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Article

Factors of consumer adoption and purchase behaviour of electric vehicles in kingdom of Saudi Arabia: Measurement and evaluation

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Abstract: The present study aims at analyzing the various factors influencing consumer attitudes towards the adoption of electric vehicles (EVs) in Saudi Arabia. The study evaluates consumer attitudes, their impact on shaping behaviours, and whether consumer intention mediates the relationship between consumer attitude and purchase behaviour towards EVs. This research employs a mixed-method approach, including literature review, surveys, and data analysis. It investigates EV adoption dimensions encompassing individual, social, economic, and environmental factors. Data collected from 397 current and potential EV owners in Saudi Arabia provide insights into their attitudes and behaviours. Survey findings indicate that in Saudi Arabia, safety rating, social influence, economic value, operating cost, and product variety significantly shape consumer attitudes and influence EV adoption. However, factors like range anxiety, charging infrastructure, environmental concern, and performance expectancy are less significant in affecting consumer attitudes toward EVs and their adoption. Investigating multiple dimensions and employing a mixed-method approach, the study enhances the existing knowledge of consumer attitudes toward EVs in the unique context of Saudi Arabia's sustainable mobility transition. Policymakers and industry stakeholders can utilize these findings to expedite the shift to sustainable transportation in the Kingdom. This research also guides future investigations in this burgeoning field.

Keywords: consumer adoption; purchase intention; purchase behaviour; electric vehicles; measurement and evaluation

1. Introduction

Electric vehicles (EVs) have become widely recognized as the most advanced mode of transportation in the automotive industry. In Saudi Arabia, the market share of electric cars has experienced significant growth, increasing from less than 1% in 2016 to over 5% in 2021, according to data from the International Energy Agency (IEA). This surge in popularity can be attributed to the efforts initiated by governments to reduce carbon dioxide emissions and address the urgent issue of climate change (Adnan et al., 2016). Furthermore, the projected growth of the electric vehicle market in Saudi Arabia is substantial. According to a publisher, the market size is expected to exhibit a Compound Annual Growth Rate (CAGR) of 42.5% from 2021 to 2027 (Research and Markets, 2022). Saudi Arabia's focus on renewable energy, a shift away from oil-based economies, and improved living standards has led to a rise in electric vehicle demand. To support the Saudi Vision 2030, the country signed a memorandum of understanding (MOU) with the UK, collaborating on developing technologies like smart grids and electric vehicles. This collaboration aligns with their shared goals of mitigating climate change and has

allowed the growth of the market of electrical vehicles in the country.

Electric vehicle (EV) technology has matured, facilitating efficient and comfortable long-distance travel. Extensive research, spanning technology, economics, logistics, and environmental aspects, underpins electric mobility (Ehrler et al., 2012). Escalating transportation challenges, such as noise, carbon emissions, and congestion, drive innovations in automobiles toward sustainable electric propulsion and automation. EVs are recognized as cost-effective urban transportation solutions, offering reduced fuel dependency and carbon emissions with potential wellness and ecological benefits. Global initiatives aim to integrate EVs into future automotive industries, with projections suggesting 150 million EVs on roads worldwide by 2030 (Class et al., 2010). While EVs hold promise for reducing greenhouse gas emissions, wider adoption hinges on complementary incentives like pollution controls and fluctuating gasoline prices. The adoption of EVs depends on public incentives. Slow EV growth and customer adoption are a result of economic incapacity and insufficient product distribution. There is huge potential for EVs in Saudi Arabia due to their several advantages. However, the acceptance of electric cars in the market presents challenges, necessitating efforts to build trust and promote their adoption over gasoline-powered vehicles.

Consumer attitudes are vital determinants of consumer behaviour and have garnered significant attention in marketing literature. Consumer attitude refers to a person's overall evaluation, favorability, or aversion toward a particular product, brand, or service. It is widely acknowledged that consumer attitudes are instrumental in shaping purchase intentions, which ultimately drive actual purchase behaviour However, the mediating role of purchase intention in the relationship between consumer attitude and purchase behaviour remains an important yet underexplored aspect. Electric vehicles (EVs) have the potential to reduce greenhouse gas emissions, but widespread adoption depends on incentives like pollution controls and fluctuating gasoline prices. Economic incapacity and product distribution hinder growth. Saudi Arabia has significant potential for EVs, but market acceptance presents challenges, necessitating trust-building efforts and promoting adoption beyond business interactions and institutional purchasing (Klabi and Binzafrah, 2023). Stakeholder preferences and priorities can vary, with "innovation champions" or early adopters crucial for organizations' acquisition of new technologies. These charismatic advocates overcome resistance and indifference towards innovative ideas. **Table 1** summaries the findings of some of the important studies indicating the predictors of e-vehicle adoption.

Despite Saudi Arabia boasting some of the cheapest oil prices globally, consumer adoption and purchase behavior of electric vehicles (EVs) in the kingdom remain relatively understudied. While existing literature has extensively examined factors influencing EV adoption in various contexts, such as environmental concerns, government incentives, and technological advancements (Axsen and Kurani, 2020; Gavalas et al., 2020), little attention has been paid to understanding the unique socio-economic and cultural factors shaping consumer attitudes towards EVs in Saudi Arabia. Saudi Arabia's heavy reliance on fossil fuels and strategic position in the global oil market make it difficult to understand why consumers still choose electric vehicles (EVs) despite the abundance of cheap oil. This research gap can provide

valuable insights into consumer decision-making and help policymakers and industry stakeholders formulate strategies for fostering sustainable transportation alternatives. This research is crucial for the strategic endeavors of policymakers, manufacturers, and marketers in facilitating the shift towards sustainable mobility. This study aims to bridge this research gap by investigating the predictors of consumer attitude and its impact on the purchase behaviour of electric cars in Saudi Arabia and analysing the mediating effect of purchase intention on the relationship between consumer attitude and purchase behaviour.

Table 1. Summary of literature reviews of some predictor of e-vehicle adoption.

Study	Year	Key predictors	Key findings	Methodology
Al-Aboudi, I., Al-Dulaijan, S., Gharaibeh, A.	2022	Environmental awareness, financial incentives, infrastructure availability	Consumers with high environmental awareness and access to financial incentives and adequate infrastructure are more likely to adopt EVs.	Survey
AlFayez, S., Khan, A., Papagiannidis, S.	2021	Perceived usefulness, social influence, cost savings	Adoption is driven by perceived usefulness of EVs, social influence, and potential cost savings from fuel efficiency and maintenance.	Mixed methods (Qualitative and Quantitative)
Al-Garni, A., Al-Saif, H.	2020	Charging convenience, driving range, government policies	Convenience of charging, sufficient driving range, and supportive government policies are crucial for increasing EV usage.	Case study
Alzahrani, K., Hall-Phillips, A., Zeng, A. Z.	2019	Attitude towards EVs, subjective norms, perceived behavioral control	Positive attitude towards EVs, favorable subjective norms, and high perceived behavioral control enhance the intention to adopt hybrid EVs.	Survey
Al-Hazmi, M. A., Dey, P. K., Le-Hoai, L.	2020	Economic factors, technological advancements, social factors	Economic benefits, advancements in EV technology, and social acceptance significantly influence EV adoption.	Empirical analysis
Alqahtani, M. A., Salloum, S. A., Alharthi, R.	2022	Economic value, product variety, brand image	Higher economic value, diverse product options, and strong brand image boost consumer interest in EVs.	Survey
Al-Saggaf, Y. A., Alamri, M. M., Al-Yami, S. H.	2020	Environmental benefits, financial incentives, technological trust	Adoption is influenced by perceived environmental benefits, available financial incentives, and trust in EV technology.	Survey
Keshav, H., Garg, S., Barua, S.	2021	Technological advancements, policy support, environmental concern	Technological improvements, supportive policies, and environmental concerns are key drivers for EV adoption globally.	Literature review
Teng, F. S., Lu, C. S., Chien, C. H.	2017	Perceptual factors, informational factors, promotional activities	Perceptual factors like design, informational factors like awareness campaigns, and promotional activities positively impact willingness to pay more for EVs.	Survey
Yang, L., Wang, W., Li, S., Huang, Y.	2020	Purchase cost, environmental attitude, range anxiety	Lower purchase costs, strong environmental attitudes, and reduced range anxiety encourage EV adoption in China.	Survey

