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Research Article

To Buy or Not to Buy? Attitudinal Ambivalence of Chinese Consumers toward Electric Vehicle Purchasing Behavior

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ABSTRACT

The development process of the popularization of electric vehicles as an important way to promote sustainable development of transportation is largely affected by consumer attitudes. Given the important role of attitudinal ambivalence in green consumer behavior, this study integrates planned behavior theory, technology acceptance model, and perceived risk theory to construct a conceptual framework. A cross-sectional survey design was used, and valid data from 351 Chinese consumers was obtained through random sampling. The study shows that perceived usefulness partially mediates the impact of attitudinal ambivalence on consumer purchase behavior. Although perceived ease of use does not have a direct significant impact on purchase behavior, it indirectly affects purchase decisions through attitudinal ambivalence. Perceived risk did not significantly affect purchasing behavior, nor did it mediate the relationship between attitudinal ambivalence and purchasing behavior. The results show that consumers pay more attention to perceived usefulness in their purchasing decisions for electric vehicles, and that perceived ease of use mainly affects the consumer's psychological evaluation process rather than directly promoting purchasing behavior. Perceived risk does not become a major obstacle. This study provides a reference for governments, manufacturers, and retailers, emphasizing the importance of optimizing the consumer experience to reduce attitudinal ambivalence and promote purchasing behavior for electric vehicles.

Keywords: Electric Vehicle, Perceived Usefulness, Perceived Ease of Use, Perceived Risk,, Purchasing Behavior, Attitudinal Ambivalence.

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1. INTRODUCTION

With the escalating global climate crisis and ever-worsening pollution, the transportation sector now ranks as the world's second-biggest culprit when it comes to carbon emissions (International Energy Agency, 2016). To tackle this climate emergency and curb transportation-related emissions, governments and international bodies are pushing hard for a shift from old-school combustion engines to cleaner, greener technologies. Electric vehicles (EVs), as a substitute for gas guzzlers, are seen as a crucial piece of the puzzle in reining in greenhouse gas emissions (Shalender & Sharma, 2021). China, a major economic player and a significant source of carbon emissions, is stepping up to the plate. Faced with mounting environmental issues, they've rolled out a slew of initiatives to boost the EV market, including everything from financial incentives and tax breaks to a ramp-up in charging station construction (Wu & Dong, 2021). On top of that, technological breakthroughs are making EVs increasingly competitive. With the "dual carbon" targets in mind, getting more EVs on the road has become a pivotal strategy for driving low-carbon changes and cutting emissions.

The acceptance of electric vehicles by consumers is shaped by a variety of psychological factors, with perceived usefulness, ease of use, and risk being key elements that sway their buying intent (Vafaei-Zadeh et al., 2022). Drawing from the technology acceptance model, perceived usefulness gauges how consumers feel about the practical benefits technology can provide, whereas perceived ease of use assesses how simple it is to operate (Davis, 1989). Research indicates that consumers are more inclined to buy electric vehicles if they believe they'll save on fuel, cut down on emissions, and enhance their driving experience (Zhang et al., 2022). Nonetheless, factors like charging accessibility, range anxiety, depreciation of used cars, and safety worries can erode trust in electric vehicles and impact purchasing decisions. Moreover, consumers often grapple with mixed feelings about their purchase, acknowledging the environmental benefits of electric vehicles yet harboring concerns about technological reliability and financial sustainability. This mixed mindset can lead to procrastination or uncertainty in their buying choices (Olsen et al., 2005).

This study aims to explore the impact of perceived usefulness, perceived ease of use, and perceived risk on consumer purchasing behavior of electric vehicles and introduces attitudinal ambivalence as a mediating variable to analyze the consumer's purchase decision-making mechanism. The results of the study will not only help the government optimize its policy system but also provide strategic guidance for manufacturers to enhance consumer acceptance of electric vehicles.

2. LITERATURE REVIEW

2.1 Background to the Development of Electric Vehicles in China

From the early 1980s onward, China's automotive sector has surged ahead at an impressive pace, with

the volume of vehicles on the road climbing far more quickly than the country's population. By 2009, China had pulled ahead of the United States to emerge as the global leader in the auto market (Qian & Yin, 2017). That said, this explosive growth has fueled rising worries about environmental damage and skyrocketing energy demands. To curb pollution and ease reliance on fossil fuels, the Chinese government has actively championed the electric vehicle industry since 2009, swiftly scaling up its market presence and technological infrastructure to establish electric vehicles as a key pillar of eco-friendly mobility.

Since 2009, the Chinese government has aggressively backed the growth of the electric vehicle sector with initiatives like financial handouts, tax breaks, and the building out of charging infrastructure (Jian & Wei, 2019). These measures have significantly sparked demand for electric cars, particularly in top-tier urban areas and within the government and commercial vehicle sectors. Nonetheless, there remain hurdles to spurring private purchases, and electric cars still trail far behind their combustion-engine counterparts in market share. More work needs to be done to win over consumers (Wang et al., 2022). Nowadays, the market is increasingly becoming less of a policy push and more of a market pull (Wu et al., 2021), and widespread adoption will necessitate a blend of robust tech infrastructure and a deep dive into consumer habits.

The future success of electric vehicles hinges on more than just supportive policies and advancements in technology; consumer psychology plays a huge role. Buyers often experience attitudinal ambivalence when trying to decide whether or not to take the plunge. They might acknowledge the environmental benefits, but they're still likely to have reservations about things like the sticker price, how far the car can go on a single charge, the convenience of charging, and overall safety. Research indicates that a consumer's tech-savviness, prior experience, and perceived risk heavily influence their interest in buying an EV (Wang et al., 2018; Budnitz et al., 2024). Ultimately, safety anxieties, the hefty price tag, and the lingering issues of limited range and a spotty charging infrastructure continue to be significant stumbling blocks for potential EV owners (Rezvani et al., 2015).

