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Posted Date: 28 May 2024

doi: 10.20944/preprints202405.1796.v1

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Consumers' Purchase Intention of Electric Vehicles from the Perspective of Perceived Green Value: An Empirical Survey from China

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Abstract: This study aims to broaden the current understanding of the antecedents and consequences of green purchase intention within the realm of perceived green value (PGV) A mixed-method approach is deployed, integrating PLS-SEM and Necessary Condition Analysis (NCA) to examine the role of influence and interaction as key precursors to perceived responsibility and perceived self-efficacy, and explores how perceived responsibility and perceived self-efficacy impacts green purchasing intention, mainly through the mediation of perceived responsibility (PER) and perceived self-efficacy (PSE) using survey data gathered from consumers participating. The results indicate that PGV positively influences green purchase intention (GPI). Moreover, PER and PSE exhibit significant chain mediation effects, with the mediation effect of perceived environmental responsibility being particularly strong. It is recommended that the government intensify green disseminate and education, promote the establishment of certification and evaluation systems for electric vehicle products, and that electric vehicle factories emphasize the environmental attributes and economic interest of their products to encourage green purchasing behavior.

Keywords: green purchase intention; green perceive value; perceived responsibility; perceived self-efficacy

1. Introduction

The vehicles industry has played a vital role in human industrialization and is a crucial pillar of the national economic system. Especially since the 21st century, China's vehicles industry has developed rapidly, growing from more than 2 million vehicles sold at the beginning to 417 million vehicles in 2022, an increase of more than 20 times in 22 years (Chinese Government Website, 2022). China has been become the world's largest seller of vehicles for six years. However, traditional vehicles are high-emission products of carbon dioxide, and as their numbers continue to increase, energy supply problems and environmental pollution inevitably become prominent. According to statistics, The United Nations Intergovernmental Panel on Climate Change shows that global warming is leading caused by carbon dioxide emission ,In 2022, global carbon dioxide emissions increased by 0.9%, rising by 321 million tons compared to 2021, reaching 36.8 billion tons (Mostafaeipour et al., 2022). The pollution from vehicle exhaust emissions is continuously worsening. According to the "2022 China Motor Vehicle Environmental Management Annual Report" released by the Ministry of Environmental Protection, in 2022, the national vehicle emissions of pollutants reached 11.73 billion tons, accounting for more than 80% of the total air pollutants with NOx and PM exceeding 90%, and HC and CO2 exceeding 80% (Chinese Government Website, 2022). Vehicle exhaust is a significant source of carbon dioxide (CO2), accounting for about 10% to 15% of total carbon dioxide emissions (Lu et al., 2021). In particular, for PM2.5, vehicle emissions account for 25% to 40%.

To mitigate the environmental shortage and environmental pollution, the global community is appeal to the ecological civilization and green transportation. Consequently, research on the factors influencing electric vehicle purchase behavior has gradually become a popular topic. As an important product of sustainable supply chain development (De Medeiros et al., 2014), the industrialization and

 doi:10.20944/preprints202405.1796.v1

marketization of electric vehicles are of great urgency. Firstly, developing electric vehicles helps mitigate environmental pollution problems, strengthen urban sustainable development. Secondly, electric vehicles conformance to requirements of energy conservation (Hasan et al., 2021), environmental protection, and sustainable development, making them a key emerging industry to focus on in the future. The development of China's electric vehicle industry can cultivate new economic growth for China (Ou et al., 2017; Tan et al., 2014; Zhang & Qin, 2018), and promote the Chinese electric vehicle industry to be more competitive and have greater development potential. To accelerate the development of the electric vehicle industry, the Chinese government has successfully released policies to support electric vehicle manufacturers, and electric vehicle manufacturers have invested heavily in technological innovation. The electric vehicle market basically meets consumption demands.

However, consumers' intention for the purchase of electric vehicles is not optimistic, and the market is not sufficiently developed (Wang et al., 2016). Until now, the promotion of electric vehicles in China has relied on government support, In 2016, the government issued policies to support electric vehicles, and at the same time, the government also clarified the next step of electric vehicle market orientation and innovation (Jaiswal et al., 2021; Shakeel, 2022). At present, China's electric vehicle market is transitioning from government subsidies to market mechanisms. Then, how to increase the market share of electric vehicles? Increasing the purchasing rate of electric vehicles is an challenge issue in the development of electric vehicles.

In previous literature, the influence of green consumption on electric vehicle has mainly been discussed from the perspective of environmental concern and self-efficacy. However, there has little research on the relationship between perceived green value and the purchase intention of electric vehicles. Gudem et al. (2013) research suggests that product effectiveness can be maximized when the product value matches the described product benefits. Perceived green value is always closed to product performance, quality, and price (Wang & Hazen, 2016; Wang et al., 2018), as consumers' awareness of environmental protection gradually increases, researchers have begun to explore how environmental responsibility affects consumers' green purchase intentions. Although some scholars have attempted to include environmental responsibility as a mediating variable, however, quantitative research on this transmission mechanism is still insufficient. This study considerate environmental responsibility as a mediating variable and perceived green value as an antecedent variable, exploring how the antecedent variable directly or indirectly influences purchase intentions through environmental responsibility.

