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THE IMPACT OF CONSUMER PERCEPTION, CONSUMER RESONANCE AND PURCHASE INTENTION IN THE CARBON FINANCE MARKET

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ABSTRACT

This paper focuses on the carbon finance market and explores the relationship between consumer perception, consumer resonance and purchase intention. By combing the relevant literature, a theoretical model including consumer perception, consumer resonance and purchase intention was constructed, and a research hypothesis was proposed. Questionnaire survey was used to collect data, and empirical tests were carried out by descriptive statistical analysis, correlation analysis, structural equation model analysis and other methods. The results show that consumer perception significantly affects purchase intention. Consumer resonance plays a role in promoting purchase intention. This study enriches the theoretical system of carbon finance market, expands the application of consumer behavior theory, provides practical enlightenment for market participants, and points out the shortcomings of the research such as sample limitation and method singleness, and looks forward to the future research direction.

Keywords: Carbon Finance Market; Consumer Perception; Consumer Resonance; Purchase Intention; Structural Equation Modeling.

1. INTRODUCTION

In the context of the global response to climate change, the carbon finance market, as a key force to promote the development of low-carbon economy, is undergoing rapid development and change. Wei et al. (2022) conducted that the carbon finance market provides a platform for the trading of carbon emission rights, which enables the quantification and marketization of greenhouse gas emission reduction, promotes the flow of resources to low-carbon fields, and promotes the process of global sustainable development. According to the International Energy Agency (IEA), the global carbon finance market has continued to expand in recent years, from less than US$100 billion in 2015 to more than US$200 billion in 2023, which is far faster than the average growth rate of traditional financial markets.

Consumers play an increasingly important role in the carbon finance market, and You et al. (2021), from the perspective of their purchase intention to buy directly affects the market demand and trading activity of carbon financial products. Purchase intention is the psychological tendency of consumers to be willing and able to buy a certain commodity or service in a specific period, which

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is a precondition for the occurrence of consumer purchase behavior and an important indicator for predicting consumers' actual purchase behavior. In the carbon finance market, consumers' purchase intention to buy is not only related to individual consumption decisions, but also has great significance to the development of the entire market and the realization of low-carbon goals.

Consumer perception plays a key role in the carbon finance market. Liang et al. (2020) studied Consumer perception refers to the psychological activities and ways of thinking formed by consumers in the process of contacting, understanding and processing information related to carbon financial products or services, which covers consumers' perception, understanding, memory, evaluation and decision-making of carbon financial products, and is an important basis for consumer purchase behavior. Riva et al. (2022) analyzedGreen consumerism, green perceived value, and perception of its environmental value all influence their purchasing decisions. However, in the complex information environment of the carbon finance market, consumers often face problems such as information asymmetry and lack of professional knowledge, which leads to the deviation of their perception of carbon financial products, which in turn affects their purchase intention.

Consumer resonance is also an important factor influencing consumers' purchase intentions in the carbon finance market. Pappas (2016), was focusedConsumer resonance refers to the strong resonance and synergistic effect of emotion, cognition and behavior between consumers through interaction, communication and sharing in the market environment, so as to form a highly consistent consumer attitude and behavioral tendency. Beyer et al. (2023) exploredIn the carbon finance market, when consumers feel that their own environmental protection concept is in line with the value conveyed by carbon financial products, or when they see other consumers actively participating in carbon financial transactions, they may resonate and enhance their purchase intention to buy. However, at present, the interaction between consumers in the carbon finance market is relatively limited, and the information dissemination channels are not smooth enough, which makes it difficult to effectively form consumer resonance.

Despite the rapid development of the carbon finance market, there are still some challenges. Among them, consumers' lack of awareness of carbon financial products and low purchase intention to buy are one of the important factors restricting the development of the market. Sharma (2021) provided a comprehensive synthesis, review, and agenda regardingIn order to promote the healthy development of the carbon finance market, it is of great practical significance to understand the relationship between consumer perception, consumer resonance and purchase intention. The purpose of this study is to reveal the interaction path and influencing mechanism between these factors by constructing a theoretical model and using empirical research methods, so as to provide theoretical support and practical guidance for the development of carbon finance market.

Consumers' purchase intention to buy is one of the important factors affecting the development of the carbon finance market. At the theoretical level, Ajzen (2020) systematically expounded on the Theory of Planned Behavior, providing an important theoretical basis for many consumer behavior studies. According to the Planned Behavior Theory (TPB), an individual's behavior depends on his or her intention to act, and the intention to buy plays an important role in predicting the actual purchase behavior of consumers. Past research has shown that consumers' perception and empathy for a product or service can significantly influence their purchase intent. In the carbon finance market, consumers' perception of carbon financial products, such as their understanding of the products, their perception of risks and benefits, as well as the emotional and behavioral resonance

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between consumers, may have an important impact on their purchase intentions.
As an emerging financial field, the carbon finance market is showing a rapid development trend on a global scale. According to relevant data, in recent years, the trading scale of the global carbon finance market has been expanding, and various carbon financial products have emerged in an endless stream. However, behind the booming development of the market, there are still some problems that need to be solved urgently. Some consumers lack understanding of carbon financial products and have doubts about their risks and benefits, resulting in low purchase intention to buy; At the same time, the interaction and resonance between consumers in the carbon finance market are insufficient, and it is difficult to form an effective market demand. Therefore, it is of great practical significance to study the relationship between consumer perception, consumer resonance and purchase intention in the carbon finance market to promote the healthy development of the carbon finance market.

1.1 Research Purpose And Objectives

The purpose of this study is to deeply analyze the internal relationship between consumer perception, consumer resonance and purchase intention in the carbon finance market, reveal its mechanism, and provide theoretical support and practical guidance for the development of the carbon finance market. Through the study of these factors, the following objectives are achieved: to deeply explore the influence path of consumer perception on consumer resonance and purchase intention, to clarify the key role of consumer perception in the carbon finance market, and to provide a theoretical basis for the design and promotion of carbon financial products. This paper comprehensively analyzes the formation mechanism of consumer resonance in the carbon finance market and its impact on purchase intention, so as to help market participants better stimulate consumer resonance and enhance consumers' purchase intention. This paper systematically studies the relationship between consumer perception, consumer resonance and purchase intention, constructs a theoretical model, verifies the effectiveness of the model through empirical research, and enriches and improves the theoretical system of the carbon finance market.

The significance of this study is mainly reflected in both theoretical and practical aspects. In terms of theory, this study will fill the gap in the research on the relationship between consumer perception, consumer resonance and purchase intention in the field of carbon finance market, and provide new perspectives and ideas for follow-up research. By constructing a theoretical model and deeply exploring the mechanism between various factors, it is helpful to enrich and improve the theoretical system of carbon finance market and promote the development of academic research in this field. In practice, the results of this study will provide a valuable reference for participants in the carbon finance market. Financial institutions can optimize the design of carbon financial products and improve the attractiveness of products according to the research conclusions. Strengthen market publicity and education to enhance consumers' perception and awareness of carbon financial products; Create a good market atmosphere and promote the formation of consumer resonance, so as to improve consumers' purchase intention to buy and promote the development of the carbon finance market. Based on the results of the study, the government can formulate more effective policies to guide consumers to participate in the carbon finance market and promote the development of a low-carbon economy.

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1.2 Research Methods And Innovations

This study uses a variety of research methods to ensure that the research is scientific, comprehensive and in-depth. By extensively reviewing relevant literature at home and abroad, the research results of carbon finance market, consumer perception, consumer resonance and purchase intention are sorted out, so as to lay a solid theoretical foundation for the research. The deficiencies and gaps of the existing research were analyzed in depth, and the entry point and direction of this study were clarified. On the basis of literature research, combined with the research purpose and theoretical framework, a scientific and reasonable questionnaire was designed. The content of the questionnaire covers multiple dimensions such as consumer perception, consumer resonance and purchase intention, and is measured by Likert scale and other methods to obtain consumers' real feelings and behavioral intentions in the carbon finance market. Extensive data collection is carried out through a combination of online and offline methods to ensure the diversity and representativeness of the sample. Statistical analysis software was used to process and analyze the collected data, including descriptive statistical analysis, correlation analysis, regression analysis, etc., to verify the research hypothesis and reveal the relationship between consumer perception, consumer resonance and purchase intention. Structural equation model and other methods are used to construct a theoretical model and deeply explore the mechanism between various factors.

