

The Double-Edged Sword Effect of Product Green Attribute Information on Consumer Decision-Making: Formation Mechanism and Boundary Conditions Postprint

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Abstract

In the domain of consumer behavior, extant research on green consumption has predominantly concentrated on objective and socio-psychological factors that facilitate or impede consumption decisions, while analyzing the positive effects of green marketing strategies at the psychological or behavioral level of consumers; however, scant attention has been devoted to investigating the negative outcome effects of product green attribute information. The present study adopts corporate green product strategy as its research entry point, and based on the classification of content dimensions of green attribute information, examines the double-edged sword effect of product green attribute information on consumer decision-making behavior. First, drawing upon multiple theoretical perspectives including risk-benefit, cognitive balance, and positive affect, we construct a multi-level integrated model delineating the influence of product green attribute information on consumer behavioral decisions; second, we investigate the boundary mechanisms that attenuate negative effects from the dual perspectives of individual psychological representation factors and external situational factors.

Full Text

Preamble

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Conceptual Framework

The Double-Edged Sword Effect of Product Green Attributes Information on Consumer Decision-Making: Formation Mechanism and Boundary Conditions

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Abstract: In the field of consumer behavior, previous research on green consumption has primarily focused on objective and psychosocial factors that either facilitate or impede decision-making, analyzing the positive effects of green marketing strategies on consumer psychology and behavior. However, few studies have examined the negative outcome effects of product green attributes information. This research takes corporate green product strategy as its entry point and explores the double-edged sword effect of product green attributes information on consumer decision-making behavior by categorizing the content dimensions of green attributes information. First, a multi-level integrated model is constructed based on multiple theoretical perspectives—risk-benefit analysis, cognitive balance, and positive emotions—to explain how product green attributes information influences consumer behavioral decisions. Second, boundary mechanisms that mitigate negative effects are investigated from the perspectives of individual psychological representation factors and external contextual factors.

Keywords: product green attributes information, consumer decision-making, double-edged sword effect, boundary mechanism

Classification Code: B849: F713.55

1. Problem Statement

In January 2022, the National Development and Reform Commission, Ministry of Industry and Information Technology, and other departments jointly issued the “Implementation Plan for Promoting Green Consumption,” explicitly stating that promoting green consumption represents a profound transformation in the consumption domain. Comprehensively advancing the green and low-carbon transformation of consumption is crucial for implementing new development concepts, building new development patterns, promoting high-quality development, and achieving the “carbon peak” and “carbon neutrality” goals. The low-carbon transformation in production and green practices in consumption constitute key breakthrough points for comprehensively promoting green consumption. Considering the necessity of green and low-carbon development and the growing popularity of consumer environmentalism worldwide, an increasing number of enterprises are implementing product green transformation strategies. By launching environmentally friendly products, they convey corporate green values, capture green market share, and secure sustainable competitive advantages. For instance, renowned automotive groups such as Toyota, BMW,

and BYD are accelerating the development of hydrogen fuel cells and lithium batteries to replace fuel engines and reduce carbon emissions. Similarly, Midea Group has launched a complete set of green smart home appliances, including air-energy water heaters and high-temperature steam range hoods, to achieve product iteration and upgrading.

However, practical experience in the business world reveals that while green attributes sometimes complement product intrinsic value attributes and facilitate consumption decisions, in other cases, revealing product green attributes produces counterproductive negative effects (Park & Lin, 2020). In response to this phenomenon, academic research has focused on how green marketing strategies, particularly product green transformation and upgrading strategies, influence consumer value judgments and decision-making. Some studies argue that revealing product green attributes helps highlight unique environmental features that differentiate products from alternatives, thereby enhancing consumers' green perceived value and purchase preferences (Liu et al., 2018). Conversely, other studies hold opposing views, suggesting that green attributes not only lead consumers to make negative inferences about product functional value but may also cause consumer skepticism, rejection, or even resistance (Newman et al., 2014). Therefore, in the consumer decision-making process, product green attributes are not always assets; in some cases, they may even become liabilities (Skard et al., 2021).

In recent years, sustainable consumption behavior has become a hot research topic in marketing, yet studies focusing on the negative outcome effects of product green attributes information only gradually emerged after 2015. There remains a lack of systematic research frameworks to reveal the internal mechanisms through which the double-edged sword effect of product green attributes information emerges in consumer decision-making. However, bridging the gap between green attitudes and behaviors and establishing long-term mechanisms to promote green consumption are not only crucial for enterprises to enhance green competitiveness but also important for the green and low-carbon transformation and upgrading of consumption across society. Based on these practical needs and theoretical limitations, two critical questions urgently need to be addressed: First, what are the mechanisms through which product green attributes information produces a double-edged sword effect on consumer decision-making behavior? Second, how can the negative effects of product green attributes information be reduced or even eliminated to construct innovative communication strategies that win positive consumer responses?

