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Factors Influencing Purchase Intention for Battery Electric Vehicles: A Systematic Literature Review

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Abstract

With the seriousness of environmental pollution, the transportation industry is paying more and more attention to the transformation of traditional fuel vehicles to electric vehicles. In recent years, the sales of electric vehicles have risen steadily, but the market share is still insufficient. This study aims to expand the market scope of battery electric vehicles in the future by investigating the factors influencing the purchase intention of battery electric vehicles. Based on systematic literature review, this paper analyzes 30 articles published between 2014 and 2023. The antecedents are divided into six categories: battery electric vehicle characteristics, psychological factors, personal characteristics, environmental factors, socio-demographic factors, battery electric vehicle related policies. The main influencing factors are discussed, and finally, the directions and recommendations for future research are pointed out, while providing clues for enterprises and governments to formulate effective policies to achieve effective and rapid transformation.

Keywords: Purchase Intention, Willingness to Purchase, Battery Electric Vehicles, Electric Vehicles, Systematic Literature Review

Introduction

In recent years, the increasing demand for conventional internal combustion engine vehicles powered by fossil fuels has worsened the current environmental and energy crisis (Ivanova & António Carrizo, 2023). Additionally, greenhouse gases emitted during the use of these vehicles have caused severe environmental pollution, highlighting the urgent need for a transition away from conventional fuel vehicles (Jiang et al., 2023b). Moreover, previous research have shown that the use of electric vehicles can alleviate global energy shortages and environmental pollution problems (He et al., 2022a), and the use of electric vehicles is conducive to reducing carbon emissions and achieving the goal of carbon neutrality (Hua & Dong, 2022). However, the current global purchase rate of electric vehicles (EVs) is generally low relative to that of fuel vehicles.

Meanwhile, many scholars have conducted detailed studies on the attributes, infrastructure, and policies of electric vehicles. The results of the studies in which multiple factors are important for are not consistent. For example, Lampo et al. (2023) has shown that environmental concern do not affect consumers' behavioral intentions towards BEVs. However, other scholars hold different views (Cui et al., 2021; Jaiswal et al., 2022). Similarly, charging stations are crucial for consumers in some nations, such as China (He et al., 2022b) and South Korea (Jang & Choi, 2021). However, for Malaysian consumers, infrastructure barriers have not significantly affected EVs purchase intentions (Vafaei-Zadeh et al., 2022). Therefore, in order to further expand the market of electric vehicles, this study analyzes the research on the purchase intention of battery electric vehicles (BEVs) through the method of systematic literature review to understand the factors that promote and hinder consumers' purchase intention.

Literature Review

In the past research, most of the research focuses on whether the judgment factors can positively influence consumers' behavioral intentions. Namely, policy (Hu et al., 2023), environmental concern (Lampo et al., 2023), attitude (Arora et al., 2022), consumer innovativeness (Tunçel, 2022), subjective norms (Jaiswal et al., 2022), and other factors are often studied by scholars in research to determine whether they can positively influence consumers' behavioral intentions. In contrast, there has been limited research on factors that negatively affect consumer behavior, such as perceived risk, infrastructure barrier (Vafaei-Zadeh et al., 2022), range anxiety (Khazaei & Tareq, 2021). In fact, the current global purchase rate of electric vehicles is generally low relative to that of fuel vehicles, further suggesting that negative factors also play an important role in consumers' behavioral intentions. For example, Khazaei and Tareq (2021) illustrated that the majority of participants express apprehension regarding the range of electric vehicles. Additionally, the risk-averse mindset is also a significant obstacle to consumer adoption of electric vehicles (Qian & Yin, 2017). In summary, although electric vehicles are environmentally friendly products, the purchase intentions will also vary among consumers. Thus, understanding the factors that influence the purchase intention of battery electric vehicles is crucial for the development of battery electric vehicles.

Research Methodology

This study presents a systematic literature review of the factors that influence consumer intent to purchase battery electric vehicles. The systematic literature review method involves identifying, evaluating, and synthesizing all available studies on a specific problem, area, or phenomenon (van Dinter et al., 2021). The method is typically divided into three steps: defining keywords, conducting a literature search, and analyzing the results (Romero et al., 2020). By following this process, the study ensures the rigor of the results. The study analysed literature primarily from scopus and web of science, supplemented by google scholar. Due to the rapid development of electric vehicles in the last decade, this study searched for relevant literature in journals published between 2014 and 2023. The search keywords used were "battery electric vehicl*" OR "battery electric car*" AND "purchas* intention" OR "intention to purchas*" OR "willingness to buy" OR "intention to buy". The literature type was limited to articles, with a source type of journal and language type of English. A total of 142 articles were retrieved, including 29 from scopus, 25 from web of science, and 88 from google scholar.