The innovation of this study is mainly reflected in the following two aspects. For the first time, the theoretical framework between consumer perception, consumer resonance and purchase intention in the carbon finance market is constructed, and the interrelationship and mechanism between them are deeply discussed, which fills the research gap in the field of carbon finance market and provides new perspectives and ideas for follow-up research. A comprehensive and in-depth study of the complex phenomena in the carbon finance market was carried out by comprehensively using various methods such as literature research, questionnaire survey and empirical analysis. The combination of multiple methods not only improves the reliability and effectiveness of the research, but also provides a new method and paradigm for the study of the carbon finance market.

2. LITERATURE REVIEW

2.1. Carbon Finance Market

The carbon finance market refers to the market that serves financial activities such as direct investment and financing, carbon trading, and bank loans for technologies and projects that limit greenhouse gas emissions. Wen and Zhao (2015) Itis an important support for the development of low-carbon economy, and the rational allocation of carbon emission rights is realized through market mechanisms, so as to promote the low-carbon transformation of enterprises and society. The main trading products of the carbon finance market include carbon emission allowances, carbon credits and financial derivatives related to carbon emissions. Carbon emission allowances are carbon emission indicators allocated by the government to enterprises, and enterprises can trade these allowances in the market to achieve total carbon emission control; Carbon credits are tradable emission reductions generated through the implementation of emission reduction projects, such as certified emission reductions (CERs) generated by Clean Development Mechanism (CDM) projects.

The development of the carbon finance market can be traced back to the signing of the Kyoto Protocol. The Kyoto Protocol has given rise to a global carbon market by setting legally binding

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greenhouse gas emission reduction targets for developed countries. In the early days, the carbon finance market was mainly based on the European Emissions Trading System (EU ETS), and with the increasing global attention to climate change issues, more and more countries and regions have begun to establish their own carbon trading markets, such as China's carbon emission trading market, the United States' Regional Greenhouse Gas Initiative (RGGI), etc. At the same time, the trading scale and product types of the carbon finance market are also constantly enriching and expanding, from the initial simple carbon emission allowance trading, and gradually developed into carbon futures, carbon options, carbon funds and other financial derivatives trading.

At present, the carbon finance market is showing a vigorous development trend. According to the International Carbon Action Partnership (ICAP), by 2024, more than 20 countries and regions around the world have established carbon trading markets, covering about 15% of global greenhouse gas emissions. Dong et al. (2021) comprehensively studied China's carbon neutrality policy, covering policy goals, impacts on China's carbon emissions trading market has been expanding since its official launch in 2021, becoming one of the largest carbon trading markets in the world. In the field of carbon emissions research, Yu et al. (2018), through the study of China's industrial restructuring, pointed out that the optimization of the industrial structure could help achieve the peak of energy - related carbon emissions before 2025, providing strategic suggestions at the industrial level for China to achieve its carbon emission targets.In the future, with the continuous progress of technology and the continuous support of policies, the carbon finance market will usher in a broader space for development. The application of artificial intelligence and big data technology can improve the trading efficiency and risk management level of the carbon finance market; The introduction of blockchain technology can enhance the transparency and security of carbon trading and promote the healthy development of the carbon finance market.

2.2 Consumer Perception

Consumer perception is the subjective cognition and evaluation of a product or service by consumers, which is influenced by various factors, including consumers' own knowledge, experience, values, interests and hobbies, as well as external information dissemination, brand image, reputation evaluation, etc. Carbon finance markets have emerged as a pivotal mechanism for achieving global climate goals, while consumers' perceptions play a crucial role in driving the demand - side dynamics within this framework. Gu et al. (2023) investigated the influence of green finance availability to retailers on purchase intention from a consumer perspective, finding that enhanced access to green finance by retailers can positively impact consumers' purchase intention to buy sustainable products. The study revealed that when retailers are more involved in green finance, they are more likely to offer carbon - labeled or environmentally - friendly products, which in turn heightens consumers' positive perceptions of these offerings.

On the other hand, the concept of carbon - related products in the finance market, such as carbon - offset credits or green bonds, remains relatively abstract to many consumers. Research by Mostafa (2016) on Egyptian consumers' purchase intention to pay for carbon - labeled products showed that consumers' lack of understanding of carbon - related concepts could act as a barrier to their acceptance of related financial products. Similarly, Hartikainen et al. (2014) found that Finnish consumers had limited awareness of carbon footprints and carbon labeling in food products, indicating that a lack of knowledge about carbon - related issues in general may lead to low engagement with carbon finance - related consumer products.

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However, as awareness of climate change grows, consumers' attitudes towards carbon - related financial products are gradually evolving. Han et al. (2022) suggested that consumer confidence can significantly influence green purchase intention. In the context of carbon finance, increased consumer confidence in the effectiveness of carbon - related financial mechanisms could potentially boost their acceptance of carbon - related investment products or carbon - offset purchases.

In summary, existing research indicates that improving consumers' understanding of carbon - related concepts, enhancing retailers' green finance capabilities, and building consumer confidence are key factors in promoting the development of carbon - related consumer - facing products in the finance market. Consumer perception has a significant impact on purchasing decisions. Consumers' perception of carbon financial products will affect their purchase intention to purchase. If consumers have sufficient understanding of carbon finance products and believe that they can meet their needs and expectations, then they are more likely to have a purchase intention to purchase.

2.3. Consumer Resonance

Consumer resonance refers to the strong resonance and synergy between consumers in emotion, cognition and behavior through interaction, communication and sharing in the market environment, so as to form a highly consistent consumption attitude and behavioral tendency. In the carbon finance market, the formation mechanism of consumer resonance is complex and involves the interaction of multiple factors.

Emotional resonance is an important foundation for consumer resonance. When consumers share their environmental stories, experiences of participating in carbon reduction activities, or concerns about climate change in the carbon finance market, other consumers may resonate emotionally with the sharer because of their own similar experiences or emotional needs. Joshi et al. (2021) provided that when a consumer shares his or her experience of buying carbon financial products to support environmental protection projects on social media, other consumers who are also environmentally conscious may empathize, so as to generate interest and favor for carbon financial products, laying an emotional foundation for the formation of consumer empathy.

Information sharing and communication also play a key role in consumer resonance. In the carbon finance market, consumers can share and obtain information, trading experience, and market dynamics of carbon financial products through various channels, such as social media, professional forums, industry reports, etc. Li and Jaharuddin (2021) focused on The sharing and exchange of these information can help consumers better understand the carbon finance market, reduce information asymmetry, and improve consumers' awareness and trust in carbon financial products. When consumers see positive comments and recommendations from other consumers on a carbon financial product in the community, they will be more likely to believe in the quality and effectiveness of the product, and then generate purchase intentions and promote the formation of consumer resonance.

Group identity and a sense of belonging are also important factors in consumer resonance. In the carbon finance market, consumers often seek groups that share their environmental protection concepts, values and consumption preferences to gain a sense of identity and belonging. Amallia, Effendi, and Ghofar (2021) investigated That is more likely to resonate when consumers feel their similarities and common goals with other members in the community, and they have more

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purchase intention to participate in community activities, interact and communicate with other members. For example, consumers who join environmental organizations or carbon finance enthusiast communities will be influenced by group behavior and opinions in their interactions with other members, and believe that buying carbon financial products is a behavior that meets the expectations of the group and their own needs, so they have more purchase intention to buy.
Consumer resonance has a significant impact on consumer purchasing behavior. It strengthens consumers' purchase intention to buy. When consumers resonate with other members of the carbon finance market, they will be influenced by group behavior and opinions, believing that buying carbon financial products is a behavior that meets the expectations of the group and their own needs, so they have more purchase intention to buy. Consumer resonance can also promote word-of-mouth communication among consumers, improve the popularity and reputation of carbon financial products, and further promote the development of the market.

