Key Factors Influencing E-Commerce Consumer Behavior in China: A Quantitative Perspective

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Abstract: This study aims to thoroughly investigate the key factors influencing Chinese consumers' e-commerce behavior, exploring the impact of elements such as convenience, product type, price, after-sale service quality, website attractiveness, and security concerns on consumers' online shopping decisions through a quantitative analytical framework. The research employs SPSS software for exploratory and confirmatory factor analysis. Results indicate that convenience, product type, price, and after-sale service significantly drive consumer online shopping behavior, while security concerns remain a major barrier to online shopping. Surprisingly, the influence of website attractiveness on consumer purchasing decisions is minimal, challenging conventional assumptions in e-commerce research. These findings provide valuable guidance for e-commerce practitioners to optimize consumer experiences, address key barriers, and promote sustainable growth in China's dynamic online marketplace, while also offering a theoretical basis for policymakers to support the development of e-commerce.

Keywords: consumer behavior; e-commerce; influencing factors; online shopping; technology acceptance model (TAM)

1 INTRODUCTION

With the rapid development of global network technology, online shopping has become an indispensable consumption channel for people worldwide. According to the latest *Statistical Report on the Development of the Internet in China* released by the China Internet Network Information Center (CNNIC), as of December 2023, the number of online shopping users in China reached 915 million, accounting for 83.8% of all Internet users. Moreover, national online retail sales amounted to 15.4 trillion yuan in 2023, solidifying China's position as the world's largest online retail market for 11 consecutive years. Global forecasts predict e-commerce sales will approach $6 trillion by 2024, with China contributing over half of that total [1]. This remarkable growth underscores China's prominence as a global e-commerce leader, with an online shopping scale far surpassing other nations.

Despite the rapid expansion of online shopping, several challenges continue to hinder its development. While the volume of information and data updates has surged, research on online shopping behaviors has not kept pace. For instance, the impact of new payment methods on consumer behavior remains underexplored. Additionally, much of the existing research focuses predominantly on the positive factors influencing online shopping in China, with insufficient attention paid to the negative factors that may deter consumers. Moreover, key differences in consumption patterns and preferences between urban and rural consumers warrant further investigation. It remains unclear whether these two demographic groups hold similar attitudes toward online shopping, raising important questions about regional disparities and consumption trends.

Existing studies have mainly focused on the positive driving factors of online shopping, such as price advantages and convenience, while the exploration of negative factors, such as security concerns and urban-rural consumption differences, is clearly insufficient [2]. Hall, Savas - Hall, and Shaw adopted a deductive method in their systematic review of entrepreneurship literature, combed the relevant

research context, and provided a reference method for this research [3]. In the field of e-commerce consumer behavior research, a similar systematic review is also needed to clarify the research direction, which is also one of the purposes of this study. Baharin, Aziz, and Mahmud conducted an empirical study on the e - shopping behavior of Malaysian consumers, analyzed the influence mechanism of various factors on consumers' shopping behavior, provided a reference for understanding the online shopping behavior of consumers in different regions, and also provided a cross - regional comparison perspective for this study to analyze the behavior of Chinese consumers [4]. In addition, although new payment methods, such as mobile payment and digital currency, have been rapidly popularized in China, their impact on consumer trust and purchasing decisions has not yet been systematically analyzed [5]. Similarly, Liang, Jiao, and Liu also found in their study on the influencing factors of customers' acceptance intention towards online behavioral advertising that there are certain limitations in current research on the influencing factors of online shopping behavior. Most studies focus on single factors or positive aspects, while the exploration of comprehensive factors and negative factors is insufficient [6]. This is similar to the issues concerned in this study.

To address these gaps, this study aims to provide a comprehensive understanding of Chinese consumers' attitudes toward online shopping. Specifically, it seeks to identify and measure the key factors shaping consumer behavior, including the significant drivers and barriers influencing their use of e-commerce platforms. By analyzing these elements, this research offers valuable insights into the preferences and mindsets of Chinese online shoppers.

This paper is structured into six sections. The first section provides an introduction to the study. The second section focuses on theoretical aspects, including definitions, background theories, and key factors influencing online shopping behavior. The third section details the research methodology used in the study. The fourth section presents

the main findings, while the fifth section provides a discussion of these findings in relation to existing research. Finally, the sixth section highlights the study's conclusions, limitations, practical applications, and recommendations for future research.

2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT
2.1 Basic Theories

Howard introduced the first consumer decision model in 1963, which was further developed by Howard and Sheth in the late 1960s into what is now known as the "Howard and Sheth Model." This model emphasizes that input and external factors stimulate purchasing behavior by triggering and shaping motivations. These factors also provide buyers with relevant information about various options, influencing their psychological processes (internal factors). Stimuli, combined with previous purchasing experiences, prompt customers to process information, generate various motivations, and form reactions to alternative products. These processes lead to intermediary factors in the purchasing decision, such as evaluation criteria, purchasing intentions, and more. Typically, the interplay of these factors creates certain tendencies or attitudes. When combined with other influences, such as constraints on buying behavior, these tendencies can easily result in a purchase decision. Moreover, the buyer's experience and perception of the purchase outcome can affect their psychological state and influence subsequent purchasing behaviors.

Ajzen and Fishbein, in their study, proposed the *Theory of Reasoned Action*, suggesting that an individual's behavior can be reasonably predicted by their behavioral intention [7]. Over time, perceived behavioral control was added as an element alongside attitudes and subjective norms, gaining recognition from numerous scholars, add the citation: Chiu and Leng used the Theory of Planned Behavior to deeply analyze the purchase decision - making process of consumers in the study of the purchase behavior of counterfeit sporting goods [8]. This further verified the effectiveness of the theory in explaining consumer behavior and also provided a reference for this study to analyze the behavior of e-commerce consumers using relevant theories. They addressed that all factors influencing behavior indirectly affect its performance through behavioral intention. Behavioral intention is influenced by three primary factors:

(1) **Attitude**: Referring to an individual's predisposition toward adopting a particular behavior based on their perspective or evaluation.
(2) **Subjective Norms**: External social pressures or influences that encourage an individual to engage in specific behaviors.
(3) **Perceived Behavioral Control**: The extent to which an individual believes they can successfully perform a given behavior.

These factors collectively shape and predict consumer actions, providing valuable insights into the decision-making process.

