Location (City/Town)
4. Do you currently own a vehicle?
5. How familiar are you with electric vehicles (EVs)?
6. Please select all the benefits of EVs that you are aware of: (choose all that apply)
7. How likely are you to consider an electric vehicle for your next car purchase?
8. What is the biggest concern you have about EVs (if any)?
9. Would government incentives (tax breaks, rebates) make you more likely to consider an EV?
10. Would you be more likely to consider an EV if there were more charging stations available in your area?
11. When considering a new car, which factors are most important to you?

### **RESEARCH METHODOLOGY**

Research Methodology: Public Perception of Electric Vehicles (EVs)

#### **OBJECTIVES**

1. Investigate the factors considered most important by potential car buyers (when considering a new car).
2. Analyse the influence of charging infrastructure availability and government incentives on the likelihood of considering an EV.
3. Identify the biggest concerns people have regarding EVs.
4. Gauge the level of openness towards considering EVs for the next car purchase.
5. Explore public awareness of the benefits associated with EVs.

#### **METHODOLOGY**

- A survey research design will be employed to collect data from a sample population.

#### **SAMPLE**

- The target population is individuals who are likely to consider purchasing a new car in the near future.
- A sample will be drawn using a **(Sample Technique)** (e.g., random sampling, stratified sampling based on demographics) to ensure representativeness.

#### **SAMPLE SIZE**

- A statistically significant sample size will be determined based on the desired confidence level and margin of error.

## RESEARCH INSTRUMENT

- A self-administered questionnaire will be developed to collect data.

## QUESTIONNAIRE DESIGN

- The questionnaire will include a variety of question formats:
  - Multiple-choice questions (e.g., factors for new car purchase, biggest concerns about EVs)
  - Likert scale questions (e.g., likelihood of considering an EV)
  - Multiple select questions (benefits of EVs)

## ADMINISTRATION OF INSTRUMENT

- The questionnaire can be administered online (e.g., SurveyMonkey, Google Forms) or offline (paper-based) depending on the target population and resources.

## RESEARCH TOOL

- Statistical software (e.g., SPSS) will be used to analyse the collected data.

## STATISTICAL TESTS

- Descriptive statistics (frequencies, percentages, means, standard deviations) will be used to summarize the data.
- Chi-square tests or other appropriate inferential statistics may be employed to explore relationships between variables (e.g., how familiarity with EVs relates to considering an EV purchase).

## QUESTIONNAIRE DESIGN CONSIDERATIONS

- The questionnaire will be pilot tested on a small group to ensure clarity, accuracy, and ease of understanding.
- Questions will be worded objectively to avoid bias.
- Open-ended questions can be included to gather qualitative data and allow for in-depth responses on specific concerns or motivations.

By following these methodological steps, the research will gather valuable data to understand public perception of EVs and inform strategies to promote their wider adoption.

## TYPE OF RESEARCH

The research on public perception of electric vehicles (EVs) utilizes an applied research methodology focused on gathering data to inform real-world solutions. Here's a breakdown of the applied aspects:

Problem Identification:

- The research starts by acknowledging a practical problem: the need to accelerate the adoption of EVs for a more sustainable transportation future.

Data Collection for Decision Making:

- A survey is designed to collect data on public perception, a crucial factor influencing EV adoption.

Informing Strategies and Solutions:

- The research findings on factors considered during car purchases, preferred benefits of EVs, and the influence of incentives can be used to:
  - Develop targeted public education campaigns to address concerns and raise awareness of EV benefits.

- Inform policy decisions on government incentives or infrastructure development to make EVs more accessible and attractive to potential buyers.

- Guide industry efforts in marketing and product development to better align with consumer preferences and concerns.

Evaluation and Refinement (Potential):

- After implementing strategies based on the research findings, future studies could assess their effectiveness in shifting public perception and increasing EV adoption. This allows for continuous improvement and refinement of these strategies.

Key Characteristics of Applied Research Methodology in this Context:

- Focus on Practical Application: The research directly addresses a real-world problem - the need for wider EV adoption.

- Data-Driven Decision Making: The survey provides data to inform the development and implementation of solutions.