In summary, China's electric vehicle market is in a stage of rapid development, but its further popularization still needs to address many challenges. This study will explore in depth the consumer's attitudinal ambivalence and its impact on electric vehicle purchasing behavior in subsequent chapters.

2.2 Consumer Purchasing Behavior

Intentions are key antecedent variables for predicting actual behavior (Ajzen, 1991), and this relationship is particularly significant in the field of low-carbon travel. Purchasing behavior research is an interdisciplinary field (Kotler, 2020) that integrates multidisciplinary perspectives such as psychology and sociology to systematically examine the complete decision-making process of consumers from the generation of needs to post-purchase evaluation (Kotler & Keller, 2021). Existing

research has deconstructed purchasing behavior into three stages: before, during, and after, each of which presents different psychological characteristics (Zong et al., 2023), among which emotionally driven consumption often leads to irrational purchasing decisions (Hartama, 2022).

The marketing of electric vehicles faces the key challenge of converting purchase intention into actual behavior (Salari, 2022), a process that is affected by a complex interplay of multidimensional factors. Existing research suggests that consumer attitudes, social norms, and psychological factors significantly influence purchase intention (Vafaei-Zadeh et al., 2022), while innovative marketing strategies such as product-service bundling can also effectively stimulate demand (Plananska & Gamma, 2022). However, current research has two limitations: on the one hand, it focuses too much on purchase intention and ignores the mechanism of translating into actual purchasing behavior (Hoang et al., 2022), and on the other hand, it does not sufficiently study the coping strategies for key purchase barriers (such as residual value risk and charging convenience). In the Chinese market in particular, consumers show significant attitudinal ambivalence towards electric vehicles—they recognize their environmental advantages but are also concerned about charging time and range (Liu et al., 2024). This attitudinal ambivalence can weaken the link between purchase intention and behavior (Zhang & Zhao, 2023). To achieve a breakthrough in the market, an integrated promotion system of “cognition-facilities-assurance” needs to be constructed. This can effectively reduce attitudinal ambivalence and promote the transformation of purchasing behavior by reducing cognitive conflicts through technology popularization, eliminating usage barriers through improved infrastructure, and enhancing confidence in decision-making through risk control.

This study focuses on the empirical research gap in consumer behavior toward electric vehicles, focusing on the impact mechanism of perceived usefulness, perceived ease of use, and perceived risk on the actual purchasing behavior of Chinese consumers, and introduces attitudinal ambivalence as a mediating variable to compensate for the theoretical deficiency of existing research that focuses too much on purchase intention and ignores actual behavior.

3. FACTORS INFLUENCING THE PURCHASING BEHAVIOR OF ELECTRIC VEHICLE CONSUMERS

3.1 Perceive Usefulness

The Technology Acceptance Model, or TAM, provides a key theoretical lens through which we can predict and understand how people embrace new technologies (Davis, 1989). Originally, the model was employed to examine how tech professionals adopt fresh technologies, with a particular focus on how perceived usefulness and perceived ease of use influence their willingness to jump on board (Davis et al., 1989). When it comes to the electric vehicle sector, what's considered "perceived

usefulness" covers economic pluses, eco-friendliness, and social viability (Wang et al., 2018). Given their status as a high-tech, long-lasting consumer product, people are going to mull over both the functional and symbolic advantages of EVs before they hit the car lot. The perception of these vehicles being beneficial is multi-faceted: it starts with cutting emissions and conserving energy, which helps combat climate change (Abbasi et al., 2021); it moves on to lowering the cost of transportation over time, bolstering household finances (Chawla et al., 2023); and lastly, it revolves around enhancing the overall driving experience with features like AI, battery longevity, and effortless charging options (Yang et al., 2025). The data point to a direct correlation between perceived benefits and purchase intent, with that perception playing a major hand in shaping consumers' views and decisions (Adu-Gyamfi et al., 2021; He et al., 2020).

Despite the many advantages of electric vehicles, consumers still face attitudinal ambivalence in the decision-making process. Attitudinal ambivalence refers to the psychological state in which an individual holds both positive and negative emotions when evaluating something (Jamal et al., 2023). When it comes to buying electric vehicles, consumers might be sold on the environmental perks and the potential for savings down the road, but they're also likely to have some reservations. Things like battery longevity, how easy it is to find a charging station, and whether the car will hold its value over time are all sticking points (Li et al., 2020). Research indicates that having mixed feelings about something, or attitudinal ambivalence, can hinder both personal growth and the desire to partake in positive actions, like being eco-conscious (Costarelli & Colloca, 2004). Zhang et al. (2023) suggest that attitudinal ambivalence can lead consumers to sit on the fence when deciding whether or not to buy something. This hesitation can put the brakes on electric vehicle purchases. They also propose that attitudinal ambivalence might act as the go-between linking how useful people think something is with whether or not they buy it. While past research has looked at attitudinal ambivalence, we still need to dig deeper into how it connects with perceived usefulness. This study proposes the following hypotheses:

H1 Perceived usefulness positively influences electric vehicle purchasing behavior.

H4 Perceived usefulness has a negative effect on attitudinal ambivalence.

