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Greenwashing and Consumer Green Perceived Value: The Mediation Mechanism of Green Consumer Confusion and Green Perceived Risk

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Abstract: Amid rising consumer awareness and regulatory scrutiny of corporate sustainability claims, greenwashing has become a pressing concern in green marketing. This study investigates the impact of greenwashing on consumer perceptions by examining its influence on green perceived value, consumer confusion, and green perceived risk. Specifically, it explores the mediating roles of consumer confusion and green perceived risk in the relationship between greenwashing and green perceived value. Using structural equation modeling (SEM) and a dataset of 299 responses from green product consumers in China, the findings indicate that greenwashing significantly diminishes green perceived value. Notably, consumer confusion emerges as a critical mediator, amplifying the negative effect of greenwashing by leading to flawed purchasing decisions. However, contrary to expectations, green perceived risk does not mediate this relationship, suggesting the presence of cognitive biases or other unexamined factors influencing consumer decision-making. These findings contribute to the literature on green marketing by revealing the nuanced mechanisms through which greenwashing affects consumer evaluations. They also highlight the need for businesses to implement transparent and authentic green marketing strategies to preserve consumer trust and perceived value. Furthermore, this study provides novel insights into the complex interplay between green perceived risk and consumer judgment, paving the way for future research on sustainable marketing practices.

Keywords: greenwashing; green perceived value; green consumer confusion; green perceived risk.

JEL Classification: Q01; D91; Q51; R11.

Introduction

In the modern environmental era, firms increasingly adopt green marketing strategies to differentiate their products, reflecting a growing emphasis on sustainability. Green marketing aligns a company's offerings with environmentally and socially re-sponsible practices, making terms like "eco," "green," and "sustainability" common-place in advertising. However, despite their intention to communicate corporate commitments to sustainability, many green claims are vague or misleading, giving rise to greenwashing. Greenwashing, as described by Huang et al. (2025), involves deceiving consumers regarding a company's environmental initiatives or the ecological ad-vantages of its offerings. Studies reveal that many products with environmental claims fall into at least one of the "seven sins of greenwashing" (TerraChoice, 2009). Companies often selectively highlight

positive environmental attributes while downplaying negative aspects, shaping a deceptively favorable corporate image (Lyon & Maxwell, 2011; Yang, 2020；Forliano et al., 2025).

Existing research indicates that greenwashing exacerbates consumer confusion and perceived risk associated with green products, thereby undermining trust in corporate environmental claims (Chen & Chang, 2013; Tarabieh, 2021). As consumers increasingly rely on corporate advertising to guide sustainable choices, misleading claims erode trust in such advertisements and create uncertainty about which firms' environmental assertions (Hamann & Kapelus, 2004). Greenwashing diminishes trust in two ways: directly, by reducing consumer confidence in corporate environmental practices, and in-directly, by increasing confusion and perceived risk regarding green products (Chen & Chang, 2013). This finding was corroborated by Tarabieh (2021), who emphasized the need for businesses to address greenwashing to sustain consumer trust in their green initiatives.

Recently, Petticrew et al. (2020) found that greenwashing exploits cognitive biases by emphasizing selective claims and manipulating messages, creating green consumer confusion that prevents consumers from distinguishing genuine sustainability from misleading claims. Such confusion inflates perceived green value, leading consumers to overestimate a product's sustainability（Azzopardi，2021).

On the other hand, Roh et al. (2022) argued that green perceived value reflects consumers' evaluation of a product's environmental benefits based on their sustainability expectations. However, when companies misrepresent their environmental claims, consumer skepticism increases, and perceived risk rises, negatively affecting perceived value (Roh et al., 2022).

Although prior studies have examined the impact of greenwashing on consumer behaviour, few have empirically investigated the transmission mechanisms through which greenwashing influences green perceived value. In particular, there is a notable gap in understanding how green consumer confusion and perceived risk mediate this relationship. To address this gap, the present study proposes a conceptual model that explores the indirect effects of greenwashing on green perceived value, with a specific focus on the dual mediating roles of consumer confusion and perceived risk. The novelty of this research lies in its integration of psychological mediators into the greenwashing framework, offering a more nuanced explanation of how greenwashing affects consumer perceptions.

This paper makes the following academic contributions:

First, this study advances the understanding of the psychological mechanisms underlying the relationship between greenwashing and green perceived value by empirically validating the mediating role of consumer confusion. While prior research has extensively highlighted the detrimental impacts of greenwashing, limited attention has been directed toward the cognitive and affective processes that drive these effects. By uncovering how deceptive green claims lead to consumer confusion and, in turn, undermine the perceived value of green products, this research fills a critical gap in the literature. It provides valuable insights into the cognitive distortions caused by green-washing practices.

Second, this study is the first to introduce green perceived risk as a mediating variable in the relationship between greenwashing and green perceived value. While existing studies have revealed the multifaceted negative impacts of greenwashing, they have never paid insufficient attention to the role of consumers' perceived risk as in this process. Green perceived risk reflects consumers' skepticism about the credibility and effectiveness of green claims. This study highlights how such skepticism exacerbates the negative effects of greenwashing on perceived value. By incorporating the green perceived risk into the research framework, this study not only deepens the under-standing of the detrimental consequences of greenwashing but also innovatively un-covers the critical role of risk perception in shaping trust and market acceptance of green products. It provides a fresh theoretical perspective for research in the green marketing domain.