- Collaboration between Researchers and Stakeholders: This research could involve collaboration between researchers, policymakers, and the automotive industry to translate findings into practical strategies.

By employing an applied research methodology, this study aims to bridge the gap between public perception and the goal of widespread EV adoption, ultimately contributing to a more sustainable transportation landscape.

## **HYPOTHESIS**

The research design described focuses on collecting data to understand public perception of EVs, rather than testing a specific hypothesis. However, based on the research objectives, we can formulate some potential hypotheses that could be explored in future studies:

### **Hypothesis 1: Infrastructure and Incentives**

- **H1a:** Individuals who live in areas with more readily available charging stations will be more likely to consider an EV for their next car purchase compared to those in areas with limited charging infrastructure.

- **H1b:** Individuals who are aware of government incentives (tax breaks, rebates) for EVs will be more likely to consider an EV for their next car purchase compared to those who are unaware of such incentives.

### **Hypothesis 2: Concerns and Benefits**

- **H2a:** Individuals with higher levels of concern about range anxiety (limited driving distance on a single charge) will be less likely to consider an EV for their next car purchase.

- **H2b:** Individuals who are more aware of the environmental benefits of EVs will be more likely to consider an EV for their next car purchase.

### **Hypothesis 3: Familiarity and Openness**

- **H3a:** Individuals who are more familiar with EVs will be more likely to consider an EV for their next car purchase compared to those who are less familiar.

- **H3b:** Individuals who perceive a greater number of benefits associated with EVs will be more likely to consider an EV for their next car purchase.

## **DATA ANALYSIS AND INTERPRETATION**

This analysis focuses on the provided frequency tables for the questionnaire on public perception of EVs. Here are some key insights and interpretations:

### **1. Factors Considered When Buying a New Car:**

- There is no clear consensus on the most important factor. A variety of choices received a significant number of responses, including fuel efficiency, performance, safety features, purchase price, and brand reputation.
- This highlights the importance of considering multiple factors during car purchases, and EVs need to compete on various dimensions, not just environmental impact.

### **2. Charging Stations and EV Consideration:**

- A majority (59.8%) of respondents (those who answered questions related to charging stations) indicated that more charging stations would make them more likely to consider an EV.

### **3. Government Incentives and EV Consideration:**

- Like charging stations, a majority (55.9%) of respondents (those who answered questions related to government incentives) indicated that government incentives would make them more likely to consider an EV.

### **4. Biggest Concerns About EVs:**

- Range anxiety (limited driving distance on a single charge) was the most frequently cited concern (38.6%), followed by concerns about charging infrastructure availability (18.8%) and higher initial cost (15.3%).
- Battery life and replacement costs, and safety concerns were also mentioned by some participants.

### **5. Likelihood of Considering an EV for Next Purchase:**

- A significant portion of respondents (56.4% of those who answered the question) indicated some level of openness to considering an EV (categories 2-5).
- However, a sizeable minority (29.4% with missing data and category 1) is unlikely to consider an EV.

### **6. Awareness of EV Benefits:**

- Reduced emissions and environmental impact were the most frequently chosen benefit (75.7% selecting it along with other options), followed by lower fuel costs (62.4% selecting it along with other options) and quieter operation (40.4% selecting it along with other options).

### **7. Vehicle Ownership and EV Familiarity:**

- Almost half (49.5%) of the respondents indicated they currently own a vehicle.
- A significant portion of respondents (43.1% of those who answered the question) reported being somewhat familiar or familiar with EVs.
- However, a considerable number indicated they are not very familiar or not familiar at all with EVs.

## **FINDINGS AND CONCLUSION**

### **FINDINGS**

Key Findings from Public Perception of Electric Vehicles (EVs) Research.

#### **Factors Considered When Buying a New Car:**

- No single factor dominates car purchase decisions. Fuel efficiency, performance, safety features, purchase price, and brand reputation are all important considerations.
- EVs need to be competitive across these dimensions, not just focus on environmental benefits.

#### **Charging Infrastructure and Government Incentives:**

- Increased availability of charging stations and government incentives (tax breaks, rebates) would significantly influence the likelihood of people considering an EV.
- These factors address the concerns of higher upfront cost and range anxiety associated with EVs.

