

Effect of Perceived Risk of Greenwashing on Consumers' Willingness to Pay a Price Premium: An Empirical Study

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Abstract: Since China released the timetable of 'dual carbon', domestic enterprises have taken relevant measures to facilitate the development of a national green low-carbon economy. However, some of the enterprises have misled consumers by marketing communication of the so-called 'green', and this phenomenon of greenwashing should be addressed urgently. From the demand-side perspective, the correlation between perceived risk and willingness to pay a price premium is investigated in this study, and the moderating effect of green innovation identification and the mediating effect of consumers' negative emotions are verified. As revealed by the empirical results: (1) Greenwashing perceived risk has a significant negative effect on premium payment intention. (2) Greenwashing perceived risk exerts a significant adverse effect on the willingness to pay a price premium on the basis of consumers' negative emotions, in which consumers' negative emotions have a partial mediating effect. (3) Green innovation identification is found to have a moderating effect, i.e., the higher the level of green innovation identification of consumers, the more the positive effect of greenwashing perceived risk on their negative emotions will be weakened. The conclusions of this study can help enterprises regulate their own behavior and elevate the market realization level of green premium.

Keywords: Greenwashing; Perceived Risk; Negative Emotions; Green Innovation Identification; Willingness to Pay a Price Premium.

1. Introduction

After '3060 Goals' were incorporated into the Chinese government work report, the hot words of 'carbon peak and carbon neutralization' have aroused rising attention from relevant industries. Green innovation has become the common concept of industry and the consumer market. Enterprises have begun to actively optimize their technology to release green products and services to the market. Moreover, consumers' enthusiasm for purchasing low-carbon environmental protection products is rising, and green consumption has become a novel economic hotspot. However, there is a phenomenon of 'duplicity' between the real behavior of enterprises and the green image they promote. Serious information asymmetry makes consumers question the green behavior of enterprises and even deterring green products in the market.

'Greenwashing' reveals that enterprises falsely promote their environmental responsibility, whereas they have not implemented green actions, which may mislead consumers. When facing environmental protection products with high prices, consumers are generally inclined to pay for the premium part of green products out of the obligation to abide by social morality and fulfil environmental protection responsibilities. However, when the truth of the 'greenwashing' behavior of enterprises is publicized, consumers will inevitably express negative emotions at psychology, thus affecting their willingness to purchase green products. The 'stimulus-organism-response (SOR)' model suggests that consumers' psychological and behavioral responses will be affected by external stimuli. Once they know that there is a 'greenwashing' behavior in the market and they cannot distinguish between the true and false, the real green proposition will be questioned, and there will even be 'interior goods expel qualified goods', which hinders the promotion and development of green innovation.

In accordance with the 'stimulus-organism-response (SOR)' theory, this study introduced consumers' negative emotions as a mediator to investigate the internal relationship between consumers' negative emotions and greenwashing perceived risk and premium payment intention of green products. Hopefully, this study can provide some reference for the vital theoretical problem of

‘how to digest the premium part of green products in enterprises’. In the context of ‘3060 Goals’, the theoretical research on green consumption in academia is primarily based on the supply side. To a certain extent, this study can fill the blank of research on the demand side of the green consumption market, which is of great significance to expedite the implementation of ‘dual carbon’ in China, achieve the innovation of the green industry and expand the novel field of green consumption.

2. Literature Review

2.1 ‘Greenwashing’ and Perceived Risk

The word ‘greenwashing’ was initially proposed by Jay Westervelt in 1986. He published an article concerned with the hotel industry making false advertisements with the banner of environmental protection. At that time, hotels tended to formulated the regulations requiring customers to use towels repeatedly. They claimed that this was one of the ways for enterprises to save water in accordance with the strategy of sustainable development though there was no environmental action with a greater environmental effect^[1]. Subsequently, scholars have given many definitions of this concept. In 1999, the term was incorporated into the Concise Oxford English Dictionary and interpreted as ‘False information disseminated by an organization to show a public image of responsibility for the natural environment; public image of environmental protection promoted by or for organizations but considered unfounded or intentionally misleading’. Laufer (2003)^[2] highlighted the three core elements, including confusion of true and false information, concealment of false information and posturing, so as to reveal the ‘greenwashing’ behavior of enterprises. Terra Choice, an environmental marketing company in the United States, released a research report on ‘the six sins of greenwashing’ in 2007, which uncovered the publicity planning behaviors of enterprises that had hypocritically reported their low-carbon environmental protection. Next, combined with the same behavior of false promotion of low-carbon environmental protection in the data center market, the following seven sins for the offence are revealed, including the sin of hidden trade-off, the sin of no proof, the sin of vagueness, the sin of irrelevance, the sin of lesser of two evils, the sin of fibbing, as well as the sin of worshipping false labels^[3]. In addition, based on the perspective of information communication, scholars proposed that ‘greenwashing’ is a selective disclosure of information, which is an ambivalent behavior to retain the disclosure of negative information regarding corporate environmental performance and disclose positive information about it. Besides, some scholars consider in a broad sense from the marketing level that any exaggerated emphasis on the green environmental protection characteristics of products and corporate behaviors can be regarded as greenwashing. This study adopted the widely accepted definition that ‘greenwashing’ is an organization to spread false or misleading information to show its public image of environmental responsibility, but it does not take real green marketing activities.