Regarding the antecedents of self-efficacy, the interaction of emotions and trust within self-efficacy has the potential to shape personal attitudes and behaviors. Previous research has investigated various factors that potentially influence the formation of perceived self-efficacy, such as customer Word-of-Mouth and customer engagement (Hallock et al., 2016; J. Wu et al., 2018). However, current literature largely overlooks the role of self-efficacy as an antecedent to purchase intentions. While earlier studies indicate that perceived self-efficacy precedes the establishment of consumer intentions, they have neglected the interplay between consumer perceived value, consumer responsibility, and self-efficacy, which is a crucial factor in the formation of consumer purchase intentions (Cheah et al., 2015; Taylor & Baker, 1994). This is particularly important in the field of electric vehicles related to green products. Consumers often prefer products they perceive and their purchasing decisions increasingly rely on perceived self-efficacy among consumers.

Based on a review of relevant literature, this study proposes a conceptual model grounded in social information processing theory. The model explores the relationships among perceived green value, environmental responsibility, perceived self-efficacy, and consumers' purchase intentions for electric vehicles. This paper further validates the facilitating effect of perceived green value on the relationships between responsibility, self-efficacy, and green purchase intention, clarifying the impact, mechanism, and formation process of perceived green value on electric vehicle purchase intentions. This aims to support the government in formulating incentive policies for electric vehicle consumption. Based on a survey questionnaire, this study analyzes consumers' intentions to explore the main factors influencing their purchase intentions, which will benefit electric vehicle companies in market demand forecasting (Archsmith et al., 2022; Becker et al., 2009; Jeon, 2010; Kah, 2018), investment, production, and marketing strategy planning. By understanding consumers' different

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needs and intentions, companies can develop corresponding strategies, offering insights and references for promoting the industrialization of electric vehicles in China.

2. Theoretical Foundation and Hypothesis Development

2.1. Social Information Processing Theory

Gerald Salancik and Jeffrey Pfeffer first proposed social information processing theory (SIPT). In 1978, they published an article titled "A Social Information Processing Approach to individuals Attitude and Task Design." Social information processing theory posits that individuals' activities and behaviors do not occur in a vacuum space; they are typically influenced by complex and ambiguous social contexts (Salancik & Pfeffer, 1978). The theory asserts that people's attitudes and behaviors are largely influenced by their social environment. Individuals decide what attitudes and behaviors to adopt by processing and interpreting specific social information.

The social environment in which an individual operates serves as a rich source of information that molds (Bell & Staw, 1989; Huckfeldt & Sprague, 1995) their attitudes and behaviors. This social information processing, in turn, influences their subsequent attitudes and behaviors. Particularly in situations where the social environment is uncertain, ambiguous, and complex (Gummer, 1998; Lane & Klenke, 2004), individuals rely more on the information provided by the social environment to adapt their work attitudes and behaviors. In essence, SIPT suggests that individuals' attitudes and behaviors are not solely driven by their own needs and goals (DeMarree et al., 2017; Salancik & Pfeffer, 1978; Zalesny & Ford, 1990), but shaped by the social environment they are. In uncertain social environments, individuals are more inclined to seek relevant social information to guide their work attitudes and behaviors.

2.2. Hypothesis Development

2.2.1. Perceived Green Value

Perceived green value refers to the perceived benefits and costs that consumers experience when purchasing and using green products. Bohnsack et al. (2014) took electric vehicle products as their research objective and creatively proposed that green value is a new dimension of perceived value, suggesting that consumers buy electric vehicles to gain more environmental value and green utility from the product. Zhao and Chen (2021) defined perceived green value as a overall merit of a product's green utility by comparing the perceived benefits and costs from a sustainable development perspective.

Social information processing theory (SITP) points out that the interaction of cognition, behavior, and environment collectively influences individual behavior, positing that human behavior is a cognition of oneself and the social environment. In this context, human cognition of the environment can manifest as environmental responsibility. Consumers' environmental responsibility determines how the product's value is perceived and directly affects their intentions. Research by Alalwan et al. (2017) found that the higher the consumers' environmental responsibility, the more they can aware the impact of their behavior on the environment, thereby engaging in pro-environmental behavior. Sh. Ahmad et al. (2022) researches consumer purchase decisions showed that self-efficacy and environmental responsibility have a significant positive effect on consumer purchase decisions. Self-efficacy does not directly influence behavioral intentions but impacts pro-environmental behavior through environmental responsibility. Thus, it can be inferred that in the pro-environmental field, environmental responsibility can promote consumers' perceived green value, thereby influencing their pro-environmental behavior.

Perceived green value is crucial for the formation of consumers' self-efficacy. Previous studies have shown that perceived green value has a significant positive effect on self-efficacy (Doszhanov & Ahmad, 2015; Farliana et al., 2023; Majeed et al., 2023). Consumers with a strong sense of efficacy believe they have certain responsibilities or obligations regarding environmental issues. and pay more attention to ecological problems, and are more intend to take proactive actions to improve the ecological environment. Therefore, consumers are more concerned with the green attributes and environmental utility of products (Mohd Suki & Mohd Suki, 2015; Olson, 2013), more appreciative of and preferring green products (Rokka & Uusitalo, 2008; Witek, 2020), thereby enhancing their perceived benefits from green products and increasing their purchase intentions. Lam et al. (2016)

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point out consumers' purchase intentions for lightweight beverage bottles showed that perceived green value significantly promotes the repurchase intentions for green products. Luo et al. (2022) verified that consumers' perceived green value of energy-saving home appliances could promote their purchase intentions. Perceived green value contain the environmental attributes, price, quality, and efficacy consumers that gain from green products. The greater the consumers' perceived green value, the more inclined they are to purchase green products. Based on this, this paper proposes the following hypotheses:

H1: Perceived green value positively promotes environmental responsibility.