2. Literature review and proposition of hypothesis

2.1. Predictors of consumer attitude towards electric vehicles

The literature review examines existing research on electric vehicle (EV) adoption and purchase behaviour, with a specific focus on factors relevant to Saudi Arabia. Multiple studies have identified various factors that influence consumer decisions, including environmental concerns, economic incentives, charging infrastructure availability, driving range, and vehicle performance. Cultural and social factors, such as social norms, perceptions of EVs, and government policies, also play significant roles. The adoption of EVs is gaining momentum worldwide,

including in Saudi Arabia. Consumer attitudes towards EVs are shaped by factors such as range anxiety and charging infrastructure, performance expectations (Alawaji et al., 2020), economic value, safety ratings, social influence, product variety, operating costs, after-sales service, and government policies. Understanding these factors is crucial for policymakers, manufacturers, and industry stakeholders to promote widespread EV adoption in Saudi Arabia. Government initiatives, social influence, operating costs and after-sales service (Alhammad et al., 2023), economic value and product variety (Alqahtani et al., 2022), and safety ratings have been identified as factors influencing consumer attitudes towards EV adoption in Saudi Arabia. Some of the important research work related to predictors of consumer attitude towards purchase intention and purchase behaviour towards electric vehicle is presented below.

2.2. Range anxiety and charging infrastructure

The fear of depleting battery power while driving, known as range anxiety, is a significant concern associated with the acceptance of electric vehicles (EVs). To address this concern, the presence of a strong charging infrastructure becomes crucial. According to a study conducted by Al-Turki et al. (2020), it is imperative to establish an extensive network of charging stations across Saudi Arabia to alleviate range anxiety and enhance consumer confidence. The research recommends that the government invest in the development of charging infrastructure, including fast-charging stations along highways and in urban areas, to improve the convenience and viability of EVs. Additionally, the availability of service support and driving range in EVs has been identified as a significant barrier to their adoption. Various authors, such as Liu et al. (2022) and Shrestha et al. (2022) have highlighted the importance of service support and driving range in the decision-making process of adopting EVs. Several authors emphasise the improvement in battery technology that leads to better performance and meets range anxiety: A study by Al-fouzan et al. (2024) and Alshahrani et al. (2022) emphasized the importance of continuous research and development efforts to enhance battery technology to meet the evolving needs of consumers in Saudi Arabia. This argument leads to the following hypothesis:

- H1: Range anxiety and charging infrastructure significantly predict the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.3. Performance expectancy

Performance expectancy refers to the perceived usefulness and benefits that individual's associate with adopting a particular technology. In the context of EVs, performance expectancy encompasses factors such as driving range, charging time, and overall reliability. According to Venkatesh et al. (2012), performance expectancy refers to the individual's conviction that the utilization of collaborative technology will enhance work productivity and contribute to achieving operational triumph. Electric vehicles have numerous advantages, such as decreased energy consumption and environmental pollution. According to a study by AL Fayez et al.

(2021), the perceived performance of EVs significantly influences the intention to adopt them. The study found that Saudi Arabian consumers were more likely to consider purchasing an EV if they believed it offered a sufficient driving range and if the charging infrastructure was accessible and reliable. These arguments lead to the following hypothesis:

- H2: Performance expectancy significantly predicts the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.4. Environmental concern

Saudi Arabia has long been aware of the environmental consequences of its heavy reliance on fossil fuels. The burning of oil and gas for transportation purposes significantly contributes to greenhouse gas emissions and air pollution, leading to detrimental health effects and climate change. Additionally, the Kingdom faces challenges such as water scarcity, which is exacerbated by high water consumption in traditional internal combustion engine vehicles (Alzahrani et al., 2019; Lampo et al., 2023; Mehdizadeh et al., 2024). These concerns have driven policymakers, academics, and the public to seek alternative solutions, including the adoption of EVs. These arguments lead to the following hypothesis:

- H3: Environmental concerns significantly predict the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.5. Social influence

Social influence refers to the impact that individuals, groups, and society as a whole have on the beliefs, attitudes, and behaviours of others. In the case of electric vehicle adoption, social influence plays a crucial role in shaping consumer perceptions, attitudes, and intentions towards EVs. According to the Theory of Planned Behaviour (Ajzen, 1991), individuals' intentions to engage in a particular behaviour, such as purchasing an electric vehicle, are influenced by subjective norms, which include the perceived social pressure to adopt or reject the behaviour. Peer Influence and Norms: Peer influence is a significant driver of electric vehicle adoption. In Saudi Arabia, social norms heavily influence individuals' decisions. Al-Hazmi et al. (2020) found that favourable attitudes toward electric vehicles among peers and families substantially increased EV adoption likelihood ($p < 0.05$). The following hypothesis was proposed:

- H4: Social influence significantly predicts the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.6. Operating cost

The operating costs associated with EV ownership have been identified as a crucial factor influencing the adoption rate of EVs in Saudi Arabia. Electric vehicles are typically more expensive to purchase than conventional internal combustion engine (ICE) vehicles due to the high cost of batteries and other electrification technologies. However, EVs offer significant advantages in terms of lower operating costs, mainly attributed to lower fuel costs, reduced maintenance requirements, and potential tax incentives or subsidies offered by governments (Hackbarth et al., 2020).

These cost-saving benefits are of particular interest to potential EV buyers in Saudi Arabia, where the government aims to transition to a sustainable and greener transportation system. Other factors supporting operating costs include fuel cost savings and maintenance and service costs that reduce long-term ownership costs and make EVs more appealing to potential buyers in Saudi Arabia. The following hypothesis was proposed:

- H5: Operating costs significantly predict the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.7. After sales service

After-sales service and the availability of spare parts are widely acknowledged as crucial factors influencing the adoption of electric vehicles (EVs). Quak et al. (2016) have emphasized that the dearth of EV repair centers and workshops, particularly when compared to those catering to internal combustion engine vehicles (ICEVs), has left existing EV owners disappointed. This sentiment is supported by a study conducted in Denmark by Ninh et al. (2014), which revealed that the novelty of EV technology has resulted in a limited number of qualified and trained workers proficient in EV repair. Consequently, even minor repairs incur substantial costs, while more intricate repairs may extend for several months. The following hypothesis was proposed:

- H6: After-sales service significantly predicts the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.8. Economic value