The concept of perceived risk was initially broadened from the psychological category by Bauer of Harvard University (1960). He suggested that all purchase decision-making of customers had the possibility that the results did not match the forecast, so consumers would bear the risk of loss^[4]. Standing on the consumers’ perspective, considerable vague and indistinguishable environmental protection claims have caused consumers to question the integrity of enterprises and worry about their green products. When facing enterprises’ external publicity of their environmental behavior and green attributes of products, consumers will further think and judge the authenticity of enterprise behavior and the accuracy of information dissemination. Green skepticism is considered a unique phenomenon in which consumers doubt green products and their legitimacy (Leonidou & Skarme, 2017)^[5], which is common among consumers. Consumers are contradictory to corporate performance and advertising since some forms of ‘greenwashing’ have been achieved, thus making it difficult for consumers to identify real green propositions (Nyilasy et al. 2014)^[6]. In addition, ‘greenwashing’ positively affects the perceived environmental performance of organizations, while negatively affecting the perceived integrity of communication (De Jong et al. 2018)^[7]. After summarizing the theory of ‘greenwashing’ and perceived risk, this study proposes the concept of ‘greenwashing perceived risk’. This concept

suggests the consumers' psychological prediction of whether the enterprises are false or exaggerated to publicize their environmental protection behavior, falsify the green attributes of the products, and fabricate the public image of low-carbon environmental protection and others, as an attempt to produce the uncertainty perception of a decision on purchasing green products. According to Terra Choice's seven sins of greenwashing and Jacoby and Kaplan's^[8] proposal of perceived risk from five aspects, including financial, performance, physiological, psychological and society, this study divides greenwashing perceived risk into seven dimensions, i.e., the risk of the hidden trade-off, the risk of no proof, the risk of vagueness, the risk of irrelevance, the risk of lesser of two evils, the risk of fibbing, as well as the risk of worshipping false labels.

2.2 Green Innovation Identification

In general, green innovation has four popular appellations, including 'sustainable innovation', 'green ecological innovation', 'environmental innovation' and 'environment-driven innovation', covering research in different disciplines, whereas their basic connotation tends to be consistent. James and Fussier (1996) first referred to the concept of green innovation in the book *Driving Eco-Innovation*, i.e., new products, technologies or processes capable of significantly reducing devastating environmental impacts and enabling themselves or other stakeholders to add value^[9]. Saunila et al. (2018)^[10] proposed that green innovation refers to new products, new service projects, new processes or new management systems that are capable of completing green environmental protection. Scholars have conducted extensive research on the implication of green innovation. It has been proposed that green innovation creates environmental performance at the technical level, while having environmental benefits at the institutional management level. Blattel-mink (1998)^[11] first emphasized that green innovation involves innovation and introduction of products, technologies, markets and systems, and business strategies are being upgraded in an ecological dimension. The viewpoint proposed by Kemp et al. (2002)^[12] has been generally recognized by the academic circles. It is considered that any innovation that can weaken the damage to the environment and promote environmental protection pertains to the category of green innovation, which includes both technology and every production and operation link closely correlated with each layer of the enterprise. Chen et al. (2014)^[13] also supported the same view that conducts of management aspect (e.g., strengthening the innovation for administration organizations) also pertain to the category of green innovation. In addition, sustainable development strategies are largely promoted by green innovation. Tian Hong et al. (2018)^[14] suggested that green products innovation contributes to the sustainable development of the enterprises, which account for a dominant position in the green competition in the industry. Ying et al. (2020)^[15] identified green innovation as a vital point in addressing sustainability issues economically, socially and environmentally and enhancing advantages in organizational competition.

Identification, a psychological term, refers to the individual's psychological state of judgment and decision-making established by an organization of a certain type. This definition has been extensively applied in the social psychology and the marketing industry. Albert and Whetten^[16] proposed the concept of organizational identification, which is considered a collective cognitive framework affecting the behavior of all members of the enterprises, i.e., enterprise members' recognition of corporate values. Subsequently, Chen^[17] proposed the novel concept of 'green organizational identification' and defined it as the identification form of green environmental management constructed by organizational members to provide significance for their behaviors. After summarizing the basic theoretical achievements (e.g., identification and green organizational identification), this study proposes a novel concept of green innovation identification and defines it as consumers' subjective cognition of various behaviors concerning green innovation adopted by enterprises, i.e., a psychologically consistent comment after comparing activities relating to green innovation with customers' own assessment. Thus far, the academic research on the driving factors of enterprise green innovation based on the field of green innovation has been also very copious. Ling Zehua and Yang Xiaoyu explored the four dimensions of environmental regulation, economic

interests, stakeholder pressure, resources and capabilities of enterprises, respectively. They suggested that the four points above are important factors driving enterprises to carry out green innovation. As indicated by the summary of the academic achievements of a wide range of scholars, the four factors of public awareness (including the low-carbon concept, propaganda of green innovation, transparency of enterprise environmental information and interest correlation) will have an effect on consumers' green innovation identification.

2.3 Consumers' Negative Emotions

In social psychology, the emotions of anxiety, tension, anger, depression, repression, sadness and pain are generally termed negative emotions. Menon and Dubé (2000)^[18] proposed that events in contrast to expected consumption goals generally lead to negative emotions. Studies have shown that the effect of consumer sentiment on consumer motivation can stimulate their consumption behavior. Slovic et al.^[19] proposed 'Affect heuristic', focusing on the main effect of emotion on risk intuition and individual behavior. When the risk of greenwashing occurs, consumers will have negative emotions. The research of Terra Choice and other studies have shown that greenwashing would make consumers angry and suspicious about all environmental propositions and relevant products^[3]. Yan Huan et al. (2019)^[20] explored the expected guilt emotions affecting consumers' green consumption behavior. They proposed that when consumers conduct moral-related consumption, moral-related negative emotions will promote consumers to select behaviors that meet moral standards, thus positively affecting green consumption behavior to a certain extent. The existing analysis of negative emotions by experts and scholars is largely assigned into two dimensions, three dimensions and four dimensions. Lazarus (1991)^[21] employed a two-dimensional (2D) model to study negative emotions, which are retrospective negative emotions and prospect negative emotions. The retrospective negative emotions are generated by consumers' perception of what has happened, which will promote consumers to escape from negative results (e.g., anger and frustration). By contrast, prospective negative emotions are consumers' emotions caused by fuzzy predictions of events that have not yet occurred, which will inhibit their behavioral motivation and tendency (e.g., helplessness and anxiety). Some scholars also divided negative emotions based on intensity, including the 2D model of high and low arousal negative emotions (Feng Jiao et al., 2012)^[22] and the three-dimensional (3D) model of strong, moderate and weak negative emotions (Cai Shuqin et al., 2017)^[23]. Yi and Baumgartner (2004)^[24] further extended negative emotions to four dimensions, which are regret, anger, disappointment and worry, severally. Laros and Steenkamp (2005)^[25] extracted four dimensions of negative emotions (including anger, fear, shame and sadness) from 172 terms relating to negative emotions. Chen Chancha and Yue Yuzhu (2018)^[26] highlighted that sadness has obvious particularity relative to the three negative emotions of anger, fear and shame (i.e., sad-spending effect). The above scholars excluded sadness from the four basic negative emotions. In this study, the 3D model of Chen Chancha and Yue Yuzhu, which are frequently used, is selected to explore the negative emotions of consumers on greenwashing behavior in depth.