Keywords appear in the title and summary in the search and are sorted by relevance. Figure 1 shows all the steps to the selection of literature reviewed.

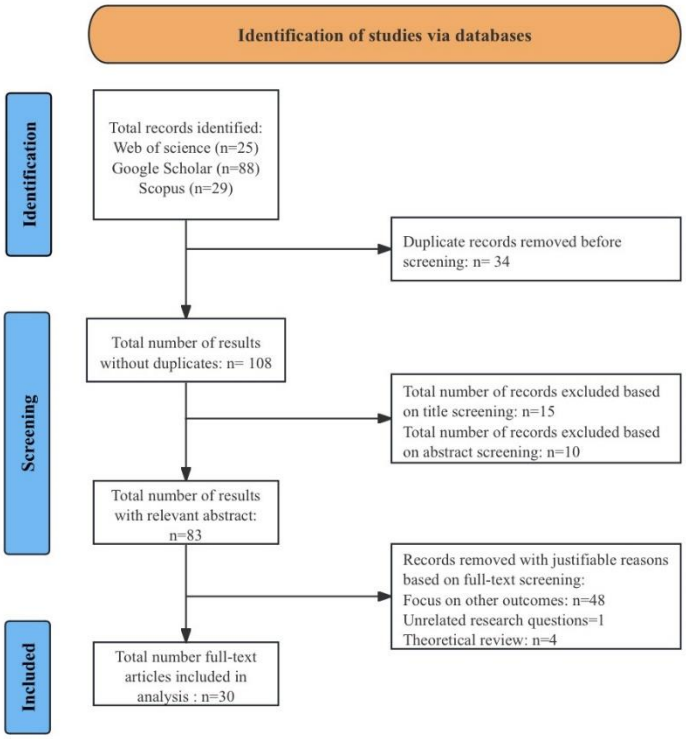

Figure 1. Flow Diagram for the Selection of Literature Reviewed

Results and Discussions

Battery Electric Vehicles Characteristics

The characteristics of battery electric vehicles are the first type of factors in this study, and they are mainly related to the electric vehicles themselves. According to Table 1, the main positive influences are performance, functional value, conditional value, emotional value, epistemic value, driving fun, charging infrastructure, top speed, energy cost, instrumental attributes, safety, brand image, brand identity, while irrelevant factors are social value, charging time, availability of charging stations, brand awareness. Additionally, some factors have inconsistent results, such as price value, driving range.

Table 1
Impact of Battery Electric Vehicles Characteristics of the Consumers' Purchasing Intention of BEVs

Antecedents	Key Finding
Performance	Battery performance can positively influence on purchase intention of BEVs (Kim et al., 2022).
Functional Value	For Indian consumers, functional value has a positive impact on consumer attitude towards BEVs (Sharma et al., 2023).
Conditional Value	In India, conditional value has a positive impact on consumer attitudes towards BEVs (Sharma et al., 2023).
Emotional Value	Emotional value can significantly moderate the direct relationship between value and consumers' attitudes towards BEVs (Sharma et al., 2023).
Social Value	In India, social value has no significant effect on consumer attitude towards BEVs (Sharma et al., 2023).
Epistemic Value	For Indian consumers, epistemic value has a positive impact on consumer attitudes towards BEVs (Sharma et al., 2023).
Price Value	Lower price cannot influence on BEVs purchase intention (Loudiyi et al., 2022). Lower price can positive influence on BEVs purchase intention (Allahmoradi et al., 2022). Price value cannot influence on purchase intention of BEVs (Xu et al., 2019).
Driving Range	A higher driving range cannot increase purchase intention of BEVs (Loudiyi et al., 2022). Higher driving range can significantly increase purchase intention of BEVs (Allahmoradi et al., 2022; Bigerna and Micheli, 2018).
Charging Time	Lower charging time cannot increase purchase intention of BEVs (Loudiyi et al., 2022; Miwa et al., 2017).
Availability of Charging Stations	A number of charging stations cannot influence on purchase intention of BEVs (Loudiyi et al., 2022; Miwa et al., 2017).
Driving Fun	Consumers are concerned about the driving pleasure of battery electric vehicles (Palmieri et al., 2023).
Charging Infrastructure	Charging infrastructure can have positive effects on BEVs purchase intention (Kim et al., 2022).
Top Speed	Enhancing top speed can increase consumer purchase intention of BEVs (Allahmoradi et al., 2022).
Energy Cost	Increasing gasoline prices can stimulate purchase intention of BEVs (Allahmoradi et al., 2022; Wang et al., 2017).
Instrumental Attributes	Fashion attributes are one of the strongest predictors of purchase intention of BEVs (Pradeep et al., 2021).
Safety	Consumers are concerned about the safety of battery electric vehicles (Kim et al., 2022; Palmieri et al., 2023).
Brand Image	Brand image can directly influence purchase intention (Jiang et al., 2021).
Brand Identity	Consumers are concerned about the brand identity of battery electric vehicles (Jiang et al., 2021; Palmieri et al., 2023).
Brand Awareness	Brand awareness cannot directly influence purchase intention (Jiang et al., 2021).

