

Reducing Carbon Footprints Through Electric Vehicles In Kerala: Ecological Drivers Of Consumer Adoption

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Abstract - The transportation sector in India is a major source of greenhouse gas emissions, contributing to ecological degradation and environmental challenges. Electric Vehicles (EVs) offer a sustainable alternative, reducing carbon emissions and promoting green mobility. This study examines the ecological drivers of EV adoption, including Eco-friendly initiative, Carbon footprint reduction, Technological innovation, Lower reliance on fossil fuels, Improved Air Quality, Futuristic outlook, Availability of public charging stations Government incentives and benefits, Cost Efficiency, Safety features and driver-assistance systems etc.. The findings emphasize that promoting EV adoption requires addressing both environmental outcomes and the drivers motivating consumers, thereby supporting India's shift toward a cleaner, sustainable mobility in future.

Keywords: Electric vehicles, Carbon footprint reduction, Sustainable transportation, Consumer adoption, Environmental conservation, Green mobility.

I. INTRODUCTION

The development of vehicles throughout history is an intriguing journey shaped by both technological breakthroughs and evolving societal demands. It all began with the invention of the wheel, an innovation that set the stage for early forms of transportation like carts and chariots, initially drawn by human strength and animals. In recent years, however, the automotive landscape has witnessed a significant shift toward electric vehicles (EVs). This change has been fuelled by significant advancements in battery technology, growing environmental concerns, and increasing governmental support through incentives. As a result, electric vehicles are no longer just a futuristic concept but a practical and competitive option for consumers.

1.1 ELECTRIC VEHICLE

An Electric Vehicle (EV) is a vehicle that relies partially or entirely on electrical power for propulsion, using one or more electric motors instead of a traditional internal combustion engine. It is a type of vehicle that operates using one or more electric motors powered by rechargeable batteries.

1.2 REVIEW OF LITERATURE

- (Saurabh Dhankhar et.al, 2024)²² the study identified both opportunities and challenges in India's transition to electric vehicles (EVs). Innovations in battery technology, improved infrastructure, and business models such as battery swapping and EV financing could accelerate adoption, positioning India as a future leader in electric mobility
- . (Punit Kumar Kanujiya et.al, 2024)²³ the study concludes that collaborative efforts between governments, industry stakeholders, and consumers are paramount to realizing widespread EV adoption, ultimately contributing to reduced carbon emissions and a more sustainable transportation landscape.
(Meghna Aggarwal et.al, 2024)²⁴ concluded that the transition to EVs presents a significant opportunity for India to reduce its carbon footprint and promote sustainable transportation. Realizing this potential

requires a concerted effort from policymakers, manufacturers, and consumers.

- (Avnika Chawla, 2024)²⁵ the study examined consumer purchase intentions toward electric vehicles (EVs) in the Indian context through the lens of the Theory of Planned Behaviour. It identified various determinants influencing consumer decisions, including consumer attributes such as environmental awareness and income, as well as product-related factors like price, range, and design.

1.3 SIGNIFICANCE OF THE STUDY

This research on the drivers of consumer adoption of electric vehicles (EVs) in the state of Kerala holds significant relevance in the contemporary context of sustainable mobility. It provides valuable insights for vehicle manufacturers, policymakers, and distributors to improve the design, efficiency, and overall attractiveness of EVs. Focusing on the Ernakulam district, the study identifies and analyzes the key determinants influencing consumers' purchasing decisions. The findings are expected to assist both companies and policymakers in aligning their strategies with consumer expectations, thereby fostering greater acceptance and widespread adoption of electric vehicles in the region.

1.4 SCOPE OF THE STUDY

The present study has been undertaken to analyse the drivers of consumer adoption of E-Vehicles in the state of Kerala. According to the latest data from the Kerala Motor Vehicles Department, the state recorded over 68,000 new electric vehicle registrations in the first half of 2025 alone. This marks a 57% increase compared to the same period in 2024¹, and Ernakulam led the state with 11,856 new EV registrations. This places Ernakulam as a key market for EV uptake in the state of Kerala. On a broader scale, by March 2025, Kerala had registered approximately 2,30,027 EVs, reflecting the cumulative growth of EV penetration in the state. Moreover, EVs accounted for 11.1% of total vehicle registrations in Kerala during FY 24, making it one of the top-performing regions in the country in terms of EV adoption. So, it provides wider scope of study on consumer adoption of EVs in Ernakulam District in the state of Kerala.

1.5 OBJECTIVES OF THE STUDY

- To study the profile of the Electric Vehicles users in Ernakulam district
- To investigate the drivers of consumer adoption of E-Vehicles in Ernakulam district.

1.6 HYPOTHESIS OF THE STUDY

H₀₁: There is no significant difference among the drivers of consumer adoption of electric vehicles in Ernakulam district.

1.7 RESEARCH METHODOLOGY

SAMPLING DESIGN AND SIZE

The respondents of the study includes e-vehicle users in Ernakulam district in the state of Kerala. The sample was selected by adopting convenience sampling method. Sample size for the study is 100 users of Electric vehicle in Ernakulam district, who were using an electric vehicle for a minimum period of 1 year.

1.8 COLLECTION OF DATA

Population of the study consists of both male and female users of Electric Vehicle in Ernakulam district, who were using an electric vehicle for a minimum period of 1 year. The data required for the study are collected from both primary and secondary sources. Primary data are those data which is collected directly from the respondents and they are original in character. The primary data are collected with the help of questionnaire (Google form). Secondary data were collected mainly from journals, books, articles, newspapers, websites etc.