Third, the innovation of this study lies in its construction of a dual-mediation mechanism that systematically reveals the interactive roles of consumer confusion and green perceived risk in the relationship between greenwashing and green perceived value. Unlike previous studies that primarily focused on single psychological mechanisms, this research provides a more comprehensive and detailed theoretical framework by examining the mediating pathways of both variables. The framework not only broadens the existing literature's understanding of the psychological effects of green-washing but also underscores the compound impact of these dual mechanisms on consumer decision-making. By emphasizing the synergistic effects of these psychological processes, the study offers significant theoretical contributions to the greenwashing literature, and delivers actionable insights to guide future research and practical efforts toward the standardization of green marketing practices. This integrative perspective represents a critical theoretical innovation, opening new avenues for academic exploration.

1. Literature Review and Hypotheses Development

1.1 Theory Mechanism

Greenwashing involves the misleading promotion of products or services as environmentally sustainable, despite their failure to genuinely meet such standards. This practice erodes consumer confidence and disrupts fair market dynamics (Forliano et al., 2025). By manipulating environmental claims, companies overwhelm consumers with excessive, often conflicting information, making it difficult for them to accurately assess a product's ecological qualities (Walsh et al., 2007; Chen & Chang, 2012; Hung & Chang, 2024). The theory of information overload explains this phenomenon, suggesting that when individuals are exposed to too much complex or contradictory information, their cognitive capacity is exceeded, leading to confusion and poor decision-making (Chen & Chang, 2012). In the case of greenwashing, companies deliberately flood consumers with misleading information, exaggerating, or selectively emphasizing certain claims while omitting or conflicting with other details, thereby deepening confusion. Bounded rationality theory further elaborates how consumers cope with such confusion. It posits that individuals, constrained by cognitive limitations, time, and information, often rely on heuristics, or mental shortcuts, to simplify decisions (De Clippel & Rozen, 2021; Mohammed et al., 2025). However, these shortcuts can lead to cognitive biases and errors in judgment. In greenwashing, businesses exploit these biases by selectively emphasizing certain environmental attributes and omitting critical details, manipulating the presentation of information to mislead consumers into overestimating a product's sustainability. This manipulation exacerbates confusion, leading consumers to inflate the product's perceived green value.

Perceived risk theory asserts that consumers evaluate the potential negative con-sequences of a purchase based on their subjective perceptions, where an increase in uncertainty amplifies perceived risk and subsequently influences decision-making (Peter & Ryan, 1976). In the context of ecofriendly products, the phenomenon of "greenwashing" - the misrepresentation of environmental benefits - has become a key concern. This practice not only heightens consumer uncertainty but also undermines trust, leading to increased skepticism about the authenticity of environmental claims (Chen et al., 2016). As such, the perceived risk surrounding eco-friendly purchases intensifies, particularly with regard to the credibility of environmental assertions, which ultimately influences eco-conscious purchasing behaviour (Tarabieh, 2021). Building on this, the risk-value model theory further establishes a direct relationship between perceived risk and the perceived value of a product, suggesting that higher levels of perceived risk correspond to a diminished overall product value (Dorfleitner, 2022). In the case of "greenwashing," this misalignment between environmental claims and actual product benefits magnifies consumer uncertainty, which in turn erodes trust in these claims and, by extension, reduces the perceived value of eco-friendly products (Font et al., 2025). These dynamic underscores the critical role of credibility in shaping consumer evaluations: as the perceived risk associated with environmental claims rises, consumers' assessment of green products is negatively impacted, reinforcing the importance of authenticity in fostering consumer trust and value perception in the marketplace.

1.2 The Positive Influence of Greenwashing on Green Consumer Confusion

Greenwashing, which involves falsely marketing products or services as environ-mentally friendly, undermines consumer trust and disrupts market dynamics. When consumers encounter misleading or inconsistent environmental claims, their confidence in these products diminishes, often resulting in reduced purchases (Pomering & Johnson, 2009). This skepticism arises from the perception that green marketing is often more about image than actual sustainability (Lyon & Maxwell, 2011). Such negative perceptions not only erode consumer trust but also adversely affect their attitudes to-wards brands promoting environmental initiatives (Peattie et al., 2009). Over time, this distrust harms the green product market by fostering consumer suspicion and hesitation.

According to Walsh and Yamin (2005), green consumer confusion can be categorized into three types: unclarity confusion, similarity confusion, and overload confusion. Unclarity confusion occurs when consumers struggle to understand a product due to factors such as conflicting information or dubious claims. Similarity confusion arises when products appear similar, leading to difficulty distinguishing between them. Overload confusion results from an overwhelming amount of information, making it harder for consumers to focus on key aspects when making decisions. These forms of confusion highlight the challenges faced by consumers when navigating green product claims. Based on the information overload theory, it describes the difficulty individuals face in processing and making decisions when the amount or complexity of information surpasses their cognitive limits. Such an overload often results in reduced effectiveness, impaired judgment, and a tendency to depend on

mental shortcuts (Hung & Chang,2024). Greenwashing can overwhelm consumers with excessive information, complicating their ability to assess a product effectively (Walsh et al., 2007 ; Chen & Chang, 2012; Kim et al., 2025). Additionally, unclear or misleading environmental claims may lead to uncertainty about the product's ecological attributes (Chen & Chang, 2012). Based on this, we propose the following hypothesis:

H1: Greenwashing is positively associated with green consumer confusion.

1.3 The Positive Influence of Green Consumer Confusion on Green Perceived Value

Bounded rationality theory highlights that individual, limited by cognitive capacity, time, and available information, often use heuristics to make decisions. However, these mental shortcuts frequently lead to cognitive biases, causing systematic errors in judgment (De Clippel & Rozen, 2021). Cognitive biases are systematic deviations in thinking that lead to errors in judgment, deviating from rational decision-making models (Tversky & Kahneman, 1974; Tversky & Kahneman,1992; Bartucz et al.,2025). These biases impact how consumers interpret information, especially during information overload or scarcity. Azzopardi (2021) suggests that cognitive biases are exacerbated by information overload. In such cases, consumers may (i) rely on memory or repeated details, as seen in availability bias, and (ii) favor information that confirms existing beliefs, as in anchoring and confirmation biases. In contrast, information scarcity leads consumers to use heuristics, such as (i) stereotyping, (ii) favoring familiar information, and (iii) simplifying complex data to aid decision-making.