Psychological Factors

Psychological factors are a key consideration for consumers and can be divided into two categories: positive and negative (Ivanova & António Carrizo, 2023). However, the results of the study did not support this categorisation. However, as can be seen from Table 2, the results of some factors are not consistent with expectations. For example, perceived risk, perceived sacrifice, attitude, perceived benefits, perceived of barriers, and knowledge.

Table 2

Impact of Psychological Factors on the Consumers' Purchasing Intention of BEVs

Antecedents	Key Finding
Perceived Risk	Perceived risk cannot directly influence on purchase intention of BEVs (Jiang et al., 2023a; Simsekoglu and Nayum, 2019). In China, perceived risk cannot negative effect on purchase intention of BEVs (Jiang et al., 2023a; Zang et al., 2022). Perceived risk can negative effect on purchase intention of BEVs (Jiang et al., 2021).
Perceived Value	The greater the perceived value for consumers, the more likely they are to increase their willingness to purchase (Fan-Yun et al., 2023; Loudiyi et al., 2022).
Climate Change Perceptions	Women are more sensitive to climate change than men, and are therefore more likely to increase purchase intent (Ana Paula et al., 2023). Climate awareness can increase consumer interest in electric vehicles (Bigerna and Micheli, 2018).
Perceived Sacrifice	Perceived sacrifice cannot influence consumer perceived value toward BEVs (Fan-Yun et al., 2023).
Perceived Utility	In China, perceived utility can positively influence on public's purchase intention of BEVs (Jiang et al., 2023a).
Personal Norm	Personal norm can positive effect on purchase intention of BEVs (Du et al., 2018; Trong Truong et al., 2022).
Social Norm	Social norm cannot effect on purchase intention of BEVs (Wang et al., 2021).
Subjective Norm	Subjective norm can directly and positively influence the purchase intention of battery electric vehicles (Du et al., 2018; Nosi et al., 2017; Riverso et al., 2023; Schmalfuß et al., 2017; Simsekoglu and Nayum, 2019; Xu et al., 2019).
Perceived Behavioral Control	Perceived behavioral control can directly and positively influence the purchase intention of electric vehicles (Du et al., 2018; Riverso et al., 2023; Simsekoglu and Nayum, 2019; Xu et al., 2019).
Perceived Quality	Perceived quality can positively impact consumers perceived value for battery electric vehicles, but no influence on attitude (Fan-Yun et al., 2023).
Attitude	For Indian consumers, consumer attitude towards BEVs can positive influence on purchase intention of BEVs (Sharma et al., 2023). In Italy, consumer attitudes can directly and positively influence the purchase intention of electric vehicles (Riverso et al., 2023). In China, attitude cannot effect on public's purchase intention of BEVs (Jiang et al., 2023a). Consumer attitude can significant influence on purchase intention of BEVs (Du et al., 2018; Nosi et al., 2017; Wang et al., 2021; Xu et al., 2019; Zang et al., 2022). For consumers in Taiwan, consumer attitudes can increase the purchase intention of battery electric vehicles (Fan-Yun et al., 2023).
Perceived Endorsement	For Chinese, perceived recognition can indirectly affect consumers' purchase intention of BEVs (Zang et al., 2022).
Perceived Benefits	In China, perceived benefits can significant effect on purchase intention of BEVs (Zang et al., 2022).

Personal Characteristics

According to Table 3, the factors that can positively influence consumers to buy battery electric vehicles are trust, environmental awareness, experience, effort expectancy,

performance expectancy, environmental concern, face consciousness, hedonic motivation, and the negative factors are intolerance of uncertainty. On the other hand, it is worth noting that the negative impact on consumer purchases of battery electric vehicles has not been as great as expected, especially in China's Cities with restricted licenses (Zang et al., 2022).