2.4 Willingness to Pay a Price Premium

Price premium refers to the price generating higher than average profit (Drozdzenko et al., 2011)^[27]. The difference between high prices and competitive prices can be recognized as a price premium when sellers of normal high-quality products are capable of charging a minimum price above the average price of high-quality products (Rao and Monro, 1988)^[28]. The concept of willingness to pay originates from marketing price and consumer behavior territory (Breidert et al., 2006)^[29]. At present, studies on marketing have highlighted consumers' willingness to pay for premium parts, and there are numerous scholars worldwide to explore its connotation and mechanism. From the perspective of a brand, Blackstone (1990)^[30] proposed that willingness to pay a price premium implies that consumers are willing to pay the price margin between a brand and the competitive brand when selecting products with the same functions. Chaudhuri and Holbrook (2002)^[31] defined consumers' willingness to pay a price premium to be a willingness to pay higher prices for a particular brand than

other brands for similar products. Netemeyer et al. (2004)^[32] emphasized that willingness to pay a price premium as the consumers' desire to pay additional costs for a well-known brand they love, even if this brand sells products of the same quality and quantity to other brands of the same or lower grade. Shi Xiaofeng and Wu Xiaoding (2011)^[33] defined the willingness to pay a price premium as consumers are willing to spend more on a product with higher prices when selecting products with similar performance, or consumers are still willing to choose this kind of product when the price of the product increases slightly.

In green product marketing, due to the low-carbon environmental protection characteristics of green products, compared with general products, the high investment behind green products often leads to the increase of its pricing. Existing studies have reported that most consumers are reluctant to pay additional costs for green practices (Manaktola and Jauhari, 2007)^[34]. The green product premium refers to the portion of the cost paid by consumers for green products that exceed their value in use and is used for green attributes (Zong et al., 2014)^[35]. From the perspective of green products, this study defines the willingness to pay a price premium as consumers are willing to pay more for green innovative products that are more environment-friendly when facing green innovative products with the same function but higher price as ordinary products. Before this, many experts and scholars have carried out scientific research on the factors of consumers' willingness to pay a price premium. Lu Hongliang (2017)^[36] conducted an in-depth study on the factors of consumers' willingness to pay a price premium and proposed that social value cognition, brand emotion cognition and brand loyalty are three vital aspects of facilitating the improvement of consumers' willingness to pay a price premium. Singh and Pandey (2018)^[37] revealed six factors for buyers' willingness to pay a price premium for green packaging, which consisted of cognitive value, functional value, economic value, symbolic value, altruistic value, as well as biosphere value. When Wan Jun et al. (2021)^[38] investigated the traceability information of agricultural products, they confirmed that the main factors for consumers' willingness to pay for the premiums are prior quality assurance, perceived value and trust, and the three factors have noticeable direct impacts on the willingness to pay for the premiums. As revealed by the existing research results, the major factor for consumers' willingness to pay a price premium is a perceived prediction of value. Based on previous views, this study will further explore consumers' willingness to pay a price premium of green innovative products.

In general, both perceived risk and consumers' negative emotions are essential areas worth noting in marketing management, and theoretical circles also have considerable research results for reference. However, from the existing references, it is difficult to fully study the 'perceived risk of greenwashing' and the willingness to pay a price premium in the context of 'dual carbon', and the relevant mechanism of 'perceived risk of greenwashing' affecting consumers' willingness to pay a price premium for green products remains unclear, so further discussions should be conducted.

3. Research Hypothesis

3.1 The Relationship Between Greenwashing Perceived Risk and Willingness to Pay a Price Premium

'Greenwashing' is false green-related propaganda by enterprises to declare themselves responsible for environmental protection, which makes consumers feel at risk. Compared with ordinary perceived risk, greenwashing perceived risk is different. The publicity of dishonesty in green environmental protection of the business circles mainly exists in seven aspects. Accordingly, it is considered in this study that greenwashing perceived risks primarily fall into seven dimensions, including the risk of hidden trade-off, the risk of no proof, the risk of vagueness, the risk of irrelevance, the risk of lesser of two evils, the risk of fibbing, as well as the risk of worshipping false labels. As revealed by the risk of hidden trade-off, the statement that a product is green and environment-friendly is unilateral turn, which is only based on its limited set of attributes, without paying attention to other vital environmental issues. For instance, new energy automobile companies have been vigorously propagating the characteristics of energy-saving and emission reduction of electric vehicles, whereas

the actual emission of electric vehicles dominated by thermal power in China may be higher than that of gasoline vehicles, thus probably having a significant negative effect on the environment. The risk of no proof indicates that the environmental claims behind the product is impossible to be confirmed through the apparent supporting information or reliable third-party certification. The risk of vagueness is a claim that the definition is so unclear or broad that its true meaning can be easily misunderstood by consumers, so it has insufficient details. For instance, 'pure natural' drugs are chemicals containing toxic ingredients which are not environment-friendly in the final analysis. The risk of irrelevance is that the enterprises' environmental claims are true, whereas it is not important or helpless for consumers seeking environmental products. The risk of lesser of two evils is the enterprise's selective disclosure of positive information on the performance appraisal of the natural environment or social development, instead of full and adequate disclosure of negative information in relevant areas, thus building an overly positive corporate image. The risk of fibbing is the enterprises' claims regarding the environment being completely mistaken and fictitious. The risk of worshipping false labels refers to the image of a product with false suggestions or certification-like image, misleading consumers that it has passed the rational and legitimate green certification process. A considerable number of existing empirical studies have suggested that the higher the perceived risk consumers suffer, the weaker their willingness to pay for relevant products or services will be. Thus, this study proposes the hypothesis that:

H1 Greenwashing perceived risk has a significant adverse impact on the willingness to pay a price premium, i.e., the weaker the greenwashing perceived risk, the stronger the willingness to pay a price premium.