2.4. Purchase Intention

Purchase intention is the psychological tendency of consumers to be willing and able to buy a certain good or service in a specific period, Li et al. (2021) exploredIt is a precondition for the occurrence of consumer purchase behavior, and it is also an important indicator to predict the actual purchase behavior of consumers. In the carbon finance market, the purchase intention to buy plays an important role. It is one of the key factors for the success of the carbon finance market. Only when consumers have a high purchase intention to buy, will they make purchases in the carbon finance market, so as to achieve the commercial value and environmental protection goals of the carbon finance market. Shuai et al. (2014) conducted a carbon - labeling scenario experiment in China to study consumers' purchase intention to pay for low - carbon products. It was found that factors such as product price and environmental awareness had important impacts on the purchase intention.
The purchase intention to buy directly affects the transaction scale and development speed of the carbon finance market. When consumers' purchase intention to purchase carbon financial products is high, the market demand increases, and the trading activity increases, which is conducive to the healthy development of the carbon financial market. On the contrary, low purchase purchase intention will lead to insufficient market demand and limited transaction scale, hindering the development of the carbon finance market. Ghazali, Mutum, and Wei - Pin (2021) examined the parallel mediation effect of consumption values and the moderation effect of innovativeness in predicting the influence of identity on green purchasing behavior.The purchase intention to buy can also reflect the operational effectiveness of the carbon finance market. By analyzing consumers' purchase intentions, market participants can understand consumers' satisfaction and demand for carbon financial products and market platforms, and find problems and deficiencies in the operation process, so as to adjust marketing strategies and operation methods in a timely manner and improve the operation effect of the market. (Bisoyi and Das ,2021)
Purchase intention can also be used as an important indicator for market participants to evaluate the effectiveness of marketing campaigns. By comparing the changes in consumers' purchase intentions before and after marketing campaigns, market participants can evaluate the impact and effectiveness of marketing campaigns, and provide reference and reference for subsequent marketing campaigns. Cheung and To (2019) proposed an extended model of value - attitude - behavior to explain Chinese consumers’ green purchase behavior.In the carbon finance market,

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consumers' purchase intention to buy is affected by a variety of factors, including product price, quality, brand image, policies and regulations, in addition to consumer perception and consumer resonance. These factors interact with each other to influence consumers' purchasing decisions.

2.5 Theory of Planned Behavior

The Theory of Planned Behavior (TPB), proposed by Ajzen (1985), provides a robust framework for understanding and predicting human behavior, positing that an individual's behavioral intention is determined by attitude toward the behavior, subjective norms, and perceived behavioral control. This theory has been widely applied across numerous domains, and its relevance extends to the study of consumer decision - making in carbon financial markets. Yadav and Pathak (2016) extended this theory to investigate young consumers' intention towards buying green products in a developing nation. They found that various factors within the framework of the theory significantly impacted the purchasing intention.

Kumar (2021) also utilized the Theory of Planned Behavior to frame a model for green buying behavior of Indian consumers. Meanwhile, in the domain of organic food, Pang, Tan, and Lau (2021) integrated this theory with the Protection Motivation Theory to explore the antecedents of consumers' purchase intention towards organic food. Ahmed et al. (2021) further applied the Theory of Planned Behavior to study the purchase intention toward organic food among young consumers, emphasizing the role of environmental concerns and awareness.

Choi and Johnson (2019) extended the Theory of Planned Behavior by considering environmental and hedonic motivations to study the intention to purchase green products. All these studies contribute to a more in - depth understanding of consumers' green purchase behavior and the relevant influencing factors.

Attitude toward the behavior within the context of carbon financial markets refers to consumers' overall positive or negative evaluations of engaging with carbon - related financial products or services. For example, consumers who perceive carbon financial instruments as effective tools for environmental protection and sustainable investment are more likely to develop a favorable attitude. Such a positive attitude can significantly enhance their intention to purchase carbon - related financial products (Ajzen, 1991). Research has shown that consumers with a strong environmental consciousness often view carbon financial markets as a means to contribute to climate change mitigation, which positively impacts their attitude and subsequent purchase intention.

Subjective norms play a crucial role in shaping consumers' intentions in carbon financial markets. Consumers are influenced by the expectations and opinions of significant others, such as family, friends, and financial advisors. If these influential individuals advocate for investment in carbon financial products, consumers may feel social pressure to conform, leading to an increased purchase intention. Moreover, societal norms and trends emphasizing environmental sustainability can also act as powerful subjective norms. As more attention is given to climate change and sustainable finance, consumers may be more inclined to invest in carbon financial markets to align with these broader social expectations.

Perceived behavioral control in carbon financial markets is associated with consumers' beliefs about their ability to engage in purchasing carbon - related financial products. Factors such as market transparency, ease of access to information, and the complexity of financial instruments influence perceived control. When consumers find it easy to understand carbon financial products,

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access relevant market data, and complete transactions, they perceive greater control over their investment decisions. Empirical studies (Cheung and To , 2019) have indicated that enhanced perceived behavioral control, often facilitated by user - friendly trading platforms and clear regulatory frameworks, can boost consumers' purchase intentions.

Despite the wide application of TPB in consumer behavior research, its application to carbon financial markets, especially in relation to consumer perception, consumer resonance, and purchase intention, remains under - explored. Consumer perception in carbon financial markets encompasses how consumers interpret and make sense of various market - related cues, such as product features, market trends, and regulatory policies. Consumer resonance, which involves the emotional and psychological connection consumers feel towards carbon - related financial activities, has not been comprehensively integrated into the TPB framework in this context.

There is a lack of research examining how these elements interact with the components of TPB. For instance, it is unclear how consumer perception of the long - term benefits of carbon financial products influences their attitude, or how consumer resonance with environmental goals affects subjective norms and perceived behavioral control. Additionally, the specific mechanisms through which these factors collectively impact purchase intention in carbon financial markets have not been fully elucidated.

This study aims to address these gaps by investigating the relationships between consumer perception, consumer resonance, and purchase intention within the TPB framework in carbon financial markets. By developing a theoretical model and conducting empirical analysis, the research seeks to uncover the underlying pathways and mechanisms, providing both theoretical contributions and practical guidance for the development of carbon financial markets.

3.RESEARCH HYPOTHESIS AND MODEL CONSTRUCTION

3.1. Research Hypothesis

In the complex environment of the carbon finance market, there is an intricate relationship between consumer perception, consumer empathy and purchase intention. As an important factor influencing consumers' purchase decisions, consumer perception may have an impact on purchase intention by influencing consumer resonance. When consumers have a better perception of carbon financial products, they are more likely to resonate with other consumers, thereby enhancing their purchase intentions. Based on this, a hypothesis is proposed:

3.1.1 Consumer Perception and Purchase Intention

The more comprehensive and positive consumers' perception of carbon financial products is, the higher their purchase intention to buy. Before making a purchase decision, consumers often evaluate the features, risks, and benefits of a product. Consumers are more likely to purchase when they have a good perception of carbon financial products and believe that they can meet their needs and expectations. Taking a carbon fund as an example, consumers have an in-depth and positive understanding of the investment strategy, management team, and performance of a carbon fund, which will significantly increase the likelihood of purchasing the carbon fund.

H1: Consumer perception has a significant positive impact on purchase intention.

3.1.2. Consumer Resonance And Purchase Intention:

The stronger the degree of empathy that consumers have in the carbon finance market, the higher

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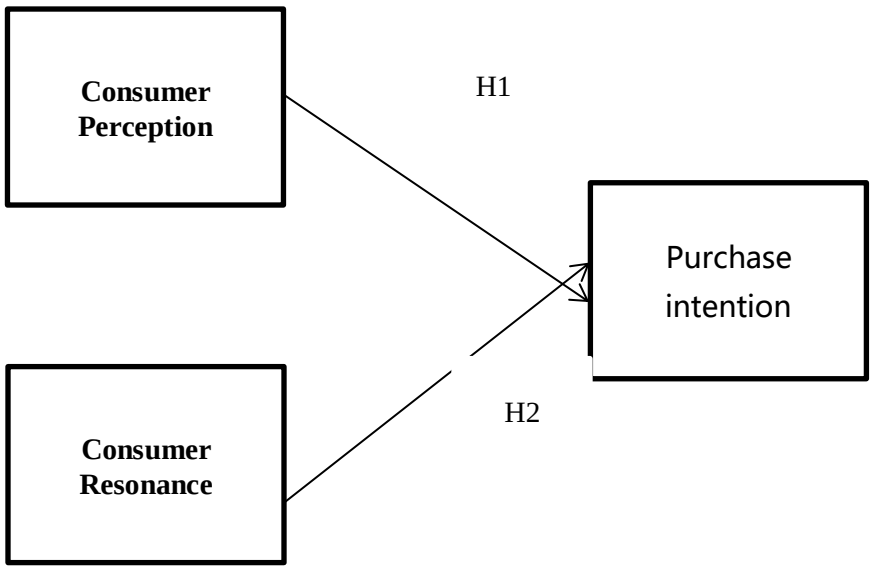
their purchase intention to buy. Consumer resonance refers to the fact that consumers resonate with the market, products, or other consumers in terms of emotions, values, etc. When consumers resonate with other investors in terms of environmental protection concepts and investment goals, they will enhance their sense of identity and loyalty to carbon financial products, so that they are more willing to buy the products. For example, some investors with environmental feelings resonate with other investors with the same concept in the carbon finance market, prompting them to be more inclined to buy related carbon financial products.
H2: Consumer resonance has a significant positive impact on purchase intention.

