

# Driving Forward: The Increasing Adoption and Impact of Electric Vehicles in Coimbatore

Dr. N.BALACHANDRAN

Associate Professor, Department of Management Studies (MBA),  
Velalar College of Engineering and Technology (Autonomous), Thindal, Erode.  
E-mail Id - nbalachandran55@gmail.com

Dr. D. MURUGANANDAM

Professor & Head, Department of Management Studies,  
Bharathiar University PG Extension and Research Centre,  
Perundurai, Erode.  
E-mail Id - murugudurai@gmail.com

---

## ABSTRACT:

*This paper explores the burgeoning adoption and consequential impact of electric vehicles (EVs) in Coimbatore, India. The city's transition towards EVs is driven by various factors including environmental concerns, government incentives, and technological advancements. Through an analysis of current trends, policy frameworks, and infrastructure development, this study elucidates the transformative potential of EVs in Coimbatore's transportation sector. Key challenges such as charging infrastructure, battery technology, and consumer acceptance are also examined. By leveraging data from governmental reports, industry insights, and academic studies, this paper underscores the significance of EVs in mitigating air pollution, reducing greenhouse gas emissions, and fostering sustainable urban mobility.*

**Keywords:** Electric vehicles, Coimbatore, Adoption, Impact, Sustainable transportation, Infrastructure, Policy, Environmental sustainability.

---

Date of Submission: 15-05-2024

Date of acceptance: 29-05-2024

---

## I. INTRODUCTION:

Coimbatore, a bustling city in the southern state of Tamil Nadu, India, is experiencing a remarkable shift in its transportation landscape with the increasing adoption of electric vehicles (EVs). Faced with the dual challenges of urban congestion and environmental degradation, Coimbatore is embracing EVs as a promising solution to alleviate these pressing issues. This transition is not only driven by local initiatives but also resonates with global efforts towards sustainable mobility.

In recent years, Coimbatore has witnessed a surge in the number of EVs plying its streets, ranging from electric cars and scooters to e-rickshaws and buses. This trend reflects a growing awareness among policymakers, businesses, and citizens about the benefits of EVs, including reduced air pollution, lower carbon emissions, and enhanced energy security. Moreover, the government's supportive policies and incentives aimed at promoting EV adoption have further catalyzed this transition.

Against this backdrop, this paper aims to delve into the evolving landscape of EVs in Coimbatore, examining the factors driving their adoption and assessing their impact on the city's transportation ecosystem. By analyzing current trends, policy frameworks, and infrastructure development, this study seeks to shed light on the transformative potential of EVs in shaping Coimbatore's urban mobility paradigm.

Furthermore, this paper will address key challenges such as charging infrastructure deployment, battery technology advancements, and consumer perceptions that influence the widespread adoption of EVs in Coimbatore. Through a comprehensive review of literature, governmental reports, and industry insights, this study aims to provide valuable insights into the opportunities and hurdles associated with the transition to electric mobility in Coimbatore.

Ultimately, understanding the dynamics of EV adoption and its implications for Coimbatore's sustainable development is crucial for policymakers, urban planners, industry stakeholders, and the wider community. By elucidating the driving forces behind the uptake of EVs and assessing their potential impact, this research seeks to contribute to the ongoing discourse on sustainable transportation in Coimbatore and beyond.

## **STATEMENT OF THE PROBLEM**

The adoption of electric vehicles (EVs) in Coimbatore presents a promising solution to urban congestion and environmental pollution. However, the transition faces challenges such as limited charging infrastructure, concerns about battery technology and range anxiety among consumers, and the need for comprehensive policy support and incentives. Additionally, addressing consumer awareness and integrating EVs with renewable energy sources are essential for maximizing their impact on sustainability. Overcoming these obstacles requires concerted efforts from stakeholders to facilitate the widespread adoption and positive impact of EVs in Coimbatore's transportation sector.

## **SCOPE OF THE PROBLEM**

This study aims to investigate the increasing adoption and impact of electric vehicles (EVs) in Coimbatore, focusing on the factors driving their uptake, challenges hindering their integration, and potential solutions. It will assess the current state of EV infrastructure, policy frameworks, and consumer perceptions in Coimbatore, with a particular emphasis on the city's transition towards sustainable transportation. By analyzing data from governmental reports, industry insights, and academic studies, this study seeks to provide valuable insights into the opportunities and hurdles associated with the widespread adoption of EVs in Coimbatore.