3.2 The Mediating Effect of Consumers' Negative Emotions in the Transmission Process of Greenwashing Perceived Risk on Willingness to Pay a Price Premium

Negative emotions affect consumers' purchasing behavior, which is one of the incentives for consumers to resist premium payment. High negative emotions will hinder the transaction process between consumers and enterprises. Nowadays, more and more empirical studies have shown that consumers' emotions have become an important motivation to stimulate consumption of consumers, and academia is also conducting continuous research on consumers' negative emotions. 'Greenwashing perceived risk' is the psychological prediction on the different behaviors of enterprises in environmental protection publicity when purchasing green products. In the research on consumers' negative emotions, many scholars have verified the influencing mechanism among perceived risk, consumers' negative emotions and willingness to pay through empirical research, and have reached meaningful conclusions. For instance, Yan Huan et al. (2019)^[20] suggested that consumers' negative emotions encourage them to choose behaviors that meet ethical standards. On the basis above, this study is based on the correlation between negative emotions, perceived risk and willingness to pay a price premium in the context of 'carbon peak, carbon neutralization'. Thus, this study proposes the hypothesis that:

H2 Consumers' negative emotions have a mediating effect between greenwashing perceived risk and willingness to pay a price premium. 'Greenwashing perceived risk' is positively correlated with consumers' negative emotions, and consumers' negative emotions show a negative correlation with willingness to pay a price premium.

3.3 The Moderating Effect of Green Innovation Identification

According to the above, consumers' green innovation identification is largely affected by four factors, including public awareness of the low-carbon concept, propaganda of green innovation, transparency of enterprise environmental information and interest correlation. On the basis of the level of green innovation identification of consumers and the advantages and disadvantages of subjective evaluation, the consumer groups are divided into two types, including consumers with high green innovation identification and consumers with low green innovation identification. The former has a high level of green innovation identification and a good subjective evaluation, while the latter

has a low level of green innovation identification and a poor subjective evaluation. When they are subjected to ‘greenwashing perceived risk’ identically, compared with consumers with low green innovation identification, consumers with high green innovation identification may selectively ignore or despise certain potential risks due to their positive evaluation of green innovation, thus probably reducing the interference of negative emotions on green innovative products, and they are more likely to pay for a premium. For instance, if consumers are fully recognized and familiar with the concept of green innovation and the efforts made by enterprises, they will think that the environmental protection behavior promoted by enterprises is less likely to be false and the transaction process is more secure. Thus, they have a positive attitude toward the product and decide to pay a price premium. Thus, this study proposes the hypothesis that:

H3 Green innovation identification exerts a moderating effect, i.e., the higher the level of green innovation identification, the weaker the positive effect of greenwashing perceived risk on consumers’ negative emotions will be.

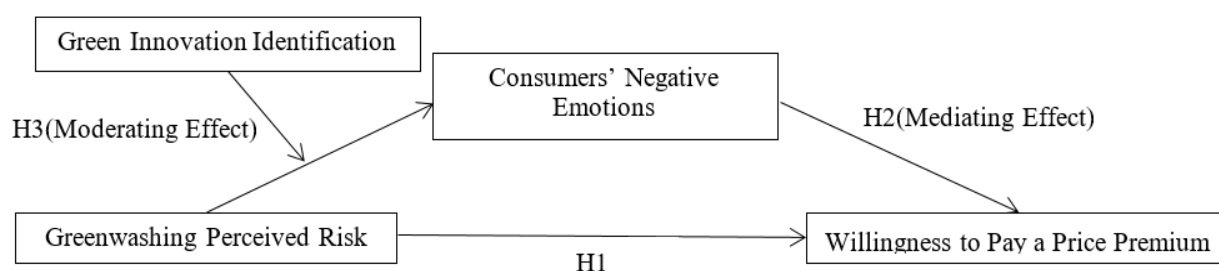


Fig. 1 Relationship model between greenwashing perceived risk of consumers and willingness to pay a price premium

4. Scale Design and Data Collection

4.1 Questionnaire Design

In this study, based on the mature evaluation scale worldwide, the measurement scheme is designed for the four dimensions, including greenwashing perceived risk, green innovation identification, consumers’ negative emotions and willingness to pay a price premium. Moreover, a pre-questionnaire survey has been conducted after the adjustment of the items according to the subject background and specific details of this study. In accordance with the results of a wide range of scholars and the seven sins of greenwashing clearly proposed by Terra Choice^[3], it is considered that the greenwashing perceived risk primarily consists of the risk of the hidden trade-off, the risk of no proof, the risk of vagueness, the risk of irrelevance, the risk of lesser of two evils, the risk of fibbing, as well as the risk of worshipping false labels. On that basis, seven questions are designed. The relevant theories proposed previously suggest that consumers’ green innovation identification will be affected by the four factors, which consist of public awareness of the low-carbon concept, propaganda of green innovation, transparency of enterprise environmental information, as well as interest correlation. Using the mature scale described by Yu-Shan Chen^[17], this study designs this variable to form four measurement items of green innovation identification. For the variable of consumers’ negative emotions, the frequently used 3D model (including anger, fear and shame) proposed by Chen Chancha and Yue Yuzhu is employed in this study. A question is set for each level, and three items are designed in total. From the dimension of willingness to pay a price premium, this study, referencing Chaudhuri and Holbrook (2002)^[31] and Netemeyer and Krishnan et al. (2004)^[32] who adopted the one-dimensional scale, optimizes the design of measurement items of Zhang and Bloemer (2008)^[39] and Chaudhuri and Ligas (2009)^[40]. Thus, three measurement items are finally retained. Table 1 lists the related items and sources of specific scales.