In greenwashing, companies exploit these biases by presenting misleading environmental claims (Forliano et al., 2025). They (1) selectively emphasize certain claims while omitting key details, and (2) manipulate message sequencing or wording to confuse consumers, making it harder to evaluate a product's true environmental impact. This manipulation leads to green consumer confusion, where consumers find it difficult to differentiate between genuine and misleading environmental claims (Kim et al., 2025). As a result, the green perceived value is inflated, causing consumers to perceive the product as more sustainable than it actually is (Azzopardi, 2021). This confusion hampers informed, rational decision-making, supporting the hypothesis that green washing not only increases consumer confusion but also distorts their perceptions of sustainability. Based on this, we propose the following hypothesis:

H2: Confusion is positively associated with green perceived value.

1.4 The Negative Influence of Greenwashing on Green Perceived Value

Perceived value reflects consumers' overall assessment of the benefits of a product or service (Punyatoya, 2015). In the context of sustainability, green perceived value captures consumers' evaluation of the environmental benefits a product or service provides, aligning with their sustainability expectations and needs (Chen & Chang, 2012). Based on the consumer trust theory, it emphasizes that trust forms the basis of the relationship between consumers and brands, relying on perceptions of the brand's credibility and consistency (Gong et al.,2021). When a brand is recognized as environ-mentally friendly, it fosters consumer trust in its environmental commitments, thereby enhancing the perceived value of the brand (Zhang et al., 2018). To capitalize on this, enterprises adopt green marketing strategies, which emphasize environmental benefits to attract consumers and secure competitive advantages. However, the practice of greenwashing - where environmental claims lack genuine action - undermines this trust. Greenwashing increases consumer skepticism about environmental claims, thereby diminishing green perceived value (Chen & Chang, 2013; Nyilasy et al., 2014; Szabo & Webster, 2021; Chen et al.,2022). Furthermore, it leads to negative word-of-mouth about green products and brands, amplifying its detrimental effects (Afianto & Waskito, 2025). Ultimately, perceived greenwashing erodes consumers' trust and significantly reduces the perceived value of green initiatives. Based on this, we propose the following hypothesis:

H3: Greenwashing is negatively associated with green perceived value.

1.5 The Positive Influence of Greenwashing on Green Perceived Risk

Perceived risk theory posits that consumers evaluate the possible negative out-comes of a purchase based on their personal perceptions. Greater uncertainty tends to amplify perceived risk, shaping how consumers make decisions (Peter & Ryan, 1976). Perceived risk can manifest in various forms, including psychological, physical, financial, social, and performance-related risks (Kaplan et al., 1974).

- Financial risk: The likelihood of a consumer experiencing a loss based on how the cost of a product aligns with their available disposable income;
- Social risk: The chance that a purchase may not satisfy the standards or preferences of an influential social group;

- Psychological risk: The emotional unease or a potential decline in self-esteem when consumers sense they have made an unfavorable purchasing decision;
- Performance risk: The probability that the product will not function as anticipated;
- Physical risk: The possibility of physical injury caused by the product's use or performance.

As perceived risk is primarily driven by uncertainty, it has a significant impact on consumer decision-making processes (Chernev, 2025). Recently, the rise in demand for eco-friendly products has been countered by concerns over "greenwashing," where companies misrepresent the environmental benefits of their products. This misleading practice increases consumers' uncertainty and distrust, heightening their concerns about the authenticity of environmental claims (Chen et al., 2016). Consequently, consumers may become more skeptical about the environmental credentials of products, amplifying their perceived risk when making eco-conscious purchasing decisions (Chen & Chang, 2012; Tarabieh, 2021; Mohammed et al., 2025). Based on this, we propose the following hypothesis:

H4: Greenwashing is positively associated with green perceived risk.

1.6 The Negative Influence of Green Perceived Risk on Green Perceived Value

Zeithaml (1988) proposed that perceived value refers to how consumers assess the worth of a product or service, based on their perception of the benefits they gain in relation to what they have to pay. where consumers compare the ‘get’ (benefits) and ‘give’ (costs) components of a product or service. In the context of sustainability, green per-ceived value specifically refers to consumers' evaluation of the environmental benefits of a product or service, aligned with their sustainability expectations and needs (Chen & Chang, 2012; Roh et al., 2022). Sweeney and Soutar (2001) identified four key dimensions of consumer perceived value: emotional, social, quality/performance, and price/value for money. Consumers evaluate products not only for their practical features, cost-effectiveness, and adaptability but also for the emotional satisfaction they provide and the social benefits they offer. The emotional dimension reflects the satisfaction or pleasure derived from the product, while the social dimension relates to how the product is perceived by others (Sweeney & Soutar, 2001).