H2: Perceived green value positively promotes the purchase intention of electric vehicles.

H3: Perceived green value positively promotes self-efficacy.

2.2.2. Environmental Responsibility

Environmental responsibility is individual understanding of the benefits pro-environmental behavior, then take actions to take proactive measures to help solve environmental problems. It is a personal virtue that integrates environmental emotion, environmental attitude, and environmental cognition (Clayton & Myers, 2015; Littledyke, 2008; Loder, 2011). It reflects a tendency to actively undertake social norms and transform into personal norms. Ruepert et al. (2017) research indicates a strong correlation between perceived environmental responsibility and personal pro-environmental behavior. Individuals with high environmental responsibility are more intentd to take behaviors to protect the environment (Babcock, 2009; Jilani et al., 2021; Kollmuss & Agyeman, 2002; Syropoulos & Markowitz, 2022). Environmental responsibility, as a sense of obligation expressed by individuals when facing ecological problems, can effectively explain consumers' pro-environmental behavior. Addressing environmental issues often requires people to invest time, money, and other resources, This may put consumers into conflicts between individual interests and social interests. In such situations, inter-environmental responsibility will be activated, driving individuals to engage in pro-environmental behavior (Kollmuss & Agyeman, 2002). As a manifestation of personal social responsibility, the measurement of one's social responsibility awareness is whether an individual can expand his interests from the personal level to the social level, and actively participate in social activities such as conservation and pro-environmental behavior. From the perspective of Shanmugavel and Balakrishnan (2023),purchasing an electric vehicle is a pro-environmental behavior, and environmental responsibility is the core moral quality of individuals engaging in such behavior. The consumers have stronger environmental responsibility, the more likely to engage in pro-environmental behavior. Therefore, it can be inferred that environmental responsibility can promote the purchase intention of electric vehicles. Based on this, this paper proposes the following hypothesis:

H4: Environmental responsibility positively promotes the purchase intention of electric vehicles.

2.2.3. Perceived Self-Efficacy

Self-efficacy is an individual's judgment and estimation of their own ability to achieve set goal (Schunk, 1984; Van der Bijl & Shortridge-Baggett, 2002). individuals possessing self-efficacy have the ability to evaluate their capabilities, select objectives, and proceed with actions. (Schunk, 1995). More research shows that self-efficacy can positively influence individual decision-making (Gianakos, 2001; Seo & Ilies, 2009). Individuals with high self-efficacy can fully grasp and utilize information during the decision-making process, make rational judgments, and more likely to achieve high work performance (Chong & Ma, 2010; Koçak et al., 2021; Phillips, 2001). Perceived green self-efficacy, within the framework of worldwide trends in green development, it represents an individual's acknowledgment of the duty to upkeep the entire environment. Individuals' awareness of responsibilities can enhance environmental matters, foster a belief in their capacity to modify environmental conditions, and increase their inclination to tackle environmental issues.

According to social information processing theory, individuals will be motivated to complete tasks or work (Salancik & Pfeffer, 1978; Walther, 2008) in a manner consistent with their self-image

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regarding the task or work. In other words, the self-concept of an individual's views on the environment needs to be effectively expressed to generate consistent cognition. Therefore, people will be motivated to engage in effective behaviors, generating a willingness to perform beyond expectations. Individuals with high environmental responsibility will consider environmental issues from an ecological perspective and actively implement solutions (Verma et al., 2022; Vives, 2022; Wang et al., 2020). They will continuously strengthen their confidence in organizing and implementing environmental behavior, believe they have the ability to handle environmental problems. Previous research has found that with the increase of perceived self-efficacy, individuals are more inclined to adopt pro-environmental behaviors to solve problems or complete tasks. Lin et al. believe that perceived self-efficacy can positively promote pro-environmental behavior (Ajzen, 2002; Yildirim & Guler, 2022), and the improvement of self-efficacy in green consumption is the core factor in determining. Therefore, self-efficacy positively influences purchase intentions. Based on this, this paper proposes the following hypothesis:

H5: Self-efficacy positively promotes environmental responsibility.

H6: Self-efficacy positively promotes purchase intention.

2.2.4. Green Purchase Intention

Green purchase intention refers to the willingness of consumers to purchases product taking into account the relevant environmental characteristics of products aiming to lessen harm to the environment (Degirmenci & Breitner, 2017; Dutta & Hwang, 2021). As early as the 1970s, scholars began conducting research related to green purchasing. Researches more about green purchasing behavior and focused on resource conservation, waste classification, and product recycling (Lam et al., 2016). Subsequently, society gradually developed a deep understanding of sustainable development concepts, and the environmental attributes of products started becoming a powerful competitive advantage (Xu et al., 2020; Zhao & Chen, 2021) in the market. Consequently, more scholars began researching electric vehicle purchases. Regarding the mechanisms behind consumers' electric vehicle purchases, previous research can be broadly categorized into two aspects.