Table 1. Scales and Sources

Variable	Summary	Sources
Greenwashing Perceived Risk	<i>GWR1</i> A green product claims to be 100 % pure, but I am concerned that some of those natural substances are harmful.	Terra Choice (2009) ^[3]
	<i>GWR2</i> I feel that many ‘energy saving’ products are not actually energy saving.	
	<i>GWR3</i> For some allegedly certified organic products, I fear they don’t have any credible proof.	
	<i>GWR4</i> I am worried that green products claim to contain no harmful substances, but they were banned long ago.	
	<i>GWR5</i> I am worried that companies selling green products falsely claim to have passed certification by authoritative environmental agencies.	
	<i>GWR6</i> Some environment-friendly products are true compared to similar products, but I am worried that this kind of publicity makes people forget about their own environmental hazards, such as organic cigarettes or environment-friendly pesticides.	
	<i>GWR7</i> I am worried that green products look like environmental certification labels made by companies themselves.	
Green Innovation Identification	<i>GII1</i> I have a good understanding of the connotation and significance of the low-carbon concept.	Yu-Shan Chen (2011) ^[17]
	<i>GII2</i> I often see governments or businesses promoting low-carbon environmental protection and green innovation.	
	<i>GII3</i> When companies disclose their true data on all aspects of environmental protection, I don’t think they are transparent.	
	<i>GII4</i> I agree that green innovation benefits me.	
Consumers’ Negative Emotions	<i>CNE1</i> I am dissatisfied with the behavior that enterprises do not implement under the banner of environmental protection.	Chen Chancha and Yue Yuzhu (2018) ^[26]
	<i>CNE2</i> The greenwashing of enterprises makes me fear the green products they sell.	
	<i>CNE3</i> I am ashamed of greenwashing behaviors of enterprises.	
Willingness to Pay a Price Premium	<i>PPI1</i> I am willing to pay a higher price for a green product than for a similar product.	Zhang & Bloemer (2008) ^[39] ; Chaudhuri& Ligas (2009) ^[40]
	<i>PPI2</i> I prefer eco-friendly products, even if other products are cheaper.	
	<i>PPI3</i> I am willing to continue to buy green innovative environmental products, even if it costs more.	

4.2 Pilot Investigation and Data Collection

The pilot investigation was conducted before the formal investigation to ensure the authenticity and validity of the data and the reliability and validity of the survey results. In accordance with the items listed in Table 1, the pilot investigation questionnaire was established, and the Likert five-point rating scale was applied (1 represents strongly disagree; 5 represents strongly agree). The pilot investigation was distributed, and 59 questionnaires were collected through Sojump (a questionnaire platform). The invalid questionnaires with too short answering time, selecting all the same options, logically contradictory results before and after the selection, and lack of understanding of green innovation (options C and D) were excluded. Finally, there were 53 valid questionnaires in total. By testing the reliability and validity of the above samples, the results are ideal and suitable for a formal investigation. In addition, unscientific items were deleted based on to the respondents’ feedback, and the more complex and difficult items were regulated to make the explanation of the items clearer and the questionnaire more logical, and determine the final formal questionnaire.

During the formal investigation, the questionnaires were released and returned with the use of Sojump. 289 questionnaires were collected, and 84 invalid questionnaires were eliminated in

accordance with the principles of logical contradiction in answering before and after and lack of understanding of green innovation (options C and D). Subsequently, there were 205 valid questionnaires in total (the effective rate was 70.93%). Table 2 lists the aggregated demographic information.

Table 2. Sample Demographics Table

Variable	Classification Index	Number of People	Percentage (%)
Gender	Male	90	43.9
	Female	115	56.1
Age	≤18	9	4.39
	19-35	121	59.02
	36-59	67	32.68
	≥60	8	3.9
Monthly Disposable Income	≤2000 yuan	11	5.37
	2001-3000 yuan	39	19.02
	3001-4500 yuan	25	12.2
	4501-6000 yuan	56	27.32
	6001-8000 yuan	61	29.76
	> 8000 yuan	13	6.34
Geographical Distribution	Eastern China	80	39.0
	Northern China	59	28.7
	Central China	15	7.3
	Southwestern China	11	5.3
	Southern China	17	8.2
	Northeastern China	14	6.8
	Northwestern China	9	4.3

In accordance with the demographic information results, the gender ratio of respondents was more balanced, with 90 males (43.9%) and 115 females (56.1%). Differences were identified in the age group of the respondents. The 19-35 age group took up the majority, which might be correlated with the greater ability of the younger consumer group to accept new things like green innovation. Some respondents who did not understand green innovation were eliminated during the judgement of the validity of the questionnaire. As a result, after the screening, numerous samples in the age range of 36-59 were considered invalid, and the questionnaires were not retained. From the perspective of monthly disposable income, over half of the respondents had a monthly disposable income from 4501 to 8000 yuan, and many were at the level of 2001-4500 yuan, basically consistent with the national per capita disposable income level or even exceeded it. The geographical distribution of the respondents was wide, Eastern China and Northern China were relatively common, and the rest were primarily concentrated in Southern China, Central China, Northeastern China, as well as other provinces, municipalities and other regions.

5. Data Analysis and Hypothesis Testing

5.1 Reliability and Validity Test

5.1.1 Reliability Test

In this study, the reliability of the scale was tested based on Cronbach's alpha coefficient. As indicated by the statistical results of the data, the measured Cronbach's α coefficient values of the respective latent variable are higher than the critical value of 0.7 for determining the strength of internal consistency. Each value ranges from 0.711 to 0.913 (Table 3), thus revealing that the correlation between the items of the questionnaire is relatively large and the data results are truly

reliable, with high internal consistency and relatively stable structure. On the whole, the questionnaire exhibits high reliability and meets the data analysis and verification standards.