2.2 Factors Influencing Online Shopping
2.2.1 Convenience

The concept of convenience in traditional retail environments primarily involves two factors: saving time and reducing effort. Chowdhury and D'Oca further emphasized that the convenience perceived by consumers mainly stems from their perception of the value of time [9]. Relevant studies have expanded this concept by examining two key dimensions of online shopping - operational convenience and transactional convenience. Berry et al. categorized retail convenience into decisional convenience, acquisition convenience, transactional convenience, and ownership convenience, highlighting that online shopping excels in these areas by providing consumers with greater control and reducing time pressure [10]. Similarly, Seiders et al. found that convenience is a key driver of customer satisfaction and repeat purchase behavior, especially in the e-commerce environment, where users prioritize easy access and simplified transactions [11]. Further research by Jiang, Yang, and Jun showed that website design, payment convenience, and delivery convenience significantly influence consumers' purchase intentions, further reinforcing the notion that online shopping is more convenient than physical retail [12].

Hypothesis 1: Convenience is a significant factor that influences consumers' online purchasing decisions.

2.2.2 Product Type

In traditional consumption scenarios, the richness of product types influences the range of choices available to consumers to a certain extent. However, in the context of online shopping, the impact of this factor is further amplified. For example, when purchasing electronic products, consumers can obtain detailed parameters, user reviews, and other information about different brands and models online, which may be difficult to fully acquire in physical stores. This rich information allows consumers to make more informed decisions and enhances their overall shopping experience.

Hoffman and Novak found in their research that the diversity of product types is a major attraction of online shopping, as consumers can more conveniently compare and filter products. This ease of comparison allows consumers to find the exact product that meets their needs, which is a significant advantage over traditional retail environments [13]. Liang, Jiao, and Liu further pointed out that a wide range of product choices and detailed product information can significantly enhance consumers' willingness to purchase. For example, in the case of online clothing shopping, a variety of styles, sizes, and colors, as well as clear product images and material descriptions, can attract consumers to place orders. These detailed product presentations not only help consumers visualize the product but also reduce the perceived risk of purchasing items they cannot physically inspect [6].

Several scholars found that the stronger consumers' interest in specific product types, the higher the likelihood of online shopping, indicating that product diversity has a

significant positive impact on purchasing behavior [2]. This suggests that consumers who are highly engaged with specific products are more likely to utilize online platforms for information gathering and purchase decision-making. Demirer et al. found that the higher the level of attention consumers pay to specific product types, the higher the frequency and amount of their online shopping [14]. This indicates that the richness and diversity of product types are important factors in attracting consumers to shop online.

Febrianti, Hermina, and Suratman explored the impact of factors such as product involvement on consumers' purchase decisions in their research. They found that the degree of consumers' involvement with products can significantly affect their purchase intentions [15]. This is related to the impact of product types on consumers' online shopping behavior, further illustrating the importance of product-related factors in consumers' decision-making.

Hypothesis 2: Product type is a significant factor that influences consumers' online purchasing decisions.

2.2.3 Price

In both traditional and online markets, price has always been a key factor influencing consumer purchases. Online shoppers are generally more attracted to lower market prices, special offers, and perceived monetary value. Many goods and services, such as banking, digital downloads, and travel products, are typically priced lower online than in physical stores, mainly due to the lower operating costs of online stores. For example, booking hotels and flights online often offers more favorable prices than booking offline.

Zhang and Dai found that price transparency and the attractiveness of promotional activities are important factors influencing consumers' online purchasing decisions. When shopping online, consumers tend to choose platforms and products with clear pricing and substantial promotional offers [16]. Yang et al. further pointed out that consumers' satisfaction with prices affects their search behavior and purchase decisions, and online shopping platforms often attract consumers by offering more competitive prices [5]. For example, during major e-commerce promotions, a large number of consumers concentrate on online shopping during these events, driven by the attractive prices.

Dertwinkel-Kalt et al. discovered that when choosing an online shopping platform, consumers place a higher weight on price factors than on other factors such as brand and product quality [17]. This suggests that price-sensitive consumers are more inclined to choose online shopping because online platforms typically offer more competitive prices and a richer array of promotional activities. Gerpott and Berends also found through a literature review that competitive pricing strategies in online markets have a significant impact on consumer behavior [18].

Hypothesis 3: Price is a significant factor that influences consumers' online purchasing decisions.

2.2.4 Website Attractiveness

Website attractiveness is considered to have a certain role in online shopping. From the perspective of traditional marketing, visual elements such as store decoration and display can influence consumers' willingness to purchase. In online shopping, the website is equivalent to the "store" for consumers, and its attractiveness is also believed to potentially affect consumer decisions. Chitcharoen et al. pointed out that website design quality is an important element reflecting the overall quality of a website and can significantly influence consumers' purchase intentions. A website with aesthetically pleasing interface design and rational layout may make consumers more willing to stay and browse [19]. Wen et al. also found that the visual attractiveness and information presentation of a website can significantly affect consumers' purchase intentions. For example, a website with clear and exquisite product images and concise text introductions is more likely to attract consumers to place orders [20]. However, Tandon et al. pointed out that although website attractiveness can enhance user experience, its impact on purchase decisions is relatively small. Functionality and usability are the key factors. Some websites, despite their exquisite design, may still fail to encourage purchasing behavior if their search functions are not convenient or the shopping process is cumbersome [21]. Harahap examined the impact of website characteristics on customer satisfaction, emphasizing the role of design and functionality [22]. While website attractiveness may have a minimal direct impact on purchasing decisions, Harahap's findings highlight its importance in enhancing overall customer satisfaction and trust. Moreover, Fath et al. found that the response speed of a website and its user-friendliness have a greater impact on consumer satisfaction than visual attractiveness. A website with fast loading speed and convenient operation can provide consumers with a better shopping experience [23].

Hypothesis 4: Website attractiveness is a significant factor that influences consumers' online purchasing decisions.

2.2.5 Security Concerns

In traditional shopping scenarios, consumers engage in face-to-face transactions with merchants, which provides a more intuitive sense of transaction security. However, in the virtual environment of online shopping, there is a significant degree of uncertainty when consumers interact with websites or retailers. Udo found that privacy and security issues are major barriers to the development of e-commerce, with consumers having serious concerns about the security of online transactions [24]. Ariff et al. also pointed out through an empirical study on Malaysian consumers that consumers' perceived risk of online shopping is closely related to their attitudes and shopping behavior. Security concerns are one of the important factors influencing consumers' online shopping decisions, which corroborates the results of other studies. For example, consumers worry about the leakage of personal information and the theft of payment details [25]. Wijaya et al. pointed out that security and privacy issues significantly impact consumer satisfaction, especially in the beauty e-commerce sector. When purchasing beauty products, consumers may

be cautious about online shopping due to concerns about product quality assurance and the potential leakage of personal skin information [26]. Relevant studies have also shown that security issues have a multifaceted impact on consumer purchasing decisions. On the one hand, consumers are worried about the leakage of personal information and payment security; on the other hand, consumers have lower trust in online retailers, especially smaller or lesser-known platforms. Therefore, addressing security issues requires not only technical means but also transparent privacy policies and reliable security certifications to enhance consumer trust.