The initial element investigates the varying consumer behaviors in eco-friendly purchasing. A multitude of research suggests that distinct individual traits, like gender, age, job category, and educational attainment, significantly sway electric vehicle purchasing behavior. (He et al., 2021; Kim & Seock, 2019; Laato et al., 2020; Yan et al., 2019). For instance, research by Yan Huan et al. shows that consumers' gender and income levels significantly influence electric vehicle purchasing behavior. However, some scholars suggest that demographic variables alone do not strongly predict purchase intentions, and studying their relationship alone may not yield highly meaningful conclusions.

The secondary element explores psychological underpinnings of consumer purchase intentions. Researchers have used well-established theories as a foundation, integrating various antecedent variables to interpret the formation mechanisms of consumers' purchase intentions. The Theory of Planned Behavior (TPB) and Technology Acceptance Model (TAM) are the most widely applied frameworks (Ajibade et al., 2021; He et al., 2022; Lyu & Zhang, 2021; Müller, 2019; Shalender & Sharma, 2020). Subsequently, scholars have incorporated new psychological variables, such as consumer innovativeness and later environmental cognition, environmental attitudes, and perceived value, to extend these theories. Shalender and Sharma (2020) introduced the variable of perceived green value into the TPB model, and their research demonstrated that the extended model had stronger predictive power for environmental behavior intentions, with perceived green value significantly promoting the formation of environmental behavior intentions.

Based on the research and derivation, the theoretical framework of this study is proposed, as shown in Figure 1:

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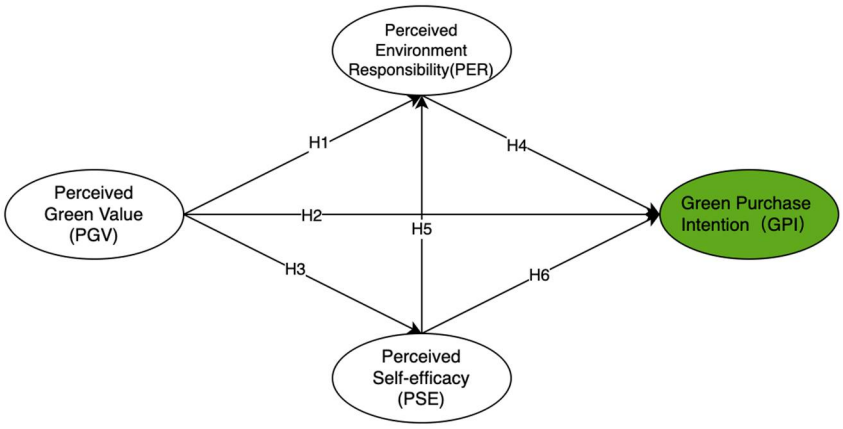

Figure 1. Conceptual framework.

3. Research Methodology

3.1. Data Collection

We designed a meticulously crafted survey questionnaire to collect quantitative data related to consumers' green purchase intentions. The survey is segmented into three parts. The first parts includes carefully formulated screening queries to identify participants who meet the eligibility prerequisites for the study. To qualify, participants must not have purchased an electric vehicle; those who have already purchased an electric vehicle are directed to end the survey. The middle section consists of 22 carefully designed items, each employing a 5-point Likert scale to assess participants' responses. These items aim to delve into the core constructs described in the proposed theoretical framework. The concluding section synthesizes queries related to the demographic background of participants, deploying a series of questions to extract information about respondents' personal profiles and social characteristics. Given that the survey questionnaire was initially in English, a back-translation method was employed to translate it into Chinese, ensuring seamless dissemination among the online respondent group. Subsequently, both the English and Chinese versions of the questionnaire underwent meticulous review by two senior researchers specializing in consumer behavior in live-streaming environments, enhancing the accuracy and reliability of the questionnaire.

The survey was strategically deployed online and meticulously collected data in March 2024 through the WJX platform (www.wjx.cn). This platform is considered China's leading online survey data collection platform, operating as a professional platform for online surveys, assessments, and voting, with nearly 50 million users nationwide. The reliability of data obtained from this platform has been validated by previous studies. To minimize the potential for common method bias, data were collected via varied intervals and through varied channels. The web-based survey was distributed among various fan groups dedicated to electric vehicles.

These groups consisted of audiences who had participated in test drives of electric vehicles. Purposeful sampling was used to ensure that respondents were mainland Chinese audiences who had participated in electric vehicle test drive experiences within the past year. A total of 456 responses were received, and after excluding invalid entries, 406 responses were deemed valid. Table 1 proposed the demographic characteristics of the respondents.

Table 1. Respondent profiles (n = 406).

Variables	Category	Frequency	Percent	Cumulative Percent
Gender	Female	194	47.8	47.8
	Male	212	52.2	100
Age	18-25	83	20.4	20.4
	21-35	130	32	52.4
	26-45	135	33.3	85.7

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	Above 46	58	14.3	100
Edu	College Diploma or below	101	24.9	24.9
	Bachelor's degree	224	55.2	80.1
	Master's degree or above	81	20	100
Income (RMB)	3000 or below	52	12.8	12.8
	3000-5000	146	36	48.8
	5001-10000	129	31.8	80.6
	10001-15000	79	19.5	100

3.2. Measures and Data Analysis

In this survey, all items used were adapted from previous studies. The measurement of Perceived Green Value (PGV) was modeled after Charng, Piliavin, and Callero (1988) and consists of 4 items. The scale for Perceived Environmental Responsibility (PER) was inspired by (Yang et al., 2022; Zhang et al., 2018); Zhang et al. (2020) and comprises 4 items. The indicators for Perceived Self-efficacy (PSE) were formulated based on the range described by W.-Y. Wu et al. (2018), including 4 items. Purchase intention (PI) measures were developed following Shen et al.'s work (2022), comprising 4 items. Each item was evaluated using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." Detailed measurement results are provided in the appendix. This study adheres to academic standards and employs two methods, PLS-SEM and NCA, to identify the sufficient and necessary conditions for consumer electric vehicle purchase intention under the context of perceived value. PLS-SEM encompasses measurement and conceptual models; the former explains the relationships links latent variables and observed variables, while the latter describes the connection between latent variables.