To address these scientific questions, this study will first systematically classify the connotative structure of product green attributes information, integrate previous fragmented research on classification methods, and standardize experimental paradigms for product green attributes information to verify and measure the double-edged sword effect. Second, from the perspectives of individual psychological information processing and emotional processing, this research elaborates on the differential impact mechanisms of product green attributes information

on consumer decisions. It identifies boundary conditions under which positive or negative effects exist across different individual characteristics or contextual factors, and comprehensively validates these mechanisms and boundary conditions using scenario experiments and field experiments.

The theoretical contributions of this study are threefold: First, it clarifies the conceptual connotation of product green attributes information and systematically organizes its multi-dimensional features and content structure. Although the core connotation of product green attributes information has been widely discussed, its definition and dimensional division remain ambiguous and inconsistent. This study employs bibliometric methods and qualitative research to integrate the content dimensions and classification paradigms of product green attributes information, standardizing experimental manipulation paradigms. This not only provides research tools for subsequent in-depth studies but also deepens understanding of green marketing strategies. Second, this research constructs a multi-dimensional integrated model of how product green attributes information influences consumer decision-making from both information cognition and emotional processing levels, based on three theoretical perspectives: perceived risk-benefit analysis, cognitive balance, and hedonic-utilitarian motivation. Previous research has relatively lacked investigation into the mechanisms through which product green attributes information negatively influences consumer decisions. This study integrates multiple perspectives to reveal the causes of the double-edged sword effect in a multi-level and three-dimensional manner. Finally, this research explores the moderating effects and boundary mechanisms of individual psychological representation factors (such as regulatory focus and mindset) and external factors (such as product type and purchase motivation) on the relationship between product green attributes information and consumer decision-making, providing theoretical insights for reducing or eliminating negative effects.

2. Literature Review and Commentary

2.1.1 Conceptual Connotation of Green Attributes

Green attributes are characteristics that reflect principles of social ethics and ecological sustainability, being highly relevant to environmental governance and other social issues (Gershoff & Frels, 2015; Tofighi et al., 2020). In sustainable marketing research, the sustainable features of products, services, or brands have become important topics. Specifically, sustainability features can be divided into two categories: social sustainability and environmental sustainability (Ramirez et al., 2015). Social sustainability involves life and health, social welfare, social justice, and other aspects, while environmental sustainability focuses primarily on natural ecological protection, including wildlife conservation, resource waste, pollution prevention, and ecosystem preservation.

Notably, green attributes exist not only during product use but throughout the

entire product life cycle, specifically covering the research and manufacturing stage (e.g., green manufacturing processes, clean production technologies, waste reduction during manufacturing), the product use stage (e.g., water and energy conservation, reduced carbon emissions and pollution), and the post-purchase stage (e.g., biodegradability, recyclability, simplified or eco-friendly packaging). Among these, green attributes in the manufacturing and research stage and post-purchase stage have relatively low association with product functional attributes, while green attributes in the use stage have relatively high association with product functional attributes (Marcon et al., 2022).

2.1.2 Presentation Methods and Content Scope of Green Attributes Information

Early research suggested that enterprises primarily present general green attributes information to consumers through green advertising, defined as advertising that employs environmental appeals to establish corporate green image and promote products or services (Banerjee et al., 1995; Muralidharan et al., 2017). In green advertising, companies highlight product green attributes as the most prominent selling points, emphasizing which characteristics are environmentally beneficial and stressing recyclable, biodegradable, low-pollution features compared to general alternatives, or showcasing unique environmental protection processes during manufacturing to promote purchase or generate higher positive evaluations (Sheehan & Atkinson, 2012). As research has deepened, scholars have found that carriers of green attributes information are not limited to green advertising but include packaging information, point-of-sale promotions, narrative statements, public relations, media reports, corporate websites, and multiple other channels (Du et al., 2010). Overall, for most products sold in retail environments, enterprises present green attributes information through environmental claims, green certification labels, and point-of-purchase advertisements highlighting energy conservation, water saving, non-toxicity, organic features, low carbon, circularity, health benefits, and pollution reduction (Kumar, 2016).

2.2 Green Attributes and Consumer Purchase Decision

2.2.1 Key Factors Promoting Consumer Green Purchase Decisions

Research examining key factors that promote green purchase behavior focuses on individual psychological factors, encompassing three research streams. The first stream analyzes psychological traits such as consumer values, motivations, and locus of control that generate positive and stable attitudes toward green products. Due to the typical prosocial characteristics of green products requiring consumers to invest more time or money, consumers with altruistic and ecological values tend to develop product preferences and purchase behaviors (Kronrod et al., 2012; Stern et al., 1999). Motivations include internal and external drivers—consumers may purchase green attribute products out of intrinsic environmental concern and moral identity, or participate in green purchasing driven by

external motives such as impression management (Ibrahim & Al-Ajlouni, 2018). Locus of control refers to whether individuals believe outcomes are controlled by self-beliefs or external forces when facing stimuli or events, divided into internal and external control types. Internal control individuals believe they can change the external environment through their own behavior, whereas external control individuals believe event outcomes depend on external environment and pressure (Ajzen, 2002). Compared to external control consumers, internal control consumers are more likely to believe their environmental efforts can achieve expected results and are valuable for solving ecological problems, thus preferring green attribute products (Patel et al., 2020).