3.2 Perceived Ease of Use

Perceived ease of use indicates a person's personal assessment of the effort needed for a specific technology (Davis, 1989). In the context of electric vehicle consumption, perceived ease of use has a multidimensional structure. On the cognitive dimension, consumers' understanding of the technical principles affects their ease of use evaluation (Wang et al., 2018); on the functional dimension, the friendliness of the operating interface and the convenience of the charging facilities are key factors (Huang et al., 2021); and on the social dimension, user education can enhance the perception of ease

of use (Wang et al., 2018). Research shows that perceived ease of use affects consumer behavior: on the one hand, easy-to-use products can significantly increase user willingness to adopt (Venkatesh & Davis, 2000); on the other hand, in cities such as Beijing and Shanghai that have implemented purchase restriction policies, convenient measures such as exclusive license plates for electric vehicles further enhance users' perception of their ease of use (Wu et al., 2019), promoting purchase decisions.

Based on attitudinal ambivalence, perceived ease of use plays an important role in consumer decision-making for electric vehicles. Ngoc et al. (2022) found that consumers perceive the convenience of operating and quick charging services when using electric vehicles, which helps alleviate concerns about range and maintenance costs. This effect is achieved through multiple pathways: enhancing consumers' perception of the practical value of the product (Vafaei-Zadeh et al., 2022); enhancing psychological security during use (Jensen et al., 2013); and shortening the training time for technological adaptation (Wu et al., 2018). Continuous technological innovation has further enhanced consumers' perception of the ease of use of electric vehicles, driving the market's transition from a policy-driven to a user experience-centric development model (Featherman & Hajli, 2021). This study proposes the following hypotheses:

H2 Perceived ease of use positively influences electric vehicle purchasing behavior.

H5 Perceived ease of use has a negative effect on attitudinal ambivalence.

3.3 Perceived Risk

Perceived risk (PR) refers to consumers' pre-purchase concerns and negative expectations caused by information asymmetry (Dunn et al., 1986). The purchase intention of electric vehicles is significantly hindered by perceived risk (Ji et al., 2021). Ostlund (1974) believes that perceived risk is an inherent attribute of new products. Although electric vehicles have undergone technological innovation, market expansion is still slow, and consumers' high perception of risk has affected promotion (Zhao et al., 2020). Risks are mainly manifested in finance, function, convenience, and safety (Zhao et al., 2020). Financial risks are caused by the immature second-hand car market, functional risks involve unstable battery life and power, convenience risks are due to insufficient charging facilities and long charging times, and battery safety is a key safety risk (Wang et al., 2017; Qian et al., 2019). These risks trigger consumers' attitudinal ambivalence between environmental protection and uncertainty, which affects purchasing behavior .

Consumer attitudes toward electric vehicles are negatively influenced by factors such as financial risk, functional risk, infrastructure, and battery safety, while government subsidies, social support, and economic benefits promote positive evaluations. Therefore, contradictory perceptions exacerbate

attitudinal ambivalence and affect purchasing behavior (Xu et al., 2022). Zhu & Jiao (2025) also confirmed the negative impact of perceived risk on purchase decisions. Wu et al. (2019) pointed out that consumers mitigate uncertainty in high-risk environments through information search, delayed decision-making, or social dependence. However, although the direct impact of perceived risk has been well studied, its mechanism of triggering attitudinal ambivalence has not been fully explored. This study proposes the following research hypotheses:

H3 Perceived risk negatively influences electric vehicle purchasing behavior.

H6 Perceived risk has a positive effect on attitudinal ambivalence.

3.4 Attitudinal Ambivalence

Attitudinal ambivalence（AA）is when someone feels two strong, opposing feelings about the same thing at once (Thompson et al., 1995). It all started when folks like Ajzen (1991) rehashed the old attitude-behavior link. This notion helps us understand why what people think and what they do often don't match up. Take electric cars, for instance. Folks see their green perks, but they're also skittish about the tech's dependability. This mixed bag of emotions can shake up their buying choices (Jaiswal et al., 2021).

Research indicates that the presence of attitudinal ambivalence can have a twofold effect on consumer behavior. On the downside, a high degree of attitudinal ambivalence can diminish the satisfaction derived from decisions, heighten feelings of uncertainty, and undermine the link between attitudes and actual behavior (Sipilä, 2021; Bee & Madrigal, 2013).On the upside, a moderate case of attitudinal ambivalence can encourage careful decision-making and enhance the precision of one's judgments (Rees et al., 2013). Take the electric vehicle market, for instance, where customers' varied views on the technical aspects and environmental benefits generate a unique kind of attitudinal ambivalence. This, in turn, influences their intentions to buy and ends up shaping their actual purchasing habits (Asadi et al., 2021). This study proposes the following research hypotheses:

H7 Attitudinal ambivalence mediates perceived usefulness and electric vehicle purchasing behavior.

H8 Attitudinal ambivalence mediates perceived ease of Use and electric vehicle purchasing behavior.

H9 Attitudinal ambivalence mediates perceived risk and electric vehicle purchasing behavior.