4. Result

4.1. PLS-SEM Result

Assessing the Outer Measurement Model

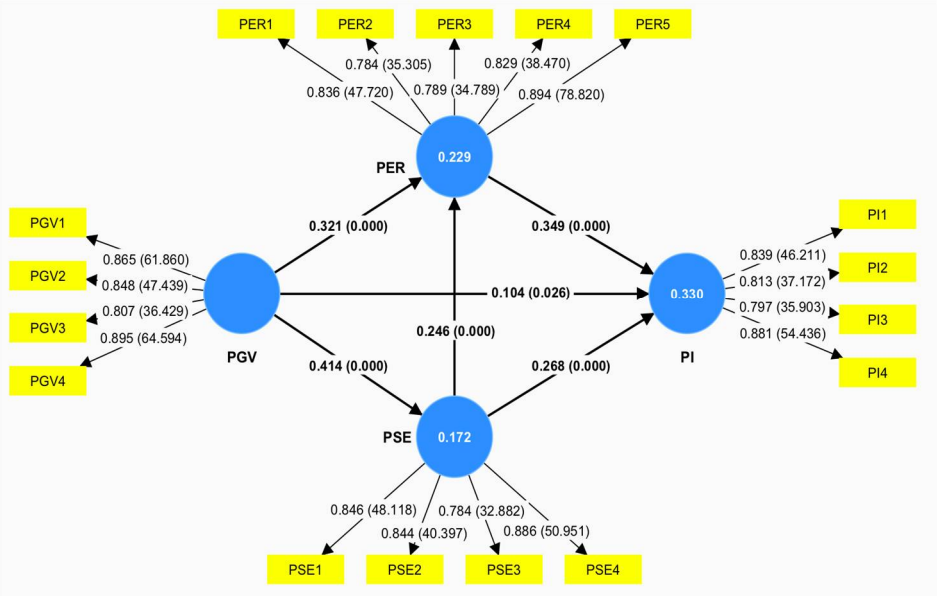

Figure 2. Path Coefficient.

The assessment of a measurement model's validity is bifurcated into covergent and discriminant validity. As per Table 2,all indicators exhibit AVE values exceeding 0.5,denoting robust covergent validity of the Model (Fornell & Larcker, 1981).Regarding discriminant validity, the outcomes of the Fornell-Lacker criterion and the HTMT ratio, derived from PLS-SEM software, are articulated in Table

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3 and Table 4.It is evident that, for the Fornell-Lacker criterion, the square root of AVE for each variable surpasses its correlation coefficients with other dimensions, and for the HTMT ratio, the values amongst variables are below 0.85.As a result, the measurement model exhibits notable discriminant validity.

Table 2. Reliability and convergent validity.

Construct	Item	Loading	VIF	Cronbach's Alpha	rho_A	CR	AVE
PER	PER1	0.835	2.267	0.884	0.887	0.915	0.684
	PER2	0.787	1.928				
	PER3	0.784	2.183				
	PER4	0.832	2.207				
	PER5	0.893	3.279				
PGV	PGV1	0.865	2.32	0.876	0.881	0.915	0.73
	PGV2	0.853	2.163				
	PGV3	0.799	1.821				
	PGV4	0.896	2.844				
GPI	GPI1	0.839	1.941	0.852	0.856	0.901	0.694
	GPI2	0.813	1.938				
	GPI3	0.794	1.727				
	GPI4	0.883	2.516				
PSE	PSE1	0.847	2.065	0.861	0.863	9.906	0.707
	PSE2	0.847	2.205				
	PSE3	0.777	1.621				
	PSE4	0.888	2.756				

Table 3. Fornell-Lacker criterion.

	PER	PGV	GPI	PSE
PER	0.827			
PGV	0.424	0.854		
GPI	0.495	0.361	0.833	
PSE	0.377	0.414	0.444	0.841

Note: The off-diagonal values(bold)in the above matrix are the square correlations between the latent constructs and the diagonals are AVEs (Fornell & Larcker, 1981).

Table 4. Heterotrait-monotrait ratio-Matix HTMT.

	PER	PGV	GPI	PSE
PER				
PGV	0.478			
GPI	0.568	0.422		
PSE	0.434	0.474	0.516	

4.2. Inspecting the Inner Structural Model

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Initially, to assess collinearity, the variance inflation factors (VIFs)for all predictive constructs in the structural model were examined. As depicted in Table 5,all VIF values were between 1.0 and 1.341,which is substantially below the cut-off value of 3,establishing that collinearity did not pose an issue in the model (Jie et al., 2022; Xu et al., 2019; Zhou, 2022; Zhou & Wang, 2022).Following this, bootstrapping, utilizing 5000subsamples,was conducted to evaluate the hypothesis significance (Tahlyan et al., 2022).