Based on the risk-value model theory, it links perceived risk with perceived value, suggesting that the value of a product is shaped by the balance between its perceived benefits and the risks associated with it. When perceived risks rise, the overall perceived value of the product tends to decline (Dorfleitner, 2022). The rising demand for eco-friendly products has been accompanied by concerns over "greenwashing" - a practice where companies misrepresent the environmental benefits of their products (Forliano et al., 2025). This deceptive behavior increases consumer uncertainty and distrust, leading to heightened concerns about the authenticity of environmental claims (Huang et al.,2025). As a result, consumers may grow more skeptical of the environmental credentials of products, amplifying their perceived risk when making eco-conscious purchasing decisions. In this context, the perceived risk associated with a product - especially regarding the credibility of its environmental claims - can negatively affect consumers' perception of its green value. When consumers perceive higher risks in the environmental claims (such as doubts about the authenticity of eco-friendly features), their assessment of the product’s green perceived value tends to decrease（Roh et al., 2022). Based on this, we propose the following hypothesis:

H5: Green perceived risk is negatively associated with green perceived value.

2. Methodology and Measurement

2.1 Data Collection and Sample

This study adopts a quantitative approach to explore participants' perceptions of purchasing green products in China, addressing gaps identified in the literature. A survey was used, and the questionnaire was first translated from English to Chinese. To ensure accuracy and cultural relevance, several professors specializing in this field re-viewed the translation and provided feedback, which was incorporated into the Chinese version. The translated questionnaire was then back-translated into English to verify consistency between the two versions. Then, a pre-test was conducted with 50 randomly selected undergraduate students from a university in Shanghai to further refine the instrument. The questionnaire items were measured using a 7-point Likert scale, ranging from "1 strongly disagree" to "7 strongly agree."

To ensure randomness in the sample, this study randomly selects customers who have previously made purchases at online supermarkets selling green products nationwide as the research participants. These supermarkets have a customer base that spans across various regions of China, ensuring a high level of representativeness and diversity.

A total of 500 questionnaires were distributed randomly via email over two weeks, resulting in 408 responses. After data cleaning, 299 valid surveys were retained, yielding a response rate of 58.8%. Details of the respondents are presented in Table 1.

Table 1. Summary of participants' profiles

Variable	Category	Percentage (%)
gender	male	41
	female	59
Age	18-30	73
	31-40	15
	41-50	7
	Above 50	5
education	senior high school (or under)	9
	university/college	79
	graduated school (or above)	12
annual purchasing frequency	1~3 times	38
	4~6 times	25
	7~9 times	6
	10 times above	31

N=299. Source: compiled by authors

2.2 The Measurement of the Constructs

This study uses a survey questionnaire to examine the hypotheses and test the proposed research framework. The consumer serves as the unit of analysis, with a focus on Chinese customers who have experience purchasing green products. The questionnaire design draws on established measurement scales from prior studies. Responses are recorded on a seven-point Likert scale, with 1 indicating strong disagreement and 7 indicating strong agreement. The research explores four primary constructs: green-washing, green consumer confusion, green perceived risk, and green perceived value, all of which are informed by previous scholarly findings. The detail is showed in table 2.

Table 2. The items used for measurements of the constructs

Items		References
Greenwashing (GW)		Chen & Chang (2012); Tarabieh (2021); Chen et al. (2022)
GW1	This advertisement uses misleading phrasing to enhance its perceived eco-friendliness.	
GW2	The visual elements in this advertisement create a distorted impression of environmental benefits.	
GW3	The green claim presented in this advertisement appears vague or lacks verification.	
GW4	This advertisement exaggerates the scope and impact of its sustainability features.	
GW5	Important information is omitted in this advertisement, making its environmental claims seem overly favorable.	
Green consumer confusion (GCC)		Chen & Chan (2012); Tarabieh (2021)
GC1	The eco-friendly aspects of this item are challenging to recognize.	
GC2	It is not easy to understand the differences in environmental attributes between these goods.	
GC3	I find it difficult to decide which sustainable product to purchase.	
Green perceived risk (GPR)		Chen & Chan (2012); Tarabieh (2021)
GPR1	Choosing this item might expose me to environmental fines or consequences.	
GPR2	Utilizing this commodity could negatively affect the environment.	
GPR3	This product's use might tarnish my eco-friendly reputation.	
Green perceived value (GPV)		Chen et al. (2022)
GPV1	I chose this product because it demonstrates greater ecological awareness compared to others.	
GPV2	I opted for this product due to its eco-friendly nature.	
GPV3	I decided to buy this product as it offers superior environmental advantages over similar items.	

Source: compiled by authors

3. Empirical Results

This research utilizes Structural Equation Modeling (SEM), executed using AMOS 28, to rigorously test and validate the proposed hypotheses and conceptual framework. The analysis is conducted in two distinct phases. In the first phase, the focus is on evaluating the measurement model to ensure the constructs are both reliable and valid. This involves assessing aspects like internal consistency, convergent validity, and discriminant validity to confirm that the measurement instruments accurately capture the intended theoretical constructs. In the second phase, the structural model is tested to explore the relationships among the constructs. This involves analyzing the significance, strength of the hypothesized direct, indirect, and total effects, robust test, and heterogeneity test. Detailed findings for both phases, including fit indices, path coefficients, and their theoretical and practical implications, will be presented in the following discussion.

3.1 The Results of the Measurement Model

Table 3 demonstrates that for each construct, the square root of its average variance extracted surpasses its correlations with other constructs, aligning with the recommendations of Hair et al. (2010). This result reinforces the discriminant validity of the constructs, ensuring that each construct measures a distinct concept. Moreover, all inter-construct correlations remain below the widely accepted threshold of 0.85, further confirming the robustness of the measurement model in distinguishing between different latent variables (Kline, 2015).

