



Research Paper

The impact of consumer characteristics on the purchasing behavior of fresh e-commerce products: the mediating effect of consumer demand

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Abstract: In recent years, the Chinese consumer market has demonstrated a gradual trend towards expanding its online business, giving rise to various sectors of the e-commerce industry, with the fresh e-commerce industry showing immense potential. This article employs two approaches, synthesizing literature research and empirical analysis, to discuss the relationship between consumer characteristics, consumer demands, and the purchasing behavior of fresh e-commerce products, while attempting to establish a research model and propose hypotheses. The analysis leads to the conclusion that, within the context of fresh e-commerce development, consumer characteristics significantly impact consumer purchasing behavior, with consumer demands exhibiting some mediating effects.

Keywords: Fresh E-commerce; Consumer Characteristics; Demands; Purchasing Behavior.

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I. Introduction

With the rapid development of e-commerce, consumers have shifted their shopping habits online, selecting the products they need and altering their consumption beliefs and behavior. Furthermore, this conventional form of e-commerce has gradually expanded into the realm of fresh products, enabling consumers to make online purchases of fresh goods, while also offering various advantageous pricing strategies. However, there is a crucial point worth noting: even if the pricing of fresh products on e-commerce platforms is sufficiently low, many of these items are not essential to consumers' daily lives. Products such as various condiments and less flavorful fresh produce are not likely to be purchased solely based on their lower price. This is due to the constraint imposed by consumer demand. Xu Fen and Chen Honghua (2020) highlighted that the high immediacy, gross profit, and repeat purchase characteristics of fresh products have become the focal points for e-commerce platforms to attract consumers. These items, as essential necessities in people's daily lives, have gradually entered the realm of e-commerce [1]. Particularly, the pandemic has led consumers to change their purchasing habits, as they find traditional offline grocery shopping inconvenient. The emergence of fresh e-commerce platforms has naturally been welcomed by consumers. In order to gain greater benefits, fresh e-commerce platforms focus on consumer characteristics and cater to their personalized needs by providing efficient services.

Consumers are the main users of fresh products, and studying their characteristics and purchasing behavior holds significance for both consumers and fresh e-commerce platforms in formulating marketing strategies. The purpose of this study is to explore how consumer characteristics influence purchasing behavior within the context of fresh e-commerce development. Combining relevant theories and existing literature, we have constructed a hypothetical model of the relationship between consumer characteristics and purchasing behavior. By collecting data through questionnaire surveys, we have employed empirical analysis to examine the impact mechanisms between consumer characteristics, demands, and purchasing behavior, drawing relevant conclusions.

This article employs three research methods: literature review, questionnaire surveys, and empirical analysis. We have reviewed relevant literature on fresh e-commerce, consumer characteristics, consumer

demands, and purchasing behavior. The collected data were analyzed using descriptive statistics, reliability and validity analysis, and regression analysis in SPSS 26.0 software. Finally, we have validated the model.

II. Literature review

2.1 Fresh e-commerce

Fresh e-commerce refers to electronic commerce platforms that directly trade fresh products online, encompassing specific items such as vegetables, fruits, and meats. Zan Mengying, Chen Guangwang, and Zhengbing (2020) have delineated the developmental phases of China's fresh e-commerce into three stages: the exploratory start-up period from 2005 to 2011, the rapid development phase from 2012 to 2015, and the transitional upgrade period from 2016 to the present [2]. The inception of Yi Guo Fresh in 2005 marked the initiation of the fresh e-commerce era, followed by the emergence of companies such as Tuotuo Gongshe and You Cai Wang. By 2012, online platforms like Benlai Life and SF Prime quickly developed under the impetus of capital. Post-2016, with the popularization of the e-commerce O2O model, platforms such as Miss Fresh, JD Daojia, Meituan Select, and Duoduo Self-pick have proliferated, especially with the rapid increase in consumer demand during the pandemic. The continued development of China's fresh e-commerce has also driven continual optimization of cold chain technology, sales models, and other technologies, resulting in the continuous expansion of the market share of fresh e-commerce platforms.

Fresh e-commerce differs significantly from traditional fresh produce stores. The main transactions for traditional fresh products primarily occur through offline vegetable markets and supermarket channels, often resulting in oversupply and necessitating consumers to expend time in selecting the required products. However, traditional fresh produce is managed with extensive experience, and the quality and freshness of the products are superior to those of fresh e-commerce. Driven by big data technology, fresh e-commerce has overcome limitations of time and space, reducing excess inventory and implementing advanced logistics distribution to achieve precise on-demand supply and distribution. The after-sales service is also more stable, enhancing the efficiency of consumers purchasing required products. The entire process, from ordering to collection, is intelligently achieved, highlighting the evident convenience of purchasing fresh produce online.