The economic value of EVs in the process of consumer adoption encompasses various dimensions, including reduced dependence on imported oil, improved air quality, and potential cost savings. Khalid and Al-Hosani (2019) conducted a study on the economic impact of EVs in Saudi Arabia and found that the reduced oil consumption resulting from EV adoption could lead to significant cost savings for the country. Similarly, Khalid and Al-Hosani (2019) highlighted the potential economic benefits of EV adoption, such as reduced healthcare costs due to improved air quality and decreased spending on fossil fuel imports. These arguments lead to the following hypothesis:

- H7: The economic value of electric vehicles significantly predicts the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.9. Product variety

The product variety is a significant determinant of EV adoption in Saudi Arabia. The availability of diverse electric vehicle models stimulates consumer interest, addresses concerns regarding quality and risk, and enhances the overall perceived value of EVs. The availability of a wide range of electric vehicle models plays a pivotal role in influencing consumer preferences and ultimately driving the adoption of EVs. According to the Variety Seeking Theory (VST), consumers are motivated by the desire for novelty and variety in their choices. When applied to the

context of EVs, a higher number of available models can enhance the perceived variety, leading to increased interest and consideration among consumers (Kahn, 2017). Lin et al. (2019) demonstrated that in Saudi Arabia, consumer interest in electric vehicles (EVs) increased with a wider selection of models available, suggesting that product variety enhances adoption inclination. These arguments lead to the following hypothesis:

- H8: The product variety of Electric vehicles significantly predicts the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.10. Safety rating

Safety ratings are a key consideration for consumers when purchasing a vehicle, as it reflects the vehicle's ability to protect occupants in the event of a crash. In Saudi Arabia, where road safety is a paramount concern, consumers are particularly sensitive to safety aspects. Several studies have indicated that safety rating is one of the most important factors influencing the purchase decision of consumers, alongside factors such as price, range, and charging infrastructure availability (Al-Qahtani et al., 2021). This highlights the significance of safety rating in the adoption of EVs in the Saudi Arabian market. In another study by Al-Bogami et al. (2022), it was found that higher safety ratings positively influence consumers' perceptions of EV safety in Saudi Arabia, thereby increasing their likelihood of adopting electric vehicles. These arguments lead to the following hypothesis:

- H9: Safety rating of Electric vehicles significantly predicts the consumer attitude towards the adoption of electrical vehicles by consumers in Saudi Arabia.

2.11. Consumer attitude and purchase behaviour towards e-vehicle

Consumer intention plays a pivotal role in shaping purchasing behaviour, particularly in the realm of electric vehicles (EVs). With a growing emphasis on sustainable transportation, more consumers are considering EVs as viable alternatives to traditional gasoline-powered vehicles. This shift is propelled by environmental consciousness, governmental incentives, and advancements in EV technology. Various factors influence consumers' intentions towards EV adoption. Perceived benefits such as reduced greenhouse gas emissions, lower operating costs, and access to preferential parking and charging facilities significantly impact consumer intentions (Kesharwani and Biswas, 2019). Conversely, perceived risks, including limited driving range, insufficient charging infrastructure, and high initial purchase costs, act as deterrents (Bamberg and Möser, 2007). Understanding these factors is essential for stakeholders in the EV market, including policymakers, manufacturers, and marketers. By identifying key drivers and barriers, stakeholders can develop effective strategies to promote EV adoption. Policymakers can offer financial incentives, enhance charging infrastructure, and implement awareness campaigns (Sierzchula et al., 2014). These arguments posit the following hypothesis:

- H10: The consumer attitude towards e-vehicle has significant influence on his purchase behaviour.

2.12. Consumer attitude and purchase intention

The significance of consumer attitudes towards electric vehicles (EVs) cannot be overstated, as they profoundly impact purchase intentions. Attitudes encapsulate individuals' evaluations and emotions towards specific objects or concepts, encompassing perceptions, beliefs, and emotions concerning EVs. Research consistently underscores the pivotal role of consumer attitudes in shaping purchase intentions, as evidenced by studies emphasizing the positive correlation between favourable attitudes and heightened purchase intentions (Eagly and Chaiken, 1993; Fishbein and Ajzen, 1975). The Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) further affirm the influential role of attitudes in predicting behavioural intentions (Ajzen and Fishbein, 1980; Ajzen, 1991). Consequently, individuals exhibiting positive attitudes towards EVs are more inclined to express intentions to purchase them, bearing significant implications for manufacturers, marketers, and policymakers amidst the automotive industry's transition towards sustainability (Sun and Zhao, 2020). Environmental concerns emerge as a prominent driver of positive attitudes, with consumers prioritizing sustainability and viewing EVs as effective tools for curbing carbon emissions and addressing climate change (Jung and Yoon, 2019). Moreover, perceived benefits such as reduced operating costs, governmental incentives, and technological advancements further bolster positive attitudes towards EVs (Bashir et al., 2021). These arguments lead to the following hypothesis:

- H11: Consumer attitude towards electric vehicles significantly influences towards the purchase intention of electric vehicles in Saudi Arabia.

2.13. Consumer purchase intention and purchase behavior towards e-Vehicle

Research on consumer purchase intention and behavior towards electric vehicles (EVs) in Saudi Arabia is gaining momentum, reflecting a global shift towards sustainable transportation. Studies have highlighted a range of factors influencing Saudi consumers' intentions to purchase EVs, including environmental awareness, economic considerations, and government incentives. Alwadain et al. (2024) found that younger consumers and those with higher education levels are more inclined to consider EVs, driven by environmental benefits and long-term cost savings. Furthermore, government policies, such as subsidies and investments in charging infrastructure, have been identified as significant motivators for EV adoption (AlGhamdi et al., 2021). However, barriers such as high initial costs and limited charging stations still hinder widespread adoption. Research by Abu-Alkeir et al. (2020) emphasizes the importance of addressing these barriers to enhance consumer confidence and stimulate market growth. Overall, while there is a growing positive attitude towards EVs in Saudi Arabia, concerted efforts are required to overcome existing challenges and fully realize the market potential. These arguments lead to the assumption of following hypothesis;

- H12: The purchase intention of e-vehicle has significant influence on his purchase behavior towards e-vehicle.

2.14. The mediating role of purchase intention

Purchase intention plays a crucial role as a mediator between consumer attitude and purchase behaviour. Authors like Bagozzi (1982) have consistently shown that purchase intention is a reliable predictor of subsequent purchase behaviour. The relationship between purchase intention and purchase behaviour is based on the assumption that individuals are more likely to act following their intentions, as suggested by Ajzen (1991). Therefore, a strong purchase intention increases the likelihood of actual purchase behaviour. Empirical evidence supports the mediating role of purchase intention in the relationship between consumer attitude and purchase behaviour. Research has demonstrated that purchase intention acts as an intermediate variable that transfers the influence of consumer attitude to purchase behaviour. This mediation process suggests that purchase intention serves as both a cognitive and motivational mechanism through which consumer attitudes translate into actual purchasing decisions. A study conducted by Lim et al. (2015) showed that purchase intention effectively mediated the relationship between the independent variables (attitude, subjective norm, and trust) and the dependent variable (online shopping behaviour). These arguments lead to the proposition of the following hypothesis:

- H13: Consumer purchase intention towards electric vehicles mediates the relationship between consumer attitude and purchase behaviour.