Considering these factors, security issues remain a major role to the adoption of online shopping by customers.

Hypothesis 5: Security concerns is a significant factor that influences consumers' online purchasing decisions.

2.2.6 After-Sale Service

In traditional retail, good after-sales service can enhance consumer satisfaction and loyalty, and online shopping is no exception. Customer service covers many aspects, and after-sales service is a key factor in reflecting and evaluating the overall quality of an online retailer's service. The process of purchasing a product inherently involves the purchase of service as well [27]. In today's highly competitive e-commerce market environment, the scope of after-sales service is constantly expanding, and its importance is becoming more and more prominent. From the installation and usage guidance after the consumer receives the product, to the repair and return/exchange handling when the product has quality issues, and then to the subsequent collection and processing of consumer feedback, each link is closely connected and together forms an important chain that affects the consumer's shopping experience. Grover pointed out that the quality of after-sales service plays an important role in influencing consumers' willingness to purchase online. Take electronic products as an example, professional installation guidance and usage training can help consumers better utilize the product's performance and avoid usage problems caused by improper operation. This not only enhances consumers' satisfaction with the product but also increases their favorability towards the brand [28]. Ferraz et al. conducted a systematic literature review on after - sales attributes in e-commerce, summarized the existing research results, and proposed future research directions. They emphasized the importance of after - sales service in the e-commerce field, providing a comprehensive perspective for a deeper understanding of the impact of after - sales service on consumer behavior.

When the product purchased by the consumer has quality issues, efficient and convenient repair and return/exchange services become particularly crucial. A responsive after-sales team can promptly soothe the consumer's emotions and reduce dissatisfaction and anxiety. For example, some e-commerce platforms promise to give an initial response within 24 hours after the consumer provides feedback and complete the return/exchange process within the stipulated time. This efficient service mechanism greatly increases the consumer's trust in the

platform. Moreover, a sound after-sales process can reduce the consumer's perceived shopping risks and make them feel more secure when shopping. In addition, after-sales service is also reflected in the attention to and processing of consumer feedback. Actively collecting consumers' opinions and suggestions and turning them into motivation to improve products and services can make consumers feel valued and respected [29]. All these fully demonstrate that high-quality after-sales service has become an important means for e-commerce platforms and merchants to attract consumers and enhance their competitiveness, and plays an indispensable role in influencing consumers' online purchasing decisions.

Hypothesis 6: The quality of after-sale service is a significant factor that influences consumers' online purchasing decisions.

3 RESEARCH METHODOLOGY
3.1 Research Design and Research Model

The research design encompasses three core stages: data collection, data cleaning, and data analysis, to ensure the scientific validity and reliability of the study results.

This study employs a cross-sectional survey methodology to systematically collect data from online shoppers across different regions in China through a questionnaire. This approach aligns with common marketing research methods, such as those described by Kent and Kent, which emphasize the importance of survey methods in gathering data for market - related studies [30]. In the data collection phase, the researchers designed a questionnaire based on extensive literature reviews and theoretical frameworks. The questionnaire covers six key factors (convenience, product type, price, website attractiveness, security concerns, and after-sales service) and uses a 5-point Likert scale for quantification. To ensure the representativeness and diversity of the sample, a multi-stage sampling technique was employed. China was divided into four regions (South, North, East, and West) based on economic development levels and internet penetration rates. Online shoppers from different cities and rural areas were then randomly selected within each region.

After data collection, the data cleaning stage commenced. The researchers processed the raw data using SPSS software and Python, excluding incomplete or abnormal responses to ensure the accuracy and completeness of the data. Descriptive statistical analyses were conducted to summarize the basic characteristics of the sample and the distribution of key variables, laying the foundation for further analysis.

In the data analysis phase, the researchers first assessed the reliability and validity of the questionnaire through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), ensuring that each item effectively measures the underlying factors it was designed to assess. Subsequently, regression analysis and other statistical methods were employed to examine the impact of each factor on consumers' online shopping behavior and to validate the study hypotheses. Finally, the scientific validity and rationality of the model were ensured through various

model fit indices (such as chi-square tests, R^2 values) and mediation effect assessments, ensuring that the study results accurately reflect the true situation of the data. This series of rigorous research design and analysis steps provides a solid foundation for a comprehensive understanding of the factors influencing Chinese consumers' online shopping behavior.
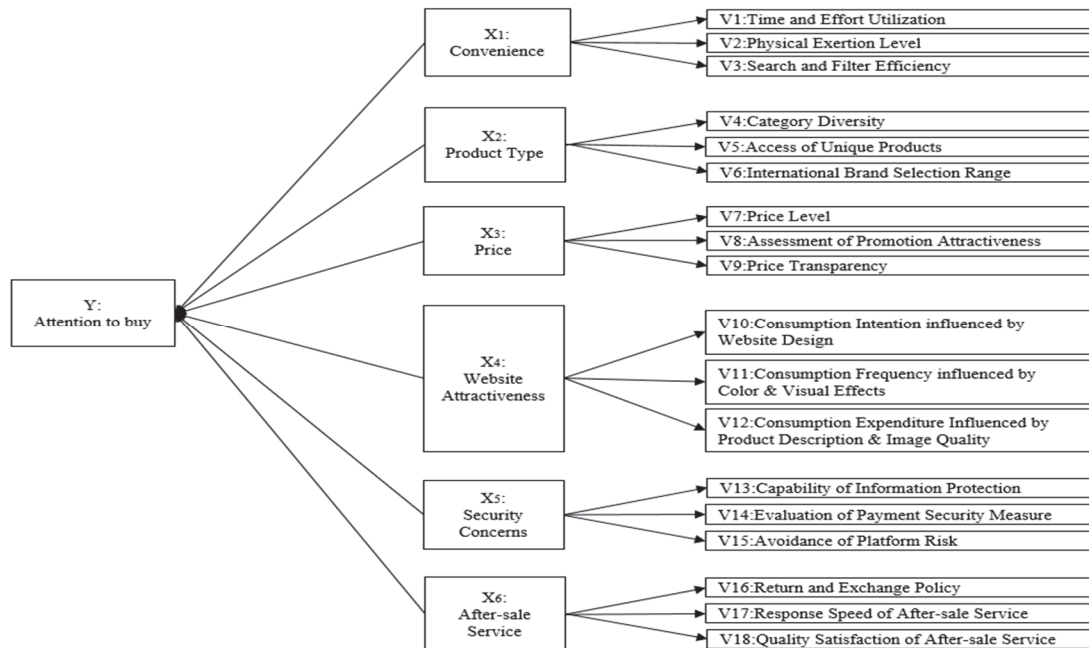