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H10 Attitudinal ambivalence negatively influences electric vehicle purchasing behavior

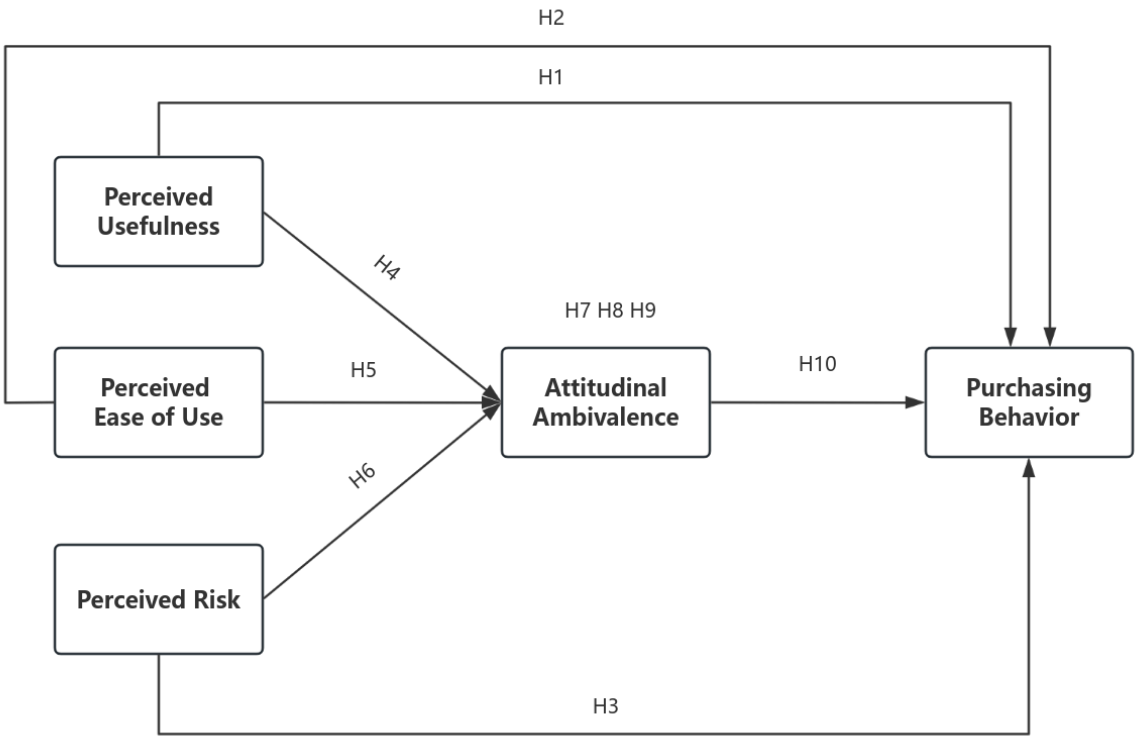

Figure 1 : Conceptual Framework

4. METHODOLOGY

4.1 Ethical Approval

This study followed the ethical guidelines of the Declaration of Helsinki and was approved by the Business Ethics Committee of the SEGi University Graduate School of Business(No. SEGiEC/SR/GSB/62/2025-2026). After being informed of the purpose of the study, the participants voluntarily completed the anonymous questionnaire, which was considered informed consent.

4.2 Sample and Data Collection

Research data was gathered through the deployment of a questionnaire, with the specifics detailed in Appendix 1. The questionnaire was meticulously crafted to align with the theoretical framework and

research propositions, drawing upon validated scales and tailoring them to fit the current context. It was available in both Chinese and English to enhance its reliability and the overall quality of the data (Davis, 1989; Ajzen, 1991; Venkatesh et al., 2003).

This study used stratified random sampling to collect data (Fowler, 2009), which effectively improves the representativeness of the sample by dividing the population into layers and randomly sampling within each layer (Zhao, 2021). This method follows the principle of equal probability (Sekaran, 2003), ensuring that each electric vehicle owner has the same probability of being selected, thereby reducing sampling errors.

This study was conducted in March 2025 through an online survey on the Questionnaire Star platform. Shandong Province was the main research area, and 351 valid questionnaires were ultimately recovered. The online survey method breaks through geographical restrictions, significantly reducing the time and economic costs of the study while ensuring data quality (Evans & Mathur, 2005).

Shandong Province was selected as the research area for this study based on the following three considerations: First, as a major province in China in terms of population and economy, Shandong Province has a huge market for automobile consumption, and the development of the electric vehicle industry started relatively early, so it has a good industrial foundation and consumer environment. Second, the local government actively promotes the development of electric vehicles and has introduced a series of supporting policies, including subsidies for car purchases, license plate discounts, and supporting measures such as the construction of charging infrastructure. Finally, this study has established a stable cooperative relationship with local universities, which provides convenient conditions for data collection and field research.

This research harnessed SPSS 22.0 and PLS-SEM 4.0 statistical software to dissect the data. Initially, we dived into descriptive statistics to get a grasp on the sample's fundamental traits. Then, we put exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to the test to gauge the trustworthiness and authenticity of our measurement gadgets (Hair et al., 2018). To validate our research assumptions and explore the interplay of variables, we deployed partial least squares structural equation modeling (PLS-SEM), ensuring the model's reliability and interpretive power (Chin, 1998; Henseler et al., 2009).

4.3 Variables and Measurement

The questionnaire for this study consists of two parts to ensure the comprehensiveness of the data and the scientific nature of the study.

The first part collects structural data related to the research variables. The question design is based on the existing theoretical framework and combined with measurement scales in related fields to ensure the reliability and validity of the instrument (Hair et al., 2019). Respondents answer according to their actual situation.

The second part collects basic demographic information about the respondents. This information helps to characterize the sample and provides context for the analysis of the data, making it easier to compare different groups.

The questionnaire was designed based on a literature review and revised to ensure the scientific rationality of the content (DeVellis, 2016). To improve the validity of the content, experts in the field were invited to evaluate the measurement tool. According to the expert feedback, some questions were optimized to measure bias.

This study used a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to measure the core variables. This well-established scale (Likert, 1932) has both reliability and validity advantages, accurately captures attitude tendencies, and its quantitative data is suitable for mean value analysis, standard deviation calculation, and PLS-SEM modeling (Henseler et al., 2009).