Table 3. Reliability and Validity Test

Variable	Item	Cronbach' α	KMO	Bartlett's Test of Sphericity
Greenwashing Perceived Risk	7	0.913	0.927	834.509
Green Innovation Identification	4	0.711	0.744	143.310
Consumers' Negative Emotions	3	0.824	0.719	222.508
Willingness to Pay a Price Premium	3	0.803	0.712	194.066

5.1.2 Validity Test

The design of the items in this study has been reasonably arranged and set. Based on learning from the mature scales worldwide, some adjustments have been made in combination with the specific research contents of this study. As supported by the network, undergraduate and master students from different universities have been convened for a panel discussion about the research contents of this study. Moreover, the ranking of the items in the scale and some unreasonable statements have been modified, thus making content validity of the questionnaire significantly improved.

The KMO test value of this study is 0.866, higher than 0.8, which reveals that the partial correlation between variables is strong and suitable for factor analysis. In addition, the p-value of Bartlett's sphericity test is lower than 0.001, thus suggesting that there is a correlation between variables. The KMO value of each variable is higher than 0.7 (Table 2), thus suggesting that the factor analysis can be performed. Furthermore, this study also tested whether the factor has a 'superimpose loading' phenomenon. It has been verified that the factors corresponding to the measurement items of the same variable bear the largest loading compared with other factors, all higher than 0.4, without 'superimpose loading'. Accordingly, the scale has a certain discriminant validity, and the construct validity of the questionnaire is also up to a relatively good level.

5.2 Analysis of Correlation

Both consumers' greenwashing perceived risk and their green innovation identification are correlated with their willingness to pay a price premium to a certain extent. The former is negatively correlated, whereas the latter is positively correlated, thus suggesting that the consumers with lower greenwashing perceived risk and higher green innovation identification are more likely to pay a price premium for green products. Furthermore addition, the above correlation preliminarily reveals that there is a significant correlation between consumers' greenwashing perceived risk and their negative emotions (Table 4).

Table 4. The Results of Correlation Analysis Between Variables

	Average Value	Standard Deviation	Greenwashing Perceived Risk	Green Innovation Identification	Consumers' Negative Emotions	Willingness to Pay a Price Premium
Greenwashing Perceived Risk	2.16	0.831	1			
Green Innovation Identification	3.00	0.780	-.605**	1		
Consumers' Negative Emotions	2.24	0.616	.147*	-.102	1	
Willingness to Pay a Price Premium	1.10	0.304	-.316**	.372**	-.153*	1

Note: ***, **, * indicate that the levels of significance are 0.001, 0.01 and 0.05, respectively. Below is the same.

5.3 The Relationship Between Greenwashing Perceived Risk and Willingness to Pay a Price Premium

First, the mediation effect of consumers' negative emotions in the hypothetical model is tested using Model 4 (a simple mediation model) of the PROCESS plug-in in SPSS compiled by Hayes (2012). As revealed by the results (Table 5), the greenwashing perceived risk exerts a significant negative effect on consumers' willingness to pay a price premium ($B=-0.33$, $t=-5.06$, $p<0.001$). When the mediator is included, the direct negative effect of greenwashing perceived risk on the willingness to pay a price premium remains significant ($B=-0.26$, $t=-4.03$, $p<0.001$), thus supporting H1. Greenwashing perceived risk is positively correlated with negative emotions ($B=0.28$, $t=4.19$, $p<0.001$), whereas negative emotions are negatively correlated with consumers' willingness to pay premium ($B=-0.29$, $t=-4.41$, $p<0.001$).

Besides, 0 is not contained in the upper and lower bounds of the bootstrap 95% confidence interval of the direct effect of greenwashing perceived risk on the willingness to pay a price premium and the mediating effect of consumers' negative emotions (Table 6), thus supporting H2. Direct effect (0.29) and mediating effect (0.26) account for 68.76% and 28.32%, respectively. Moreover, this study tests the mediating effect of consumers' negative emotions. To make the explanatory significance of the coefficients of the regression equation stronger, this study centralizes the variables. Table 6 lists the test results. As revealed by the specific results, the mediating effect of consumers' negative emotions is significant and partially mediated. Furthermore, this study tests the mediating effect of consumers' negative emotions. To make the coefficients of the regression equation more explanatory, the variables are centralized, and the test results are listed in Table 6. As indicated by the specific results, the mediating effect of consumers' negative emotions is significant and partially mediated.

Table 5. Mediating Model Test of Consumers' Negative Emotions

	Willingness to Pay a Price Premium		Willingness to Pay a Price Premium		Consumers' Negative Emotions	
	B	t	B	t	B	t
Greenwashing Perceived Risk	-0.33	-5.06***	-0.26	4.03***	0.28	4.19***
Consumers' Negative Emotions			-0.29	-4.41***		
R ²	0.14		0.28		0.11	
F	19.11***		32.07***		16.91***	

Table 6. Decomposition Table of Total Effect, Direct Effect and Mediating Effect

	Effect Size	Boot Standard Error	Boot CI		Relative Effect Size
			Lower	Upper	
Total Effect	0.35	0.03	0.30	0.38	100%
Direct Effect	0.29	0.02	0.25	0.32	68.76%
Mediating Effect of Consumers' Negative Emotions	0.26	0.02	0.24	0.29	28.32%

Second, the Model 7 of PROCESS test in SPSS compiled by Hayes (2013) is adopted to test the moderated mediation model and the moderating effect of green innovation identification. The mediating effect of consumers' negative emotions on the correlation between greenwashing perceived risk and willingness to pay a price premium is also reduced at the three levels of green innovation identification (adding and subtracting a standard deviation from the average value) (Table 7), i.e., with the increase in the subject's consumer green innovation identification level, the stronger the subject's ability to alleviate the effect of greenwashing perceived risk, the better the consumers' negative emotions will be improved, thus contributing to a more stable willingness to pay a price premium. As revealed by the results, the mediating effect of negative emotions is insignificant at the low level of green innovation identification (95% confidence interval is $[-0.008, 0.343]$, including 0). In contrast, the mediating effect of negative emotions on a high identification level (95% confidence interval is $[0.247, 0.706]$, not including 0).

After green innovation identification is incorporated into the model, the product term of greenwashing perceived risk and green innovation identification exerts a significant negative effect on consumers' negative emotions (consumers' negative emotions: $B = -0.25$, $t = -4.08$, $p < 0.01$). Thus, it can be explained that green innovation identification is capable of regulating the effect of greenwashing perceived risk on consumers' negative emotions (Table 8). Thus, this study assumes that H3 holds.