Table 3
Impact of Personal Characteristics of the Consumers' Purchasing Intention of BEVs

Antecedents	Key Finding
Intolerance of Uncertainty	For Italian consumers, intolerance of uncertainty can negatively and indirectly affect the purchase intention of BEVs (Riverso et al., 2023).
Trust	For Chinese, trust can positively influence on purchase intention of BEVs (Jiang et al., 2023a).
Environmental Awareness	Consumer awareness of environmental issues can effectively increase their willingness to purchase battery electric vehicles (Palmieri et al., 2023).
Experience	Consumers who have experience driving or using electric vehicles are more likely to buy battery electric vehicles (Ling et al., 2021; Schmalfuß et al., 2017; Wang et al., 2017). Test drive experience can increase purchase intention (Hinnüber et al., 2019).
Mobility Behavior	There is no correlation between mobile behavior and consumer purchase intent (Ana Paula et al., 2023).
Personal Innovativeness	personal innovativeness can be significantly moderated between purchase intention and purchase behavior (Trong Truong et al., 2022).
Effort Expectancy	Effort expectancy can positively influence on purchase intention of BEVs (Manutworakit and Kasem, 2022; Trong Truong et al., 2022).
Performance Expectancy	Performance expectancy can positively influence on purchase intention of BEVs (Manutworakit and Kasem, 2022; Trong Truong et al., 2022).
Environmental Concern	Environmental concerns can positive and significantly influence on purchase intention of BEVs (Manutworakit and Kasem, 2022; Wang et al., 2021).
Face Consciousness	Face consciousness can increase BEVs purchase intention (Wang et al., 2021).
Hedonic Motivation	The hedonic motivation can drive consumer attitudes towards battery electric vehicles (Palmieri et al., 2023). Hedonic motivation can influence on purchase intention of BEVs (Manutworakit and Kasem, 2022).
Range Anxiety	For Chinese, range anxiety has no influence on purchase intention of BEVs (Zang et al., 2022).

Socio-Demographic Factors

As shown in Table 4, the most studied and influential factors among the socio-demographic factors are gender, age, education, and income. At the same time, some studies have found that there are significant differences in the preferences of consumers for electric vehicles between men and women (Simsekoglu & Nayum, 2019; Wang et al., 2017), as well as between different age groups (Manutworakit & Kasem, 2022; Palmieri et al., 2023; Schmalfuß et al., 2017). These findings are conducive to the accuracy of subsequent studies.

Table 4
Impact of Socio-Demographic Factors of the Consumers' Purchasing Intention of BEVs

Antecedents	Key Finding
Gender	Gender can significantly influence consumers' willingness to purchase a battery electric vehicle (Palmieri et al., 2023; Schmalfuß et al., 2017). Male can negative effect on intention to buy BEVs (Simsekoglu and Nayum, 2019). Gender cannot affect on intention to buy BEVs (Cheng et al., 2015; Du et al., 2018). Women prefer German brand vehicles, while men prefer Chinese brand electric cars (Wang et al., 2017).
Age	Age can significantly influence consumers' willingness to purchase a battery electric vehicle (Manutworakit and Kasem, 2022; Palmieri et al., 2023; Schmalfuß et al., 2017). Age cannot affect on intention to buy BEVs (Cheng et al., 2015; Du et al., 2018).
Education	Education levels have a significant impact on consumers' intentions to purchase electric vehicles (Kim et al., 2019). Education cannot affect on intention to buy BEVs (Cheng et al., 2015; Du et al., 2018).
Place of Residence	The area where the consumer lives may affect the satisfaction of the consumer (Cheng et al., 2015).
Household Income	Consumers with lower incomes are less willing to buy BEVs than those with high incomes (Ana Paula et al., 2023; Du et al., 2018; Wang et al., 2017). Consumer income does not have effect on purchase intention of BEVs (Cheng et al., 2015).
Family Number	Family numbers cannot affect on intention to buy BEVs (Du et al., 2018).
Types of Job	The type of job does not affect consumers' willingness to buy an electric vehicle (Cheng et al., 2015; Wang et al., 2017).
Driver's License	Driver's license cannot affect on intention to buy BEVs (Du et al., 2018).
Driving Frequency	Driving frequency can significantly influence consumers' intention to purchase a battery electric vehicle (Palmieri et al., 2023).
Car Ownership	Car ownership cannot affect on intention to buy BEVs (Cheng et al., 2015; Du et al., 2018).
Number of Vehicles Owned	The number of household cars has a significant impact on consumers' intentions to purchase electric vehicles (Kim et al., 2019).