3. Conceptual framework of the study

The conceptual framework of the study on "Consumer Adoption and Purchase Behaviour of Electric Vehicles in Saudi Arabia" is grounded in the Technology Acceptance Model (TAM) proposed by Davis (1989), which posits that perceived usefulness and perceived ease of use significantly influence consumers' intention to adopt new technologies. Additionally, the Theory of Planned Behavior (Ajzen, 1991) is utilized to understand the influence of subjective norms, attitudes, and perceived behavioral control on consumers' intentions towards electric vehicle adoption. Furthermore, Rogers' (1962) Diffusion of Innovations theory is incorporated to explore the role of early adopters, opinion leaders, and social networks in the diffusion process of electric vehicles within the Saudi Arabian context. This framework provides a comprehensive understanding of the factors shaping consumer adoption and purchase behavior of electric vehicles in Saudi Arabia, contributing to both theoretical advancements and practical implications for policymakers and industry stakeholders. The following model (**Figure 1**) was proposed for the study of attitude.

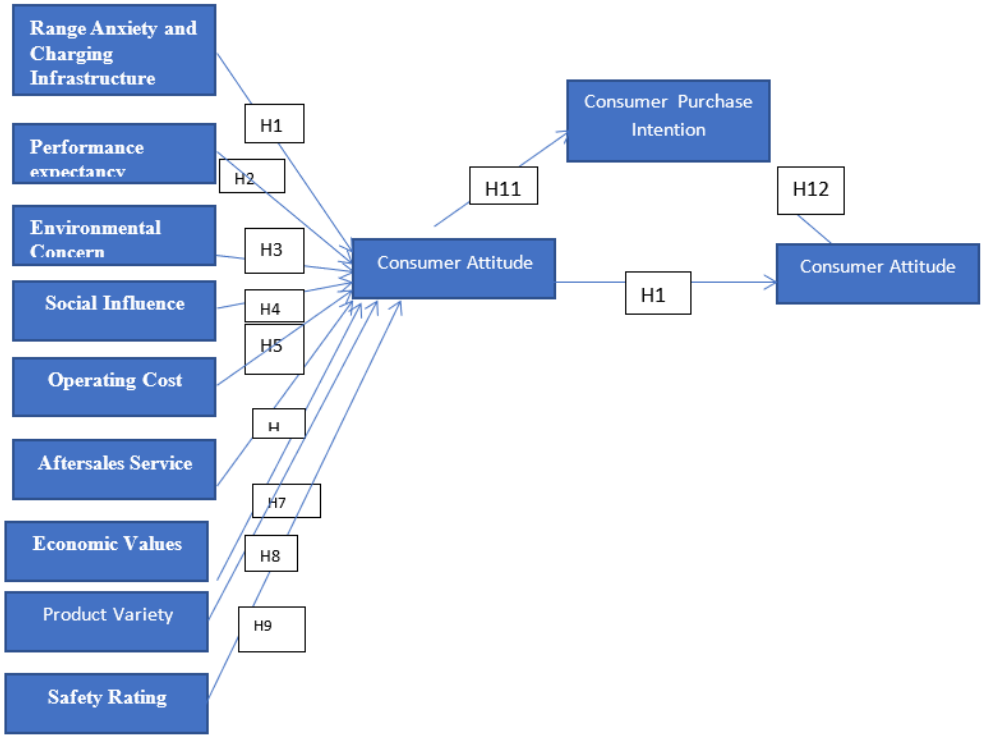

Figure 1. Proposed model.

4. Research methodology

This study employs a mixed-methods approach, combining a comprehensive literature review, surveys, and data analysis. To investigate the factors influencing consumer adoption and purchase behavior of electric vehicles (EVs) in the Kingdom of Saudi Arabia, a structured survey design was adopted. This method allows for the systematic collection of quantitative data from a large population, ensuring the reliability and comparability of results. The survey employs a stratified random sampling technique, ensuring representation across key demographics such as age, gender and income. This approach helps capture diverse perspectives and behaviors, enhancing the generalizability of the findings. Data collection was done through online and face-to-face questionnaires, distributed via social media platforms, EV dealerships, and public spaces. The stratified sampling ensures the sample genuinely represents the population, addressing potential biases and ensuring the inclusivity of various consumer segments. A well-structured questionnaire was designed to cover different predictors of consumer attitude, purchase intention, and purchase behaviour towards electric vehicles. The measurement variable for consumer attitude was developed based on the previous research work of Alzahrani et al. (2019), Alshehri and Alharthi (2021), Alawaji et al. (2020), Almutairi and Alkhatib (2021), Alhammad et al. (2023), and Alqahtani et al. (2022). The measurement variable for the construct of consumer purchase intention of electric vehicles were developed based on previous research work of Ajzen (1991), Habib et al. (2022), Kala and Chaubey (2023). Further measurement variable for the purchase behaviour of electric vehicles was developed based on the previous research work of Jun and Park (2018) and Ho et al. (2016). The questionnaire items were tailored to align with the study's objectives, employing a five-point Likert scale for respondent feedback.

Content validity, item clarity, and alignment with research goals were evaluated by a panel of marketing and faculty experts. Primary data collection involved surveys distributed among a representative sample of Saudi Arabian consumers, gathering insights on attitudes, intentions, and purchase behaviour towards electric vehicles. The study targeted current and potential electric vehicle owners in key Saudi cities like Makka, Madina, and Jeddah. A pilot test with 40 respondents (10% of the sample) demonstrated questionnaire representativeness. Cronbach's alpha yielded a reliability coefficient of 0.913, indicating satisfactory internal consistency. A total of approximately 450 responses were received, and after excluding 53 incomplete or insincere responses, 397 were deemed suitable for analysis in this study. The collected data were organized, tabulated, and analyzed using SPSS 22 and Smart PLS software. To lessen the possibility of common method bias (CMB), the order of the items was carefully mixed (Kala and Chaubey, 2024). Harman's single factor test is a statistical technique used to check for common method variance (CMV) in survey data, which occurs when measurement errors are correlated due to the method of data collection rather than the constructs being measured. In this test, all variables in a study are entered into an exploratory factor analysis to determine the number of factors that account for the variance in the data. If a single factor emerges or one factor accounts for a significant majority of the variance, CMV may be a concern. In this context, a variance value of 27.439% indicates that the single factor accounts for approximately 27.4% of the total variance. Since this value is below the commonly accepted threshold of 50%, it suggests that common method variance is not likely to be a major issue in the dataset, indicating that the responses are not unduly influenced by the data collection method. The data was analyzed using SPSS software and Smartpls 4.0 to identify the key factors influencing consumer behaviour in the Saudi Arabian country. **Table 2** indicates the demographic characteristics of respondents.