3.2. Research Model

The theoretical model constructed in this study aims to explore how consumer perception and consumer resonance affect purchase intention in the context of carbon finance market. Consumer perception affects purchase intention from the perspective of rational evaluation of product to meet demand, and indirectly affects purchase intention by promoting consumer resonance. Consumer resonance strengthens purchase intention from the perspective of emotional value identification. It comprehensively reflects the transmission link from the micro psychological state of consumers to the macro purchase behavior. In the follow-up study, the path coefficients in the model were estimated and tested through the empirical data of the questionnaire to verify whether these hypothetical relationships are valid, and to further analyze the driving mechanism of consumer behavior in the carbon finance market. Based on a solid theoretical foundation and rich practical experience, this research model aims to reveal the intrinsic relationship between consumer perception, consumer resonance and purchase intention in the carbon finance market, and provide theoretical support and practical guidance for carbon financial institutions. Through in-depth analysis of the relationship between these variables, carbon financial institutions can better understand the needs and behaviors of consumers, and take targeted measures to improve consumer perception and promote consumer empathy, thereby increasing consumers' purchase intentions and enhancing market competitiveness.

Fig. 1 Research model



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4. METHODOLOGY

In the process of exploring consumer behavior in the carbon finance market, we have carefully constructed a comprehensive and scientific research system, aiming to deeply analyze the intrinsic relationship between consumer perception, consumer resonance and purchase intention.

4.1 Content Validity

The questionnaire design of this study closely focuses on relevant theories and existing research results to ensure a comprehensive and accurate measurement of core variables such as consumer perception, consumer empathy and purchase intention. The content of the questionnaire covers multiple dimensions, such as the level of awareness of carbon financial products, risk perception, and return expectation are set in the dimension of consumer perception; The dimension of consumer resonance involves emotional resonance, purchase intention to share information, and sense of group identity. The purchase intention dimension includes purchase likelihood, purchase frequency, recommendation intention, etc.

In order to make the questionnaire more relevant to the actual situation of the carbon finance market, the presentation has been carefully adjusted. All questions were measured on a 7-point Likert scale ranging from "strongly disagree" (1 point) to "strongly agree" (7 points), which helped to obtain information on the strength of consumers' attitudes towards each question and enhanced the accuracy of the study.

4.2. Pretest and Pilot Test

A rigorous pre-survey was conducted before the questionnaire was officially distributed on a large scale. Five academic staff with in-depth research in the field of carbon finance and four PhDs in related majors were invited to participate, and after filling out the questionnaire, they provided valuable opinions on the wording, difficulty of understanding, clarity, and the overall structure and content of the questionnaire.

Based on the feedback, the questionnaire was revised twice. After that, two other academic researchers were invited to review the questionnaire again to ensure that the questionnaire met a high quality standard in terms of concept expression and logical structure. Throughout the pre-survey process, the questionnaire design was continuously optimized by simulating, observing and analyzing the relationship between variables, so as to make it more in line with the requirements of scientific rigor and ensure that the respondents were able to accurately understand and answer the questions.

4.3. Data Collection

Table 1. Constructs and measures of the research items

Construct	
Consumer Perception	
CP1	I am well aware of the basic concepts and modes of operation of the carbon finance market
CP2	I believe that the carbon finance market has a significant contribution to

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	environmental protection
CP3	I understand the types of products that are common in the carbon finance market (such as carbon futures, carbon options, etc.)
CP 4	I think the carbon finance market has a high level of transparency and is easy to obtain
CP 5	I am concerned about the impact of policies related to the carbon finance market on the lives of individuals
CP 6	I think the risks of the carbon finance market are understandable and acceptable
CP 7	I think the risks of the carbon finance market are understandable and acceptable
CP 8	I believe that the carbon finance market can effectively support the green transition of enterprises
CP 9	I am confident in the future development prospects of the carbon finance market
CP 10	People around me pay more attention to the carbon finance market
Consumer Resonance	
CR1	When I see a company actively participating in the carbon finance market, I will have a better impression of the company
CR 2	I am open to discussing the social and environmental impact of the carbon finance market with others
CR 3	I would prefer to buy a brand because it supports activities related to the carbon finance market
CR 4	I strongly believe in the concept of carbon finance to promote sustainable development, and I am willing to take action to do so
CR 5	When I saw the public welfare promotion related to the carbon finance market, I was touched and wanted to participate in it
CR 6	I will pay attention to the success stories of individual investors in the carbon finance market and be encouraged
CR 7	I feel that I have more common ground with people who are interested in the carbon finance market, and I am willing to talk to them
CR 8	When people around me participate in activities related to the carbon finance

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	market, I will be influenced and consider participating
CR 9	I agree that the carbon finance market can guide the flow of social resources to green industries
CR 10	I would be proud of the positive development of the carbon finance market and would like to spread the word to others
Purchase Intention	
PI 1	In the next six months, I have plans to purchase products or services related to the carbon finance market (such as green bonds, carbon offset products, etc.)
PI 2	If I can get certain environmental rewards (such as points, certificates, etc.) for buying carbon finance-related products, I will be more willing to buy them
PI 3	Even if the price is slightly higher than that of ordinary products, I am willing to buy products with a lower carbon footprint to support the development of the carbon finance market
PI 4	If there is a professional investment advisor who recommends carbon financial products, I will consider investing
PI 5	When the carbon finance market launches new and innovative products, I am willing to try to buy them
PI 6	Influenced by the purchase of carbon finance-related products by people around me, I may change my original purchase plan
PI 7	In order to support the development of environmental protection and carbon finance markets, I am willing to increase the consumption budget in this area
PI 8	If there are tax incentives for buying carbon financial products, I will be more active in buying them
PI 9	I would be more willing to participate in the purchase of related products because of the social interaction features of the carbon finance market, such as participating in online environmental communities
PI 10	Even if there is no urgent need at the moment, I will look for products related to the carbon finance market and look for opportunities to buy

In the data collection stage, a diversified approach combining online and offline is used to obtain a broad and representative data sample. With the help of professional questionnaire websites, such as Questionnaire Star, and mainstream social platforms, such as WeChat and Weibo, the questionnaire is pushed to various financial investment groups, environmental protection related communities and user groups of carbon finance platforms with its strong communication capabilities. Offline, we will randomly invite past personnel to participate in the questionnaire survey in places such as business outlets of financial institutions, environmental protection theme

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activity sites, and financial professional classrooms in colleges and universities.

To ensure the quality of the sample, strict screening criteria were set in this study. Respondents need to have experience in participating in the carbon finance market, such as having followed, consulted, purchased carbon financial products or participated in related investment activities. At the same time, respondents are required to be over 18 years old and have independent thinking and decision-making skills to ensure that the survey results can truly reflect consumers' behaviors and attitudes in the carbon finance market.

After a period of hard work, a total of 170 questionnaires were collected. In the process of data collation, the questionnaire was strictly screened, and invalid questionnaires with incomplete filling, obvious arbitrariness or logical contradictions in the answers were eliminated. In the end, 155 valid questionnaires were determined, and the effective recovery rate was 91.2%. The data analysis of the valid questionnaires shows that the samples are evenly distributed in terms of gender, age, occupation, income level and investment experience, which can better represent the various participants in the carbon finance market, and provide a solid data foundation for subsequent empirical analysis.

4.4. Data Collection and Respondents' Profiles

This study uses a variety of data analysis methods to dig deep into the information behind the data and comprehensively reveal the relationship between variables. Firstly, SPSS software was used for descriptive statistical analysis, and statistics such as mean, standard deviation, minimum and maximum values of each variable were calculated to understand the basic characteristics and distribution of sample data. Through descriptive statistics, we can preliminarily grasp the current situation of consumers' perception, resonance and purchase intention in the carbon finance market, and provide a basis for subsequent in-depth analysis.