Figure 1 The research model

3.2 Data Collection

In the data collection process, we employed a multi-stage sampling technique to ensure the representativeness and diversity of the sample. Initially, based on the economic development levels and internet penetration rates of different regions in China, the sample was divided into four regions: South, North, East, and West. Subsequently, online shopping users from various cities and rural areas were randomly selected within each region.

The questionnaire was designed based on extensive literature reviews and theoretical frameworks, covering six key factors: convenience, product type, price, website attractiveness, security concerns, and after-sale service. Each factor was measured through several specific questions using a 5-point Likert scale (1 indicating "strongly disagree" and 5 indicating "strongly agree"). For example, in measuring convenience, questions included "Online shopping saves me time and effort" and "The search and filtering functions of online shopping platforms are very effective." These questions were designed to gain a deep understanding of consumers' perceptions and attitudes towards various aspects of online shopping.

In the pre-test phase of the questionnaire, 50 consumers with varying levels of online shopping experience and from different regions and social backgrounds were selected as the pre-test sample. The initially designed questionnaire was distributed to them, with a requirement to complete the responses within a specified time frame. After collecting the pre-test questionnaires, a preliminary analysis of the data was conducted. The main focus was on whether the wording of the questions in the questionnaire was clear and understandable, and whether there were any ambiguities or

leading language; whether the answer options for each question were comprehensive and reasonable, and whether any key options were missing; and whether the overall logical structure of the questionnaire was smooth and in line with consumers' thinking habits. At the same time, communication and interaction with some of the pre-test participants were conducted to obtain their subjective feedback on the questionnaire, such as their feelings during the filling process and the difficulty in understanding certain questions. Based on the pre-test results, modifications and improvements were made to the questions in the questionnaire. For example, for questions with ambiguous wording, the phrasing was reworked to make them clearer; for questions with defective answer options, the corresponding options were supplemented or adjusted; and the layout and formatting of the questionnaire were optimized to improve its readability and ease of completion. Through pre-testing and questionnaire optimization, the quality of the officially distributed questionnaire was enhanced, ensuring that it could more accurately collect the data required for the study.

In the process of questionnaire design and data collection, ethical considerations were taken into account. As Bell and Bryman pointed out in their research on the ethics of management research, ensuring the anonymity and confidentiality of participants is crucial [31]. Therefore, in this study, no personal identifying information was collected in the questionnaire, and all data was processed anonymously to protect the privacy of respondents.

A total of 250 questionnaires were distributed, of which 186 were deemed valid. The response rate for the survey was approximately 74.4%, which is considered relatively positive.

3.3 Data Analysis

This study aims to thoroughly analyze the key factors influencing Chinese consumers' e-commerce behavior. Through a rigorous and scientific data analysis process, the reliability and validity of the research results are ensured, providing strong support for the theoretical and practical development of the e-commerce field. In the data analysis process, a variety of statistical methods are comprehensively used to deeply explore the value of the data and comprehensively investigate the impact mechanisms of various factors on consumers' online shopping decisions.

After the data collection is completed, the SPSS software is first used to systematically clean the raw data. Missing values, outliers, and logical errors in the data are strictly screened and processed. For missing values, if the missing proportion is low and the variable has important research value, methods such as mean imputation and multiple imputation are used to reasonably supplement the data. If the missing proportion is too high or the variable has little impact on the core research issue, the corresponding samples are cautiously removed to ensure the integrity and accuracy of the dataset, laying a solid foundation for subsequent analysis.

After data cleaning, descriptive statistical analysis is conducted. By calculating statistical indicators such as frequency, percentage, mean, and standard deviation, the basic characteristics of the sample are comprehensively sorted out, covering multiple dimensions of consumers, including regional distribution, urban-rural differences, gender composition, age groups, educational background, income levels, and occupational types. At the same time, the distribution of key variables such as convenience, product type, price, website attractiveness, security concerns, and after-sales service is detailed to provide researchers with a clear understanding of the overall data trend, and to preliminarily explore the central tendency and dispersion of each variable, providing an intuitive basis for subsequent in-depth analysis.

To test the validity and reliability of the questionnaire, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) are used. These methods are in line with the research methods for business proposed by Sekaran and Bougie, which provide a systematic framework for data analysis in business - related research. In the EFA stage, principal component analysis is used to extract common factors. The number of factors is determined based on eigenvalues greater than 1 and the inflection point of the scree plot, and varimax rotation is used to make the factor structure clearer and more interpretable. By analyzing the loadings of each measurement item on the factors, the correlation between items and factors is judged. Items with low loadings or serious cross-loadings are reasonably deleted or adjusted to ensure that the items included in each factor have high homogeneity, thereby constructing a reasonable factor structure model. Subsequently, CFA is used to validate the factor structure obtained from EFA. Model fit indices such as the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) are used to assess the fit between the model and the data. If the fit indices do not meet the ideal standards, the model is gradually revised, such as adding or deleting paths, freeing or fixing parameters, etc., until the model fits well, thereby confirming the validity and reliability of the questionnaire measurement tool and ensuring the credibility of subsequent research results [32].

In the hypothesis testing phase, multiple linear regression analysis is used to explore the impact of independent variables such as convenience, product type, price, website attractiveness, security concerns, and after-sales service on consumers' online shopping decisions (dependent variable). Before regression analysis, multicollinearity diagnosis is performed on the data. Variance inflation factors (VIF) and tolerance are calculated to determine whether there are serious multicollinearity issues among independent variables. If multicollinearity exists, methods such as stepwise regression, principal component regression, or ridge regression are used to ensure the stability and reliability of the regression results. At the same time, t-tests are used to test the significance of regression coefficients to determine whether the impact of each independent variable on the dependent variable is significant. Based on the direction and magnitude of the regression coefficients, the impact direction and degree of each factor on consumers' online shopping decisions are intuitively judged, thereby rigorously testing the research hypotheses.