5. Results

Research on consumer demographics has shown to be critical in understanding consumer purchase intentions and behavior, especially in the context of electric vehicles (EVs) in Saudi Arabia. Studies highlight that demographic factors such as age, gender, income, education, and environmental awareness significantly influence consumers' attitudes towards EVs and their subsequent purchasing decisions. Younger consumers, typically more environmentally conscious and technologically savvy, show a higher propensity to adopt EVs compared to older generations (Zhao et al., 2023). Additionally, higher income and education levels correlate with an increased likelihood of EV purchase, attributed to better financial capacity and greater awareness of environmental benefits (Zhao et al., 2023). Gender differences also play a role, with men more likely to purchase EVs, possibly due to traditional gender roles and driving habits in Saudi culture (Limon et al., 2023). **Table 2** summarizes the demographic characteristics of the study participants. It offers a detailed breakdown of variables such as age, gender, marital status, education, income, and occupation, accompanied by corresponding frequencies and percentages. Respondents were classified into five age groups, with the majority

(32.0%) falling within the 26–35 year bracket, followed by those aged up to 25 years (18.1%). Males constituted 71.5% of the sample, while females accounted for 28.5%. Marital status was divided between unmarried (32.2%) and married (67.8%) individuals. Postgraduates comprised the largest educational group (32.5%), followed by graduates (30.2%), undergraduates (23.7%), and professionals (13.6%). Income distribution ranged across five categories, with the majority (36.8%) falling within the SAR 1501 to SAR 2500 bracket. Retirees formed 32.2% of the sample, followed by service (28.5%) and self-employed individuals (28.2%), while students constituted the smallest group (11.1%). These statistics offer insights into the demographic composition essential for interpreting research outcomes.

Table 2. Demographic characteristics of respondents (N = 397).

Demographic categories	Description	Frequency	Percentage
Age Category	Up to 25 years	72	18.1
	26–35 years	127	32.0
	36–45 years	95	23.9
	46–55 years	80	20.2
	Above 55 years	23	5.8
Gender	Male	284	71.5
	Female	113	28.5
Marital Status	Unmarried	128	32.2
	Married	269	67.8
Education	Under graduate	94	23.7
	Graduate	120	30.2
	Post graduate	129	32.5
	Professionals	54	13.6
Income (Monthly)	Up to SAR 1500 PM	62	15.6
	From SAR 1501 SAR 2500 PM	146	36.8
	From SAR 2501 to SAR 4000 PM	83	20.9
	From SAR 4001 to SAR 5000 PM	65	16.4
	Above SAR 5000 PM	41	10.3
Occupation	Students	44	11.1
	Service	113	28.5
	Self employed	112	28.2
	Retired	128	32.2

Table 3 presents descriptive statistics for predictors of consumer attitudes, purchase intentions, and behaviour towards electric vehicles based on a survey of 397 respondents. Range anxiety and charging infrastructure scored a mean of 3.5642 (SD = 0.88041), with driving range and charging availability having the highest mean of 3.6877 (SD = 0.9682). Environmental concerns were moderately expressed (mean = 3.5806, SD = 0.87154), as were perceptions of Government Incentives (mean = 3.6707, SD = 0.82189) and Social Influence (mean = 3.6537, SD = 0.78335). Participants moderately valued operating costs (mean = 3.6537, SD =

0.78335) and after-sales services (mean = 3.2305, SD = 1.07342). Economic value (mean = 3.6354, SD = 0.79857), product variety (mean = 3.7779, SD = 0.79182), and safety ratings (mean = 3.8228, SD = 0.93996) were positively perceived. These predictor variables form the consumer attitude towards electric vehicle adoption. The analysis yielded a mean score of 3.6379 (SD = 0.62439) for overall interest in electric vehicle (EV) purchases. Examination of purchase intention revealed a moderate inclination (mean = 3.7204, SD = 0.47679), mirrored by a moderately positive attitude towards purchase behaviour (mean = 3.6807, SD = 0.51639). Some respondents sought further persuasion before deciding (mean = 3.7783, SD = 0.57405). Notably, a substantial portion expressed definitive intent to procure an EV (mean = 3.6373, SD = 0.68122), often tied to replacing current vehicles (mean = 3.6297, SD = 0.69006). Additionally, a willingness to recommend EVs emerged (Mean = 3.6776, SD = 0.59189).

Table 3. Predictors of consumer attitudes, purchase intentions, and purchase behaviour towards electric vehicles: A descriptive statistic (*n* = 397).

Measurement variable description	Mean	Std. Deviation
Range Anxiety and Charging Infrastructure	3.5642	0.88041
The driving range of electric vehicles and their easy Availability with charging infrastructure for electric vehicles influence my adoption	3.6877	0.96827
Accessibility of charging stations and the cost associated with it in various regions affect my adoption motives	3.4484	1.08268
Improved battery technology with adequate charging infrastructure is important for me	3.5567	1.10323
Performance Expectancy	3.2173	0.99883
Electric vehicles have a sufficient driving range for my daily commuting needs.	3.3577	1.09084
Electric vehicles provide satisfactory acceleration and speed.	3.1562	1.08049
Electric vehicles have reliable battery performance.	3.1763	1.09597
Electric vehicles have comparable or better performance than traditional gasoline/diesel vehicles.	3.1788	1.34868
Environmental Concern	3.5806	0.87154
Low running cost and Reduced reliance on fossil fuels motivates me to adopt an electric car	3.6625	1.16208
Evs have the potential to reduce air pollution and improve the environment.	3.7229	1.07488
Electric vehicles are useful for reducing carbon emissions and alleviating the energy shortage problems	3.5919	1.10084
The electric vehicle can contribute to the environment for the future generation	3.3451	1.23473
Government Incentive	3.6707	.82189
The availability of financial incentives, such as low-interest loans, affects my decision to purchase an electric vehicle.	3.7305	1.08730
Government incentives in Saudi Arabia with clear policies influencing purchase decisions and subsidies for electric vehicles effectively motivate EV adoption,	3.7380	1.09262
The government has provided adequate financial incentives (e.g., tax credits, subsidies) for electric vehicle owners.	3.6020	1.13831
The government's policies have effectively addressed the concerns and challenges associated with electric vehicles (e.g., range anxiety, charging infrastructure).	3.6121	1.08043
Social Influence	3.6537	0.78335
Social variables, such as the opinions of my friends, family, and coworkers, have an impact on my decision to purchase an electric vehicle.	3.7783	1.03535
My friends and family believe that while buying an EV, it's crucial to take the environment into account.	3.8060	0.91572
I would feel more socially responsible if I drove the EV.	3.4181	1.18555

Table 3. (*Continued*).