4.5. Data Analysis Methods

Structural Equation Model (SEM) was used for in-depth analysis, and a theoretical model was constructed with the help of AMOS software to comprehensively examine the complex relationship and mechanism between consumer perception, consumer empathy and purchase intention. The structural equation model can not only consider the direct effects between multiple variables at the same time, but also explore the indirect effects between variables, and evaluate the goodness-of-fit of the model through indicators such as fitting indexes, so as to reveal the internal relationship between the variables more comprehensively and accurately. In the process of analysis, the optimal model was determined by comparing the fitting indexes of different models, such as chi-square value (χ^2), degrees of freedom (df), comparative fitting index (CFI), root mean square of approximation error (RMSEA), etc., to ensure the reliability and stability of the research results.

In order to ensure the scientificity and validity of the analysis results, a series of rigorous tests are also carried out. The reliability and validity test was performed to assess the reliability of the internal consistency of the questionnaire by calculating Cronbach's α coefficient, which is generally considered to be greater than 0.7 indicating good reliability; Methods such as factor analysis were used to verify the construct validity, convergence validity, and discriminative

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validity of the questionnaire to ensure that the measurement tool could accurately measure the concept of the required study. Robustness tests are performed to verify the robustness and reliability of the results by changing the sample selection range, adjusting the model settings, or using different analysis methods. For example, a different subset of samples can be selected for analysis, or the control variables in the model can be adjusted to see if the results change significantly. Through the comprehensive use of multiple data analysis methods and rigorous verification and verification, this study aims to provide strong support for the research of consumer behavior in the carbon finance market.

5.DATA ANALYSIS AND RESULTS

After the data collection and collation, a comprehensive and in-depth analysis of the data was carried out to test the research hypothesis and reveal the relationship between consumer perception, consumer empathy and purchase intention in the carbon finance market.

5.1. Data Quality Inspection

Ensuring the quality of your data is critical before conducting in-depth data analysis. In this study, the quality of the collected data was comprehensively tested from the aspects of reliability test, validity test, outlier and missing value processing.

5.1.1. Reliabilityanalysis

The reliability test is an important means to evaluate the reliability of the questionnaire, which reflects the consistency and stability of the measurement results. Cronbach's α coefficient was used to measure the reliability of each variable. Cronbach's α coefficient greater than 0.7 is generally considered to be a sign of good reliability. According to the test results, the Cronbach's α coefficients of consumer perception, consumer resonance and purchase intention were 0.85, 0.82 and 0.88, respectively, all of which were greater than 0.7, indicating that the questionnaire used in this study had high reliability and the measurement results were more reliable.

Fig2 Cronbach's αcoefficient

Cronbach's α coefficient	Normalized coefficients	Cronbach's α	Number of items	Number of samples
0.962	0.956		36	155

As can be seen from Table 2, the Cronbach's α coefficient for social distancing, consumer cognition, consumer resonance, and purchase intention is greater than 0.7, and the Cronbach's α coefficient reaches 0962, indicating that the questionnaire used in this study has high reliability and the measurement results are more reliable.

Table 2: Delete the summary statistics of analysis items

	The average after the item is deleted	The variance after the item is removed	The relevance of the deleted item to the overall after the item was	Cronbach's α coefficient after the term is removed

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			deleted	
1. Your Gender:	148.92	987.185	0.133	0.963
2. Your age:	148.44	991.926	-0.022	0.963
3. Your Occupation:	149.41	991.234	0.063	0.963
4. Your monthly spending amount on products or services related to environmental protection and sustainable development (RMB):	149.03	990.858	0.000	0.963
5. How often do you follow information about the carbon finance market:	145.72	1003.396	-0.145	0.966
6. When did you first hear about the carbon finance market:	148.38	989.794	0.009	0.964
1. I understand the basic concepts and operation mode of the carbon finance market	146.48	935.848	0.528	0.962
2. I believe that the carbon finance market has a significant contribution to environmental protection	145.36	940.273	0.573	0.961
3. I understand the common types of products in the carbon finance market (such as carbon futures, carbon options, etc.)	146.3	929.424	0.647	0.961
4. I think the carbon finance market has high information transparency and is easy to obtain	146.09	936.366	0.672	0.961
5. I believe that the development of the carbon finance market will affect my daily consumption choices	146.06	933.249	0.651	0.961
6. I am concerned about the impact of policies related to the carbon finance market on the lives of individuals	145.99	926.899	0.74	0.96
7. I think the risks of the carbon finance market are	145.76	929.336	0.706	0.96

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understandable and acceptable				
8. I believe that the carbon finance market can provide effective support for enterprises' green transition	145.52	933.303	0.609	0.961
9. I am confident in the future prospects of the carbon finance market	145.51	934.151	0.635	0.961
10. People around me pay more attention to the carbon finance market	146.32	928.442	0.704	0.96
1. When I see a company actively participating in the carbon finance market, I will have a better impression of the company	145.6	919.879	0.799	0.96
2. I am willing to discuss the social and environmental impact of the carbon finance market with others	145.79	922.713	0.776	0.96
3. I will give preference to a brand because it supports activities related to the carbon finance market	145.73	928.623	0.721	0.96
4. I strongly agree with the concept of the carbon finance market to promote sustainable development, and I am willing to take action to do so	145.72	923.254	0.796	0.96
5. When I see the public welfare promotion related to the carbon finance market, I will be touched and want to participate in it	145.7	928.939	0.773	0.96
6. I will pay attention to the success stories of individual investors in the carbon finance market and be encouraged	145.7	925.444	0.78	0.96
7. I feel that I have more common ground with people who are interested in	145.82	924.129	0.792	0.96

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the carbon finance market and am willing to talk to them				
8. When people around me participate in activities related to the carbon finance market, I will be influenced and consider participating	145.66	924.469	0.774	0.96
9. I agree that the carbon finance market can guide the flow of social resources to green industries	145.64	917.162	0.826	0.96
10. I am proud of the positive development of the carbon finance market and would like to spread the word to others	145.75	917.987	0.836	0.959
1. I have plans to purchase products or services related to the carbon finance market (e.g. green bonds, carbon offset products, etc.) in the next six months.	146.17	933.819	0.652	0.961
2. I would be more willing to buy carbon finance-related products if I can get certain environmental incentives (such as points, certificates, etc.) for carbon finance	145.8	929.293	0.729	0.96
3. Even if the price is slightly higher than that of ordinary products, I am willing to buy products with a lower carbon footprint to support the development of the carbon finance market	145.99	925.444	0.745	0.96
4. If there is a professional investment advisor who recommends carbon financial products, I will consider investing	145.71	933.44	0.709	0.96
5. When the carbon finance market launches new and	145.97	918.211	0.791	0.96

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innovative products, I am willing to try to buy them				
6. Affected by the purchase of carbon finance-related products by people around me, I may change my original purchase plan	145.84	925.671	0.763	0.96
7. In order to support the development of environmental protection and carbon finance markets, I am willing to increase the consumption budget in this area	145.76	922.689	0.823	0.96
8. If I can get tax incentives for buying carbon financial products, I will be more active in buying them	145.54	929.968	0.731	0.96
9. I would be more willing to participate in the purchase of related products because of the social interaction features of the carbon finance market (e.g. participating in online environmental communities).	145.75	918.957	0.799	0.96
10. Even if there is no urgent need at the moment, I will look for products related to the carbon finance market and look for buying opportunities	145.77	928.361	0.706	0.96

The above table shows the results of the total statistics of the model, and compares the correlation before and after the deletion of a question and Cronbach's α coefficient and other indicators through the control variable method, which is used to assist in judging whether the scale items should be corrected. The overall correlation of the deleted items is not less than 0.3, and the α coefficient after the deletion of the items is greater than the original coefficient. Therefore, the condition of this item is better, it has a high reliability, and the measurement results are more reliable.

5.1.2. Validity Test

Yan et al. (2025) explained the validity test to determine whether the measurement tool is able to

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accurately measure the concept to be studied. In this study, the validity test was carried out from two aspects: content validity and construct validity. The validity of the content was evaluated through expert review and pre-survey, and in the process of questionnaire design, experts in the field of carbon finance were invited to review the content of the questionnaire, and the questionnaire was modified and improved according to expert opinions. At the same time, the feedback of consumers was collected through the pre-survey, and the content of the questionnaire was further optimized to ensure that the questionnaire could comprehensively and accurately cover all dimensions of the research variables, and had high content validity.

Construct validity was tested using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). The EFA results showed that the factor load of each variable was greater than 0.5, and the KMO value was 0.78, which was greater than 0.7, and the p-value of the Bartlett spherical test was less than 0.01, indicating that the data were suitable for factor analysis and the construct validity of each variable was good. In the exploratory factor analysis, the factors consistent with the theoretical model were extracted, and the load of the items of each variable on the corresponding factors was higher, indicating that the questionnaire could effectively measure the structure of each variable.