In addition to affirming the distinctiveness of the constructs, Table 3 offers descriptive statistics that provide a more nuanced understanding of consumer perceptions. Notably, green perceived risk demonstrates the lowest mean, suggesting that, on average, consumers do not associate significant risks with green products. In contrast, green perceived value exhibits the highest mean, indicating that consumers generally recognize substantial benefits in purchasing environmentally friendly products. This phenomenon can be examined through the lens of

information over-load theory, which posits that an overwhelming volume of ambiguous or excessive green marketing claims can exceed consumers' cognitive processing capacity, making it challenging for them to critically evaluate product attributes (Hung & Chang, 2024). This information overload induces decision fatigue and cognitive strain, as outlined in bounded rationality theory, which asserts that individuals, facing such cognitive limitations, tend to rely on mental shortcuts and heuristics to simplify decision-making (Bartucz et al., 2025). In this context, the interplay between green-washing-induced information overload and consumer judgment leads to a distortion in the perception of green products. Specifically, the perceived value of green products is often amplified, overshadowing any perceived risks.

Table 3. Descriptive Statistics and Discriminant Validity

	Mean	Std.ed	GW	GCC	GPR	GPV
Greenwashing (GW)	3.964	1.458	**0.817**			
Green consumer confusion (GCC)	4.454	1.419	0.725	**0.802**		
Green perceived risk (GPR)	3.079	1.365	0.433	0.314	**0.776**	
Green perceived value (GPV)	5.219	1.232	-0.200	0.013	-0.127	**0.832**

Note: Diagonals represent the square root of the average variance extracted while the other entries represent the square correlation. Source: compiled by authors

The observed variability in responses reveals that the perceived value of green initiatives exhibits the smallest standard deviation, indicating a relatively uniform perception among respondents. In contrast, the standard deviation for greenwashing is notably larger, suggesting a significant divergence in consumer opinions regarding corporate greenwashing practices. This discrepancy likely reflects differences in consumer awareness and skepticism towards environmental marketing claims, with some individuals being more discerning of the authenticity of such claims than others. From a managerial standpoint, these findings highlight the critical importance for firms to establish and maintain credibility in their sustainability efforts. The inconsistency in consumer perceptions of greenwashing poses a potential risk to consumer trust, which could undermine the effectiveness of environmental marketing strategies. Therefore, it is imperative for companies to adopt transparent, substantiated, and verifiable environmental claims in order to mitigate skepticism, build credibility, and ultimately foster long-term customer loyalty.

Table 4. Internal Reliability and Convergent Validity

Constructs	Items	λ	Cronbach's a	AVE	CR
Greenwashing (GW)	GW1	0.685***	0.907	0.667	0.909
	GW2	0.809***			
	GW3	0.870***			
	GW4	0.875***			
	GW5	0.830***			
Green consumer confusion (GCC)	GC1	0.835***	0.840	0.644	0.844
	GC2	0.859***			
	GC3	0.705***			
Green perceived risk (GPR)	GPR1	0.668***	0.812	0.602	0.818
	GPR2	0.844***			
	GPR3	0.805***			
Green perceived value (GPV)	GPV1	0.743***	0.866	0.692	0.870
	GPV2	0.906***			
	GPV3	0.839***			

Note. *p <0.05. **p < 0.01. ***p < 0.001. Source: compiled by authors

To evaluate the reliability of the measurement model, multiple approaches were employed. First, the individual item loadings (λ) for each construct, as presented in Table 4, were found to be statistically significant, underscoring the strength of the measurement model. The composite reliability (CR) values, which reflect the consistency of the indicators within each construct, ranged from 0.818 to 0.909, surpassing the established

threshold of 0.6 (Hair et al., 2006; Shrestha, 2021). This indicates a high level of internal consistency across all constructs. In addition, the Cronbach's alpha (α) values for the constructs were as follows: "greenwashing" (0.907), "green consumer confusion" (0.840), "green perceived risk" (0.812), and "green perceived value" (0.866), all exceeding the commonly accepted minimum of 0.7 (Hair et al., 2006). These findings reinforce the reliability of the constructs.

Furthermore, the validity of the measurement model was rigorously assessed by examining discriminant validity through the average variance extracted (AVE) method, as recommended by Fornell and Larcker (1981). AVE quantifies the proportion of variance a construct accounts for relative to its measurement error, with a value greater than 0.5 signifying adequate convergent validity (Hair et al., 2006). As presented in Table 4, the AVE values for the four constructs - 0.667, 0.644, 0.602, and 0.692 - exceeded this threshold, further validating the convergent validity of the model.

Taken together, these comprehensive reliability and validity assessments confirm that the measurement model employed in this study not only meets but exceeds the recommended standards, making it both robust and well-suited for the intended analysis.

3.2 The Results of the Structural Model

Table 5 presents the hypothesis testing results, indicating that four of the five proposed hypotheses (H1, H2, H3, and H4) are supported, with path coefficients aligning with theoretical predictions. The findings demonstrate that greenwashing has a significant positive effect on consumer confusion (H1), which, in turn, enhances green perceived value (H2). This suggests that while greenwashing may mislead consumers, it can also inadvertently create an illusion of environmental commitment, thereby in-creasing the perceived value of green products. Moreover, greenwashing is negatively associated with green perceived value (H3), indicating that once consumers recognize deceptive sustainability claims, their evaluation of a product's actual environmental value declines. Additionally, greenwashing exhibits a positive relationship with green perceived risk (H4), suggesting that misleading environmental claims heighten consumer skepticism and concerns regarding the authenticity of a brand's sustainability efforts. These findings highlight the dual effects of greenwashing: while it reinforces perceived value through confusion, it simultaneously undermines consumer trust and increases perceived risk, which may have long-term negative implications for brand credibility.