5. DATA ANALYSIS AND RESULTS

5.1 Response Rate

A total of 400 questionnaires were distributed for this study. After excluding 49 invalid questionnaires from people who did not purchase electric vehicles, 351 valid questionnaires were finally obtained, with a recovery rate of 87.75%. According to Baruch & Holtom (2008), the average recovery rate for survey research is 52.7%, and a recovery rate of over 80% is considered an ideal level. Therefore, the recovery rate of the questionnaires in this study is relatively high, and the data quality is more reliable.

5.2 Background of the Respondents

The demographic characteristics of the sample in this study show that the consumer group for electric vehicles has obvious structural characteristics. In terms of gender distribution, male consumers account for a dominant 69.2%, while females account for 30.8%, reflecting the current gender gap in the electric vehicle market. However, the participation of nearly 30% of women indicates that their influence in purchasing cars is on the rise.

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The age structure is characterized by a younger population, with the 26-30 age group accounting for the highest proportion at 44.4%, followed by the 31-40 age group at 22.8%. The proportion of consumers aged 41 and above is relatively low, which is related to the differences in the acceptance of new technologies and travel needs among different age groups.

The occupational distribution shows that institutional personnel (23.1%) and business service practitioners (20.2%) constitute the main consumer groups, while professional and technical personnel (15.1%) and education, research, and medical practitioners (17.1%) also account for a large proportion, indicating a high degree of receptiveness among knowledge-based occupational groups. It is worth noting that 74.3% of the respondents in the sample have a bachelor's degree or above, which confirms the leading position of highly educated groups in the consumption of electric vehicles.

In terms of vehicle ownership, the sample is polarized: 50.7% of households only own electric vehicles, while 49.3% of households own both electric and fuel vehicles. Since the research subjects of this study are people who have already purchased electric vehicles, those who have not purchased electric vehicles are excluded. This “two-car model” reveals that consumers still have practical considerations about the use of electric vehicles, such as battery life, and indicates that the market is in the transition phase from fuel vehicles to electric vehicles.

Table 1

Background of the Respondents

category		**sample size**	**percentage**
Gender	Male	243	69.2
	Female	108	30.8
Age	18-25	36	10.3
	26-30	156	44.4
	31-40	80	22.8
	41-50	55	15.7
	51-60	19	5.4
	Over 60	5	1.4
Occupation	Personnel of State organs, party organizations, enterprises, and institutions	81	23.1
	Professional Technical Personnel	53	15.1

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	Commercial and service sector personnel	71	20.2
	Agricultural, forestry, animal husbandry, fishery and water conservancy production personnel	49	14.0
	Workers in the fields of education, research, and health	60	17.1
	Students	13	3.7
	Other freelance workers	24	6.8
Education	Junior high school and below	13	3.7
	High school	20	5.7
	Junior College	56	16.0
	Bachelor	178	50.7
	Master	74	21.2
	PhD and above	10	2.8
Type of vehicle owned by the household	Electric Vehicles	178	50.7
	Fuel powered vehicles	0	0
	Both of the above vehicles have	173	49.3

5.3 Measurement Model Analysis

This research employs composite reliability (CR), Cronbach's Alpha, and the average variance extracted (AVE) to gauge the reliability and validity of the measurement model. Notably, the CR is a more precise gauge of the internal consistency among latent variables than Cronbach's Alpha, as suggested by Hair et al. (2019). Additionally, the AVE is utilized to determine the explanatory strength of the latent variables for their measurement indicators; it must surpass the threshold of 0.5, according to Fornell & Larcker (1981). These metrics collectively guarantee the reliability and convergent validity of the measurement instrument.

As you can see in Table 2, the reliability and validity metrics for each latent variable in this study are up to snuff. Looking at reliability, the CR values (all above 0.70) and Cronbach's Alpha coefficients (ditto, above 0.70) for all variables clear the hurdle, suggesting solid internal consistency in the measurement tool (Hair et al., 2019). When it comes to convergent validity, the AVE values for each variable are above the 0.50 mark set as the minimum (Fornell & Larcker, 1981). While the perceived usefulness (0.672) and perceived risk (0.739) values are a bit on the low side, they still cut the mustard in terms of demonstrating measurement stability (Hair et al., 2019).

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In this study, the measurement model demonstrated strong reliability and convergent validity. Each latent variable easily cleared the benchmark for composite reliability (CR ≥ 0.70) and Cronbach's Alpha (CA ≥ 0.70), as suggested by Fornell & Larcker (1981), confirming the internal consistency and reliability of the measurement instrument. Furthermore, the average variance extracted (AVE ≥ 0.50) indicated solid convergent validity, suggesting the overall measurement quality was more than adequate for empirical research.

Table 2

Reliability and validity analysis of variables

Construct	Indicator	Loading	Composite Reliability	Cronbach's Alpha	AVE
AA	AA1	0.877	0,962	0.953	0.810
	AA2	0.894			
	AA3	0.910			
	AA4	0.919			
	AA5	0.901			
	AA6	0.900			
PB	PB1	0.853	0.943	0.924	0.768
	PB2	0.891			
	PB3	0.882			
	PB4	0.883			
	PB5	0.873			
PU	PU1	0.801	0.925	0.902	0.672
	PU2	0.818			
	PU3	0.833			
	PU4	0.820			
	PU5	0.832			
	PU6	0.814			
PEU	PEU1	0.740	0.871	0.779	0.694
	PEU2	0.896			
	PEU3	0.855			

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PR	PR1	0.841	0.944	0.902	0.739
	PR2	0.834			
	PR3	0.874			
	PR4	0.855			
	PR5	0.880			
	PR6	0.871			

Table 3 presents the descriptive statistics and correlation results for each latent variable. The means indicate the general perception level of each construct, while the standard deviations reflect data variability. Importantly, the square roots of the AVE values on the diagonal exceed the corresponding inter-variable correlations, confirming adequate discriminant validity of the measurement model (Fornell & Larcker, 1981). Overall, the analysis of the central tendency, dispersion, and correlation structure supports the robustness of the measurement instruments. The constructs remain statistically distinct, and the overall quality of the measurements meets the criteria for empirical research.