Table 7. Moderated Mediation Effect in the First Stage

Variable	Effect	BootSE	BootLLCI	BootULCI
Lower Identification (M-1SD)	0.167	0.089	-0.008	0.343
Medium Identification (M)	0.322	0.076	0.171	0.473
Higher Identification (M+1SD)	0.477	0.116	0.247	0.706

Table 8. The Moderating Effect Test of Green Innovation Identification

	Consumers' Negative Emotions		Willingness to Pay a Price Premium	
	Coefficient	T	Coefficient	T
Constant	0.04	0.46	0.26	1.08
Greenwashing Perceived Risk	0.23	3.77**	-0.32	-4.96***
Green Innovation Identification	-0.11	1.16	0.47	7.85***
Greenwashing Perceived Risk*Green Innovation Identification	-0.25	-4.08**	-0.13	1.56
R ²	0.45		0.54	
F	17.84		27.35	

On the basis of the above results, the moderating effect of green innovation identification on the correlation between greenwashing perceived risk and consumers' negative emotions is further explored. Subsequently, simple slope analysis is conducted, and the effect diagram is drawn (Fig. 2). As depicted in the figure, for subjects with low green innovation identification (M-1SD), the greenwashing perceived risk does not exert any significant positive effect on consumers' negative emotions or only a weak positive effect. In contrast, for the subjects with higher identification of green innovation (M+1SD), a significant positive effect is identified (simple slope=0.38, $t = 4.12$, $p < 0.001$). It is therefore suggested that with the improvement of individual green innovation identification level, it can play a stronger role in regulating the positive effect of greenwashing perceived risk on consumers' negative emotions.

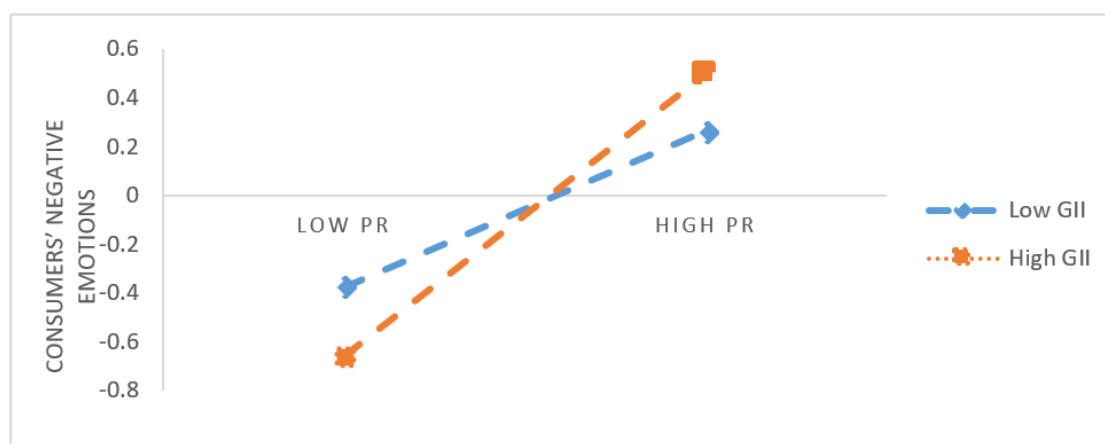


Fig. 2 Moderating Effect of Green Innovation Identification

Note: PR stands for 'Perceived Risk'; GII stands for 'Green Innovation Identification'.

6. Conclusions and Implications

6.1 Conclusions

This study analyzes consumers' willingness to pay a price premium for green products from the demand side of green consumption. From the preliminary retrieval of literature and theoretical collation to the presentation of questions and conjecture, the correlation between greenwashing perceived risk and willingness to pay a price premium, measured is investigated in this study, the mediating effect of consumers' negative emotions and the moderating effect of green innovation identification is verified, and the collected survey data are employed for empirical research. The following conclusions are drawn.

First, similar to other influencing mechanisms of willingness to pay a price premium under the SOR model (stimulus-organism-response), it is verified that multiple risks perceived by consumers in the process of paying premium exert significant negative impacts on willingness to pay a price premium for green product. The influencing mechanism of this study suggests that consumers' negative emotions for greenwashing behavior of enterprises as mediator have a partial mediating effect. Consumers make psychological predictions regarding greenwashing behaviors (e.g., false or exaggerated propaganda of enterprise environmental behavior, fabricating green attributes of products, and concocting public images of low-carbon environmental protection), thus resulting in uncertainty perception. Under information asymmetry, consumers need to consider potential risks and losses when paying a price premium for green products. The above potential risk perceptions will have directly or indirectly effects on consumers' negative emotions toward environmental protection claims and green products, while ultimately affecting their willingness to pay a price premium. In the emerging and promising green market, there are also some real green organizations. The development and classification of greenwashing risks can help avoid unconfirmed charges, thus protecting those real green enterprises.

Second, this study suggests that the higher the level of green innovation identification, the more favorable it will be to reduce consumers' negative emotions, and ultimately consumers' willingness to pay a price premium will be stronger. Integrating green innovation identification into the mechanism will get the same obvious mediating effect. Different from consumers' negative emotions, green innovation identification is largely employed to mediate the positive effect of greenwashing perceived risk on consumers' negative emotions, to weaken consumers' negative emotions and strengthen consumers' acceptance of willingness to pay a price premium. Green innovation identification refers to the subjective cognition of consumers on various green innovation-related behaviors adopted by enterprises, and the consistent subjective evaluation of psychology after comparing green innovation-related activities with their own measurement. When consumers gain insights into the measures of green innovation conducted by enterprises at the level of technology and management, they will have a consistent subjective evaluation of public awareness of the low-carbon concept, propaganda of green innovation, transparency of enterprise environmental information and interest correlation. From consumers' perspectives, they are yearning for improving the understanding of the concept connotation and significance of the top words 'carbon peak, carbon neutralization' since this can deepen the public awareness of the low-carbon concept and make the green innovation concept more effectively integrated into public life. They prefer to see the government or enterprises increase the publicity of low-carbon environmental protection and green innovation because to some extent it means the positive attitude of relevant subjects to green innovation and the responsibility of environmental protection. Moreover, consumers expect enterprises to disclose their environmental information and make it highly transparent. Only when enterprises disclose and publish environmental information and data without reservation can consumers have higher confidence in the authenticity of corporate green behavior. Furthermore, they want to see the benefits of green innovation, and this benefit is significantly correlated with consumers, so consumers have a stronger sense of identification on the comprehensive performance of green innovation for society.