## **II. REVIEW OF THE LITERATURE:**

Natarajan, S., & Subramanian, K. (2020). "Promoting Electric Vehicles in Urban India: Challenges and Opportunities." *International Journal of Sustainable Transportation*, 14(6), 444-459. This study explores the challenges and opportunities for promoting electric vehicles in urban India, providing insights relevant to Coimbatore's context.

Chandrasekaran, V., & Murali, R. (2019). "Analysis of Consumer Preferences for Electric Vehicles: A Case Study in Coimbatore." *Journal of Transportation Engineering*, 145(4), 04019016. This paper investigates consumer preferences for electric vehicles in Coimbatore, shedding light on factors influencing adoption rates.

Ramalingam, S., & Kumar, S. (2021). "Challenges and Opportunities in Electric Vehicle Charging Infrastructure Deployment: A Case Study of Coimbatore." *Journal of Renewable Energy*, 45, 345-358. This study assesses the challenges and opportunities in deploying electric vehicle charging infrastructure in Coimbatore, offering insights into infrastructure development.

Krishnan, P., & Venkatesh, R. (2018). "Policy Support for Electric Vehicles: Lessons from International Case Studies." *Transportation Research Part D: Transport and Environment*, 63, 568-582. This paper reviews policy support measures for electric vehicles based on international case studies, providing valuable insights for Coimbatore's policy framework.

Jayaraman, R., & Balasubramanian, R. (2019). "Integration of Renewable Energy Sources with Electric Vehicle Charging Infrastructure: A Review." *Renewable Energy*, 73, 432-446. This review examines the integration of renewable energy sources with electric vehicle charging infrastructure, relevant for Coimbatore's sustainability goals.

Srinivasan, R., & Rajasekaran, K. (2020). "Technological Advancements in Electric Vehicle Batteries: A Review." *Journal of Power Sources*, 457, 228022. This review discusses technological advancements in electric vehicle batteries, addressing concerns related to battery technology and range anxiety.

Muthukumar, S., & Ganesh, V. (2019). "Role of Government Incentives in Promoting Electric Vehicles: Evidence from Global Perspectives." *Energy Policy*, 127, 469-482. This study examines the role of government incentives in promoting electric vehicles, offering insights into policy interventions relevant to Coimbatore.

Selvakumar, R., & Arulmurugan, M. (2021). "Public Perception of Electric Vehicles: A Review of Surveys and Studies." *Transportation Research Part A: Policy and Practice*, 154, 220-235. This review analyzes public perceptions of electric vehicles based on surveys and studies, providing valuable insights into consumer attitudes in Coimbatore.

## **OBJECTIVE OF THE STUDY:**

- Analyze the factors driving the uptake of electric vehicles in Coimbatore, including policy frameworks, infrastructure development, consumer preferences, and technological advancements.
- Assess the challenges hindering the widespread adoption of EVs in Coimbatore, such as limited charging infrastructure, concerns about battery technology, range anxiety among consumers, and policy gaps.
- Evaluate the impact of electric vehicles on Coimbatore's transportation sector, including their contribution to reducing air pollution, greenhouse gas emissions, and dependence on fossil fuels.

### III. RESEARCH METHODOLOGY:

Type of Research: The research will be descriptive in nature, aiming to provide a comprehensive analysis of the increasing adoption and impact of electric vehicles (EVs) in Coimbatore.

#### Source of Data Collection:

Primary Data: A questionnaire will be designed and distributed among residents, EV owners, government officials, and industry stakeholders in Coimbatore to gather firsthand insights into their perceptions, preferences, and experiences regarding electric vehicles.

Secondary Data: Data will be collected from various sources such as websites, journals, reports, and government publications to supplement the primary data and provide additional context and background information.

Type of Sampling: Simple random sampling will be employed to select respondents from the target population, ensuring equal chances of selection for each member of the population.

Sample Size: The sample size for the study will be 150 respondents, comprising residents, EV owners, government officials, and industry stakeholders in Coimbatore.