The second research stream focuses on moral and environmental psychological factors such as environmental concern, personal norms, and responsibility. Environmental concern refers to consumers' emotional evaluation of environmental issues and their willingness to make personal efforts to solve ecological problems, with green purchasing being an important form of expressing this concern (Ajzen, 2002). Personal norms refer to individuals' expectations regarding behavioral and belief norms, closely related to self-concept, and have significant predictive power for pro-environmental behavior, with green purchase decisions being manifestations of personal norm effects. Responsibility, specifically environmental responsibility, is consumers' sense of accountability based on full awareness of ecological welfare, leading them to actively take measures to solve environmental problems (Widegren, 1998; Wu & Yang, 2018). Research shows environmental responsibility is an internal driver of pro-environmental decision-making—the stronger the environmental responsibility, the greater the likelihood of choosing green products (Miniero et al., 2014).

The third research stream explores other social psychological factors promoting green purchase decisions, such as power, social norms, status perception, and self-accountability (Elgaaied-Gambier et al., 2018; Kohlová & Urban, 2020; Pelloza et al., 2013; van der Wal et al., 2016). Through this literature review, it is evident that psychological traits, moral factors, and environmental factors significantly predict green purchase decisions, and related research is increasingly sophisticated.

2.2.2 Key Factors Hindering Consumer Green Purchase Decisions

Despite green purchase behavior satisfying both consumer self-needs and contributing to sustainable economic and social development, numerous obstacles remain. Research content includes two thematic directions. The first direction examines objective factors constraining green purchase decisions from information asymmetry, price constraints, and limited market diversity. First, the green product market suffers from severe information asymmetry (Gleim et al., 2013). The market is mixed with genuine and fake products, while most consumers have limited product knowledge and lack the ability to identify and compare actual functions and environmental values (Wang et al., 2018). Consequently, consumers, being information-disadvantaged, are unwilling to invest additional

time and effort in purchasing green products due to decision-making efficiency and effectiveness considerations (Song et al., 2019; van Doorn et al., 2021). Second, regarding price constraints, green attribute products are priced higher than general alternatives—a phenomenon known as the green premium. This occurs because green attribute products require substantial investment in design, research, technology introduction, and innovation, creating additional product costs. Due to this premium, consumers are unwilling to pay higher prices, representing a major reason why green purchase behavior fails to materialize (de Silva et al., 2021). Finally, in terms of market diversity, green product development in China remains in its growth stage and has not yet matured even in Western countries, resulting in limited green alternatives and preventing green product manufacturers from scaling up the market (Johnstone & Tan, 2015).

The second research direction summarizes social psychological factors hindering green purchase behavior from perspectives such as green authenticity, quality loss, and gender stereotypes. First, from the green authenticity perspective, an increasing number of domestic and international enterprises claim to contribute to ecological environmental protection, yet whether actual results align with these claims remains questionable (Lee et al., 2018; Parguel et al., 2011). In other words, greenwashing behavior has become increasingly prominent (Seo & Scammon, 2017). Due to difficulties in visually measuring green effectiveness and increasing deception through hidden real green information, consumers lack confidence in green attribute products, further increasing barriers to green purchasing (Silva et al., 2020). Second, from the quality loss perception perspective, some scholars argue that product environmental protection attributes may reduce consumers' quality perception. According to the zero-sum game perspective, the total resources enterprises invest sum to zero—resources invested in producing environmentally friendly green products directly lead to reduced investment in other product dimensions. Therefore, investment in green attributes not only increases environmental effects but also damages product inherent functional quality (Newman et al., 2014). For example, consumers may believe that although organic food is healthy, it is less delicious and has poorer taste. Finally, from the gender stereotype perspective, research finds that green attribute product purchase behavior differs by consumer gender. Specifically, due to the “green femininity” stereotype, gender becomes an important factor affecting green purchase decisions (Brough et al., 2016).

2.3 Green Attributes Attitude-Behavior Gap and Correction

A persistent phenomenon in green purchasing is the attitude-behavior gap—while consumers at the attitudinal level believe that participating in green consumption and purchasing green attribute products are effective for improving the ecological environment and alleviating resource pressure, and generally hold positive purchase attitudes toward green attribute products, such positive attitudes rarely translate into actual purchase behavior. Academia refers to this dilemma as the green attitude-behavior gap or inconsistency (Johnstone & Tan,

2015). How to solve this gap, explain its formation mechanism, and align attitudes with behaviors are not only key for enterprises to enhance green competitiveness but also important for green consumption transformation.