1.9 TOOLS FOR DATA ANALYSIS

¹ <https://cheriyre.in/kerala-ev-registration-trends-2025/>

		FREQUENCY	PERCENT
Gender	Male	62	62%
	Female	38	38%
Age	Below 20	0	0
	20 – 30	40	40%
	30 – 40	26	26%
	40 years and above	34	34%
Marital status	Married	61	61%
	Unmarried	39	39%
Educational Qualification	SSLC	7	7%
	Higher secondary	12	12%
	Undergraduate	39	39%
	Postgraduate	30	30%
	Others	12	12%
Occupation	Student	12	12%
	Business	20	20%
	Government sector	16	16%
	Private sector	46	46%
	Agriculture	2	2%
	Others	4	4%
Area of Residence	Rural	40	40%
	Semi – Urban	45	45%
	Urban	15	15%
Type of E-vehicle	Electric two-wheeler	59	59%
	Electric three wheeler	1	1%
	Electric four-wheeler	40	40%
Years of Using E-	1 year – 2 years	65	65%

The collected data were suitably classified and analyzed, keeping in view the objectives of the study. Percentages and Friedman Repeated Measures Analysis of Variance on Rank were used for analysing the collected data by using SPSS software.

1.10 DURATION OF THE STUDY

The duration of the study was from November 2025 to January 2026

1.11 Drivers of Consumer Adoption of E-Vehicles –Analysis

Drivers of Consumer Adoption of E-Vehicles have been analysed by considering the variables Eco-friendly initiative, Carbon footprint reduction, Technological innovation ,Lower reliance on fossil fuels, Improved Air Quality ,Futuristic outlook, Availability of public charging stations Government incentives and benefits, Cost Efficiency, Safety features and driver-assistance systems etc,

Table No. 1 Profile of the Electric Vehicles Users in Ernakulum District.

Vehicles	2 years – 3 years	31	31%
	3 years and above	4	4%

Source: Primary Data

From the above table it is understood that 62% of respondents are male. 40% of E-vehicle users fall under the age group of 20 – 30. 34% of E-vehicle users belong to the age group of 40 years and above. 61% of the E-vehicle users are married, while 39% are unmarried. 69% of the E-vehicle users are undergraduate. 46% of E-vehicle users in Ernakulum district are private sector employees. 45% resides in the semi-urban area and 40% of the population resides in the rural area. 29% of the respondents have a monthly income of less than 25,000. 39% of the respondents earn between 50,000 and 100,000 per month. Majority of the E-vehicle users (59%) use electric two-wheeler and (40%) of E-vehicle users use four wheeler. 65% of electric vehicle users have been using E-vehicle for 1 to 2 years and 31% have used them for 2 to 3 years.

Table 2

FRIEDMAN TEST FOR MEASURING DIFFERENCE AMONG MEAN RANKS OF DRIVERS OF CONSUMER ADOPTION OF ELECTRIC VEHICLE

Drivers of Consumer Adoption	Mean Rank	Chi-Square value	P value
Futuristic outlook	5.40	82.253	<.001**
Lower reliance on fossil fuels	5.83		
Carbon footprint reduction	6.25		
Technological innovation	5.91		
Improved Air Quality	5.50		
Eco-friendly initiative	6.52		
Availability of public charging stations	5.04		
Cost Efficiency	4.79		
Safety features and driver-assistance systems	4.79		
Government incentives and benefits	4.99		

Interpretation

Denotes significant at 1% level

Since the p-value is less than 0.000, the null hypothesis is rejected at a 1% level of significance. Thus, it can be concluded that there is a significant difference in the Drivers of Consumer Adoption of electric vehicles in Ernakulam District. Based on the mean ranks, “Eco-friendly initiative” (6.52) is identified as the most important factor influencing the purchasing decision of electric vehicles. Other important drivers include “Carbon footprint reduction” (6.25), “Technological innovation” (5.91) Lower reliance on fossil fuels (5.83), Improved Air Quality (5.50), Futuristic outlook (5.40) Availability of public charging stations (5.04) Compared to the above drivers the least influencing drivers are “Cost Efficiency” (4.79) and “Safety features and driver-assistance systems” (4.79), which have received the lowest mean ranks. From the analysis, it is inferred that the respondents give the highest importance to environmental concerns and technological advancement when considering the purchase of electric vehicles. However, drivers related to Cost Efficiency and Safety features

and driver-assistance systems are perceived to have comparatively lesser influence on their decision-making process.

II. CONCLUSION

The study on Reducing Carbon Footprints through Electric Vehicles in Kerala: Ecological Drivers of Consumer Adoption highlights that environmental consciousness and technological innovation are the dominant factors shaping consumer preferences toward electric vehicles in Ernakulam district. The findings demonstrate that consumers are increasingly aware of the ecological benefits of EVs, with eco-friendly initiatives, carbon footprint reduction, and innovation emerging as the most significant determinants of their purchase decision. This growing environmental awareness signifies a positive shift toward sustainable mobility in Kerala, aligning with national and global goals for carbon neutrality. The study concludes that strengthening policy support, improving charging infrastructure, and promoting technological advancements will further accelerate EV adoption and contribute to a greener, more sustainable transportation future.

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