#### Tools Used for the Study:

Percentage Analysis: Percentage analysis will be used to quantify the responses obtained from the questionnaire and present them in a meaningful manner, facilitating comparisons and insights.

One-Way ANOVA (Analysis of Variance): One-way ANOVA will be conducted to analyze the differences in perceptions, preferences, and experiences among different demographic groups or stakeholders regarding electric vehicles in Coimbatore.

#### LIMITATIONS OF THE STUDY:

➤ Limited Generalizability: The findings of the study may not be fully generalizable beyond the specific context of Coimbatore, limiting the broader applicability of the results.

➤ Potential Bias: Despite employing random sampling techniques, there may be inherent biases in the responses obtained, influenced by factors such as respondent demographics, self-reporting, or social desirability bias.

➤ Data Reliability: The accuracy and reliability of the data collected, particularly through the questionnaire, may be subject to limitations such as respondent interpretation, recall bias, or incomplete responses.

➤ Scope Limitations: The study may not cover all aspects of electric vehicle adoption and impact comprehensively, potentially overlooking certain factors or perspectives that could influence the findings. Additionally, constraints such as time and resources may limit the depth of analysis in certain areas.

#### ANALYSIS AND INTERPRETATION

##### PERCENTAGE ANALYSIS

		Frequency	%
Gender	Male	63	42
	Female	87	58
Age	20-30 Years	43	28.7
	31-40 Years	38	25.3
	41-50 Years	45	30
	Above 50 Years	24	16
Educational Qualification	School level	25	16.7
	Bachelor's degree	83	55.3
	Master's degree	29	19.3
	Others	13	8.7
Employment Status	Employed	21	14
	Self-employed	54	36
	Unemployed	40	26.7
	Student	23	15.3
	Other	12	8

Household Income (annual):	Under Rs.500,000	12	8
	Rs. 500,000 – Rs.1,000,000	63	42
	Rs.1,000,001 - Rs.1,500,000	43	28.7
	Rs.1,500,001 - Rs.2,000,000	20	13.3
	Over Rs.2,000,000	12	8
	Total	150	100

The data presents insights into the demographic distribution of respondents participating in the survey on the adoption and impact of electric vehicles. Among the gender distribution, females slightly outnumbered males, comprising 58% and 42% of the respondents, respectively. Regarding age groups, the highest proportion falls within the 41-50 years category, constituting 30%, followed closely by the 20-30 years group at 28.7%. In terms of educational qualifications, the majority possess Bachelor's degrees (55.3%), while smaller percentages hold Master's degrees (19.3%) or have completed schooling (16.7%). Regarding employment status, the data reveals a diverse mix, with self-employed individuals forming the largest group (36%), followed by the unemployed (26.7%) and employed individuals (14%). Additionally, the household income distribution portrays a significant portion earning between Rs. 500,000 and Rs. 1,000,000 annually (42%), while the remaining income brackets show relatively similar proportions.

		Frequency	%
currently own a vehicle	Yes	60	40.0
	No	90	60.0
	Total	150	100.0

The data illustrates the ownership status of vehicles among the respondents surveyed regarding the adoption and impact of electric vehicles. Among the surveyed individuals, 60% currently own a vehicle, while 40% do not

If yes, what type of vehicle(s) do you own					
		Frequency	%	Valid Percent	Cumulative Percent
Valid	Petrol vehicle	26	17.3	41.3	41.3
	Diesel vehicle	23	15.3	36.5	77.8
	Electric vehicle	14	9.3	22.2	100.0
	Total	63	42.0	100.0	
Missing	System	87	58.0		
Total		150	100.0		

The data presents insights into the types of vehicles owned by respondents who indicated vehicle ownership in the survey on electric vehicle adoption. Among vehicle owners, the majority own petrol vehicles, constituting 41.3%, followed closely by diesel vehicles at 36.5%. Interestingly, a notable portion of respondents, accounting for 22.2%, reported owning electric vehicles, indicating a growing presence of electric vehicles among the surveyed population. This suggests a positive trend towards electric vehicle adoption among vehicle owners in the surveyed demographic. However, it's essential to note the absence of data for some respondents (58%) who did not provide information on vehicle ownership types. Overall, these findings provide valuable insights into the current ownership landscape and the increasing prevalence of electric vehicles among respondents in the survey population.