Table 3

Means, standard deviations, and correlations of constructs of sub-study

Construct	Mean	SD	AA	PB	PU	PEU	PR
AA	2.8552	1.24894	0.900				
PB	3.9447	0.92842	-0.422	0.876			
PU	4.1500	0.71799	-0.188	0.314	0.820		
PEU	4.1624	0.60546	-0.230	0.356	0.499	0.833	
PR	3.7175	1.07373	0.030	0.190	0.175	0.241	0.860

The results of the reliability and validity assessments indicate that the measurement model demonstrates strong internal consistency and stability. It also satisfies the requirements for both convergent and discriminant validity. Thus, the measurement instrument is deemed appropriate, offering a solid foundation for the subsequent partial least squares structural equation modeling (PLS-SEM) analysis.

5.4 Hypotheses Testing

To evaluate the research hypotheses, this study applied partial least squares structural equation

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modeling (PLS-SEM) (Sekaran, 2003). To ensure robust results, bias-corrected confidence intervals (BC-CI) were estimated based on 5,000 bootstrap samples—an approach compatible with PLS-SEM due to its non-reliance on normality assumptions (Hair et al., 2019). As illustrated in Table 4, the model assessed the effects of perceived usefulness (PU), perceived ease of use (PEU), and perceived risk (PR) on attitude ambivalence (AA), as well as the subsequent impact of AA on purchase behavior (PB).

Table 4

Structural Model Assessment

Hypotheses	Relationships	Beta	t	Sig.	Summary
H1	PU -> PB	0.326	5.173	0.000	Accepted
H2	PEU ->PB	0.084	1.433	0.152	Rejected
H3	PR->PB	0.123	2.215	0.027	Rejected
H4	PU -> AA	-0.104	2.127	0.033	Accepted
H5	PEU -> AA	-0.201	3.935	0.000	Accepted
H6	PR-> AA	0.097	1.537	0.124	Rejected
H10	AA -> PB	-0.345	6.808	0.000	Accepted

As presented in Table 4, the analysis supports Hypothesis H1, revealing a significant positive relationship between perceived usefulness (PU) and purchase behavior (PB). However, the influence of perceived ease of use (PEU) on PB in H2 is not statistically significant, leading to the rejection of H2. Although Hypothesis H3 posits a positive effect of perceived risk (PR) on PB, the results do not support it. H4 and H5 confirm that PU and PEU each have a significant negative impact on attitude ambivalence (AA). In contrast, H6—proposing an effect of PR on AA—lacks statistical significance and is therefore not upheld. Lastly, findings for H10 demonstrate that AA significantly and negatively affects PB, highlighting the importance of attitudinal ambivalence in shaping consumer behavior.

Through the bootstrapping method of PLS-SEM, this study supports hypotheses H1, H4, H5, and H10, while hypothesis H2 is not supported, indicating that ease of use may not be a major factor in driving purchasing behavior. Hypothesis H3 is not supported, but instead shows a positive relationship, indicating that consumers will not reduce purchasing behavior due to perceived risk. Hypothesis H6 is not supported, indicating that perceived risk may not directly lead to consumers' attitudinal ambivalence. Figure 2 shows the partial least squares structural equation model, which displays the

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factor loadings of latent variables and their measurement indicators, as well as the path coefficients between latent variables, corresponding to the results in Tables 2, 3, and 4.