To further explore the potential relationships between various factors, mediation effect analysis is conducted. A mediation effect model is constructed to test whether variables such as website attractiveness indirectly affect consumers' online shopping decisions through mediating variables such as consumer trust. The Bootstrap method is used to test the significance of the mediation effect. The mediation effect is calculated through multiple resampling, and if the confidence interval does not include 0, it indicates that the mediation effect is significant. Through these analyses, the complex impact mechanisms of various factors on consumers' online shopping decisions are more comprehensively revealed.

In terms of model evaluation and optimization, a variety of fit indices are used to comprehensively evaluate the regression model. In addition to the chi-square test, the adjusted R^2 is focused on to measure the model's ability to explain the variation in the dependent variable. The closer the value is to 1, the stronger the model's explanatory power. At the same time, the F-test value is examined to determine the overall significance of the model. If the model fit is not ideal, the residual distribution is further analyzed. Methods such as plotting residual graphs and calculating the Durbin-Watson statistic are used to test whether the residuals meet the assumptions of independence, normality, and homoscedasticity. If there are issues with the residuals, the data is transformed or the model form is adjusted accordingly, such as using non-linear regression models or adding polynomial terms, until the model can fit the data well and accurately reflect the relationships between variables.

Through the above series of rigorous data analysis steps, the research results are comprehensively interpreted. The research findings are deeply compared with existing theories to explore the contributions of the research to the relevant theories in the e-commerce field in terms of supplementation and extension. At the same time, based on the research results, targeted practical suggestions are provided for e-commerce practitioners, such as optimizing website functions to enhance shopping convenience, enriching product types to meet consumers' diverse needs, formulating reasonable pricing strategies to attract consumers, strengthening website security construction to

eliminate consumers' security concerns, and improving the after-sales service system to enhance consumer trust, thereby promoting the sustainable development of the e-commerce industry.

4 RESULTS
4.1 Descriptive Statistics

In this research, a total of 186 questionnaires were used for analysis. The regional distribution was as follows: 31.0% were from Southern China, 25.3% from Western China, 22.8% from Northern China, and 20.9% from Eastern China.

By residence, 58.2% were urban and 41.8% rural. In terms of gender, there were 117 females and 69 males. Regarding the age group, 26.6% of participants were aged 26 - 32, 25.3% were 19 - 25, and 21.5% were 33 - 39. Concerning education background, 51% had bachelor's degrees, 25.8% had below high school education, and 16.6% had high school diplomas. For monthly income, 34.9% earned between 3001 - 4000 RMB, 22.5% between 2001 - 3000 RMB, and 18.8% less than 2000 RMB. In terms of occupation, 38.1% worked in the service industry, 15% in the liberal professions, and 13.9% in the financial industry.

Table 1 Cronbach reliability analysis

Independent variable	Items	Cronbach α Coefficient
$X1$: Convenience	$V1$: Time and Effort Utilization $V2$: Physical Exertion Level $V3$: Search and Filter Efficiency	0.824
$X2$: Product Type	$V4$: Category Diversity $V5$: Access of Unique Products $V6$: International Brand Selection Range	0.813
$X3$: Price	$V7$: Price Level $V8$: Assessment of Promotion Attractiveness $V9$: Price Transparency	0.840
$X4$: Website Attractiveness	$V10$: Consumption Intention influenced by Website Design $V11$: Consumption Frequency influenced by Color & Visual Effects $V12$: Consumption Expenditure Influenced by Product Description & Image Quality	0.842
$X5$: Security Concerns	$V13$: Capability of Information Protection $V14$: Evaluation of Payment Security Measure $V15$: Avoidance of Platform Risk	0.784
$X6$: After-sale Service	$V16$: Return and Exchange Policy $V17$: Response Speed of After-sale Service $V18$: Quality Satisfaction of After-sale Service	0.817

4.2 Reliability and Validity Analysis
4.2.1 EFA

Exploratory Factor Analysis (EFA) is a crucial tool for assessing the reliability of a questionnaire, with Cronbach's alpha coefficient being a key indicator of internal consistency. In this study, all variables' Cronbach's alpha coefficients exceeded the threshold of 0.7, which is generally considered an acceptable level of reliability. Specifically, the Convenience ($X1$) dimension demonstrated a Cronbach's alpha coefficient of 0.824, indicating a high degree of consistency among these items measuring consumers' perceptions in online shopping. The Product Type ($X2$) and Price ($X3$) dimensions exhibited Cronbach's alpha coefficients of 0.813 and 0.840,

respectively, both nearing the 0.85 mark, demonstrating good reliability and suggesting that these items effectively measure the constructs they represent. The Website Attractiveness ($X4$) dimension's Cronbach's alpha coefficient of 0.842 was slightly higher than that of Convenience and Product Type, further confirming its reliability. The Security Concerns ($X5$) dimension's Cronbach's alpha coefficient of 0.784, while slightly lower than other dimensions, was still within an acceptable range, indicating a certain level of consistency in measuring consumers' concerns about online shopping security. The After-sale Service ($X6$) dimension's Cronbach's alpha coefficient of 0.817 showed the reliability of this dimension in measuring consumers' perceptions of after-sale service.

Table 2 Kaiser-Meyer-Olkin test and Bartlett's test of sphericity

Independent variable	KMO	Bartlett		
		approximate chi-square	df	p
$X1$	0.719	202.705	3	< 0.001
$X2$	0.718	192.616	3	< 0.001
$X3$	0.720	223.370	3	< 0.001
$X4$	0.518	18.528	3	< 0.001
$X5$	0.638	193.693	3	< 0.001
$X6$	0.692	203.810	3	< 0.001

4.2.2 CFA

Confirmatory Factor Analysis (CFA) is another tool used to assess the validity of a questionnaire, measured through the Kaiser-Meyer-Olkin (KMO) test and Bartlett's

test of sphericity. The KMO test results indicated that all variables had KMO values above 0.5, with Convenience ($X1$), Product Type ($X2$), and Price ($X3$) nearing 0.7, suggesting that these variables have good validity in measurement. Although the Website Attractiveness ($X4$)

had a lower KMO value of 0.518, it was still above 0.5, indicating that this variable is suitable for factor analysis to some extent. The Security Concerns ($X5$) and After-sales Service ($X6$) dimensions had KMO values of 0.638 and 0.692, respectively, both indicating that these variables are suitable for factor analysis and possess good validity. The results of Bartlett's test of sphericity showed that all variables had p-values less than 0.001, implying a significant correlation among the variables and further confirming the validity of the questionnaire. These results suggest that the items in the questionnaire effectively measure the constructs they are designed to assess, providing a reliable foundation for the study.