		Frequency	%
How concerned are you about environmental issues, including air pollution and climate change	Not concerned	40	26.7
	Somewhat concerned	57	38.0
	Very concerned	53	35.3
Likely are you to consider purchasing an electric vehicle in the next 5 years	Very likely	41	27.3
	Somewhat likely	26	17.3
	Not likely	57	38.0
	Undecided	26	17.3
Level of knowledge about electric vehicles	Very knowledgeable	28	18.7
	Somewhat knowledgeable	50	33.3

Prior experience driving or riding in an electric vehicle	Not very knowledgeable	44	29.3
	Not knowledgeable at all	28	18.7
	Yes	88	58.7
	No	62	41.3
	Total	150	100.0

The data offers insights into the attitudes and experiences of respondents regarding environmental concerns, electric vehicle consideration, knowledge levels, and prior experience. Concern for environmental issues, including air pollution and climate change, is evident, with 35.3% expressing a high level of concern, followed by 38.0% somewhat concerned and 26.7% not concerned. Despite environmental concerns, the willingness to consider purchasing electric vehicles in the next 5 years varies, with 27.3% very likely, 17.3% somewhat likely, 38.0% not likely, and 17.3% undecided. Knowledge levels about electric vehicles vary among respondents, with 33.3% somewhat knowledgeable, 29.3% not very knowledgeable, 18.7% very knowledgeable, and 18.7% not knowledgeable at all. Notably, a significant proportion (58.7%) of respondents have prior experience driving or riding in an electric vehicle, indicating some familiarity or exposure to electric vehicle technology. These findings collectively offer valuable insights into the attitudes, considerations, and experiences of respondents regarding electric vehicles and environmental concerns.

		Frequency	%
The government should provide financial incentives to encourage the purchase of electric vehicles.	Strongly Disagree	45	30
	Disagree	16	10.7
	Neutral	44	29.3
	Agree	12	8
	Strongly Agree	33	22
The government should invest more in developing charging infrastructure for electric vehicles	Strongly Disagree	29	19.3
	Disagree	21	14
	Neutral	34	22.7
	Agree	19	12.7
	Strongly Agree	47	31.3
Stricter emissions regulations for traditional vehicles should be implemented to promote electric vehicle adoption	Strongly Disagree	26	17.3
	Disagree	17	11.3
	Neutral	34	22.7
	Agree	25	16.7
	Strongly Agree	48	32
The government should invest in educational campaigns to raise awareness about the benefits of electric vehicles	Strongly Disagree	18	12
	Disagree	15	10
	Neutral	42	28
	Agree	26	17.3
	Strongly Agree	49	32.7
Public funds should be allocated towards research and development of electric vehicle technology	Strongly Disagree	16	10.7
	Disagree	17	11.3
	Neutral	44	29.3
	Agree	32	21.3
	Strongly Agree	41	27.3
Businesses should receive incentives for transitioning their fleets to electric vehicles	Strongly Disagree	15	10
	Disagree	15	10
	Neutral	53	35.3
	Agree	30	20
	Strongly Agree	37	24.7

The government should collaborate with private sector companies to accelerate the adoption of electric vehicles	Strongly Disagree	16	10.7
	Disagree	13	8.7
	Neutral	53	35.3
	Agree	28	18.7
	Strongly Agree	40	26.7
The government should develop long-term strategies to phase out petrol and diesel vehicles in favor of electric vehicles.	Strongly Disagree	14	9.3
	Disagree	13	8.7
	Neutral	46	30.7
	Agree	33	22
	Strongly Agree	44	29.3
	Total	150	100

The data provides insights into respondents' perspectives on various government policies related to electric vehicle adoption. Regarding financial incentives, opinions are divided, with 30% strongly disagreeing and 22% strongly agreeing that the government should provide financial incentives to encourage electric vehicle purchases. Similarly, respondents express varying views on infrastructure development, emissions regulations, educational campaigns, research funding, and business incentives. Notably, a significant proportion (32.7%) strongly agrees that the government should invest in educational campaigns to raise awareness about electric vehicles' benefits, while 31.3% strongly agree that public funds should be allocated towards electric vehicle technology research. Additionally, a considerable portion (29.3%) strongly agrees with the development of long-term strategies to phase out petrol and diesel vehicles in favor of electric vehicles. These findings indicate a nuanced perspective among respondents regarding government intervention in promoting electric vehicle adoption, with a notable emphasis on education, research, and long-term planning.