To address this gap, enterprises need to develop more efficient and targeted green marketing strategies, reasonably and effectively leveraging products as the most important carrier to present green attributes information, thereby winning green assets. However, research on the relationship between product attribute information and consumer purchase behavior exhibits certain discrepancies—some studies suggest green attributes information has positive effects, while others indicate negative effects. This study argues that the main reasons for these discrepancies are as follows: First, although existing research has reached consensus on the definition of green attributes information, detailed classification of its connotative structure remains limited. Green attributes manifest in different aspects of products, such as green packaging, eco-labels, and green advertising. Consequently, green attributes information also has content orientation, and different content orientations directly lead to differential consumer cognition and responses. To comprehensively explain the internal mechanisms of the double-edged sword effect of green attributes information, a detailed classification of its content structure is necessary as a foundation for further empirical analysis of the effects of different content-oriented green attributes information.

Second, existing research offers relatively simple psychological mechanism interpretations of negative effects, with quality inference alone being insufficient to comprehensively explain consumers' value judgments of green attributes information. In reality, the influence of green attributes information on consumer decision-making is not completed at a single level. Systematically examining mechanisms across various levels can comprehensively reveal how consumers cognitively understand green attributes information. Additionally, existing research lacks investigation into moderating variables affecting how green attributes information influences consumer decision-making. Exploring how to amplify the positive effects and reverse or eliminate negative effects of green attributes information holds greater theoretical value for guiding green marketing practice.

2.4 Product Green Attributes Information and Consumer Purchase Decision

Enterprises primarily rely on products as important carriers to showcase green attributes information. Searching Web of Science core collection databases using keywords such as product green attributes, environmental attributes, ethical attributes, and consumer purchase decision reveals that research on how product green attributes information influences consumer purchase decisions in management field SSCI and SCI-indexed journals has shown a year-by-year increasing trend over the past five years. Related studies have examined how product green attributes information affects product preference, purchase intention, post-purchase experience, and other specific issues. Table 1 lists ten

representative studies on the theme of product green attributes information and consumer purchase decision behavior.

Through literature review and summary, on one hand, some studies indicate that launching green attribute products represents an important manifestation of corporate social responsibility and catering to increasingly popular ecological consumerism, serving as an important way to accumulate corporate green assets (Aragon-Correa & Sharma, 2003; Baskentli et al., 2019). On the other hand, a considerable number of studies question or negate the positive relationship between product green attributes and consumer response. Research finds that product green attributes are not always “assets” ; in some cases, they become “liabilities,” and whether green attributes can enhance consumer product preference depends on the core benefit values consumers focus on in that product category (Luchs et al., 2010). Specifically, consumers associate gentleness attributes highly with green attributes, while associating strength attributes weakly with green attributes. Therefore, when strength attributes are salient, a green liability effect emerges; when gentleness attributes are salient, a green asset effect appears. Additionally, other series of studies explain the negative effects of green attributes based on trade-offs between green attributes and quality functions, emphasizing that consumers’ concerns about the functional quality of green attribute products constitute the primary cause of the attitude-behavior gap.

2.5 Research Commentary

Tracing previous literature on green purchase behavior and the relationship between product green attributes information and consumer purchase decisions reveals that early research focused on analyzing psychological motivations behind consumers’ positive and stable attitudes toward green attribute products, and summarized general moral and environmental psychological factors promoting green purchase decisions. Furthermore, existing research has not only organized objective factors constraining green purchase decisions but also explored social psychological factors hindering green purchase behavior, with relatively complete empirical analyses. However, the green attitude-behavior gap remains a critical challenge in green marketing.

Product green attributes information has multi-dimensional features. On one hand, different content-oriented green attributes information produces different communication effects. On the other hand, the same content-oriented green attributes information has differential impacts across decision contexts and among consumers with different psychological characteristics. This heterogeneity in product green attributes information content and differences in consumer decision psychology constitute the fundamental reasons for its double-edged sword effect on consumer decision-making. Accordingly, this study will first systematically classify the content structure of product green attributes information, using bibliometric methods and CiteSpace and Gephi mapping software to visually analyze research hotspots and 脉络 in studies on how product green attributes

information influences consumer decisions. Through cluster analysis, it will categorize existing literature dimensions of product green attributes information and conduct preliminary dimensional division of specific information content. The study will also employ qualitative research to further analyze the dimensional structure of product green attributes information, conducting semi-structured interviews with typical consumers to obtain rich first-hand data based on Chinese green consumption contexts, capturing key details of consumer attention to product green attributes information. Ultimately, based on bibliometric and qualitative research results, this study will systematically classify product green attributes information, establishing a foundation for subsequent experimental paradigm construction and double-edged sword effect measurement.