Table 5. The results of the structural model

Hypothesis	Proposed effect	Path coefficient	Results
H1	+	0.744***	supported
H2	+	0.257**	supported
H3	-	-0.333***	supported
H4	+	0.403***	supported
H5	-	-0.043	not supported

Note. *p <0.05. **p < 0.01. ***p < 0.001. Source: compiled by authors

Conversely, H5, which posits a negative association between green perceived risk and green perceived value, is not supported, as its path coefficient fails to reach statis-tical significance. This suggests that the relationship between perceived risk and perceived value may be more complex than initially theorized, potentially influenced by moderating factors such as consumer trust, environmental awareness, and brand reputation. It is possible that consumers with strong trust in a brand may discount the negative effects of perceived risk, thereby weakening the expected relationship. Alter-natively, consumers who are highly committed to sustainability may be willing to tolerate a certain level of perceived risk if they believe a product aligns with their environmental values. The lack of empirical support for H5 underscores the nuanced nature of consumer perceptions in the green marketplace and highlights the need for further research to explore the conditions under which green perceived risk influences perceived value. Future studies could investigate potential mediating or moderating mechanisms that shape this relationship, offering a more comprehensive understanding of how consumers evaluate green products in the presence of perceived risk.

3.3 Mediation Effect

To investigate the effects of greenwashing (GW) on green perceived value (GPV) through green consumer confusion (GC) and green perceived risk (GPR), we conducted a bias-corrected bootstrapping analysis with 2,000 bootstrap samples at a 95% confidence interval. The results, summarized in Table 6, reveal significant and nuanced findings. Specifically, green consumer confusion (GC) demonstrates a significant mediating effect in the relationship between greenwashing and green perceived value, as indicated by the indirect effect estimate of 0.187 (p = 0.003) with a confidence interval [0.083, 0.281], which does not cross zero. This suggests that green consumer confusion partially mediates the impact of greenwashing on green perceived value. This finding aligns with the theoretical mechanism that greenwashing, by contributing to information overload, induces consumer confusion. Given consumers' bounded rationality and cognitive biases, they may find it challenging to process and differentiate genuine environmental claims from misleading ones, leading to an inflated perception of green product value in the short term. However, in the long run, once consumers recognize the deceptive nature of greenwashing, their perceived value of green products is likely to decline, reinforcing the detrimental impact of misleading sustainability claims on consumer trust and brand credibility.

Table 6. Bootstrap mediation effects

	Estimate	P	BootLLCI	BootULCI
Indirect effect				
GW-GC-GPV	0.187	0.003**	0.083	0.281
GW-GPR-GPV	-0.015	0.659	-0.065	0.033
Indirect effect				
GW-GPV	-0.333	0.001***	-0.472	-0.173

Note. ∗p <0.05. ∗∗p < 0.01. ∗∗∗p < 0.001. Source: compiled by authors

In contrast, green perceived risk (GPR) does not exhibit a significant mediating effect in the same relationship. The indirect effect estimate for the GW-GPR-GPV pathway is -0.015 (p = 0.659) with a confidence interval [-0.065, 0.033], which includes zero, indicating the absence of mediation. This finding is consistent with the theoretical frame-work, suggesting that while greenwashing increases consumer perceived risk, the relationship between perceived risk and value perception is more nuanced and contingent upon various moderating factors, such as consumer trust, environmental awareness, and brand reputation. Specifically, consumers who place high trust in a brand may downplay the perceived risk, thereby reducing its impact on their evaluation of the product's value. This complexity in the relationship underscores the absence of a significant mediating effect of perceived risk, highlighting the need for further empirical investigation into the contextual factors that govern how perceived risk influences consumers' valuation of green products.

3.4 Robust Test

To ensure the robustness of the empirical results, this study conducts several tests by goodness of fit indicators and deleting insignificant paths.

Table 7 presents the goodness-of-fit indices for the structural equation model, providing a thorough evaluation of both the model's alignment with the empirical data and the robustness of the experimental results. The overall fit indices suggest that the model demonstrates an adequate fit. Specifically, the Goodness-of-Fit Index (GFI) is 0.920, surpassing the commonly accepted threshold of 0.90, which implies that the model captures the relationships between the variables effectively. The Root Mean Square Error of Approximation (RMSEA) is 0.072, remaining below the conventional cut-off of 0.08, which indicates that the model provides a reasonable approximation of the population covariance matrix.

The chi-square to degrees of freedom ratio (χ^2/df) is 2.542, falling within the recommended range of less than 3.0, suggesting that the model strikes an appropriate balance between complexity and fit. Furthermore, the Comparative Fit Index (CFI) is 0.954, exceeding the benchmark of 0.90, reinforcing the adequacy of the model fit. Taken together, these indices demonstrate that the proposed structural model offers a robust and reliable representation of the hypothesized relationships.

Table 7. Goodness of Fit

Model	CMIN	df	p-value	χ2/df ≤ 3.00	GFI ≥ 0.90	AGFI ≥ 0.90	CFI ≥ 0.90	TLI ≥ 0.90	IFI ≥ 0.90	RMSEA ≤ 0.08
Measurement	183.036	72	0.000	2.542	0.920	0.884	0.954	0.942	0.955	0.072

Note. GFI = Goodness-Of-Fit statistic; AGFI = Adjusted Goodness-Of-Fit statistic; CFI = comparative fit index; TLI = Tucker-Lewis index; IFI = Incremental Fit Index; RMSEA = Root Mean Square Error of Approximation. Source: compiled by authors

Table 8. The results of the structural model

Hypothesis	Proposed effect	Path coefficient	Results
H1	+	0.744***	supported
H2	+	0.259**	supported
H3	-	-0.353***	supported
H4	+	0.403***	supported

Note. ∗p <0.05. ∗∗p < 0.01. ∗∗∗p < 0.001. Source: compiled by authors

Table 8 presents the refined structural model results after eliminating non-significant paths. The retained paths remain statistically significant, with H1 (β = 0.744, p < 0.001), H2 (β = 0.259, p < 0.01), H3 (β = -0.353, p < 0.001), and H4 (β = 0.403, p < 0.001), all of which align with theoretical expectations and show no significant differences from the results in table 5. By removing paths that lack statistical support, the model achieves greater simplicity while reinforcing the validity of the observed relationships. This refinement not only strengthens the reliability of the findings but also offers a more precise depiction of the underlying mechanisms, ensuring that the conclusions drawn are both theoretically and empirically robust.