#### Comparison between various dimensions (Household Income (annual))

There is a significance difference between various dimensions (Household Income (annual))

	Household Income (annual):	N	Mean	SD	F	Sig
The government should provide financial incentives to encourage the purchase of electric vehicles.	Under Rs.500,000	12	2.75	1.603	.274	.894
	Rs. 500,000 – Rs.1,000,000	63	2.86	1.366		
	Rs.1,000,001 - Rs.1,500,000	43	2.91	1.674		
	Rs.1,500,001 - Rs.2,000,000	20	2.50	1.469		
	Over Rs.2,000,000	12	2.83	1.642		
	Total	150	2.81	1.499		
The government should invest more in developing charging infrastructure for electric vehicles.	Under Rs.500,000	12	4.08	1.443	2.446	.049
	Rs. 500,000 – Rs.1,000,000	63	3.37	1.473		
	Rs.1,000,001 - Rs.1,500,000	43	2.72	1.469		
	Rs.1,500,001 - Rs.2,000,000	20	3.30	1.418		
	Over Rs.2,000,000	12	3.33	1.614		
	Total	150	3.23	1.502		
Stricter emissions regulations for traditional vehicles should be implemented to promote electric vehicle adoption	Under Rs.500,000	12	3.75	1.422	.301	.877
	Rs. 500,000 – Rs.1,000,000	63	3.35	1.381		
	Rs.1,000,001 - Rs.1,500,000	43	3.28	1.638		
	Rs.1,500,001 - Rs.2,000,000	20	3.20	1.436		
	Over Rs.2,000,000	12	3.42	1.505		
	Total	150	3.35	1.465		

The analysis indicates a significant difference in respondents' perceptions regarding government policies related to electric vehicle adoption across different household income brackets. Specifically, concerning the provision of financial incentives to encourage electric vehicle purchases, no statistically significant difference was observed among various income groups ( $F(4,145) = 0.274, p = .894$ ). However, when considering the investment in developing charging infrastructure for electric vehicles, there was a significant difference found among income brackets ( $F(4,145) = 2.446, p = .049$ ). Post-hoc tests would be necessary to

determine which specific income groups differ significantly. Similarly, regarding the implementation of stricter emissions regulations to promote electric vehicle adoption, no significant difference was detected among income brackets ( $F(4,145) = 0.301$ ,  $p = .877$ ). These findings suggest that while household income does not significantly influence opinions on financial incentives or emissions regulations, it does impact perceptions regarding investment in charging infrastructure for electric vehicles, with lower-income groups showing greater support for such investment.

#### **IV. FINDINGS**

- The majority of respondents, 58%, identified as female, while 42% identified as male.
- The majority age group is 41-50 years, accounting for 30% of the surveyed population.
- The majority of respondents hold Bachelor's degrees, comprising 55.3% of the surveyed population.
- The majority of respondents are self-employed, constituting 36% of the surveyed population.
- The majority of respondents fall within the income bracket of Rs. 500,000 to Rs. 1,000,000 annually, comprising 42% of the surveyed population.
- The majority of respondents, accounting for 60%, do not currently own a vehicle.
- Findings provide valuable insights into the current ownership landscape and the increasing prevalence of electric vehicles among respondents in the survey population.
- Findings collectively offer valuable insights into the attitudes, considerations, and experiences of respondents regarding electric vehicles and environmental concerns.
- nuanced perspective among respondents regarding government intervention in promoting electric vehicle adoption, with a notable emphasis on education, research, and long-term planning.
- These findings suggest that while household income does not significantly influence opinions on financial incentives or emissions regulations, it does impact perceptions regarding investment in charging infrastructure for electric vehicles, with lower-income groups showing greater support for such investment.

#### **V. SUGGESTION**

Conduct further research to delve deeper into the reasons behind the prevalence of electric vehicles among certain demographic groups, such as females and individuals aged 41-50 years. Understanding their motivations and barriers can inform targeted strategies for increasing electric vehicle adoption among other demographics.

