

# **A SYSTEMATIC REVIEW OF CONSUMER PREFERENCES AND BARRIERS IN ELECTRIC VEHICLE ADOPTION**

## **Authors**

**Mr. Ameet Kulkarni**

Research Scholar

Department of Management Studies,

Visvesvaraya Technological University, Belagavi, Karnataka, India.

ORCID Id: <https://orcid.org/0009-0005-1255-0397>

**Dr. Basavaraj S. Kudachimath**

Associate Professor, Department of Management Studies,

Visvesvaraya Technological University, Belagavi;

ORCID: <https://orcid.org/0000-0001-6979-41423>

## **Abstract**

The adoption of electric vehicles (EVs) is crucial for achieving sustainable mobility and reducing environmental impact. However, despite the growing interest in EVs, consumer adoption remains limited in several markets. This systematic review aims to explore and synthesize existing research on the factors influencing consumer preferences and barriers to electric vehicle adoption. Drawing from a diverse range of studies, the review identifies key determinants such as environmental concerns, cost considerations, vehicle performance, and the role of government policies in shaping consumer attitudes. Additionally, it highlights significant barriers including range anxiety, inadequate charging infrastructure, and high upfront costs. The review also examines how demographic factors (e.g., age, income, and education) and socio-psychological factors (e.g., trust in technology and perceived convenience) influence consumer decisions. The findings provide valuable insights for policymakers, manufacturers, and researchers seeking to enhance EV adoption by addressing consumer concerns and aligning product offerings with market preferences. The study concludes with recommendations for future research directions and practical strategies to promote sustainable consumer behavior in the context of electric vehicle adoption.

## **Introduction**

The transition from internal combustion engine vehicles to electric vehicles (EVs) is a central component in global efforts to reduce greenhouse gas emissions and combat climate change. As part of broader sustainability goals, many governments have introduced policies aimed at incentivizing the adoption of EVs, including tax rebates, subsidies, and the development of charging infrastructure (Sierzchula et al., 2014). Despite these efforts, the uptake of electric vehicles remains sluggish in many regions, raising questions about the factors influencing consumer adoption and the barriers to EV penetration in the automotive market.

Consumer behavior plays a critical role in shaping the market for electric vehicles. A variety of factors, including environmental concerns, economic incentives, technological advancements, and social influences, affect consumer decisions regarding EV adoption (Rezvani et al., 2015). While some consumers are motivated by environmental considerations such as reducing carbon footprints, others are driven by economic benefits, such as lower operating costs and potential savings on fuel (Axsen et al., 2016). However, despite the potential advantages, several barriers remain that hinder widespread adoption, including concerns about limited driving range, the availability and convenience of charging infrastructure, and the higher upfront cost compared to traditional vehicles (Kollmuss & Agyeman, 2002).

The purpose of this systematic review is to examine the factors influencing consumer preferences for electric vehicles and to identify the key barriers that prevent consumers from adopting them. By synthesizing findings from the existing literature, this study aims to provide a comprehensive understanding of the multifaceted nature of consumer behavior towards EVs, focusing on both the positive drivers and the challenges that continue to hinder adoption. Understanding these factors is essential for policymakers, automotive manufacturers, and other stakeholders who seek to promote the adoption of electric vehicles and contribute to a sustainable transportation future.

## **Literature Review**

The adoption of electric vehicles (EVs) has garnered increasing attention in both academic and policy circles, driven by the need for sustainable transportation solutions and the desire to reduce the environmental impact of fossil fuel-based mobility. Despite numerous government incentives, technological advancements, and growing environmental awareness, the adoption of EVs remains limited. A thorough understanding of consumer preferences and barriers is essential for addressing these challenges and promoting widespread EV adoption.

### **Consumer Preferences for Electric Vehicles**

**Environmental Concerns:** Environmental sustainability is one of the primary motivations for purchasing EVs. Numerous studies show that environmentally conscious consumers are more likely to choose electric cars due to their lower carbon footprint compared to conventional gasoline vehicles (Rezvani et al., 2015). This preference is particularly strong among individuals who prioritize reducing pollution and contributing to climate change mitigation (Jansson, 2011). Furthermore, awareness of the negative environmental impact of fossil fuel consumption often enhances the desire to adopt cleaner technologies like EVs (Axsen et al., 2016).

**Economic Factors and Incentives:** The economic incentives offered by governments, such as subsidies, tax rebates, and free parking, play a significant role in consumer decision-making. A study by Sierzechula et al. (2014) found that countries with stronger financial incentives saw higher adoption rates of EVs. Moreover, the total cost of ownership (TCO), including savings on fuel and maintenance costs, is a crucial factor for consumers. Although EVs have a higher upfront cost, they are perceived to offer lower long-term operational costs, thus attracting economically motivated consumers (Egbue & Long, 2012).