3. Research Framework

The research content is divided into two modules: (1) classification of product green attributes information content dimensions, experimental paradigm construction, and double-edged sword effect measurement (Study 1); and (2) construction of a multi-dimensional integrated model of how product green attributes information influences consumer decision-making behavior (Study 2). The relationship between the two sub-studies is as follows: Study 1 serves as the logical starting point of this project; Study 2 focuses on the core content of “formation mechanism and boundary conditions of the double-edged sword effect” and represents the key component. The overall research framework is illustrated in Figure 1 [Figure 1: see original paper].

3.1 Study 1: Classification of Product Green Attributes Information Content Dimensions, Experimental Paradigm Construction, and Double-Edged Sword Effect Measurement

(1) Classification of Product Green Attributes Information Content Dimensions Based on Bibliometric and Qualitative Research

On the basis of comprehensively summarizing the multi-dimensional features of green attributes information and organizing its content structure, this study takes the heterogeneity of product green attributes information content as its starting point to examine how different thematic contents of green attributes produce differential cognition and responses among consumers. Specifically, based on the benefit-risk analysis model, this study analyzes the trade-offs between benefits and risks that consumers make when cognitively processing product green attributes information, revealing the formation mechanism of the double-edged sword effect.

First, from the perceived benefit perspective, consumers' comprehensive benefit judgments of green attribute products depend not only on objective functional benefits but also on social benefits achieved through environmental attributes

(Lin et al., 2017). Specifically, green benefits primarily include utilitarian environmental benefits and self-expression benefits. Utilitarian environmental benefits stem from unique environmental attributes that surpass competing products in the market, representing the sum of individual and ecological environmental benefits—objective environmental gains. Self-expression benefits arise from consumers' external self-esteem needs and social approval goals achieved through participating in pro-environmental behavior, essentially constituting symbolic benefits. Both benefit perceptions, as carriers of product green value, are key elements promoting actual purchase decisions.

Second, from the risk perception perspective, risk perception refers to consumers' uncertainty about potential negative outcomes of decisions, including six basic dimensions: time, function, psychology, society, finance, and physical aspects. In green decision contexts, risk perception mainly originates from two sources: (1) negative quality inferences caused by adding green attributes, leading to functional risk perception—existing research finds that consumers believe resources enterprises invest in producing environmentally friendly green products directly lead to reduced investment in other product dimensions, causing green attributes to lower product quality evaluations (Luchs & Kumar, 2017; Newman et al., 2014); and (2) social psychological risk perception when facing controversial green attributes information, where consumers believe enterprises intentionally design and manipulate green information content to mislead and deceive consumers (Ganz & Grimes, 2018; Luo et al., 2020). This study collectively refers to consumers' perceptions of actual environmental effectiveness of product green attributes and their psychological perception of substantive environmental efforts enterprises make in developing green products as green authenticity perception. Overall, green risk perception can be summarized as negative quality perception (functional risk) and green authenticity perception (social psychological risk). Green risk perception significantly contributes to negative value judgments and ultimately reduces purchase intention or produces avoidance behavior. The dynamic trade-off between green risk perception and green benefit perception determines whether actual purchase decisions emerge.

Based on existing literature and referencing the dimensional classification results from Study 1, this study posits that product green attributes exist throughout the entire product life cycle, specifically including the research and manufacturing stage (e.g., green manufacturing processes, clean production technologies, waste reduction during manufacturing), product use stage (e.g., water and energy conservation, reduced carbon dioxide emissions and pollution), and post-use stage (e.g., biodegradability, recyclability, simplified or eco-friendly packaging). In the research and manufacturing stage, product green attributes are psychologically distant from consumers' usage contexts, and due to constraints such as product premiums and limited environmental knowledge, information about green attributes in this stage is difficult for consumers to concretely understand and accept, thus easily causing risk perception. Conversely, in the use and post-use stages, product green attributes have higher relevance to consumers, where both functional and ethical appeals are simultaneously satisfied,

making benefit perception more likely to emerge.

(2) Experimental Paradigm Improvement and Double-Edged Sword Effect Measurement

First, scientific and efficient experimental manipulation methods will be designed for different content structures of product green attributes information. Existing research primarily targets Western consumption contexts using laboratory experimental designs, with paradigms combining product design, advertising text descriptions, and images to manipulate one or several specific aspects of product green attributes, measuring corresponding outcome variables through scales and choice options. This study will draw on previous experimental paradigms and, based on literature review and qualitative research results from Module 1, design experimental paradigms suitable for Chinese green marketing contexts for different content dimensions of product green attributes information. Additionally, field experiments will be employed to measure the double-edged sword effect of green attributes information. The study plans to conduct two-stage field experiments: In the first stage, green attributes information will be displayed through prominent text or poster images in large supermarkets or stores, with consumers' real reactions recorded. In the second stage, online field experiments will be conducted in collaboration with e-commerce platforms, randomly selecting participants from CRM databases and displaying different green attributes information through webpage sidebar titles, banner designs, and other methods, with objective data recorded through backend systems.