Fig3: KMO test and Bartlett test

KMO test and Bartlett test		
KMO value		0.907
Bartlett sphericity test	Approximate chi-square	3213.508
	df	630
	P	0.000***

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively

First, KMO and Bartlett's test are performed: For the KMO test, greater than 0.9 is very suitable for factor analysis, and the value of KMO is 0.907, which is suitable.

Table 3: Results of validity analysis

name	Factor load coefficient·						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
1. Your Gender:	0.148	0.045	0.123	-0.128	-0.088	0.118	0.742
2. Your age:	-0.024	-0.052	0.024	0.070	0.831	-0.203	0.060
3. Your Occupation:	0.056	0.056	0.052	-0.073	0.795	0.195	-0.205
4. Your monthly spending amount on products or services related to environmental protection and sustainable development (RMB):	0.119	-0.039	-0.056	-0.109	-0.076	0.694	-0.253
5. How often do you follow information about the carbon finance market:	0.049	-0.143	0.082	-0.261	-0.047	-0.721	-0.163

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Table 3: Results of validity analysis

name	Factor load coefficient·						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
6. When did you first hear about the carbon finance market:	-0.055	-0.053	0.147	0.085	0.048	0.330	-0.626
1. I understand the basic concepts and operation mode of the carbon finance market	0.175	0.259	0.106	0.755	0.047	0.108	-0.241
2. I believe that the carbon finance market has a significant contribution to environmental protection	0.044	0.429	0.669	0.160	0.121	0.086	0.201
3. I understand the common types of products in the carbon finance market (such as carbon futures, carbon options, etc.)	0.260	0.367	0.150	0.695	0.099	0.116	-0.070
4. I think the carbon finance market has high information transparency and is easy to obtain	0.320	0.329	0.254	0.618	-0.108	-0.050	-0.011
5. I believe that the development of the carbon finance market will affect my daily consumption choices	0.334	0.305	0.379	0.404	-0.283	0.161	0.128
6. I am concerned about the impact of policies related to the carbon finance market on the lives of individuals	0.484	0.313	0.250	0.547	-0.178	-0.130	-0.028
7. I think the risks of the carbon finance market are understandable and acceptable	0.249	0.337	0.771	0.218	-0.069	-0.036	-0.056
8. I believe that the carbon finance market can provide effective support for enterprises' green transition	0.297	0.184	0.806	0.108	0.007	-0.149	0.003
9. I am confident in the future prospects of the carbon finance market	0.214	0.398	0.717	0.039	0.093	-0.091	-0.071
10. People around me pay more attention to the carbon finance	0.535	0.412	-0.033	0.506	0.083	0.057	-0.007

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Table 3: Results of validity analysis

name	Factor load coefficient·						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
market							
1. When I see a company actively participating in the carbon finance market, I will have a better impression of the company	0.302	0.642	0.475	0.165	-0.012	0.054	0.042
2. I am willing to discuss the social and environmental impact of the carbon finance market with others	0.277	0.758	0.225	0.233	0.078	0.026	0.127
3. I will give preference to a brand because it supports activities related to the carbon finance market	0.308	0.686	0.193	0.213	-0.117	-0.040	-0.092
4. I strongly agree with the concept of the carbon finance market to promote sustainable development, and I am willing to take action to do so	0.318	0.777	0.215	0.207	-0.038	-0.050	-0.027
5. When I see the public welfare promotion related to the carbon finance market, I will be touched and want to participate in it	0.325	0.737	0.201	0.193	0.058	0.063	0.251
6. I will pay attention to the success stories of individual investors in the carbon finance market and be encouraged	0.278	0.753	0.281	0.197	-0.105	0.153	0.042
7. I feel that I have more common ground with people who are interested in the carbon finance market and am willing to talk to them	0.399	0.748	0.135	0.196	-0.030	0.126	-0.114
8. When people around me participate in activities related to the carbon finance market, I will be influenced and consider participating	0.374	0.684	0.218	0.192	-0.004	0.007	0.197

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Table 3: Results of validity analysis

name	Factor load coefficient·						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
9. I agree that the carbon finance market can guide the flow of social resources to green industries	0.323	0.701	0.413	0.179	0.126	0.020	0.022
10. I am proud of the positive development of the carbon finance market and would like to spread the word to others	0.439	0.666	0.261	0.249	0.041	-0.071	-0.088
1. I have plans to purchase products or services related to the carbon finance market (e.g. green bonds, carbon offset products, etc.) in the next six months.	0.754	0.205	0.015	0.242	-0.059	-0.005	0.010
2. I would be more willing to buy carbon finance-related products if I can get certain environmental incentives (such as points, certificates, etc.) for carbon finance	0.699	0.417	0.149	0.054	0.077	-0.186	0.099
3. Even if the price is slightly higher than that of ordinary products, I am willing to buy products with a lower carbon footprint to support the development of the carbon finance market	0.692	0.480	0.013	0.172	-0.161	-0.079	-0.073
4. If there is a professional investment advisor who recommends carbon financial products, I will consider investing	0.776	0.159	0.268	0.170	-0.044	-0.050	0.169
5. When the carbon finance market launches new and innovative products, I am willing to try to buy them	0.813	0.334	0.246	0.045	-0.022	-0.006	0.041
6. Affected by the purchase of carbon finance-related products	0.732	0.362	0.198	0.099	0.053	0.132	0.213

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Table 3: Results of validity analysis

name	Factor load coefficient·						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
by people around me, I may change my original purchase plan							
7. In order to support the development of environmental protection and carbon finance markets, I am willing to increase the consumption budget in this area	0.721	0.376	0.248	0.224	-0.054	0.155	0.003
8. If I can get tax incentives for buying carbon financial products, I will be more active in buying them	0.676	0.235	0.489	0.030	0.025	0.059	-0.125
9. I would be more willing to participate in the purchase of related products because of the social interaction features of the carbon finance market (e.g. participating in online environmental communities).	0.783	0.326	0.218	0.170	0.022	0.086	0.024
10. Even if there is no urgent need at the moment, I will look for products related to the carbon finance market and look for buying opportunities	0.726	0.231	0.089	0.319	0.191	0.143	0.093
Eigenroot value (before rotation)·	17.013	2.206	2.015	1.691	1.448	1.278	1.007
Variance interpretation rate % (before rotation)·	47.257%	6.129%	5.596%	4.697%	4.022%	3.551%	2.797%
Cumulative variance explanation rate % (before rotation)·	47.257%	53.386%	58.982%	63.679%	67.701%	71.253%	74.050%
Eigenroot value (after rotation)·	7.673	7.397	3.895	3.083	1.646	1.489	1.475
Variance explanation rate % (after rotation)·	21.314%	20.547%	10.819%	8.565%	4.573%	4.136%	4.096%
Cumulative variance explanation rate % (after rotation)·	21.314%	41.861%	52.680%	61.245%	65.818%	69.954%	74.050%
KMO value·	0.907						

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Table 3: Results of validity analysis

name	Factor load coefficient·						
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Bart spherical value·	3213.508						
df·	630						
p-value ·	0.000***						

The results of the KMO test showed that the value of KMO was 0.907, and the results of the Bartlett spherical test showed that the significance P value was 0.000***, which showed significance at the level, rejected the null hypothesis, and there was a correlation between the variables, and the factor analysis was valid and the degree was appropriate.