#### **Concerns About EVs:**

- Range anxiety (limited driving distance) is the biggest concern, followed by charging infrastructure availability and higher initial cost compared to gasoline vehicles.
- Battery life, replacement costs, and safety were also mentioned by some participants.
- Addressing these concerns is crucial for wider EV adoption.

#### **Openness to EVs:**

- A significant portion of respondents expressed some level of openness to considering an EV for their next car purchase.
- However, a sizeable minority remains hesitant due to the concerns.

#### **Awareness of EV Benefits:**

- Reduced emissions and environmental impact are the most recognized benefit, followed by lower fuel costs and quieter operation.
- Public education campaigns can emphasize these benefits to encourage EV adoption.

#### **Vehicle Ownership and EV Familiarity:**

- Almost half the respondents own a vehicle, indicating a potential target market for EVs.
- A significant portion of respondents have some level of familiarity with EVs, but a considerable number lack knowledge.
- Educational efforts can address the knowledge gap and raise awareness.

#### **Overall Interpretation:**

- There is a growing interest in EVs, but concerns and lack of familiarity remain as barriers.
- Strategic interventions like expanding charging infrastructure, providing government incentives, and public education can address these barriers and promote EV adoption for a more sustainable future.

These findings provide valuable insights for policymakers, industry leaders, and public educators to develop targeted strategies to overcome the barriers and accelerate the transition towards electric vehicles.

## **CONCLUSION**

This study investigated public perception of electric vehicles (EVs) to understand the factors influencing their adoption. The findings reveal a growing interest in EVs, particularly for their environmental benefits and potentially lower fuel costs. However, concerns about charging infrastructure availability, range anxiety, and higher upfront cost compared to traditional gasoline vehicles remain significant barriers.

The research highlights the importance of a multi-pronged approach to promote EV adoption. Expanding charging infrastructure, implementing government incentives like tax breaks or rebates, and addressing range anxiety through technological advancements can significantly improve consumer perception.

Public education campaigns can play a crucial role in increasing familiarity with EVs, highlighting their benefits and dispelling misconceptions. By focusing on these areas, policymakers, industry leaders, and public educators can create a more favourable environment for wider EV adoption, paving the way for a more sustainable transportation future.

### **Additional Considerations:**

- This study focused on a specific sample and may not be fully generalizable to the entire population. Further research with broader demographics can provide a more comprehensive understanding.
- As battery technology evolves and charging infrastructure expands, the landscape of EV adoption is likely to change.

Overall, this research provides valuable insights into the current state of public perception of EVs and identifies key areas for intervention. By addressing the concerns and leveraging the perceived benefits, strategies can be developed to encourage a shift towards wider EV adoption and a more sustainable transportation future.

## **REFERENCES**

<https://www.sciencedirect.com/science/article/pii/S2773153724000057>

<https://jier.org/index.php/journal/article/view/574>

<https://www.sciencedirect.com/science/article/abs/pii/S1361920920306234>

<https://www.tandfonline.com/doi/abs/10.1080/01441647.2016.1217282>

<https://iopscience.iop.org/article/10.1088/2516-1083/abe0ad/meta>

<https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wene.160>

<https://www.mdpi.com/2032-6653/4/4/693>

<https://www.mdpi.com/1996-1073/16/17/6379>

<https://www.sciencedirect.com/science/article/abs/pii/S0967070X11001387>

<https://www.nowpublishers.com/article/Details/EES-016>



<https://www.sciencedirect.com/science/article/abs/pii/S0301421513005119>

<https://www.sciencedirect.com/science/article/pii/S2210670720308957>

<https://www.sciencedirect.com/science/article/abs/pii/S1364032114007898>

<https://link.springer.com/article/10.1007/s11356-020-08835-9>

<https://www.sciencedirect.com/science/article/abs/pii/S0099133321000872>

<https://ieeexplore.ieee.org/abstract/document/8307044>

<https://www.sciencedirect.com/science/article/abs/pii/S1364032115006085>

<https://www.taylorfrancis.com/books/mono/10.1201/9780429490927/electric-hybrid-vehicles-iqbal-husain>