4.3 Regression Model

This study employed regression analysis to assess the impact of various factors on consumers' online shopping decisions. Tab. 3 presents the results of the regression analysis, which includes standardized coefficients, t-values, p-values, and collinearity diagnostics. From the standardized coefficients, it is evident that convenience ($X1$), product type ($X2$), price ($X3$), and after-sale service ($X6$) have significant driving effects on consumers' online purchasing decisions. Specifically, the standardized coefficient for convenience is 1.1745, product type is 0.6123, price is 0.825, and for after-sale service is 1.115. These values all indicate that these factors significantly influence consumers' online purchasing decisions in a statistical sense.

Furthermore, the study also observed that the standardized coefficient for website attractiveness ($X4$) is 0.056, which is close to 0, suggesting that its influence on consumers' online shopping decisions is not significant. The standardized coefficient for security concerns ($X5$) is −0.034, which, although close to 0, indicates a slight negative impact, suggesting that security issues might slightly deter consumers from online shopping. These findings align with our hypotheses that convenience, product type, price, and after-sale service are key factors significantly influencing consumers' online shopping decisions.

However, the standardized coefficient for website attractiveness ($X4$) was only 0.056, close to zero, indicating a negligible impact on consumers' online shopping decisions. This result was unexpected and challenged the conventional assumption in e-commerce research that website attractiveness is an important factor influencing

consumer purchasing decisions. Further mediation analysis revealed that the total effect of website attractiveness on online shopping frequency was 0.09, indicating a minimal direct impact on online shopping intentions but an indirect effect through enhanced consumer trust. This finding suggests that while website attractiveness has limited direct influence on consumer purchasing decisions, it still plays a role in enhancing consumer trust.

The heatmap provides a more intuitive visualization of the correlations between variables. The deeper the color (with warm tones indicating positive correlations and cool tones indicating negative correlations), the stronger the correlation. This facilitates the rapid identification of variables that may have strong associations, thereby providing a basis for further analysis. From the correlation coefficient matrix, it is evident that most variables exhibit weak correlations. Strong correlations with absolute values close to 1 are relatively rare, and the majority of coefficients have absolute values below 0.3, indicating low linear association between variables. However, there are some relatively strong correlations worth noting: educational background and place of residence show a strong negative correlation (correlation coefficient of −0.53), suggesting that there may be differences in the distribution of educational backgrounds across different regions. For example, urban and rural areas may have significant disparities in educational resources and the level of education attained by the population. Additionally, some factors related to online shopping experience have strong positive correlations. For instance, the correlation between Security Concerns_V13: Capability of Information Protection and Security Concerns_V14: Evaluation of Payment Security Measure is 0.63. This is expected, as both factors pertain to the security aspects of online shopping. Users who rate information protection capabilities highly are also likely to rate payment security measures more favorably.

4.4 Path Analysis

Fig. 2 visually represents the relationships between the independent variables and the dependent variable, which in this context is consumers' online purchasing decision. The path coefficients displayed in the diagram indicate the strength and direction of the relationship between each independent variable and the dependent variable.

Table 3 Regression results

| variable	Standardized Coefficients		t	P	Collinearity Diagnostics	
	B	Standard Error			Tolerance	VIF
const	−0.896	0.436	1.06	0.042	−1.757	−0.035
$X1$	1.1745	0.124	1.404	0.002	−0.071	0.420
$X2$	0.6123	0.162	−1.311	0.001	−0.532	0.107
$X3$	0.825	0.133	0.936	0.041	−0.138	0.387
$X4$	0.056	0.078	0.711320	$4.778121e^{-01}$	−0.099	0.210
$X5$	−0.034	0.109	−0.314	0.007	−0.250	0.181
$X6$	1.115	0.130	8.610	0.000	0.860	1.371
R^2	0.539					
Adjusted R-squared	0.523					
F	$1.06e^{-27}$					
DW	1.943					
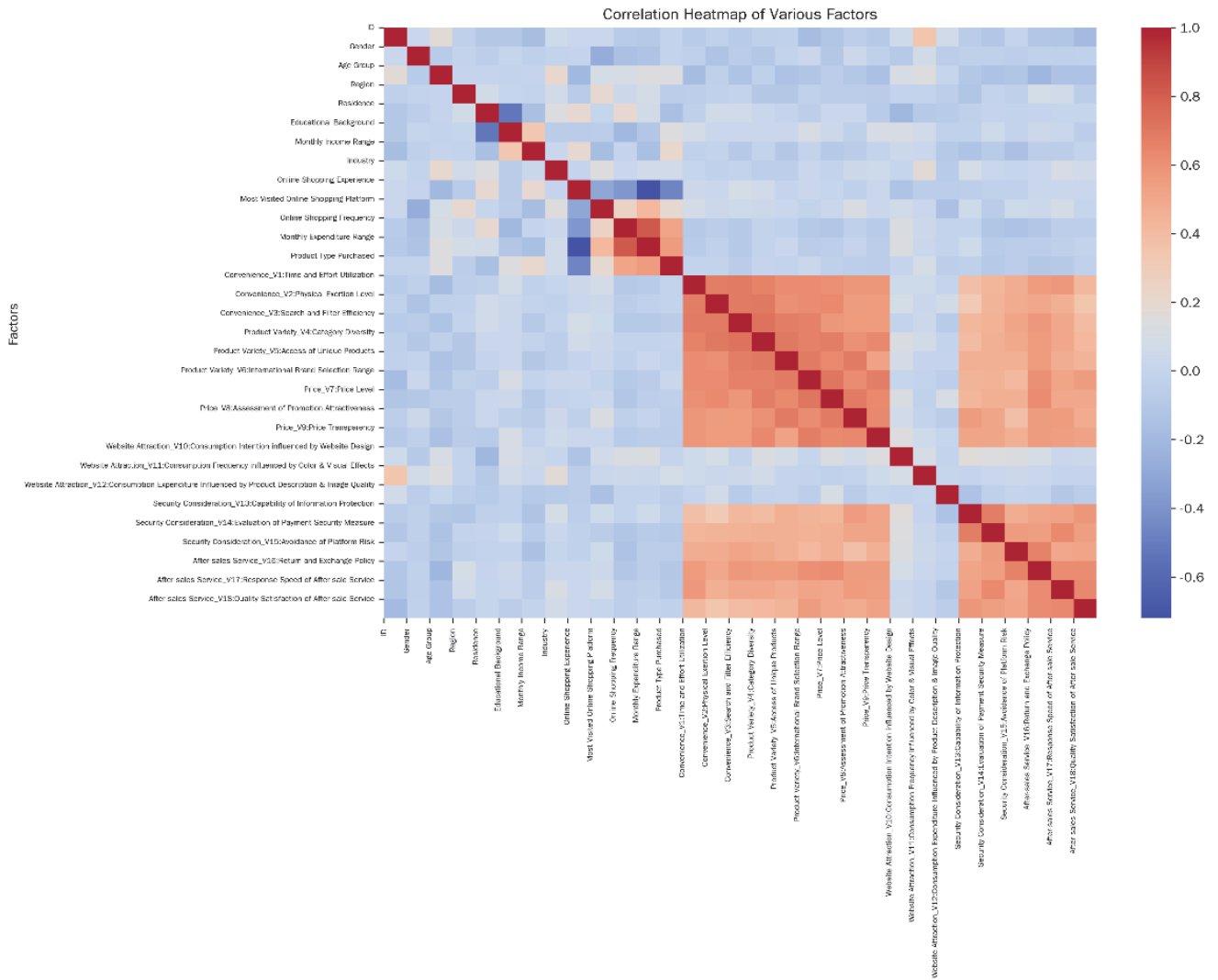
Figure 2 Correlation heatmap
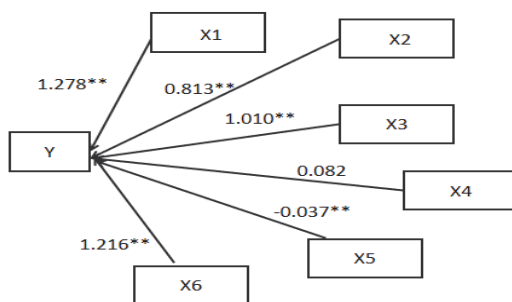
Figure 3 Path diagram