3.2 Study 2: Construction of a Multi-Dimensional Integrated Model of Product Green Attributes Information Influencing Consumer Decision-Making Behavior

3.2.1 Study 2a: Risk-Benefit Trade-Off Mechanism of Product Green Attributes Information Influencing Consumer Decision-Making Based on Regulatory Focus Boundary Conditions (1) Psychological Trade-Off Mechanism Between Green Risk and Green Benefit

Focusing on green product purchase decision contexts, the purpose of presenting green attributes information is to enhance consumers' green benefit perception, thereby generating green preferences and purchase behavior. However, in real consumption contexts, green attributes information carries high uncertainty, ambiguity, and even misleadingness. Due to limited expertise and technical knowledge, consumers in most cases lack professional means to identify green features (Lee et al., 2022; Parguel et al., 2011). The double-edged sword effect of product green attributes information thus emerges: On one hand, environmental attribute features enable products to simultaneously satisfy consumers' functional and environmental needs, increasing green benefit perception (Chernev & Blair, 2021); on the other hand, green attribute products face relatively high prices, information asymmetry issues, and as innovative attributes often face

significant uncertainty—all contributing to risk perception.

Based on the benefit-risk model, this basic analytical framework in consumer behavior, this study examines the trade-offs consumers make when cognitively processing green attributes information, revealing the formation mechanism of the double-edged sword effect. First, from the perceived benefit perspective, consumers' comprehensive benefit judgments of green attribute products depend not only on objective functional benefits but also on social benefits achieved through environmental attributes. Green benefits mainly include utilitarian environmental benefits and self-expression benefits, both serving as carriers of product green value that promote actual purchase decisions. Second, from the risk perception perspective, risk perception in green decision contexts primarily stems from negative quality inferences caused by adding green attributes and social psychological risks when facing controversial green attributes information. Green risk perception significantly contributes to negative value judgments and reduces purchase intention. The dynamic trade-off between green risk perception and green benefit perception determines whether actual purchase decisions emerge.

Based on existing literature and referencing dimensional classification results from Study 1, this study proposes that different thematic contents of product green attributes information will elicit differential green benefit perception and green risk perception among consumers, thereby creating a double-edged sword effect on consumption decisions.

Proposition 1: Different thematic contents of product green attributes information will elicit differential green benefit perception and green risk perception among consumers, thereby creating a double-edged sword effect on consumption decisions.

Proposition 2: Compared to revealing green attributes information from the product research and manufacturing stage, revealing green attributes information from the product use and post-use stages is more likely to stimulate consumers' utilitarian environmental benefit perception and self-expression benefit perception, thereby promoting purchase decisions.

Proposition 3: Compared to revealing green attributes information from the product use and post-use stages, revealing green attributes information from the product research and manufacturing stage is more likely to cause consumers' functional risk perception and social risk perception, thereby inhibiting purchase decisions.

(2) Boundary Mechanism of Promotion Focus vs. Prevention Focus

According to regulatory focus theory, individuals exhibit two specific tendencies in thought control and focus: promotion focus and prevention focus (Förster et al., 1998). Promotion-focused individuals concern themselves with potential gains, pursue advancement and progress, and are willing to use risky strategies to achieve higher benefits. Prevention-focused individuals concern themselves

with potential losses, pursue safety and responsibility, and adopt conservative strategies to avoid unnecessary losses. When facing product green attributes information, promotion-focused consumers attend to additional environmental benefits green attribute products offer compared to other products, while prevention-focused consumers focus more on whether green attributes cause functional or financial losses.

Taking core and peripheral green attribute information as examples, for promotion-focused consumers, core green attribute information emphasizing significant environmental benefits better matches their psychological expectations and more easily generates green benefit perception and purchase behavior. For prevention-focused consumers, peripheral green attribute information, being less likely to cause green risk perception, is more attractive and promotes purchase behavior (Gong et al., 2022). Therefore, different regulatory foci lead consumers to make differential value judgments when facing different content-oriented green attributes information. Specifically, under promotion focus, consumers form positive value judgments and benefit cognition toward product green attributes information emphasizing environmental benefits such as green innovation, green uniqueness, and environmental spillover effects. Under prevention focus, consumers form positive judgments toward product green attributes information focusing on safety, protection, and environmental responsibility that emphasize reducing environmental losses.

Proposition 4: Regulatory focus and product green attributes information produce a matching effect in consumer decision-making. Specifically, under promotion focus, consumers develop benefit cognition toward product green attributes information oriented toward “gaining environmental benefits,” thereby promoting consumption decisions; under prevention focus, consumers develop benefit cognition toward product green attributes information oriented toward “reducing environmental losses,” thereby promoting consumption decisions.