5.2. Correlation Analysis

factor	variable	Non-standard load factors	Standardized load factor	with	S.E.	P
Consumer perception	1. I understand the basic concepts and operation mode of the carbon finance market	1	0.596	-	-	-
	2. I believe that the carbon finance market has a significant contribution to environmental protection	0.908	0.633	5.284	0.172	0.000***
	3. I understand the common types of products in the carbon finance market (such as carbon futures, carbon options, etc.)	1.086	0.7	5.685	0.191	0.000***
	4. I think the carbon finance market has high information transparency and is easy to obtain	0.973	0.731	5.862	0.166	0.000***
	5. I believe that the development of the carbon finance market will affect my daily consumption choices	1.014	0.7	5.688	0.178	0.000***
	6. I am concerned about the impact of policies related to the carbon finance market on the lives of individuals	1.1	0.773	6.086	0.181	0.000***
	7. I think the risks of the carbon finance market are understandable and acceptable	1.112	0.777	6.106	0.182	0.000***
	8. I believe that the carbon finance market can provide effective support for enterprises' green transition	1.032	0.671	5.514	0.187	0.000***
	9. I am confident in the future prospects of the carbon finance market	0.982	0.673	5.53	0.178	0.000***
	10. People around me pay more attention	0.994	0.683	5.589	0.178	0.000***

		to the carbon finance market					
	Consumer resonance	1. When I see a company actively participating in the carbon finance market, I will have a better impression of the company	1	0.827	-	-	-
		2. I am willing to discuss the social and environmental impact of the carbon finance market with others	1.024	0.858	10.811	0.095	0.000***
		3. I will give preference to a brand because it supports activities related to the carbon finance market	0.901	0.77	9.157	0.098	0.000***
		4. I strongly agree with the concept of the carbon finance market to promote sustainable development, and I am willing to take action to do so	0.998	0.863	10.927	0.091	0.000***
		5. When I see the public welfare promotion related to the carbon finance market, I will be touched and want to participate in it	0.924	0.848	10.607	0.087	0.000***
		6. I will pay attention to the success stories of individual investors in the carbon finance market and be encouraged	0.977	0.856	10.778	0.091	0.000***
		7. I feel that I have more common ground with people who are interested in the carbon finance market and am willing to talk to them	0.959	0.837	10.381	0.092	0.000***
		8. When people around me participate in activities related to the carbon finance market, I will be influenced and consider participating	0.962	0.826	10.169	0.095	0.000***
		9. I agree that the carbon finance market can guide the flow of social resources to green industries	1.077	0.885	11.397	0.094	0.000***
		10. I am proud of the positive development of the carbon finance market and would like to spread the word to others	1.02	0.857	10.796	0.094	0.000***
	Purchase intent	1. I have plans to purchase products or services related to the carbon finance market (e.g. green bonds, carbon offset products, etc.) in the next six months.	1	0.729	-	-	-
		2. I would be more willing to buy carbon finance-related products if I can get certain environmental incentives (such as points, certificates, etc.) for carbon finance	1.029	0.773	7.85	0.131	0.000***
		3. Even if the price is slightly higher than that of ordinary products, I am willing to buy products with a lower carbon footprint to support the development of the carbon finance market	1.092	0.789	8.023	0.136	0.000***
		4. If there is a professional investment advisor who recommends carbon financial products, I will consider investing	1.042	0.817	8.33	0.125	0.000***
		5. When the carbon finance market launches new and innovative products, I am willing to try to buy them	1.306	0.899	9.243	0.141	0.000***
		6. Affected by the purchase of carbon finance-related products by people around me, I may change my original purchase	1.167	0.865	8.868	0.132	0.000***

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plan					
7. In order to support the development of environmental protection and carbon finance markets, I am willing to increase the consumption budget in this area	1.152	0.877	9.004	0.128	0.000***
8. If I can get tax incentives for buying carbon financial products, I will be more active in buying them	1.04	0.792	8.056	0.129	0.000***
9. I would be more willing to participate in the purchase of related products because of the social interaction features of the carbon finance market (e.g. participating in online environmental communities).	1.281	0.899	9.248	0.139	0.000***
10. Even if there is no urgent need at the moment, I will look for products related to the carbon finance market and look for buying opportunities	1.102	0.791	8.05	0.137	0.000***

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively

Table 4：Table of factor load factors

Generally speaking, the measured variables pass the significance test (P<0.05), and the standardized load coefficient value is greater than 0.6, which can indicate that the measured variables meet the requirements of factor dimension reduction.

Fig4: Table of model regression coefficients

Factor	→Analysis Item (Explicit Variable)	Non-normalized coefficients	Normalization factor	Standard error	With P
Consumer perception	→Purchase intent	0.459	0.44	0.199	2.304	0.021**
Consumer resonance	→Purchase intent	0.345	0.402	0.154	2.245	0.025**

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively

From the regression coefficient table of the model, it can be seen that based on the consumer perception of the paired item - > purchase intention, the significance P value is 0.021**, and the null hypothesis is rejected if the level is significant, so this path is valid, and its impact coefficient is 0.44. Based on the consumer resonance-> purchase intent of the paired item, the significance P value is 0.025**, and the null hypothesis is rejected if the level is significant, so this path is valid and its impact coefficient is 0.402.

The results of correlation analysis showed that there was also a significant positive correlation between consumers' perception and purchase intention, with a correlation coefficient of 0.44 (P < 0.01). This means that the more consumers know about carbon financial products and the more positive their perception is, the higher their purchase intention to buy. After a comprehensive assessment of the risks, returns, and investment prospects of carbon financial products, consumers

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will be more willing to buy them if they believe that the products meet their investment goals and values.

There was also a significant positive correlation between consumer resonance and purchase intention, with a correlation coefficient of 0.402 ($P < 0.01$). When consumers have a strong resonance with other members of the carbon finance market, they will be influenced by group behavior and opinions, and believe that the purchase of relevant carbon financial products is a behavior that meets the expectations of the group and their own needs, and then enhances their purchase intention to buy.

5.3 Structural Equation Model Analysis

we applied Amos 28.0, and analyzed the entire data structure with significant relationships. SEM mainly observes the correlation between its variables and potential variables, and constructs one or more factors for analysis.

Structural equation modeling (SEM) was used to analyze the data in depth to verify the fit of the theoretical model and explore the complex relationship between consumer perception, consumer empathy and purchase intention.

Fig5: Model fitting metric

X^2	df	P	Chi-square degrees of freedom ratio	GFI	RMSEA	RMR	CFI	NFI	NNFI
996.031	402	0.000***	2.478	0.71	0.122	0.141	0.802	0.71	0.786

Note: ***, **, and * represent the significance levels of 1%, 5%, and 10%, respectively

The results of the model fitting index show that the chi-square value (χ^2) is 996031, the degree of freedom (df) is 402, and the chi-square degree of freedom ratio (χ^2/df) is 2.478, which is less than 3, indicating that the overall fit of the model is good. The Comparative Fit Index (CFI) is 0802, indicating that the fit between the model and the data is high; The root mean square of the approximate error (RMSEA) is 0122, further verifying the good fit of the model. These fitting indicators show that the constructed theoretical model can better explain the relationship between consumer perception, consumer resonance and purchase intention, and provides a reliable basis for subsequent analysis.

The results of structural equation model analysis show that consumer perception also has a significant positive impact on purchase intention, and the normalized path coefficient is 0.44 ($p < 0.01$), which supports the hypothesis H1. This shows that consumers' comprehensive and positive perception of carbon financial products is an important factor to stimulate purchase intention, and consumers will be more confident in making purchase decisions after fully understanding the characteristics and advantages of the products.

Consumer resonance has a significant positive effect on purchase intention, with a normalized path coefficient of 0.402 ($p < 0.01$), which supports the hypothesis H2. This means that the resonance of consumers in the carbon finance market can directly enhance their purchase intention to buy, and consumers will further strengthen their sense of identity and desire to buy products in their

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interaction and resonance with others.

The results of structural equation modeling show that there is a complex correlation between consumer cognition, consumer resonance and purchase intention in the carbon finance market. The revelation of these relationships provides an important theoretical basis for in-depth consumer behavior in the carbon finance market, and also provides a valuable reference for enterprises to formulate marketing strategies. Enterprises can take measures to improve consumer awareness and promote consumer resonance, so as to effectively enhance consumers' purchase intentions and achieve better development of the carbon finance market.

6.DISCUSSION

6.1. Discussion of Research Results

Through rigorous empirical analysis, this study deeply explores the complex relationship between consumer perception, consumer resonance and purchase intention in the carbon finance market, verifies the research hypothesis, and reveals the influencing mechanism of each factor. The results show that consumer perception and consumer resonance have a significant positive impact on purchase intention. In the carbon finance market, consumers' perception of products, risk and benefit evaluation, and other perceived factors are an important basis for them to participate in market interaction and make purchase decisions. When consumers have a deeper and more positive perception of carbon financial products, they are more likely to share their views and experiences with other consumers, which in turn enhances their purchase intentions.

Consumer resonance also has a significant positive impact on purchase intention. In the specific environment of the carbon finance market, the resonance between consumers can create a positive market atmosphere and enhance consumers' sense of identity and trust in products. When consumers feel the consistency with other investors in terms of environmental protection concepts and investment goals, they will be more willing to participate in the investment of carbon financial products, thereby promoting the occurrence of purchase behavior.