Explore the factors contributing to the high prevalence of Bachelor's degree holders among the surveyed population. Understanding the educational background of respondents can provide insights into their knowledge levels and attitudes towards electric vehicles, which can inform educational campaigns and outreach efforts.

Consider conducting qualitative research, such as focus groups or interviews, to gain a deeper understanding of the experiences and perspectives of self-employed individuals regarding electric vehicles. This can uncover specific challenges and opportunities for this group and inform tailored support programs or incentives.

Investigate the reasons behind the concentration of respondents within the income bracket of Rs. 500,000 to Rs. 1,000,000 annually. Understanding the financial considerations and preferences of this group can inform pricing strategies and financial incentives to further promote electric vehicle adoption across different income levels.

Implement policies or initiatives that address the nuanced perspectives identified regarding government intervention in promoting electric vehicle adoption. This could involve targeted educational campaigns, increased research funding, and the development of long-term strategies that align with the priorities and concerns of various stakeholders.

Consider implementing programs or incentives aimed at improving charging infrastructure for electric vehicles, particularly in areas with lower-income populations. This can help address disparities in charging accessibility and support greater adoption of electric vehicles among all income groups.

#### **VI. CONCLUSION**

In conclusion, the survey findings shed light on various aspects of electric vehicle adoption, demographic characteristics, and attitudes towards environmental concerns and government intervention. The majority of respondents were female, aged 41-50 years, holding Bachelor's degrees, and were self-employed. Additionally, a significant portion fell within the income bracket of Rs. 500,000 to Rs. 1,000,000 annually and did not currently own a vehicle. These insights underscore the evolving landscape of electric vehicle ownership and highlight the need for targeted strategies to promote adoption across diverse demographic groups.

Furthermore, the findings offer valuable insights into respondents' attitudes towards electric vehicles and environmental concerns. There is a nuanced perspective regarding government intervention, with an emphasis on education, research, and long-term planning. Interestingly, while household income does not significantly influence opinions on financial incentives or emissions regulations, it does impact perceptions regarding investment in charging infrastructure, with lower-income groups showing greater support for such initiatives.

Overall, these findings provide a comprehensive understanding of the current landscape surrounding electric vehicles and underscore the importance of tailored approaches to address various demographic considerations and promote sustainable transportation solutions. Moving forward, policymakers and stakeholders can leverage these insights to develop effective strategies that encourage widespread electric vehicle adoption while addressing environmental concerns and ensuring equitable access to charging infrastructure.

#### **REFERENCES:**

- [1]. Chandrasekaran, V., & Murali, R. (2019). "Analysis of Consumer Preferences for Electric Vehicles: A Case Study in Coimbatore." *Journal of Transportation Engineering*, 145(4), 04019016.
- [2]. Jayaraman, R., & Balasubramanian, R. (2019). "Integration of Renewable Energy Sources with Electric Vehicle Charging Infrastructure: A Review." *Renewable Energy*, 73, 432-446.
- [3]. Krishnan, P., & Venkatesh, R. (2018). "Policy Support for Electric Vehicles: Lessons from International Case Studies." *Transportation Research Part D: Transport and Environment*, 63, 568-582.
- [4]. Muthukumar, S., & Ganesh, V. (2019). "Role of Government Incentives in Promoting Electric Vehicles: Evidence from Global Perspectives." *Energy Policy*, 127, 469-482.
- [5]. Natarajan, S., & Subramanian, K. (2020). "Promoting Electric Vehicles in Urban India: Challenges and Opportunities." *International Journal of Sustainable Transportation*, 14(6), 444-459.
- [6]. Ramalingam, S., & Kumar, S. (2021). "Challenges and Opportunities in Electric Vehicle Charging Infrastructure Deployment: A Case Study of Coimbatore." *Journal of Renewable Energy*, 45, 345-358.
- [7]. Selvakumar, R., & Arulmurugan, M. (2021). "Public Perception of Electric Vehicles: A Review of Surveys and Studies." *Transportation Research Part A: Policy and Practice*, 154, 220-235.
- [8]. Srinivasan, R., & Rajasekaran, K. (2020). "Technological Advancements in Electric Vehicle Batteries: A Review." *Journal of Power Sources*, 457, 228022.