Table 5. Assessment of Structural Model.

Hypothesis and Path	Coefficient	Std	T values	P Values	f^2	VIF	Result
PGV->PER	0.321	0.053	6.115	***	0.111	1.207	Supported
PSE->PER	0.246	0.054	4.594	***	0.207	1.286	Supported
PER;R^2=0.229;Q^2 predict=0.494							
PGV->PSE	0.414	0.048	8.649	***	0.207	1.000	Supported
PSE;R^2=0.172;Q^2 predict=0.501							
PGV->GPI	0.104	0.047	2.223	0.026	0.012	1.341	Supported
PSE->GPI	0.268	0.049	5.463	***	0.083	1.207	Supported
PER->GPI	0.349	0.050	7.046	***	0.140	1.297	Supported
GPI;R^2=0.33;Q^2 predict=0.483							

Note: ***, $p < 0.001$.

The results indicated that the majority of the paths reached statistical significance at the 0.05 level, thus validating most of the proposed hypotheses. Specifically, the effects were as follows: PGV to PER (β=0.321, t-value=6.115),PSE to PER (β=0.054, t-value =4.594), PGV to PSE (β=0.414,t-value=8.649),PGV to GPI (β=0.104,t-value=2.223),PSE to GPI (β=0.268,t-value=5.463),PER to GPI (β=0.349, t-value=7.046).

In addition, the model explains a substantial amount of variance in the dependent variables. The R-squared value for PER is 0.229, for PSE is 0.172, and for GPI is 0.33. The Q-squared values further confirm the predictive relevance, all of which are above zero. The Q-squared value for PER is 0.494, for PSE is 0.501, and for GPI is 0.483. Regarding the effect size (f^2), the model demonstrates that several predictor variable structures have a significant impact on the dependent variable. f^2 ranges from 0.012 to 0.207.

4.3. Necessary Condition Analysis

NCA offers a novel approach to dissecting complex causal relationships by pinpointing indispensable conditions that influence outcome variables. Unlike traditional methods, it goes beyond mere identification to quantify the magnitude and constraints of these essential conditions. This technique is particularly adept at isolating the "indispensable yet insufficient" relationships between dependent and independent variables. As an enhancement to conventional sufficiency-based analyses, NCA provides a numerical measure of the prerequisite conditions needed to reach a given outcome level, offering insights into their effect sizes and potential bottlenecks.

Initially, the PLS-SEM method was utilized to acquire scores for latent variables, as outlined by Henseler et al. (2015). Subsequently, the NCA package available in PLS-SEM software was leveraged to execute the NCA analysis, following the guidelines set by Dul (2016); (He & Ismail, 2023).The foundational step in an NCA involves plotting of a ceiling line that intersects the upper-left data points on an x-y graph, as depicted in Figure 4,where scatter plots for all pertinent relationships are displayed.

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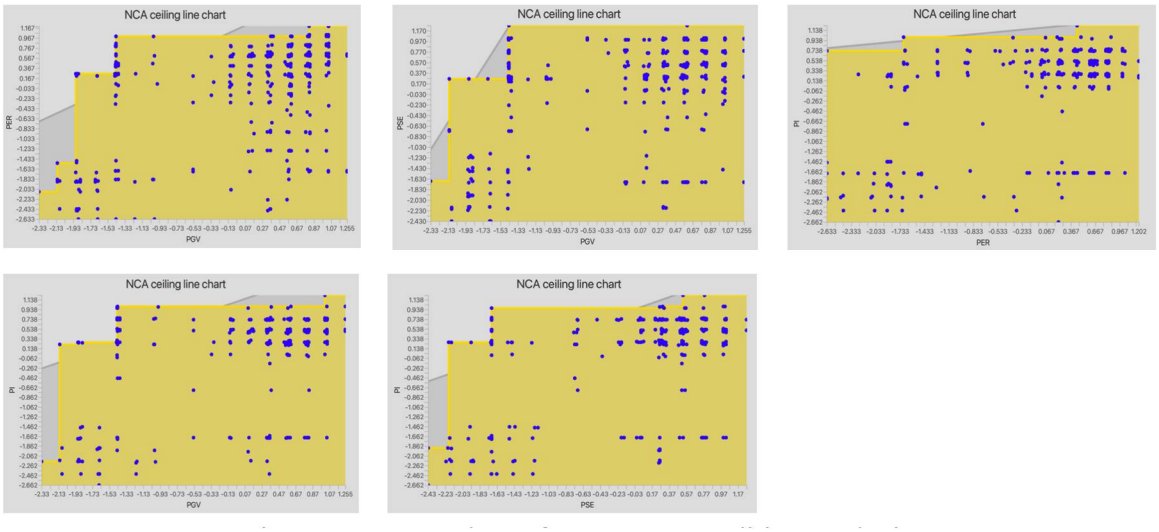

Figure 3. Scatter plots of necessary condition analysis.