Convenience, product type, price and after-sale service are depicted as having the most substantial impacts on online purchasing behavior. These factors are shown to have strong path coefficients, suggesting that as these factors increase, the likelihood of consumers making online purchases also increases. The path from website attractiveness to online purchasing decisions, however, is indicated with a weaker coefficient, highlighting the less significant role this factor plays in influencing online purchasing decisions. Security concerns, on the other hand, show a negative path coefficient, indicating that increased

security concerns could potentially deter consumers from making online purchases. The path analysis also allows us to understand the relative importance of each factor in shaping consumers' online shopping behaviors, providing a clear direction for e-commerce platforms to focus their strategies on enhancing the online shopping experience.

4.5 Key Drivers of Online Shopping

The research identified several key drivers that shape Chinese consumers' online shopping behavior. Convenience emerged as a primary factor positively influencing purchasing decisions. Most respondents cited convenience as a fundamental motivation for online shopping, reflecting the widespread view that digital platforms offer superior accessibility and search efficiency compared to traditional retail outlets.

Product type also proved to be a crucial determinant, with 86.5% of respondents identifying it as a major factor, while only 1.5% considered it insignificant. This strong correlation suggests that consumers who are highly engaged with specific products are more likely to utilize online platforms for information gathering and purchase decision-making [14].

Price stands out as another significant motivator for online shopping adoption. A substantial 78.9% of respondents indicated that online retailers offer more favorable pricing compared to brick-and-mortar stores, with only 3.6% considering price as non-crucial. This finding reinforces the common perception that online platforms provide compelling price advantages, serving as a powerful draw for consumers [17].

After-sale service quality emerged as the fourth major drivers, with 82.2% of respondents expressing concerns about return and exchange support. This widespread apprehension suggests that perceived adequacies in after-sales service significantly strengthen consumer confidence in online shopping platforms.

The interplay of these four factors - convenience, product type, price and after-sale service - provides valuable insights into the motivational framework driving Chinese consumers' online shopping behavior. This understanding is particularly relevant for e-commerce platforms and retailers seeking to optimize their digital presence in the Chinese market.

4.6 Barriers to Online Shopping

This study finds that security concerns are a significant barrier to the adoption of online shopping among Chinese consumers. Survey results indicate that 59.9% of participants consider security risks a major impediment, while only 11.9% deem it insignificant. This highlights the ongoing challenges of trust and data security in e-commerce environments.

Security issues in online shopping primarily stem from payment security, data privacy, and fears of fraud. Previous research has emphasized that privacy risks and perceived insecurity significantly reduce consumers' willingness to shop online, as individuals worry about potential financial losses and unauthorized access to personal data [24]. Wijaya et al. further pointed out that security features of platforms, such as encryption, multi-factor authentication, and transparent refund policies, play a crucial role in enhancing consumer confidence [26]. Despite advancements in blockchain-based payment security and AI-driven fraud detection technologies, many consumers remain skeptical about the security of online transactions.

Moreover, concerns about the misuse of personal information and identity theft exacerbate trust issues. Studies have shown that consumers' lack of awareness of cybersecurity best practices further amplifies these fears [33]. To alleviate these concerns, e-commerce platforms should implement stronger encryption methods, secure payment gateways, and real-time fraud detection systems. Visible trust signals, such as verified payment badges, SSL certificates, and consumer protection assurances, can also help reassure hesitant shoppers [34].

Another key aspect of security concerns is the perception of unreliable sellers in online marketplaces. Counterfeit products, deceptive marketing practices, and poor dispute resolution mechanisms negatively impact consumer trust. Camilleri emphasized that platforms with transparent seller verification, clear return policies, and

effective customer support systems significantly reduce perceived risks [35].

4.7 Website Attractiveness

A notable finding emerged regarding website aesthetics: contrary to conventional wisdom, website attractiveness did not significantly influence consumers' online purchasing decisions. Most respondents did not rank website design as a primary factor for online shopping. This insight challenges the prevalent assumption that attractive website design serves as a key element of e-commerce engagement, suggesting instead that functional aspects such as convenience and price play more decisive roles in consumer decision-making.
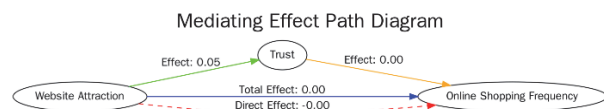

Figure 4 Mediating effect path diagram

The mediation effect analysis reveals a total effect value of 0.088, which rounds to approximately 0.09 when retaining two decimal places. This indicates that "website attractiveness" has a positive total impact on "online shopping frequency". Specifically, as website attractiveness increases, there is a tendency for online shopping frequency to rise, although this impact is relatively small. The effect of the independent variable on the mediator variable is 0.106, approximating to 0.11 when rounded to two decimal places. This suggests that "website attractiveness" positively influences "trust". In other words, a more attractive website is associated with higher consumer trust. The direct effect value is 0.098, which rounds to approximately 0.10 when retaining two decimal places. This means that, even after accounting for the mediating variable "trust," "website attractiveness" still has a positive direct impact on "online shopping frequency". Moreover, the direct effect is slightly larger than the total effect.