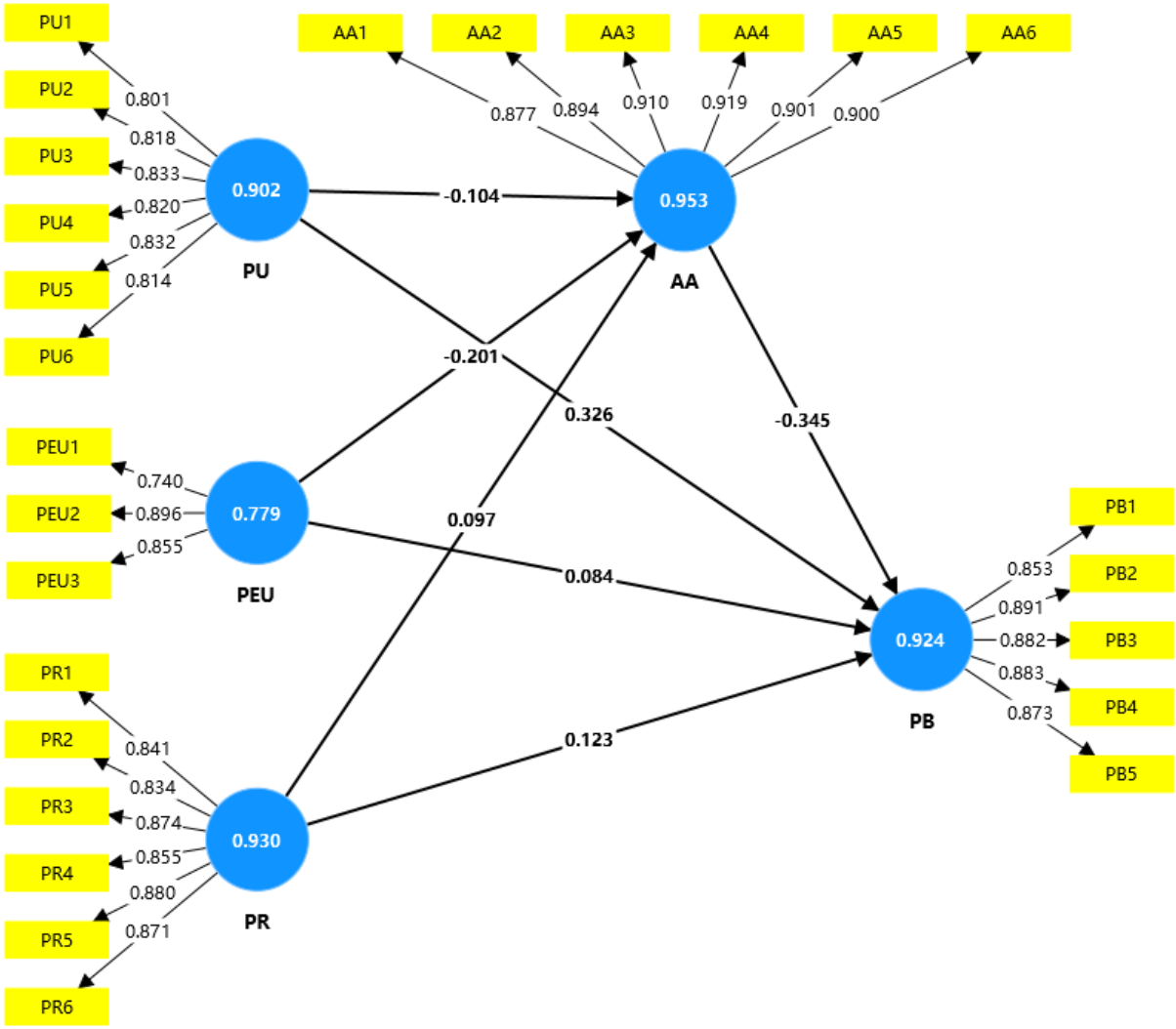

Figure 2 : Model Path Coefficient Plot

5.5 Mediating Effect Test

This study used Smart PLS 4.0 software to perform a Bootstrapping analysis to test the indirect effect of the path coefficient, and based on this, the Variance Accounted For (VAF) of the mediating effect was calculated. According to the criteria proposed by Preacher & Hayes (2004), the VAF value is used to measure the proportion of the total effect accounted for by the mediating effect: when VAF<20%, there is no mediating effect; 20%≤VAF≤80%, there is a partial mediating effect; and VAF>80%, there is a complete mediating effect. This criterion provides a clear basis for determining the mediating effect analysis in this study.

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Subsequently, the Sobel test is used to test for the significance of the mediating effect, and the final test result for the mediating effect is obtained. In the past, the indirect effect method (Indirect Effects) proposed by Sobel (1982) was mostly used to test Z≧1.96. Under the condition of α=0.05, according to the suggestions of Preacher and Hayees (2004), the Sobel test is calculated based on the path coefficient and the estimated standard error. When Z≧1.96, it indicates a significant mediating effect.

This study verifies the mediating role of attitudinal ambivalence in purchasing behavior through an intermediary effect test. The results show that PU and PEU partially mediate the effect of PB through attitudinal ambivalence, while the mediating effect of PR is not significant. Specifically, H7 (PU → AA → PB) is partially established, with a path coefficient of 0.036, t = 2.065, p = 0.039, and a VAF of 0.177, indicating that the effect of PU on PB is mainly direct; H8 (PEU → AA → PB) is established, with a path coefficient of 0.069, t = 3.444, p = 0.001, and a VAF of 0.452, indicating that attitudinal ambivalence plays a significant partial mediating role. H9 (PR → AA → PB) is not valid, with a path coefficient of -0.033, t = 1.554, p = 0.120, and a VAF of 0.294, the mediation effect was not established because the p-value was not significant. In summary, H7 and H8 were supported, while H9 was not verified, further confirming the mediating mechanism of attitudinal ambivalence in the influence of specific factors on purchasing behavior.

Table 5

Mediating Effect Test

Hypothesis	Path	β	T	Sobel test	VAF	Sig.
H7	PU- > AA- > PB	0.036	2.065	2.025*	0.177	0.039
H8	PEU- > AA- > PB	0.069	3.444	3.405**	0.452	0.001
H9	PR- > AA- > PB	-0.033	1.554	-1.501	0.294	0.120

6. DISCUSSION

This study found that perceived usefulness has a significant positive impact on electric vehicle purchasing behavior and a significant negative impact on attitudinal ambivalence, which is consistent with related research. Consumers' perceived usefulness is mainly reflected in terms of economic savings, environmental sustainability, transportation efficiency, and health protection. Enhancing perceived usefulness requires not only technological innovation but also policy support and marketing to reduce attitudinal ambivalence and increase confidence in purchasing. Governments can lower the barrier to entry for electric vehicles through subsidies, charging infrastructure construction, and tax incentives, while electric vehicle retailers should strengthen marketing to highlight the economic and environmental advantages. In addition, social advocacy can increase consumer acceptance through

experiential marketing and public education. Future research should further explore the mechanism of perceived usefulness and analyze the impact differences of different policies and consumer groups to promote the sustainable development of green products.