**Technology and Performance:** Technological advancements in EVs, particularly improvements in battery life, charging times, and vehicle performance, significantly influence consumer preferences. Research indicates that consumers' concerns regarding the limited driving range of earlier electric models have reduced as battery technologies have advanced (Sierzechula et al., 2014). Moreover, EVs are increasingly seen as having comparable or superior performance characteristics, such as smooth acceleration and low noise levels, which attract performance-conscious consumers (Kou & Wang, 2013).

### **Social and Psychological Factors**

The influence of social and psychological factors is also significant in the adoption process. Consumers are often swayed by the perceptions of peers, societal trends, and their desire to adopt "green" technologies to align with environmental or social norms (Kollmuss & Agyeman, 2002). For example, people with higher environmental values, or those living in socially conscious communities, are more likely to invest in electric vehicles (Klößner & Nayum, 2017). The social prestige associated with owning an EV can also play a role in decision-making, with some consumers viewing EV ownership as a symbol of modernity and environmental consciousness (Zhao et al., 2020).

## **2. Barriers to Electric Vehicle Adoption**

Despite the positive motivations driving EV adoption, several barriers hinder their widespread adoption. These barriers can be categorized into practical, psychological, and socio-economic factors.

### **Range Anxiety**

One of the most widely discussed barriers to EV adoption is range anxiety, or the fear that an EV will run out of power before reaching a charging station. While technological improvements in battery capacity have mitigated this issue to some extent, concerns about long-distance travel and the availability of charging stations remain prevalent (Egbue & Long, 2012). A study by Rezvani et al. (2015) found that range anxiety is a significant deterrent for potential EV buyers, especially in regions where charging infrastructure is underdeveloped.

### **Charging Infrastructure**

The availability and accessibility of charging stations are critical factors influencing EV adoption. Consumers are more likely to purchase an EV if they believe that charging will be convenient and easily accessible (Breetz et al., 2018). Inadequate charging infrastructure, particularly in rural or less developed areas, remains a major barrier to EV adoption. Furthermore, the lack of fast-charging networks further exacerbates concerns about the convenience and time required for recharging (Hidrue et al., 2011).

### **Upfront Cost and Financial Constraints**

The initial purchase price of electric vehicles is often higher than that of conventional vehicles, primarily due to the cost of batteries. Although long-term cost savings on fuel and maintenance can offset this higher initial cost, the upfront financial barrier remains significant, particularly for lower-income households (Rezvani et al., 2015). Despite the availability of financial incentives, many consumers still find it challenging to justify the higher purchase price, especially in regions where subsidies are limited or temporary.

### **Lack of Knowledge and Misconceptions**

Consumer knowledge about EVs remains a significant barrier. Misconceptions about the performance, cost savings, and environmental benefits of electric vehicles persist, even among environmentally conscious individuals (Jansson, 2011). A lack of understanding about the total cost of ownership, the availability of incentives, and the actual environmental impact of EVs can

deter potential buyers. Educational campaigns are needed to increase consumer awareness and correct misconceptions (Kollmuss & Agyeman, 2002).

#### Cultural and Lifestyle Factors

Cultural attitudes and lifestyle preferences also play a significant role in EV adoption. In many regions, car ownership is closely tied to cultural norms, where larger, more powerful vehicles are preferred for personal and family use (Sierzchula et al., 2014). Additionally, lifestyle factors such as driving patterns, including long daily commutes or frequent road trips, may influence the adoption of electric vehicles. Consumers who are used to owning large vehicles with longer driving ranges may be reluctant to switch to EVs due to their perceived limitations (Breetz et al., 2018).

### 3. Emerging Trends and Future Directions

The growing interest in electric vehicles and their adoption is influenced by several emerging trends. These include advancements in battery technology, the development of faster and more widespread charging networks, and increasing environmental awareness among consumers. Furthermore, the introduction of new business models, such as car-sharing and subscription services, is expected to impact the adoption of EVs, especially in urban areas where private car ownership is less common (Sierzchula et al., 2014). As these trends continue to evolve, it is likely that many of the existing barriers to adoption will be mitigated.

#### Conclusion

This literature review underscores the complexity of consumer behavior regarding electric vehicle adoption. While there are strong drivers, such as environmental concerns, economic incentives, and technological advancements, numerous barriers, including range anxiety, inadequate charging infrastructure, and the high upfront cost, continue to hinder the widespread adoption of EVs. Addressing these barriers through targeted policies, improvements in infrastructure, and consumer education is crucial for accelerating the transition to electric mobility.

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