Environmental Factors

As shown Table 5, although the environmental factors analyzed in this study are not numerous, they can also be found to be critical to consumers' intention to purchase battery electric vehicles. For example, the social influence, facilitating conditions, and environmental responsibility have different results on consumers' purchase intentions in different countries. These factors of inconsistent results can also be further analyzed in future studies.

Table 5
Impact of Environmental Factors on the Consumers' Purchasing Intention of BEVs

Antecedents	Key Finding
Social Influence	In Vietnam, social influence cannot influence on purchase intention of BEVs (Trong Truong et al., 2022). In Thailand, social influence can positively influence on purchase intention of BEVs (Manutworakit and Kasem, 2022).
Facilitating Conditions	In Vietnam, facilitating conditions can significantly influence on purchase intention of BEVs, but cannot affect on purchase behavior (Trong Truong et al., 2022). In Thailand, facilitating conditions cannot influence on purchase intention of BEVs (Manutworakit and Kasem, 2022).
Environmental Responsibility	In Morocco, environmental responsibility can influence BEVs purchase intention (Loudiyi et al., 2022).
Environmental-economic Attributes	Environmental-economic attributes can positively influence on purchase intention of BEVs (Schmalfuß et al., 2017; Simsekoglu and Nayum, 2019).
Value Co-creation	Value co-creation can significantly influence BEVs purchase intention (Nosi et al., 2017).
Energy Security	Energy security issues can positively influence consumers' willingness to buy BEVs (Wang et al., 2017).

Battery Electric Vehicle Related Policies

The last sub-category battery electric vehicle related policies are mainly divided into two categories: monetary subsidy policy and non-monetary subsidy policy. In contrast to South Korea, China's financial subsidies have been shown to increase consumer purchase intentions (Kim et al., 2022; Shi et al., 2023). Additionally, the effects of non-financial subsidy policies vary among consumers with different levels of consumption (Ana Paula et al., 2023).

Table 6
Impact of Battery Electric Vehicle related Policies on the Consumers' Purchasing Intention of BEVs

Antecedents	Key Finding
Monetary Incentive Policy	In China, even though local financial subsidies have declined, they still can positive effect on purchase intention of BEVs (Jiang et al., 2023a; Shi et al., 2023). For consumers, financial subsidies can increase their willingness to buy, especially for families with low incomes (Ana Paula et al., 2023). Policy incentives can positively influence BEVs purchase intention (Allahmoradi et al., 2022; Broadbent et al., 2021; Du et al., 2018; Kim et al., 2019; Loudiyi et al., 2022; Wang et al., 2017; Wang et al., 2021; Xu et al., 2019). In Korea, government policy does not have an influence on purchase intention of BEVs (Kim et al., 2022). In China, the road priority policy is a significant factor in the increase of BEV sales, particularly in cities with restricted licenses (Shi et al., 2023).
Non-monetary Incentive Policy	In China, non-monetary incentive policy can positively influence on purchase intention of BEVs (Jiang et al., 2023a). For high-income households, the improvement of non-fiscal policies such as scrapping policies is also conducive to increasing purchase intention (Ana Paula et al., 2023). Convenience policies cannot affect BEVs purchase intention (Wang et al., 2021). Non-monetary incentive policy cannot influence on purchase intention of BEVs (Xu et al., 2019).

Conclusions

Through an in-depth study of the purchase intention of battery electric vehicles, this study has made a series of important findings. First, attitude was identified as one of the main factors influencing car purchase intentions. Consumers' perception of environmental issue is closely related to car purchase decisions, providing clear support for the sustainable development of the electric vehicle market. However, it's important to note that car buying decisions are not just influenced by environmental perceptions. Consumer characteristics, socio-demographic factors, economic costs, vehicle performance, and environmental factors all contribute to consumers' attitudes toward BEVs purchases. The formation of BEVs purchase intention is a complex and multidimensional process, which requires the development of more comprehensive strategies to meet the diverse needs of consumers.

Although this study has made important achievements in the study of battery electric vehicle purchase intention, there are still many future research directions worth exploring. First, future research can further explore the differences in car purchase decisions between different groups, such as consumers of different ages, income levels, and cultural backgrounds. This allows for a more targeted marketing strategy that better meets the needs of different groups. Secondly, the impact of the marketing strategy of electric vehicles on car

purchase intention can be studied. Understanding the potential mechanism of factors such as publicity, promotions, and government incentives on vehicle purchase intentions can help improve the competitiveness of the electric vehicles market. In addition, Future research could further explore the impact of consumer attitudes on purchase intentions in different contexts, such as the impact of consumer attitudes on purchase intentions for battery electric vehicles in underdeveloped regions of China.

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