This analysis highlights the nuanced roles of website attractiveness in influencing online shopping behavior, both directly and indirectly through trust.

5 DISCUSSION
5.1 Interpretation of the Driving Factors in Online Shopping

The study identified convenience, product type, price, and after-sale service quality as key drivers influencing Chinese consumers' online shopping behavior. These findings align with the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB). Convenience reflects the high perceived ease of use of online shopping, which is consistent with the positive impact of "perceived ease of use" on behavioral intention in TAM. The importance of product type and price demonstrates consumers' pursuit of "perceived usefulness" in the context of online shopping. A wide range of products and competitive prices make consumers believe that online

shopping can better meet their needs, thereby enhancing their willingness to purchase. Additionally, the significant impact of after-sale service quality indicates that consumers consider potential risks and uncertainties when making purchase decisions. High-quality after-sale service provides psychological assurance and reduces perceived risks, which corresponds to the concept of "perceived behavioral control" in TPB. Consumers are more likely to engage in online shopping when they believe they can effectively deal with potential issues during the shopping process.

From a marketing strategy perspective, e-commerce platforms should focus on optimizing search and filtering functions to enhance shopping convenience, reducing consumers' time and effort. At the same time, platforms should enrich product types, provide detailed product information, and offer diverse choices to meet the needs of different consumers. In terms of pricing strategies, platforms can collaborate with suppliers and optimize supply chain management to offer more competitive prices and attractive promotions, targeting price-sensitive consumers. Moreover, platforms need to pay attention to after-sale service by establishing rapid response mechanisms, simplifying return and exchange processes, and providing high-quality customer support to enhance consumer trust and loyalty.

5.2 Barriers to Online Shopping

The study found that security concerns are a major barrier to online shopping, which is consistent with previous research on consumer online shopping behavior. From a theoretical standpoint, security concerns are related to consumers' "perceived risk" of online transactions. This perceived risk is negatively correlated with "perceived usefulness" in TAM; that is, consumers' concerns about security issues weaken their perception of the usefulness of online shopping, thereby reducing their purchase intentions. Additionally, security concerns are associated with "subjective norms" in TPB. Consumers are influenced by the evaluations and suggestions of people around them regarding the security of online shopping, which in turn affects their own behavioral intentions.

To overcome this barrier, e-commerce platforms need to take a multi-faceted approach. Technologically, platforms should enhance data encryption, adopt advanced security protocols, and ensure the secure transmission and storage of consumers' personal and payment information. At the user experience level, platforms can provide transparent privacy policies and explanations of security measures to help consumers understand how their data is protected. Platforms can also add security certification logos, user reviews, and case studies to enhance consumers' trust in platform security. Furthermore, platforms can collaborate with third-party security agencies to conduct regular security audits and risk assessments to identify and address potential security issues in a timely manner.

5.3 Website Attractiveness as Insignificant Role

The study unexpectedly found that website attractiveness has a minimal impact on consumers' online shopping decisions, which contradicts the common belief in previous studies that website design and visual appeal significantly influence consumer purchasing behavior. From a theoretical perspective, this finding may be related to the "task-oriented" behavior of consumers during online shopping. According to the Task Characteristics Theory, when consumers engage in online shopping, they primarily focus on the efficiency and effectiveness of completing the shopping task rather than the visual appeal of the website. When consumers clearly know what products they need to purchase, they tend to directly search for and filter relevant products without paying much attention to the website's design style. Additionally, this finding reflects consumers' adaptive behavior in an information-overloaded environment. In the internet age, consumers are exposed to a vast amount of information every day, and they have gradually learned to filter out information unrelated to their shopping tasks, thereby reducing the impact of website attractiveness on purchasing decisions.

For e-commerce platforms, this finding suggests that more resources should be allocated to enhancing functionality and user experience rather than excessively pursuing visual design. Platforms should optimize the website's navigation structure, ensure the accuracy and convenience of search functions, and improve page loading speed to meet consumers' demands for shopping efficiency. Moreover, platforms can use user behavior analysis tools to understand consumers' browsing paths and dwell times on the website, and optimize website layout and functional settings accordingly to further enhance user experience.

6 CONCLUSION

This study aimed to explore the key factors influencing Chinese consumers' online shopping behavior. Through quantitative analysis, it revealed that convenience, product type, price, and after-sale service quality are the main factors driving consumers' online shopping, while security concerns are the primary barrier. Additionally, the study found that website attractiveness has a negligible impact on consumers' online shopping decisions, providing a new perspective for e-commerce platforms' website design and optimization.

Based on the research findings, e-commerce platforms should formulate long-term development strategies. Despite the valuable insights provided by this study, there are some limitations. First, the sample was predominantly female, which may skew the results towards reflecting the shopping behavior characteristics of female consumers rather than the overall consumer behavior pattern in China. Future research should strive to balance the gender ratio of the sample to obtain more representative results. Second, the study employed a cross-sectional design, which only reflects consumer behavior at a specific point in time and cannot capture changes in consumer behavior over time. Future research is recommended to adopt a longitudinal design to track changes in consumer behavior over different periods, thereby better understanding market dynamics and the evolution of consumer behavior. Moreover, the study

did not cover other factors that may influence online shopping behavior, such as trust, overall shopping experience, and marketing strategies. Future research can further explore the mechanisms of these factors to enrich the understanding of consumer online shopping behavior.

Based on the study findings, e-commerce platforms should focus on enhancing shopping convenience, enriching product types, optimizing pricing strategies, and improving after-sale service quality to increase consumer acceptance and participation in online shopping. At the same time, platforms need to take effective measures to address security issues, enhance consumer trust in online transactions through technological means and transparent privacy policies. For policymakers, it is essential to strengthen the regulation of the e-commerce market, enact relevant laws and regulations to protect consumer rights, and promote the healthy development of the e-commerce industry. Future research can adopt a mixed-methods approach, combining quantitative and qualitative data, to more comprehensively reveal the complexity and diversity of consumer online shopping behavior.

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