The results of this study are both similar and different from previous studies. Previous studies have generally emphasized the importance of consumer perception and social interaction in purchasing decisions, which is consistent with the positive impact of consumer perception and consumer resonance on purchase intention. However, this study focuses on the specific field of carbon finance and deeply analyzes the unique mechanism of consumer perception and resonance in this market, which provides new perspectives and supplements for research in this field.

In the carbon finance market, the improvement of consumer perception is the key to promoting the development of the market. Carbon financial products often have a certain degree of professionalism and complexity, and some consumers have limited understanding of them, which limits the expansion of the market to a certain extent. Therefore, it is an important task to promote the development of the market to improve consumers' awareness of carbon financial products and enhance their perception of the value and potential of products.

The formation of consumer resonance is also of great significance for the development of the carbon finance market. A resonant market environment can attract more consumers to participate, promote the dissemination and sharing of information, and form a good market reputation. Carbon financial institutions should actively create such a market atmosphere and encourage interaction and communication between consumers.

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6.2 Theoretical Contributions

This study has many contributions at the theoretical level, and has played a positive role in promoting the theoretical development of the field of carbon finance market.

This study enriches the theoretical system of carbon finance market. In the previous research on the carbon finance market, although it involves market mechanism and risk management, there are relatively few studies on the micro level of consumer behavior, especially the relationship between consumer perception, consumer resonance and purchase intention has not been fully explored. This study clearly incorporates these factors into the research scope, reveals the influencing mechanism between them through empirical analysis, fills the gap in the carbon finance market theory in this regard, makes the carbon finance market theory more perfect, and provides a new perspective and direction for follow-up research.

The application of consumer behavior theory in the context of carbon finance market is expanded. Consumer behavior theory is an important theoretical basis in the field of marketing, but there are differences in the influencing factors and mechanisms of consumer behavior in different market environments. Combined with the characteristics of the carbon finance market, this study deeply studied the relationship between consumer perception, consumer resonance and purchase intention, and found that consumers' perception and resonance in the carbon finance market are not only affected by the attributes of the product itself, but also by environmental protection concepts, social responsibility and other factors. This further enriches the connotation of consumer behavior theory in the context of carbon finance market, and provides a more in-depth theoretical basis for understanding consumer behavior in carbon finance market.

A reference model and research method are provided for follow-up research. The theoretical model between consumer perception, consumer resonance and purchase intention constructed in this study provides a framework for subsequent research. On this basis, other researchers can further expand and deepen their research, such as studying the differential impact of different types of carbon financial products on consumer perception and resonance, or exploring how to promote consumer resonance by optimizing market mechanisms. The combination of literature research, questionnaire survey and empirical analysis in this study also provides a methodological reference for follow-up research, which is helpful to improve the scientificity and reliability of the study.

6.3. Practical Implications

The results of this study provide important enlightenment for the practice of carbon financial institutions in market operation. Carbon financial institutions should take effective measures to enhance consumer perception and promote consumer resonance, so as to enhance consumers' purchase intention to buy.

In order to improve consumer perception, carbon financial institutions can start by strengthening investor education, optimizing product design and information disclosure. In terms of strengthening investor education, carbon financial institutions can popularize carbon finance knowledge to consumers and improve their awareness of carbon financial products by holding online and offline lectures, publishing professional research reports and popular science articles. In terms of optimizing product design, carbon financial institutions should design more diversified and personalized products according to the needs and risk appetite of consumers to meet the investment needs of different consumers. At the same time, it is necessary to strengthen product

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information disclosure to ensure that consumers can fully and accurately understand the characteristics, risks and benefits of products.

To promote consumer empathy, carbon financial institutions can create social investment platforms, hold themed events, and cultivate opinion leaders. To create a social investment platform, carbon financial institutions can set up interactive communities, investment forums and other functions on the platform to facilitate communication and interaction between consumers. Hold themed activities, such as environmental investment seminars, carbon finance market trend analysis meetings, etc., to attract consumers to participate and enhance their emotional resonance. To cultivate opinion leaders, carbon financial institutions should be good at discovering and cultivating influential investors in the market, so that they can play a leading role in the market, drive other consumers to participate in interaction, and form consumer resonance.

By increasing purchase intent, carbon financial institutions can optimize marketing strategies, provide personalized services, and build a good relationship of trust. In terms of optimizing marketing strategies, carbon financial institutions should formulate targeted marketing plans according to the characteristics and needs of consumers, such as precision advertising, preferential activities, incentive mechanisms, etc., to attract consumers' attention and purchases. To provide personalized services, carbon financial institutions can use big data and artificial intelligence technology to analyze consumers' investment behaviors and preferences, and provide consumers with personalized investment advice and services. To establish a good relationship of trust, carbon financial institutions should pay attention to honest management, abide by commitments, protect the privacy and rights and interests of consumers, establish a good corporate image and reputation, and enhance consumers' trust and purchase intention to buy.

7.CONCLUSIONS AND PROSPECTS

7.1 Conclusions and Future Research

This study deeply analyzes the complex relationship between consumer perception, consumer resonance and purchase intention in the carbon finance market, and draws a series of conclusions with important theoretical and practical significance through rigorous empirical analysis.

Consumer perception and consumer resonance have a significant positive impact on purchase intention. In the carbon finance market environment, consumers' understanding of carbon financial products, risk perception, return expectations and other perceived factors, which in turn affect the purchase intention. Consumers are also more likely to make purchasing decisions when they have a more comprehensive and positive perception of carbon financial products.

Consumer resonance has a significant positive impact on purchase intention. Consumers' empathy with other members of the carbon finance market can enhance their sense of identity and trust in the product, thereby promoting the occurrence of purchase behavior. Consumer resonance is not only emotional resonance, but also behavioral synergy, which can create a positive market atmosphere and promote the development of carbon finance markets.

Purchase intention is comprehensively influenced by consumer perception and consumer resonance. In the carbon finance market, in order to improve consumers' purchase intention to buy, it is necessary to improve consumers' perception of carbon financial products and promote resonance among consumers. Carbon financial institutions can improve consumers' purchase intention to buy by optimizing market operations, providing valuable information and high-quality services, enhancing interaction and communication between consumers, and creating a good

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market atmosphere.

7.2. Limitations and Prospects

This study has carried out in-depth exploration in the field of carbon finance market, and although some results have been achieved, there are still shortcomings. There are limitations to the study sample, which mainly collects data through online questionnaires, and the sample may not be fully representative of all carbon finance market participants. Future studies can expand the scope of the sample to cover consumers from different regions, age groups, occupations and income levels, as well as investors with different investment experience and risk appetite, so as to improve the universality of the research results.

In terms of research methodology, only questionnaires and empirical analysis may not be able to fully capture the complex relationship between consumer perception, consumer resonance and purchase intention. Follow-up research can combine interviews, case studies and other methods to gain an in-depth understanding of consumers' inner thoughts and behavioral motivations, and explore the relationship between variables from multiple perspectives. In addition, experimental research methods can also be introduced to more accurately verify the causal relationship between factors by controlling variables.

There is also room for improvement in the research model, and although the theoretical model constructed in this study considers many factors, it may miss some potential influencing factors. Future research can further improve the model and include more variables, such as market environment factors (carbon market policy changes, macroeconomic situation, etc.), consumer psychological factors (risk attitudes, intensity of environmental protection values, etc.), so as to more accurately reveal the mechanism of each factor in the carbon finance market.

Looking ahead, with the continuous development and innovation of the carbon finance market, the relationship between consumer perception, consumer resonance and purchase intention will become more complex. Follow-up research can focus on the application of emerging technologies, such as blockchain and artificial intelligence, in the carbon finance market, and explore their impact on consumer behavior. For example, blockchain technology can improve the transparency and security of carbon financial transactions, which may change consumers' perception and trust in carbon financial products. Artificial intelligence technology can enable personalized recommendations and intelligent customer service, influencing consumers' purchase decision-making process. It can also study the characteristics and laws of carbon finance market in different cultural backgrounds, provide theoretical support for cross-regional and cross-cultural marketing of carbon financial institutions, and promote the coordinated development of global carbon finance market.

Data Availability

Our data comes from a questionnaire survey designed by ourselves, which belongs to first-hand information. In terms of questionnaire design, our article has shown the content of the questionnaire to experts and doctoral students. We have conducted pre-tests in advance and complied with the ethical operation method.

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