3.2.2 Study 2b: Research on Matching Effects Between Green Attributes Information and Product Types Based on Mindset Boundary Conditions (1) Matching Green Attributes Information with Product Types: Cognitive Balance

To achieve cognitive balance, individuals spontaneously support information consistent with their beliefs and avoid information inconsistent with their beliefs (Frost et al., 2015). Cognitive bias theory further indicates that during decision-making, individuals develop belief consistency cognition toward information supporting their self-beliefs, making such information more persuasive; conversely, they develop inconsistent perception (cognitive dissonance) toward information contradicting their pre-existing beliefs, reducing information persuasiveness and effectiveness (Gao et al., 2016). In consumer behavior, belief consistency is an important cognitive prerequisite for consumer information judgment and screening, playing a critical role in consumer attitudes and behavioral decisions (Jia et al., 2020).

This study posits that when facing product green attributes information, consumers first judge whether it is consistent with their inherent beliefs. However, belief consistency judgment is largely influenced by product type. Research categorizes green products into typical green products and atypical green products. Typical green products are those where environmental attributes are widely present or product green image is familiar to most consumers, such as energy-saving appliances and organic food. Atypical green products are those where few products in the category possess environmental attributes (Usrey et al., 2020). For typical green products, consumers hold high environmental expectations, and authoritative, trustworthy green attributes information leads to belief consistency. For atypical green products, green attributes information contradicts consumers' inherent cognition, causing belief inconsistency. However, changing the presentation form of product green attributes information—for example, using metaphors to display green attributes or showing non-core product green attributes—may alleviate consumer belief inconsistency and improve negative effects.

Proposition 5: Product type and green attributes information produce a matching effect in consumer decision-making. Specifically, for typical green products, green attributes information stimulates consumers' belief consistency perception, promoting consumption decisions; for atypical green products, green attributes information leads to consumers' belief inconsistency perception, inhibiting consumption decisions.

(2) Boundary Mechanism of Mindset

Cognitive psychology indicates that mindset serves as a filter for individuals' information processing, significantly influencing how people cognitively understand external events and make behavioral decisions, with two modes: global processing mindset and local processing mindset (Navon, 1977). Individuals in a global mindset more frequently use holistic information processing, preferring to understand external stimuli through overall visual perception and abstract semantic expression. Individuals in a local mindset tend to view the external world as a collection of numerous elements, preferring to understand external stimuli through local visual perception and concrete semantic expression (Förster et al., 2008). Research shows mindset significantly influences consumer purchase decisions, with consumers in different mindsets exhibiting large differences in cognitive processes, leading to differential attitudes and behaviors toward products or services (Teng et al., 2020).

This study argues that consumers in different mindsets will have different attention foci when facing product green attributes information. Specifically, consumers in a global mindset pay more attention to the goals and meanings of product green attributes information—the significance of green utility for ecological environmental protection and sustainable development. Consumers in a local mindset focus more on the credibility and measurability of product green attributes information—objective effects. Therefore, differences in information attention focus caused by mindset will further moderate the matching effect

between green attributes information and product type. Specifically, under a global mindset, consumers amplify commonalities between atypical and typical green products, also attending to the social value of green labels and environmental claims themselves, and to some extent ignore differences in substantive environmental effectiveness between different types of green attributes information. At this point, belief inconsistency caused by mismatched parts will be weakened or eliminated, facilitating consumer decision-making. Conversely, under a local mindset, consumers amplify differences between atypical and typical green products, strengthening differences in substantive environmental effectiveness between different green attributes information types. Only matched parts can stimulate consumers' belief consistency and further promote purchase decisions.

Proposition 6: Consumer mindset moderates the effect of the matching between product green attributes information and product type on belief consistency. Specifically, under a global mindset, revealing product green attributes information can stimulate consumers' belief consistency/reduce belief inconsistency for both typical and atypical green products, promoting consumption decisions; under a local mindset, only when product type matches green attributes information can consumers' belief consistency be stimulated, promoting consumption decisions.

3.2.3 Study 2c: Emotional Mechanism of Product Green Attributes Information Influencing Consumer Decision-Making from the Hedonic-Utilitarian Motivation Perspective (1) Boundary Mechanism of Purchase Motivation

In consumer psychology, existing research generally agrees that consumer purchase motivation is closely related to purchase decision behavior. Based on whether it is emotionally or rationally driven, purchase motivation can be divided into utilitarian motivation and hedonic motivation (Voss et al., 2003). Under utilitarian motivation, consumers are goal-oriented toward task completion or performance achievement, rationally pursuing objective value acquisition (Ran & Zheng, 2017). Under hedonic motivation, consumers pursue emotional needs or pleasant sensory experiences, preferring to seek variety from emotional attributes. Differences in purchase motivation lead to differential information focus and preferences during decision-making processes (Xia et al., 2020; Zhu et al., 2020).