Measurement variable description	Mean	Std. Deviation
I am frequently the first in my group of friends to test out new items like EV	3.6121	1.05680
Operating Cost	3.6537	0.78335
I am willing to adopt an electric vehicle due to its low running cost	3.3879	1.29905
I am very much concerned about the initial cost of purchasing an electric vehicle compared to a conventional gasoline-powered vehicle.	3.4408	1.22872
The electricity costs for charging an EV compared to the fuel costs for a conventional gasoline-powered vehicle.	3.5214	1.11131
The expenses of upkeep and repairs for an electric car with a typical gasoline-powered car.are significant	3.3476	1.13042
After Sales Services	3.2305	1.07342
The convenience and ease of charging an electric vehicle at home positively influenced my decision to adopt them.	3.3401	1.23204
The availability of charging stations and suitable infrastructure influenced my decision to purchase an electric vehicle.	3.1889	1.06935
There are enough service centres nearby	3.1486	1.01034
The convenience and ease of charging an electric vehicle at home positively influenced my decision to adopt them.	3.3401	1.23204
Economic Value	3.6354	0.79857
For me, cost is a key consideration when buying an electric vehicle.	3.3249	1.22586
Fuel economy and maintenance costs come first when purchasing an E.C.	3.8035	1.08325
The resale value of electric vehicles is a consideration in my purchase decision.	3.6877	0.96566
Evs are useful in reducing my household expenses	3.7254	1.01885
Product Variety	3.7779	0.79182
The availability of EV models and options meets my preferences and requirements.	3.8060	1.02008
Product variety and design is an important consideration for me in adopting an EV	3.8741	0.98947
The driving range (distance per charge) of electric vehicles is sufficient for my needs.	3.8262	1.12704
The aesthetics and design of electric vehicles are appealing to me.	3.8640	0.96224
The perception of electric vehicles as technologically advanced influences my decision to purchase them.	3.7204	0.96657
Electric vehicles are equipped with advanced safety features.	3.5768	1.19226
Safety Ratings	3.8228	0.93996
My main fear when switching to an electric automobile is safety.	3.7632	1.08682
Safety risks are more in electric vehicle	3.8589	1.06375
Electric vehicles are more environmentally friendly than traditional gasoline-powered vehicles.	3.8463	1.16084
Consumer Attitude	3.6379	0.62439
I am very positive towards the futuristic technology of electrical vehicles and their position in future	3.5592	0.72797
I am likely to test drive an electric vehicle before making a purchase decision.	3.1108	0.89488
The current battery technology of electric vehicles needs improvement to win the customer trust and confidence	3.4257	0.78021
The design and aesthetics value of electric vehicles are appealing to me.	3.5491	0.79183
Purchase Intention	3.7204	0.47679
I am likely to test drive an electric vehicle before making a purchase decision.	3.6574	0.68056
I am likely to seek information about electric vehicles from online sources.	3.5668	0.69173
I am likely to consider leasing an electric vehicle rather than buying one.	3.9169	0.57353
I am likely to rely on the advice of friends or family who own electric vehicles.	3.8086	0.65415
I am likely to wait for more advanced technology before purchasing an electric vehicle.	3.7708	0.61163
Shortly, I plan to buy an E.C., considering the famous brand and recommending it to friends and relatives.	3.6020	0.83955

Table 3. (*Continued*).

Measurement variable description	Mean	Std. Deviation
Purchase Behaviour	3.6807	0.51639
I am considering buying an electric car but need more convincing thought on it	3.7783	0.57405
I will buy an electric car in future	3.6373	0.68122
I want to buy an electric vehicle after replacing my present car	3.6297	0.69006
I would like to recommend my friends purchase an electric car	3.6776	0.59189
Valid *N* (listwise)		

5.1. Predictors of consumer attitudes, purchase intentions, and purchase behaviour towards electric vehicles: PLS-SEM model

5.1.1. Measurement model

In the PLS SEM model, the measurement model serves as the foundation for assessing the validity and reliability of latent constructs within a structural equation model. It encompasses the relationships between observed indicators and their respective latent variables. Through factor loadings, indicator reliability, and composite reliability, the measurement model quantifies the extent to which observed variables accurately measure underlying constructs. The reliability and validity of constructs were assessed using Smart Partial Least Squares (PLS) analysis, as illustrated in **Table 4**. Construct reliability was determined through Cronbach's alpha, composite reliability (rho_a), and composite reliability (rho_c), while construct validity was evaluated via average variance extracted (AVE) (Hair et al., 2019). "After-sales Services" demonstrated robust reliability and validity, with high Cronbach's alpha (α = 0.933), rho_a (1.035), rho_c (0.950), and AVE (0.827) scores. Similarly, "operating cost" and "Performance Expectancy" showed strong reliability and validity. However, "purchase intention" exhibited comparatively lower levels. These findings emphasize cautious interpretation, particularly regarding "Purchase Intention" (Hair et al., 2019), elucidating the psychometric properties of the constructs through Smart PLS analysis.

Table 4. Construct reliability and validity.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	The average variance extracted (AVE)
After sales services	0.933	1.035	0.950	0.827
Consumer attitude	0.761	0.799	0.847	0.585
Economic value	0.732	0.750	0.831	0.553
Environmental concern	0.763	0.871	0.827	0.546
Operating cost	0.833	0.838	0.888	0.666
Performance expectancy	0.887	0.953	0.919	0.738
Product variety	0.855	0.864	0.892	0.580
Purchase behaviour	0.826	0.827	0.885	0.659
Purchase intention	0.801	0.810	0.859	0.505
Range anxiety and charging infrastructure	0.789	0.830	0.874	0.699
Safety sating	0.812	0.811	0.889	0.727
Social influence	0.734	0.749	0.830	0.552

The correlation **Table 5** elucidates construct relationships, crucial for discerning discriminant validity (Fornell and Larcker, 1981). Diagonal elements denote the square root of the average variance extracted (AVE) for each construct, affirming convergent validity (Hair et al., 2019). Despite generally low coefficients indicating satisfactory discriminant validity, notable exceptions exist, like the strong correlation between "After-sales Services" and "consumer attitude" (Hair et al., 2019). These findings necessitate further scrutiny to ensure construct distinctiveness and model refinement.

Table 5. Discriminant validity: Fornell-Larcker criterion.

	After-Sales Services	**Consumer Attitude**	**Economic Value**	**Environmental Concern**	**Operating Cost**	**Performance Expectancy**	**Product Variety**	**Purchase Behaviour**	**Purchase Intention**	**Range Anxiety and Charging Infrastructure**	**Safety Rating**	**Social Influence**
After Sales Services	0.909	-	-	-	-	-	-	-	-	-	-	-
Consumer Attitude	0.097	0.765	-	-	-	-	-	-	-	-	-	-
Economic Value	−0.030	0.862	0.743	-	-	-	-	-	-	-	-	-
Environmental Concern	0.788	0.118	−0.010	0.739	-	-	-	-	-	-	-	-
Operating Cost	−0.022	0.702	0.452	0.018	0.816	-	-	-	-	-	-	-
Performance Expectancy	0.160	0.072	0.052	0.121	0.044	0.859	-	-	-	-	-	-
Product Variety	−0.023	0.864	0.736	0.029	0.585	0.051	0.761	-	-	-	-	-
Purchase Behaviour	−0.089	0.747	0.583	−0.026	0.692	0.014	0.708	0.812	-	-	-	-
Purchase Intention	−0.057	0.721	0.534	0.018	0.698	0.020	0.653	0.872	0.711	-	-	-
Range Anxiety and Charging Infrastructure	−0.018	0.026	0.029	0.005	0.016	0.009	0.025	0.046	0.081	0.836	-	-
Safety Sating	−0.027	0.751	0.625	0.018	0.476	0.014	0.732	0.678	0.610	−0.027	0.852	-
Social Influence	−0.062	0.742	0.533	0.011	0.665	0.025	0.615	0.661	0.670	0.038	0.519	0.743

The Heterotrait-Monotrait Ratio (HTMT) was employed to evaluate discriminant validity (Henseler et al., 2015). Results in **Table 6** revealed perfect discriminant validity indicated by diagonal HTMT values of 1. Off-diagonal values provided further insights. For instance, an HTMT value of 0.338 between After-sales services and consumer attitude suggests moderate discriminant validity. Notably, an HTMT value of 0.759 between environmental concern and After-sales services signifies high discriminant validity. These findings bolster the credibility of the study's measurement model (Henseler et al., 2015).

Table 6. Discriminant validity: Heterotrait-monotrait ratio (HTMT)-Matrix.