6.2 Theoretical Contribution and Management Implications

This study makes a contribution to the theoretical research primarily by contributing to the greenwashing theory, the model of willingness to pay a price premium and the concept of green innovation identification. First, since green consumption is a new economic hotspot in the context of ‘3060 Goals’, the theoretical research of green consumption in academia is primarily based on the supply side. This study can fill the gap of the demand side of the green consumption market in theory to a certain extent, which is critical to facilitate the task of ‘dual carbon’, carry out the innovation of green industry and expand the new field of green consumption in China. Second, the research on green consumption upgrading is the key point of the implementation of the whole ‘3060’ plan, and the realization of consumption upgrading can effectively promote the technological breakthrough of the green industry. Existing studies tended to highlight market exchange technology, while this study focuses on the driving effect of the market on technology. Besides, there is still a huge space for innovation in this regard. Third, this study makes up for the research on the influencing mechanism of greenwashing perceived risk on willingness to pay a price premium, optimizes the empirical model of willingness to pay a price premium of green product and provides novel ideas. The measurement methods of greenwashing perceived risk are enriched by introducing the seven sins of greenwashing perceived risk. In addition, the concept of green innovation identification improves the theoretical system of green marketing. By verifying the moderating effect of green innovation identification, to a certain extent, the four important points of improving green innovation identification are strengthened, including public awareness of the low-carbon concept, propaganda of green innovation, transparency of enterprise environmental information and interest correlation. The relevant conclusions of this study have the following enlightenment for enterprises on how to launch technological innovation and green marketing, as well as how to transform and upgrade the green consumption market:

First, enterprises should provide consumers with information actively and honestly, publicize their efforts to environmental protection, and make consumers aware of environmental problems. As supported by the popular green certification system, the consumers’ cognition would be established to help consumers understand which labels are real, as well as which are false. Furthermore, when they are more likely to encounter greenwashing in daily life, consumers are enabled to pay attention to the relevant issues, and they are assisted in protecting their rights and interests.

Second, enterprises should take real and effective green behavior, thus leading to the completely open and transparent green environmental information relating to enterprises. It would be better to have rules for everything, and everything well documented, to reduce perceived risk to consumers. As a result, consumers’ negative emotions will be weakened and even transformed into positive emotions, thus eventually leading to consumers’ positive willingness to pay a price premium. Now, in the era of moving toward the ‘3060 Goals’, enterprises have followed the process of ‘dual carbon’, and products labelled with green attributes have attracted a large number of consumers to pay for them. The green attributes of commodities have been used as vital selling points, which has brought huge benefits to enterprises. However, if the green environment measurement standard system is not perfect but the returns are high, some enterprises transgress industry ethics for profit, thus violating the original intention of the green innovation concept. The above enterprises are entangled with false propaganda, smuggling concepts, misleading consumption and other negative news, thus negatively affecting the normal transaction of green products or green services. Accordingly, enterprises that promote green environmental protection should abide by the law, implement relevant rules and regulations accurately, achieve environmental indicators, cooperate with regulation, and avoid abandoning long-term strategic objectives for short-term interests. Moreover, a clear plan should be formulated for target performance and detailed implementation measures, the concept of sustainable development should be followed, and effective progress in green innovation technology should be jointly promoted. Furthermore, when the enterprises’ greenwashing behavior is exposed, it should also be corrected in time to reduce the negative impact and take action to achieve a better trust repair effect.

Lastly, enterprises in green marketing should maintain enthusiasm and appropriateness, while weakening consumers' negative emotions and consolidating their willingness to pay a price premium. Enterprises are capable of popularizing green environmental protection knowledge to people via creative public service advertisements or activities, thus improving public awareness of the low-carbon concept. Moreover, a variety of ways can be taken (e.g., various software startup pages, popular platform tweets, outdoor advertising media). With the combination of online and offline, the propaganda of green innovation can be strengthened. Besides, the specific information, statistical data and related performance of the enterprise's quarterly contribution to green environmental protection can be truthfully published, which actively cooperate with regulatory authorities. Furthermore, it would be better to establish a dedicated supervision service hotline to ensure that the enterprise's environmental information is highly transparent, and that information asymmetry is avoided. Lastly, we can dig out the interest points and resistance points of green products to consumers through market research, thus improving the matching degree between enterprise environmental protection behavior and consumers' interest points of purchasing green products, i.e., to ensure that green innovation shows a high-interest correlation with consumers. By actively conducting green marketing and taking a variety of measures to enable consumers to form a high degree of green innovation identification, the effect of greenwashing perceived risk on their negative emotions will be regulated, thus affecting their willingness to pay a price premium.

6.3 Limitations and Future Research Directions

Starting from the demand side of green consumption, this study explored the consumers' digestion mechanism of green product premium, which is of certain theoretical significance, whereas there are still some limitations that should be further reduced.

This study uses the 3D model to explore negative emotions, whereas the negative emotions of other dimensions are not investigated, and the correlation between every two emotions should be considered. In this study, the investigation method of the questionnaire survey is too single, which can be more convincing if combined with other ways to verify the results. In this study, the number of samples is relatively limited, which may inevitably affect the results and conclusions of the study. In future research, green innovation identification can be further subdivided in accordance with the market demand side, the scope of the sample can be expanded more specifically, and the number of samples can increase, so as to more deeply and comprehensively study the effect of greenwashing perceived risk on the willingness to pay a price premium of green products.

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