Focusing on the green attributes information context of this study, consumers' emotional value judgments of green features significantly influence purchase motivation. Specifically, under utilitarian motivation, consumers tend to be rational, diminishing the special emotional value of product green attributes information, and in some cases, green attributes conflict with product performance features. Therefore, the content effectiveness of product green attributes information becomes complex. This study argues that green attributes information with low product function association—such as using eco-friendly packaging or

ecological labels—serves only as additional product attribute information without affecting consumers' functional value judgments, thus more easily promoting purchase decisions. Conversely, green attributes information with high product function association—such as developing environmentally friendly formulas or investing in green manufacturing processes—reduces consumers' functional value judgments and increases difficulty in obtaining supportive reasons for green attribute products, thereby decreasing purchase intention.

Conversely, under hedonic motivation, consumers focus more on whether products with green environmental attributes can satisfy their emotional needs and whether unique pro-environmental features can enhance personal emotional experiences. The addition of green attributes not only fails to reduce original emotional experiences but instead increases overall product emotional value through added green emotional value, achieving product attribute transcendence where hedonic products possess exceptionally excellent emotional value attributes (Cervellon & Carey, 2014). Compared to general products, green products with pro-environmental features can increase the pleasantness of consumption experiences (Tezer & Bodur, 2020). Therefore, under hedonic motivation, the special emotional value of green attributes information is amplified, and presenting environmental claims, eco-labels, and other diverse forms to showcase products' environmental attributes that differentiate them from general non-green alternatives can satisfy consumers' diverse emotional needs, leading to positive purchase behavior.

Proposition 7: Purchase motivation moderates the effect of product green attributes information on consumer decision-making. Specifically, **Proposition 7a:** Under hedonic motivation, revealing product green attributes information promotes consumption decisions. **Proposition 7b:** Under utilitarian motivation, revealing green attributes information with low product function association promotes consumption decisions, while revealing green attributes information with high product function association inhibits consumption decisions.

(2) Flow Experience as a Mediating Mechanism

Flow experience is a positive emotion individuals generate when participating in certain activities or behaviors. Interaction theory suggests that flow emerges from the interaction between individuals and their surrounding environment—when environmental cues match personal goals, flow experience occurs (Bilgihan, 2016). In consumer behavior, flow experience represents positive emotions generated during consumption, typically comprising three basic components: pleasure, control, and self-efficacy (Wei et al., 2020). As a manifestation of abundant psychological resources, flow experience becomes an internal driving force for consumers to complete current behavior and is itself a positive emotional experience that enhances psychological ownership, identification, and satisfaction.

This study argues that flow experience only emerges when green cues align with

consumers' personal purchase goals. For consumers pursuing hedonic goals, who seek sensory and spiritual pleasure and fulfillment and make purchase decisions based on optimal psychological experience principles (Cheng et al., 2020), product green attributes information can increase individuals' uniqueness perception of products, enhance purchase process pleasure, and elicit positive emotions such as self-efficacy and warm-glow feelings, providing conditions for flow experience. For consumers pursuing utilitarian goals, green attributes information such as developing environmentally friendly formulas or investing in green manufacturing processes—highly associated with core product functions—conflicts with decision goals of maximizing use value, making it difficult to elicit flow experience during consumption. Conversely, due to the green halo effect, revealing green attributes information with low product function association can elicit flow experience and promote consumption decisions.

Proposition 8: Under hedonic motivation, revealing product green attributes information elicits consumers' flow experience, promoting consumption decisions.

Proposition 9: Under utilitarian motivation, only revealing green attributes information with low product function association can elicit consumers' flow experience, promoting consumption decisions.

4. Theoretical Contribution and Practical Implications

In recent years, research on green marketing and consumer green decision-making has continued to gain momentum. While most previous studies have focused on objective and psychosocial factors that facilitate or hinder green consumption decisions, analyzing the positive effects of green marketing strategies on consumer psychology and behavior, this project extends and theoretically expands the double-edged sword effect of product green attributes information through two research modules and multiple research angles.

From a theoretical perspective, this project reveals the causes, mechanisms, and solutions for negative effects of the double-edged sword effect of product green attributes information in a multi-level and three-dimensional manner, providing new perspectives for research on green consumption decision behavior. From a practical perspective, this project offers new ideas for marketers to develop targeted promotion strategies and provides new strategic directions for enterprises to enhance the market competitiveness of green products.

Specifically, this study first constructs a risk-benefit trade-off mechanism model of how product green attributes information influences consumer decision-making based on regulatory focus boundary conditions. Second, from the cognitive balance perspective, it builds a matching effect model between green attributes information and product types based on mindset boundary conditions. Finally, it constructs an emotional mechanism of how product green attributes information influences consumer decision-making from the

hedonic-utilitarian motivation perspective. By identifying these mechanisms and boundary conditions, this research provides both theoretical insights and practical guidance for mitigating the negative effects and amplifying the positive effects of green attributes information in green marketing practice.

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