	After Sales Services	**Consumer Attitude**	**Economic Value**	**Environmental Concern**	**Operating Cost**	**Performance Expectancy**	**Product Variety**	**Purchase Behaviour**	**Purchase Intention**	**Range Anxiety and Charging Infrastructure**	**Safety Rating**	**Social Influence**
After Sales Services	-	-	-	-	-	-	-	-	-	-	-	-
Consumer Attitude	0.338	-	-	-	-	-	-	-	-	-	-	-

Table 6. (*Continued*).

	After Sales Services	Consumer Attitude	Economic Value	Environmental Concern	Operating Cost	Performance Expectancy	Product Variety	Purchase Behaviour	Purchase Intention	Range Anxiety and Charging Infrastructure	Safety Rating	Social Influence
Economic Value	0.086	0.863	-	-	-	-	-	-	-	-	-	-
Environmental Concern	0.759	0.273	0.091	-	-	-	-	-	-	-	-	-
Operating Cost	0.050	0.824	0.535	0.060	-	-	-	-	-	-	-	-
Performance Expectancy	0.174	0.125	0.080	0.150	0.048	-	-	-	-	-	-	-
Product Variety	0.066	0.851	0.867	0.092	0.688	0.062	-	-	-	-	-	-
Purchase Behaviour	0.105	0.888	0.708	0.064	0.825	0.034	0.836	-	-	-	-	-
Purchase Intention	0.079	0.876	0.658	0.099	0.842	0.046	0.768	0.895	-	-	-	-
Range Anxiety and Charging Infrastructure	0.032	0.041	0.052	0.086	0.046	0.050	0.046	0.071	0.102	-	-	-
Safety Sating	0.055	0.910	0.765	0.049	0.568	0.063	0.859	0.825	0.754	0.060	-	-
Social Influence	0.104	0.893	0.650	0.071	0.852	0.070	0.716	0.837	0.878	0.099	0.616	-

5.1.2. Structural model and hypothesis testing

The structural model's findings, detailed in **Table 7** and **Figure 2**, offer insights into the interplay among various factors and consumer attitudes, along with their influence on purchase behavior and intention. Path coefficients, mean values, standard deviations, *t*-statistics, *p*-values, and hypothesis testing outcomes are presented in the table. Notably, after-sales services exhibit a significant positive impact on consumer attitude (path coefficient = 0.128, *t*-statistic = 2.436, $p = 0.015$). Conversely, the relationship between range anxiety and charging infrastructure, and consumer attitude lacks statistical significance (path coefficient = 0.003, *t*-statistic = 0.269, $p = 0.788$). safety rating, social influence, economic value, product variety, and operating cost significantly influence consumer attitude, whereas environmental concern, performance expectancy, and purchase intention do not. Consumer attitude significantly affects both purchase behavior (path coefficient = 0.247, *t*-statistic = 7.336, $p = 0.000$) and purchase intention (path coefficient = 0.721, *t*-statistic = 32.324, $p = 0.000$). Moreover, purchase intention significantly correlates with purchase behaviour (path coefficient = 0.694, *t*-statistic = 23.554, $p = 0.000$). Finally, the combined effect of consumer attitude, purchase intention, and purchase behaviour is evidenced by a significant path coefficient of 0.500 (*t*-statistic = 17.985, $p = 0.000$), reinforcing their interconnectedness.

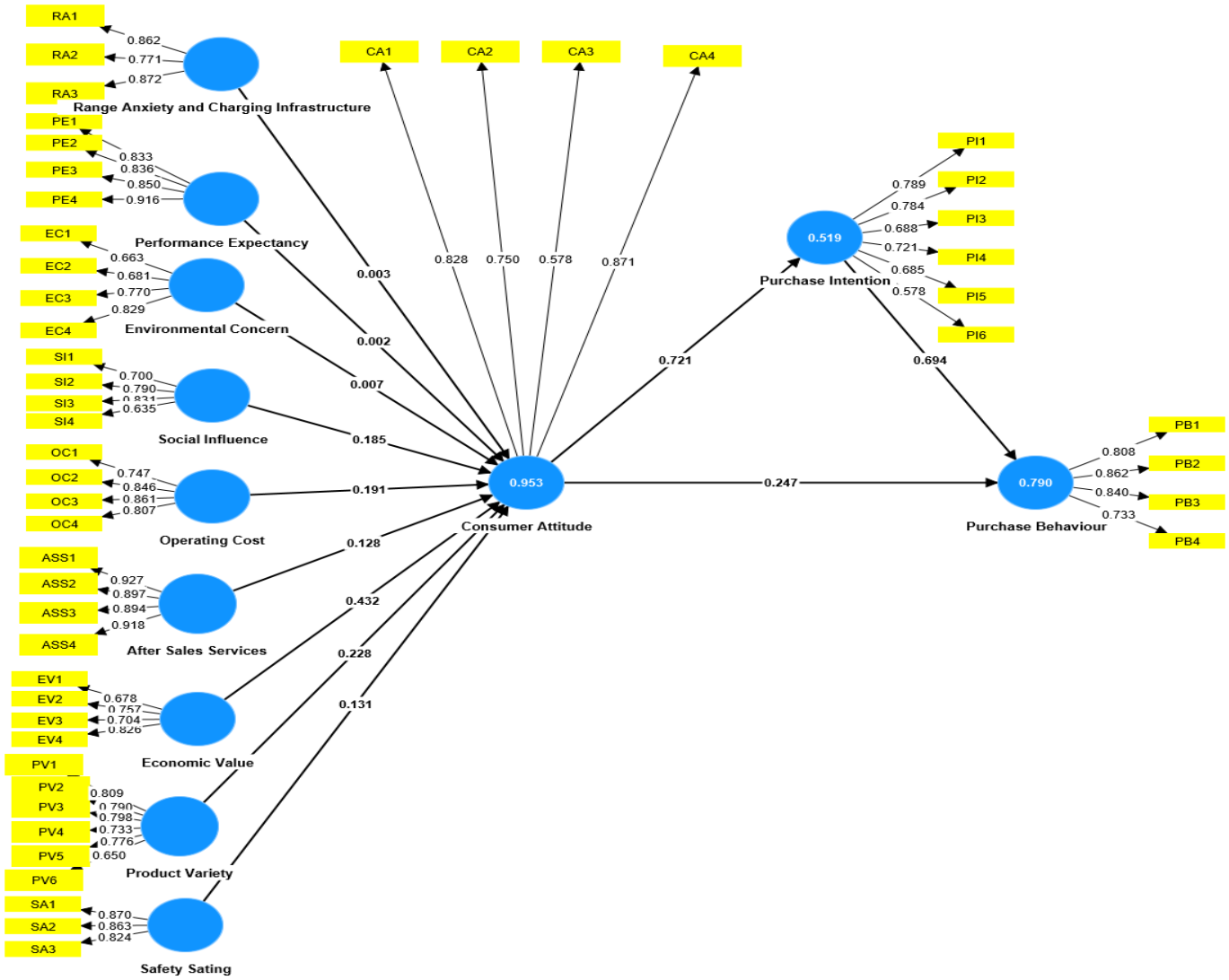

Figure 2. Structural model.

Table 7. Structural model: Path coefficients mean, STDEV, *T* values, *p* values and hypothesis testing.