Subsequently, an analysis was conducted to assess the statistical significance of effect sizes(d)pertaining to the latent variable scores, employing a random sample size of 10,000 (Dul, 2016; He & Ismail, 2023; Piff et al., 2015).As the CR-FDH line is well-suited for survey data derived from a five-point Likert scale, the interpretation of the NCA results aligned accordingly. The findings, as presented in Table 6 reveal that PER (d=0.044,p=0.072), PGV (d=0.136,p<0.001),and PSE (d=0.175,p<0.001)are essential conditions for the consumer's Purchase Intention. Similarly, PGV (d=0.164,p<0.001),PSE (d=0.031,p=0.002)are essential conditions for PER;PGV (d=0.149,p=0.025)are essential conditions for PSE.

Table 6. Necessary condition analysis result(Method:CR-FDH).

Construct	Effect size	Ceiling	Slope	Condition inefficiency	Outcome inefficiency	P Value	Rel. inefficiency	Abs. inefficiency
GPI								
PER	0.044	2	0.153	23.712	88.508	0.072	91.233	13.61
PGV	0.136	54	0.595	29.645	61.45	***	72.878	10.163
PSE	0.175	44	0.616	22.633	54.669	***	64.929	9.34
PER								
PGV	0.164	56	0.796	33.578	50.569	***	67.167	9.234
PSE	0.031	2	1.416	78.621	70.816	0.002	93.761	13.297
PSE								
PGV	0.08	3	2.599	74.809	36.528	0.025	84.011	11.138

Note:***,p<0.001.

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The bottleneck technique for GPI further clarified the threshold levels necessary for achieving specific performance levels. As delineated in Table 7, to attain a 90%level of green purchase intention, a minimum of-2.253 for PER-0.462 for PGV, and-0.2 for PSE is required. For a 100%level, the necessary conditions include PER at no less than 0.293,PGV at no less than 0.192,and PSE at no less than 0.431.

Table 7. Bottleneck table(CE-FDH).

GPI	PER	PGV	PSE
0.00%	NN	NN	NN
10.00%	NN	NN	NN
20.00%	NN	NN	NN
30.00%	NN	NN	NN
40.00%	NN	NN	NN
50.00%	NN	NN	NN
60.00%	NN	NN	-2.094
70.00%	NN	-1.771	-1.462
80.00%	NN	-1.116	-0.831
90.00%	-2.253	-0.462	-0.2
100.00%	0.293	0.192	0.431

5.1. Conclusions and Discussion

5.1.1. Conclusion

This study empirically examined the relationships among environmental responsibility, green self-efficacy, perceived green value, green purchase behavior, and their interactions, leading to the following conclusions.

First, environmental responsibility positively promotes consumers' green purchase intention (GPI). There are also three indirect paths, constituted by the two mediating variables of perceived self-efficacy (PSE) and perceived green value (PGV), that indirectly influence green purchase intention (GPI), validating the assumption of a chained mediation model. The model confirms that environmental responsibility has a direct positive impact on green purchase intention, indicating that individuals with stronger environmental responsibility have a stronger intention to purchase green products.

Second, environmental responsibility positively promotes green purchase intention through the mediating roles of green self-efficacy and perceived green value. This demonstrates that green self-efficacy and perceived green value play a mediating role in the transmission effect between environmental responsibility and green purchase intention. Green purchase intention can be achieved by reinforcing individuals' beliefs in achieving environmental goals and their perceived value of green products.

Third, by comparing the three indirect paths, it can be seen that environmental responsibility enhances consumers' green purchase intention through promoting green self-efficacy, which is the most important psychological mechanism affecting consumers' green purchase intention. Some scholars have found that perceived green value plays a mediating role between environmental responsibility and green purchase intention. In comparison with existing studies, this study found that the mediating role of green self-efficacy between environmental responsibility and green purchase intention is more significant, indicating that individuals who are more concerned about environmental issues are more likely to believe in achieving environmental goals, forming a green purchase intention, and thus tend to implement green purchase behavior.

5.1.2. Theoretical Implications

The following section will elaborate on the theoretical contributions and practical implications of these findings. First, our study investigated the functions of environmental perception and self-

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efficacy in different environments by integrating perceived value influencing factors, such as their impact on consumer purchase intentions (Cheah et al., 2015; Dutta & Hwang, 2021; Taylor & Baker, 1994) and their mediating role in consumer intentions (Dutta & Hwang, 2021). However, research on the specific background of perceived value in the context of environmental responsibility and self-efficacy remains very scarce. This study addresses this academic gap by identifying the dimensions of perceived value as key factors and provides a deeper understanding of the formation of perceived value in the context of the evolving green sustainable transportation. Furthermore, this work is at the forefront of exploring the impact of environmental perception and self-efficacy under different perceived value contexts. Our study demonstrates that perceived value has a significant impact on environmental responsibility and self-efficacy, a finding that resonates with existing literature (Ajzen, 2002; Li et al., 2020; Mansoor & Wijaksana, 2023; Shabbir & Wisdom, 2020). In today's sustainable transportation environment, individual value perceptions are becoming increasingly prominent, and consumers' decisions to purchase seem to be less influenced by environmental responsibility and self-efficacy, but more by perceived value. This can be attributed to consumers' increasing focus on individual value characteristics, and purchase decisions are usually made spontaneously. Additionally, in today's social culture, consumers are increasingly prioritizing individual perceived values (Leite et al., 2021; Sarkar, 2011). These findings provide new insights into the factors influencing purchase intentions, enriching existing literature on consumer purchase intentions in the context of perceived value.