3.5 Further Discussion

To examine the moderating effect of demographic characteristics on the relation-ship between greenwashing and green perceived value, we segment the sample based on gender (male and female) and age (individuals under 40 and those over 40) in Table 9.

Table 9. The results of the structural model

	Subgoup		Proposed effect	Path coefficient	Results
GW- GPV	(1)	Female	-	-0.328***	supported
		Male	-	-0.374*	supported
	(2)	Young people under 40	-	-0.358***	supported
		People aged over 40	-	-0.301	not supported

Note. ∗p <0.05. ∗∗p < 0.01. ∗∗∗p < 0.001. Source: compiled by authors

The heterogeneity test for group (1) in table 9 shows that the negative impact of greenwashing on green perceived value is significant in both gender groups, but the degree of impact varies. Specifically, the path coefficient of greenwashing on female consumers is -0.328, lower than the -0.374 for male consumers, with both coefficients being significantly negative. This suggests that when both male and female consumers perceive

greenwashing behaviors by a company, their perception of the company's green value decreases significantly. However, the path coefficient for the male group (0.374) is slightly higher than that for females (0.328), indicating that male consumers may be more sensitive to the negative effects of greenwashing. This gender difference can be explained through the affective-cognitive model of decision making. According to the affective-cognitive model of decision making, consumers' decision-making pro-cesses are driven by both rational analysis and emotional responses (Cristofaro et al., 2022). Research indicates that men tend to adopt a more rational and analytical approach in their consumption decisions, focusing on product authenticity and consistency. When a brand engages in greenwashing, male consumers are more likely to quickly identify false or exaggerated environmental claims through cognitive evaluation. This inconsistency in information typically triggers negative emotional reactions, leading to a significant decrease in their perceived green value of the brand (Pilcher & Smith, 2024). In contrast, women are more likely to rely on emotional drivers when making decisions, placing greater emphasis on brand image and social responsibility rather than purely rational analysis. As a result, they are less sensitive to greenwashing and may be more influenced by emotional identification with the brand rather than a strict evaluation of information consistency (Pilcher & Smith, 2024).

The heterogeneity test for group (2) in Table 9 shows that the negative impact of greenwashing on green perceived value is significant in both age groups, but the degree of impact varies. Specifically, the path coefficient of greenwashing for young consumers under 40 is -0.358, which is higher than 0.301 for consumers aged over 40, with both coefficients being significantly negative. This suggests that when both groups perceive a company's greenwashing behavior, their perception of the company's green value de-clines significantly. However, the higher path coefficient for the younger consumer group indicates that they may be more sensitive to the negative effects of greenwashing. This age-based difference in sensitivity can be explained through information pro-cessing theory, which posits that individuals differ in how they process and evaluate information (Swanson, 1987). Younger consumers, who have grown up in a digitalized information environment, tend to engage in more systematic and critical processing of marketing claims. Their higher familiarity with digital platforms and exposure to di-verse sources of information enable them to scrutinize corporate environmental claims more rigorously (Li, 2021). Consequently, when they detect inconsistencies between a brand's green marketing and its actual practices, they are more likely to perceive greenwashing and react negatively, leading to a greater decline in green perceived value. In contrast, older consumers are more inclined toward heuristic, relying on established brand reputation and long-term trust rather than actively verifying specific environ-mental claims (Wickens & Carswell, 2021). As a result, while they still experience a decrease in green perceived value when exposed to greenwashing, the magnitude of their reaction is relatively smaller compared to younger consumers.

Conclusions and Implications

This study investigates the effect mechanism of greenwashing on consumer perceptions, specifically focusing on green perceived value, consumer confusion, and green perceived risk, with particular attention given to the mediating mechanism of consumer confusion and green perceived risk. The results show that greenwashing substantially erosions green perceived value. A notable contribution of this research is the identification of consumer confusion as a critical mediator, amplifying the negative effects of greenwashing by causing consumers to make irrational purchase choices. However, green perceived risk does not serve as a mediator in this context. This finding suggests that there may be cognitive biases and other unexplored factors influencing the relationship between green perceived risk and green perceived value, offering potential directions for future research in green marketing. The study highlights the importance for businesses to implement transparent and authentic green marketing strategies to protect perceived value. Additionally, it provides valuable insights into the complex relationship between green perceived risk and consumer evaluations, offering practical guidance for developing sustainable and effective marketing strategies.

From the perspective of literature contributions, this study offers three key insights:

First, it enhances our understanding of the mediating mechanism that consumer confusion plays in the relationship between greenwashing and green perceived value. While previous research has extensively discussed the negative impacts of greenwashing, this study is the first to validate the mediating role that consumer confusion plays in the relationship between greenwashing and green perceived value. By empirically testing the mediating role of consumer confusion, this research sheds light on how misleading environmental claims create confusion, which in turn reduces consumers' perceived value of green products.

Second, this study contributes by examining the role of green perceived risk as a mediator in the greenwashing-green perceived value relationship, an area that has been less explored in prior research. The findings suggest that green perceived risk - representing consumers' concerns about the authenticity and

effectiveness of green claims - magnifies the negative consequences of greenwashing. By incorporating this factor into the analysis, the study offers a deeper understanding of how deceptive environmental marketing not only leads to confusion but also heightens perceptions of risk, further eroding trust in green products.