This study found that perceived ease of use did not directly significantly affect electric vehicle purchasing behavior, but it can indirectly promote consumer decision-making by significantly reducing attitudinal ambivalence. As a high-tech product, electric vehicles make consumers pay more attention to range, cost of use, licensing policies, and parking convenience, which relatively reduces the priority of ease of use. However, perceived ease of use is still of practical significance in reducing cognitive burden and enhancing confidence in use. It is recommended that policymakers optimize traffic restriction policies, improve charging facilities, and promote smart technologies, while manufacturers should improve human-computer interaction design and system integration. Meanwhile, perceived risk has no significant impact on purchasing behavior or attitudinal ambivalence, indicating that its hindering effect is gradually weakening due to policy support, technological progress, diversified information, and strengthened social norms. In the future, we should focus on optimizing the user experience and enhancing cognitive trust. Attitudinal ambivalence has a significant negative impact on purchasing behavior. Although consumers recognize the environmental and economic advantages of electric vehicles, concerns about issues such as battery life, charging convenience, and value retention can easily trigger psychological conflicts, which reduces willingness to purchase and delays decision-making. Attitudinal ambivalence plays a mediating role between perceived usefulness and purchasing behavior. In the future, we should conduct in-depth research on its formation mechanism and group differences, formulate targeted strategies to alleviate psychological conflicts, and help transform green consumer behavior.

This study found that H7 and H8 were supported, while H9 was rejected, indicating that the influence of perceived usefulness and perceived ease of use on electric vehicle purchasing behavior is mainly achieved through attitudinal ambivalence. When consumers perceive electric vehicles to be more useful or easier to use, attitudinal ambivalence decreases, and purchase intention increases. However, the rejection of H9 indicates that although perceived risk may trigger attitudinal ambivalence, this psychological conflict does not significantly affect purchasing behavior. In other words, attitudinal ambivalence is not a determining factor when consumers evaluate the risk of electric vehicles. Therefore, the relationship between perceived risk and purchasing behavior does not rely on the mediation of attitudinal ambivalence, but rather more complex cognitive and decision-making mechanisms.

7. CONCLUSION

This study explores in depth the impact of perceived usefulness, perceived ease of use, and perceived risk on the purchasing behavior of electric vehicles among Chinese consumers, and specifically

analyzes the mediating role of attitudinal ambivalence. The results show that perceived usefulness has a significant positive impact on the purchasing behavior of electric vehicles, and consumers' attitudes towards electric vehicles are directly driven by this factor. Consumers generally believe that electric vehicles have significant advantages in terms of economic benefits, environmental advantages, driving experience, and health benefits, which promote their purchasing behavior.

This study found that perceived ease of use does not directly affect electric vehicle purchasing behavior, but can indirectly promote purchasing decisions by significantly alleviating attitudinal ambivalence. This shows that although ease of use is no longer central to decision-making, its positive perception can help reduce cognitive conflict and enhance confidence in decision-making. This reflects a shift from “explicit motivation” to “implicit moderating factor” and highlights its mediating role between attitude and behavior. Therefore, the promotion of electric vehicles should focus on optimizing the user experience and lowering the barrier to entry to reduce psychological conflict and indirectly stimulate purchasing intentions. At the same time, the impact of perceived risk on purchasing behavior and attitudinal ambivalence is no longer significant, indicating that its barrier effect is gradually weakening. Policy optimization, technological progress, and improved infrastructure have continued to reduce consumers' perception of risk. Especially in the context of declining subsidies, trust has actually increased, charging convenience has increased, and transparent communication and continuous education have further strengthened consumers' perception of the advantages and reliability of electric vehicles.

Especially in the context of declining subsidies, trust has actually increased, charging convenience has increased, and transparent communication and continuous education have further strengthened consumers' perception of the advantages and reliability of electric vehicles. However, it is important to note that all survey participants in this study are existing EV owners, who may naturally exhibit a higher tolerance toward EV-related risks due to their post-purchase experiences. Therefore, the non-significant effect of perceived risk observed in this study may not be generalizable to prospective buyers or those with hesitant attitudes. Future research should consider extending the analysis to include these populations to better assess the role of perceived risk in broader consumer groups.

This phenomenon of the “two-car model” reveals the core issue currently facing the promotion of electric vehicles. Specifically, in terms of functional positioning, electric vehicles mainly serve the function of short-distance commuting, and their range and charging convenience still cannot meet the diverse travel needs of users. At the psychological level of consumption, users' concerns about battery life and vehicle retention rates prompt them to adopt the conservative solution of “coexistence of gasoline and electricity”. This feature of the transitional period of the market suggests that policymakers should work together from the three dimensions of technological innovation, infrastructure construction, and consumer education to effectively promote the full popularization of electric vehicles.

The study has certain limitations in terms of sample representativeness. The main data comes from Shandong Province, which may affect the universality of the research conclusions. To enhance the value of the research, follow-up work can be expanded in the following dimensions: at the regional level, it is recommended to expand the sample coverage to include urban and rural areas at different levels of economic development for comparative analysis; in terms of research methods, the current cross-sectional design makes it difficult to capture the dynamic change process, and longitudinal tracking research can be considered; in terms of analysis dimensions, existing research focuses on the individual level, and in the future, it is possible to add the investigation of group variables such as social class, while exploring the impact mechanism of organizational factors on promotion effects. In addition, comparative studies with Asian markets such as India and Southeast Asia can more clearly identify the differential impact of cultural and economic factors on the promotion of electric vehicles. To improve the external validity of the research conclusions, it is recommended that a stratified sampling method be used in the follow-up, taking into account key variables such as city level and economic status.

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