Hypothesis testing	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	*T* statistics (|O/STDEV|)	*P* values	Remarks
After Sales Services → Consumer Attitude	0.128	0.112	0.053	2.436	0.015	Accepted
Range Anxiety and Charging Infrastructure → Consumer Attitude	0.003	0.003	0.012	0.269	0.788	Rejected
Safety Sating → Consumer Attitude	0.131	0.131	0.019	6.838	0.000	Accepted
Social Influence → Consumer Attitude	0.185	0.183	0.017	10.591	0.000	Accepted
Economic Value → Consumer Attitude	0.432	0.430	0.018	23.410	0.000	Accepted
Environmental Concern → Consumer Attitude	0.007	0.014	0.027	0.280	0.780	Rejected
Operating Cost → Consumer Attitude	0.191	0.192	0.017	10.980	0.000	Accepted
Performance Expectancy → Consumer Attitude	0.002	0.003	0.012	0.150	0.881	Rejected
Product Variety → Consumer Attitude	0.228	0.228	0.022	10.233	0.000	Accepted
Consumer Attitude → Purchase Behaviour	0.247	0.246	0.034	7.336	0.000	Accepted
Consumer Attitude → Purchase Intention	0.721	0.722	0.022	32.324	0.000	Accepted
Purchase Intention → Purchase Behaviour	0.694	0.695	0.029	23.554	0.000	Accepted
Consumer Attitude → Purchase Intention → Purchase Behaviour	0.500	0.502	0.028	17.985	0.000	Accepted

6. Discussion

The primary objective of this research is to investigate the determinants influencing consumer adoption and purchasing behavior of electric vehicles (EVs) within the Kingdom of Saudi Arabia. Through structural model analysis, notable associations between various factors and consumer attitudes have been identified, along with their impacts on purchasing behaviour and intentions. Notably, after-sales services were found to exert a positive and significant influence on consumer attitudes (Al-Aboudi et al., 2022). Similarly, safety ratings were found to significantly impact consumer attitudes (Al-Aboudi et al., 2022). Social influence, economic value, product variety, and operating cost also demonstrated significant positive effects on consumer attitudes (Olsen et al., 2021). Conversely, factors such as range anxiety, charging infrastructure, environmental concern, and performance expectancy were found to have no significant influence on consumer attitudes (Egbue and Long, 2012). This finding aligns with previous research indicating that consumer attitudes towards EVs may be adversely affected by range anxiety and charging concerns (Egbue and Long, 2012) and that performance falling short of expectations can lead to negative attitudes.

Consumer attitude significantly influences both purchase behavior and purchase intention. This is supported by previous studies conducted by Yang et al. (2020). Additionally, a positive relationship between purchase intention and purchase behavior was found, consistent with the findings of Shi et al. (2019). The significant interconnectedness among consumer attitude, purchase intention, and purchase behavior was highlighted by a notable path coefficient of 0.500. This finding underscores the importance of understanding the interplay between these variables. Moreover, subsequent research has shed light on the mediating function of purchase intention in the association between consumer attitude and purchase behaviour regarding electric vehicles. This outcome aligns with earlier studies conducted by Keshav et al. (2021), which reported analogous findings.

Saudi Arabian countries are oil-rich country using traditional fossil fuel. The present study revealed that range anxiety and charging infrastructure, environmental concern, and performance expectancy seem to be less effective in building consumer attitude towards electric vehicle adoption and making them more sensitive towards alternate fuel car. It is needed to motivate the consumer to adopt e-vehicle and make them more motivated and more environmental sensitive. Motivating people towards sustainable products involves enhancing their self-efficacy, which plays a crucial role in shaping consumer intentions. Phan and Pham (2023) highlight that self-efficacy mediates the relationship between perceived value, perceived quality, and purchase intention of organic foods among Vietnamese young adults, suggesting that consumers who feel confident in their ability to make sustainable choices are more likely to do so. By focusing on education and information dissemination, we can enhance consumer confidence and knowledge about the benefits and accessibility of sustainable products. This educational approach can demystify sustainable products, making them seem less daunting and more attainable. Consequently, as consumers become more informed and self-assured, their intention to purchase and consistently choose sustainable options is significantly boosted, creating a positive feedback loop

that encourages widespread adoption of sustainable consumption behaviors.

7. Theoretical implication

It is anticipated that positive consumer attitudes towards EVs will positively influence purchase intention, which in turn will lead to increased purchase behaviour. The mediating role of purchase intention in the consumer attitude-purchase behaviour relationship will provide empirical evidence on the underlying cognitive processes that drive EV adoption. These findings will contribute to the existing body of literature by expanding the understanding of how consumer attitudes translate into actual purchase decisions in the context of EVs in Saudi Arabia. Furthermore, the identification of specific factors influencing purchase intention can inform policymakers and marketers about effective strategies to promote EV adoption and support sustainable transportation initiatives in the region.

8. Managerial implications

The findings of this study have several important managerial implications for marketers and policymakers seeking to promote the adoption of EVs in Saudi Arabia. Firstly, it is crucial to focus on shaping positive consumer attitudes towards EVs by highlighting their environmental benefits, cost savings, and technological advancements. This can be achieved through targeted marketing campaigns, educational programs, and partnerships with environmental organizations. Secondly, efforts should be made to enhance purchase intention by addressing the perceived barriers, such as range anxiety and limited charging infrastructure, through government initiatives, private investments, and collaborations with charging infrastructure providers. Additionally, policymakers should consider offering financial incentives, such as tax breaks and subsidies, to encourage consumers to overcome the price premium associated with EVs.

9. Conclusion

The present study analyses the factors influencing consumer attitude towards electric vehicles and its impact on purchase intention and purchase behaviour of Electric Vehicles in the Kingdom of Saudi Arabia. The findings from the structural model reveal important dynamics between various factors and consumer attitudes, as well as their impact on purchase behavior and intention regarding electric vehicles in Saudi Arabia. After-sales services notably enhance consumer attitudes positively, while factors such as range anxiety and charging infrastructure do not significantly affect attitudes. Key influencers of consumer attitude include safety ratings, social influence, economic value, product variety, and operating cost, whereas environmental concern, performance expectancy, and purchase intention show no significant effect. Consumer attitude plays a crucial role in shaping both purchase behavior and purchase intention. Additionally, there is a strong correlation between purchase intention and actual purchase behavior. The interconnectedness of consumer attitude, purchase intention, and purchase behavior is evident, highlighting their combined effect on the adoption of electric vehicles. Understanding the factors

influencing EV adoption is crucial for policymakers and industry stakeholders in Saudi Arabia. This paper evaluates individual, social, economic, and environmental factors influencing EV adoption, providing measurement and evaluation techniques. By considering these factors, policymakers can develop effective strategies to accelerate EV adoption and foster sustainable transportation in the Kingdom of Saudi Arabia.

10. Limitations and future scope of the of study

The present research work analyses consumer attitudes and purchase intentions towards electric vehicles (EVs) in Saudi Arabia, with some limitations. The first limitation of the study is the limited sample size in the small population of the country that restricted the generalizability of the findings due to the country's unique cultural, economic, and regulatory landscape. Secondly, it highlights reliance on self-reported data, which may introduce biases. Objective measures, like actual purchase behaviour could enhance accuracy. Thirdly, the study focuses solely on purchase intention as a mediator, neglecting other potential factors like environmental awareness or social influence. Future research should explore these to better understand the complexities of EV adoption. Overall, caution is advised in applying the study's results to other regions, and future investigations should employ diverse methodologies and consider additional influencing factors for a comprehensive understanding of consumer behaviour towards EVs.

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