Third, the novel aspect of this research lies in its integrative approach, considering both consumer confusion and green perceived risk as dual mediators in the green-washing-green perceived value relationship. This dual-mediation approach provides a more holistic view of the psychological processes that influence consumer perceptions of green products. By exploring the interaction between confusion and perceived risk, the study contributes to the literature by offering a more detailed understanding of the compounded effects of greenwashing on consumer decision-making.

From the perspective of practical contributions, this study offers two key insights:

First, it demonstrates that greenwashing not only increases green consumer con-fusion and green perceived risk but also decreases green perceived value. To enhance consumers' green perceived value, companies should focus on reducing greenwashing, consumer confusion, and perceived risk associated with their products.

Second, for policymakers, it is crucial to recognize that companies may exploit consumer cognitive biases through greenwashing to artificially boost green perceived value. This manipulation can mislead consumers into making purchasing decisions that do not accurately reflect the true environmental impact of the products. To address this, policymakers should implement measures to combat greenwashing, ensuring that companies provide transparent and truthful environmental claims. This would empower consumers to make informed, responsible choices based on accurate information.

The study has three primary limitations. First, the research sample is limited to Chinese consumers, and the findings reflect the context of developing countries. As a result, the conclusions may not be directly applicable to developed countries. Future research could expand the sample to include consumers from developed nations for comparative analysis. Second, the impact of green perceived risk on green perceived value was found to be insignificant, and green perceived risk did not mediate the relationship between greenwashing and green perceived value. This suggests that future studies should explore this relationship further. Third, another potential avenue for future research is to extend the study to other areas, such as exploring potential mediators or moderators within the framework, including factors like culture or green advertising.

Credit Authorship Contribution Statement

Yaru Liang: conceptualization, methodology, software, writing - original draft preparation, supervision.
Cheng Cheng: conceptualization, software, writing - review and editing, supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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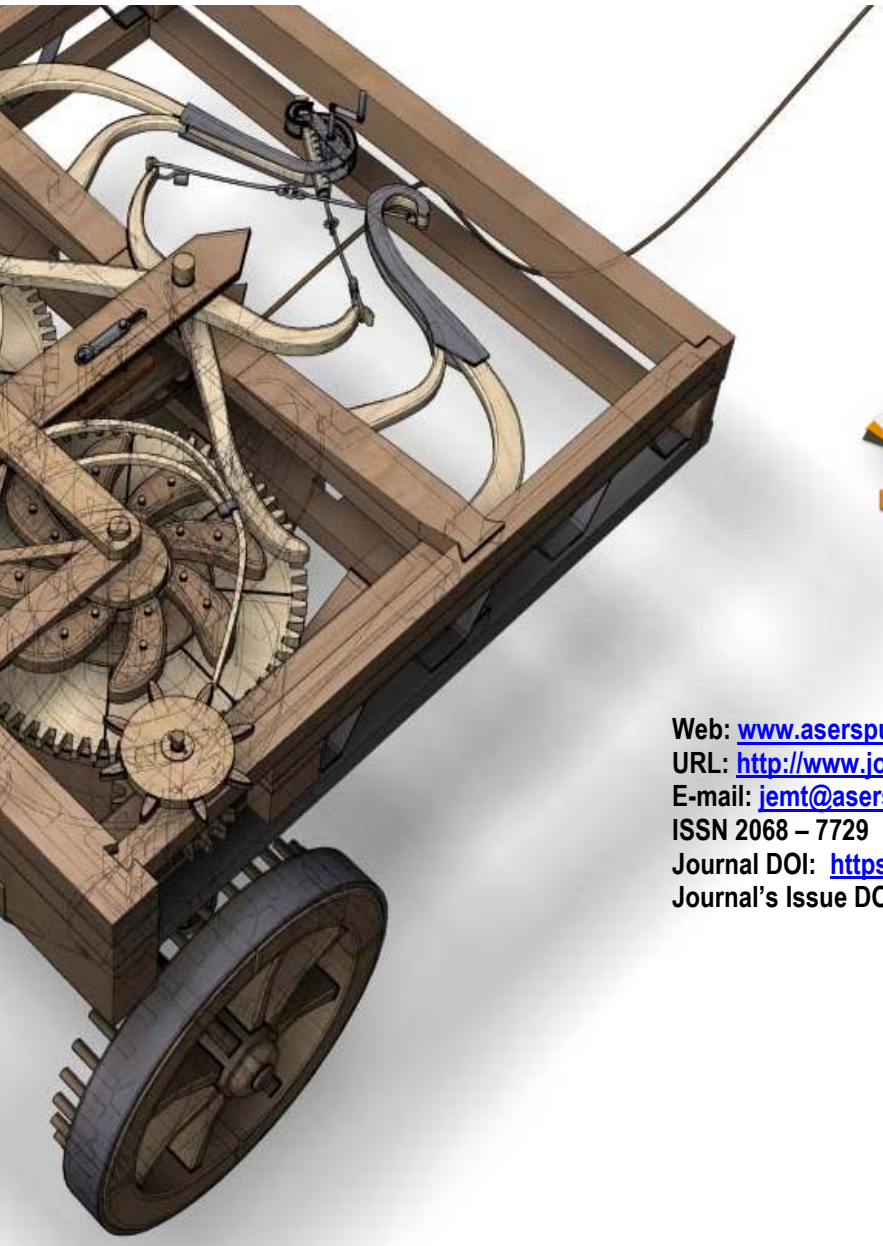

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