Second, unlike traditional research, this study positions the intention to purchase electric vehicles as an inevitable result of environmental responsibility and self-efficacy in perceived value. Results proposed by Sarkar (2011)indicate that the structure, relationship, and cognitive dimensions of environmental responsibility and self-efficacy have a positive impact on consumers' perceptions of perceived value, thereby cultivating consumer loyalty to products. Consistent with this result, the current study contributes to the discussion by focusing on perceived value, which has been addressed in previous investigations on the impact of environmental responsibility and self-efficacy on sustainable purchase intentions (Xu et al., 2020), but our effort is at the forefront in focusing on green purchase intentions, particularly in the context of perceived value. This not only expands the scope of the impact of environmental responsibility and self-efficacy but also resonates with the increasing emphasis on ecological consciousness consumerism in contemporary markets. Our study, consistent with previous research results, emphasizes the ability of perceived value to influence consumers' environmental purchasing tendencies. Additionally, our study reveals how and when perceived value influences sustainable consumer behavior. Our research resonates with previous academic calls for the role of perceived value (Agarwal & Teas, 2015; Chiu et al., 2012; Majeed et al., 2023). This study is the first to investigate the impact of perceived value on environmental responsibility and self-efficacy. Uniquely, this study pioneered the integration of self-efficacy as a chained mediator under the background of perceived value on the impact of environmental responsibility, thereby elucidating its impact on green purchasing. A fortunate result is that our study demonstrates that self-efficacy plays a significant mediating role between environmental responsibility and purchase intention. This study, by examining the direct and indirect paths of self-efficacy and environmental responsibility to purchase intention under the background of perceived value, while also considering the impact of the chained mediating effect of self-efficacy on environmental responsibility, emphasizes the complexity of this relationship. This multifaceted approach can more comprehensively understand the mechanisms influencing purchase intention, including direct and indirect paths. It also helps to clarify situations where this influence is enhanced or diminished.

5.1.3. Practical Implications

Considering the results of this study, the first practical implication for the electric vehicle industry focuses on the positive impact of perceived value, environmental responsibility, and self-efficacy on purchase intention. Therefore, platforms should prioritize establishing a sense of value perception among consumers. Conducting in-depth market research to understand environmental issues and values that resonate with the target audience is crucial. Based on this understanding, platforms can collaborate with influential figures advocating for sustainable practices to align with consumers' shared values. In the increasingly sustainable market, consumers are not only looking for products but also for platforms and products that align with their values. Therefore, in addition to

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showcasing eco-friendly products, platforms should also highlight their and their influencers' advocacy for sustainable practices and values to cultivate shared values and drive electric vehicle purchase intentions.

The second practical insight discusses the impact of perceived value and two different types of perceived performance (i.e., environmental responsibility and self-efficacy) on the initial structure of purchase intentions. In the electric vehicle field, it is believed that a sufficient number of people recognizing the product can significantly promote the formation of purchasing behavior. Therefore, platforms should consider strategies to highlight green sustainable development, possibly through real-time product advertising, shared electric vehicles to enhance consumer awareness of the product. Additionally, platforms can encourage influential individuals to adopt more graceful and relevant ways to enhance the product's visibility. Furthermore, integrating features that promote customer interaction, such as community forums or real-time chat rooms focusing on sustainable development themes, can enhance customer engagement. By strengthening these social interactions, platforms can create a more cohesive and engaging community, which in turn can positively influence sustainable or electric vehicle purchase intentions.

The third practical implication revolves around the mediating role of self-efficacy, environmental responsibility, and electric vehicle purchase intention. In the electric vehicle field, purchasing electric vehicles can not only save costs but also emotionally appeal to audiences and inspire them to consider sustainable choices. For example, influential individuals can showcase the long-term benefits of sustainable products, share personal stories or testimonials that evoke emotional resonance, or even collaborate with environmental experts to provide credible and inspiring information. Platforms can also consider incorporating interactive features, such as real-time polls or quizzes focusing on sustainable development themes, to maintain audience engagement and inspiration. By doing so, companies can not only enhance the social acceptance of products but also increase customer motivation, indirectly boosting electric vehicle purchase intentions. This multifaceted approach provides a more comprehensive strategic framework for encouraging sustainable consumer behavior.

6. Limitation

This research has several limitations. Initially, this investigation focused on assessing the outlined framework using samples from Chinese consumers within perceived value, potentially limiting the results' applicability to the Chinese context. Therefore, a promising direction for future research could involve re-assessing the model of this study with geographically and ethnically diverse samples. Secondly, this study, grounded in robust theoretical underpinnings, employed a cross-sectional survey, rendering the data potentially vulnerable to method variance. For subsequent research in the realm of consumer Perceived

Environment Responsibility (PER) and Perceived Self-efficacy (PSE) within perceived value, addressing such method variance can be achieved by administering data collection at varied time points and incorporating distractor items. Besides, this research probes into the precursor variables impacting consumer perceived usefulness and perceived ease of use, examines through the lenses of perceived value. Future studies could venture into augmenting consumer Perceived Environment Responsibility (PER) and Perceived Self-efficacy (PSE) from diverse perspectives. Moreover, Perceived Environment Responsibility (PER) and Perceived Self-efficacy (PSE), are pinpointed as crucial conditions for consumer green purchasing in this research. Future investigations can extend this foundational understanding by examining varied configurations of consumer green purchasing utilizing complexity theory and the fsQCA method, thereby furnishing platform decision-makers with more streamlined and resource-efficient sustainability solutions.

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