2.2 Consumer characteristics

In regard to consumer characteristics, Yang Peihong (2014) investigated these traits through online shopping experiences [3]. Due to the substantial research significance of demographic stability, the autonomous independence of preferences, and the value of e-commerce studies focused on online shopping experiences, variables such as demographics, lifestyle, online shopping experience, and subjective preferences were selected for examining the impact on consumer behavior. Bellman (1999) noted that consumer demands are influenced by demographic characteristics [4]. Other scholars have approached consumer traits through lifestyle, that is, the differing ways of life across consumer groups. Tian Quan (2009) studied these from the perspectives of consumers' life and consumption philosophies, finding that lifestyle trait variations can affect purchasing behavior [5]. Additionally, consumer subjective preferences refer to the judgment consumers exercise, based on their own tastes, when comparing various goods or services, and while making purchasing decisions. Gao Tian (2019) categorized subjective preferences into safety, popularity, convenience, reliability, and economy, and analyzed the impact of these preferences on consumer needs and purchasing behavior [6]. Therefore, consumer characteristic diversity influences demands, which in turn, affects purchasing behavior.

2.3 Consumer demand

Zhao Yu, Zhai Yuming, and Yang Shasha (2016) contended that consumer demand is the manifestation of a consumer's purchasing desire for a product, the result of an interplay between purchasing power and buying needs [7]. Various scholars have delved into the concept of demand, such as Maslow's hierarchy of needs, Kotler's identification of "needs, wants, and demands" as core marketing concepts, and Robert's 4Cs theory, which orients itself around consumer demand; each of these theories underscores the importance of researching consumer demand. Additionally, Hill, Fishbein, and Ajzen (1977) posited that psychological or physiological needs of consumers can influence purchasing behavior [8]. Zhu Zhixian's (1984) psychological research also discovered that consumer demand is a precursor to consumer buying behavior, a psychological indicator guiding the acquisition of desired goods [9]. As fresh products are indispensable in people's lives, the sustained high demand for fresh goods dictates the degree of consumers' reliance on fresh e-commerce platforms. However, the reality is that the incidence of purchasing does not automatically arise even with the consumer's economic capability, a rich lifestyle, online shopping experience, and strong subjective preferences; it is essential to analyze whether there is a consumptive demand because, without it, even if the fresh products are priced low and regardless of the richness of the online shopping experience, purchasing behavior may not materialize. Therefore, this article posits consumer demand as a mediating variable to explore its role in consumer purchasing behavior.

2.4 Purchasing behavior

Purchasing behavior refers to the totality of an individual's actions when acquiring goods or services, with such behavior catalyzed by the emergence of consumer needs and motivations. Considering that fresh products are essential commodities, intense motivational needs towards these products on e-commerce platforms can subsequently lead to purchasing actions. Investigating the purchasing behavior concerning fresh products can empower e-commerce enterprises specializing in this category to master consumer preferences more effectively and thereby devise sound marketing strategies. Ajzen in 1991 introduced the Theory of Planned Behavior (TPB), which is an advancement and refinement of the Theory of Reasoned Action (TRA). Stock and Hoyer (2005) noted that TRA presumes people's actions as wholly rational, and that actions are taken only when the feasibility of an action is pronounced [10]. Yet, in real life, rationality is influenced by numerous factors, and TPB posits that human behavior is the result of deliberate mental planning, not solely governed by rationality, but also by needs and desires. The TPB model suggests that behavioral intentions are determined by three critical elements: attitudes towards the behavior, subjective norms, and perceived behavioral control, which in turn stimulates actual actions. Notably, perceived behavioral control can influence behavior directly, without the intermediary of behavioral intention. Therefore, adopting the TPB model facilitates the examination of whether consumer characteristics and demands positively affect purchasing behaviors towards e-commerce fresh products.

III. Research Design

3.1 Model construction

Building on the analysis presented in the literature review and considering the backdrop of the burgeoning fresh e-commerce industry, this paper draws upon the theoretical framework of the Theory of Planned Behavior, selecting consumer characteristics as independent variables—encompassing demographics, lifestyle, online shopping experience, and subjective preferences—to investigate their impact on consumer purchasing behavior. Furthermore, the study introduces consumer demand as a mediating variable, as illustrated in Figure 1.

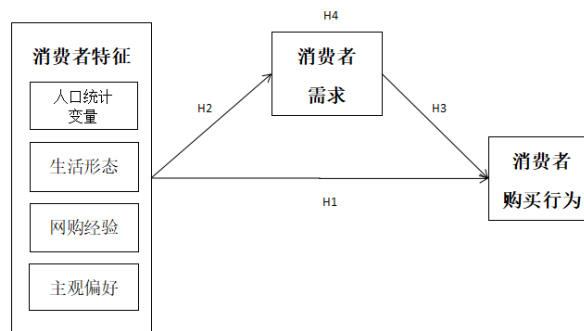


Figure 1: Model construction of the research

3.2 Hypotheses

Yin Lijuan et al. (2018) posited that individual characteristics exert palpable influence on e-commerce, noting a direct correlation between age and online shopping frequency, with older individuals tending to shop online less frequently. According to Yan Jianguo (2021), there is a certain relationship between gender and online shopping, while research by Sheu et al. (2008) has highlighted that economic income strongly impacts e-commerce shopping practices, with higher-income consumers being more inclined to use online shopping platforms. Li et al. (1999) work underscored that educational attainment positively affects consumers' online purchasing behaviors. Zhang Liru (2018) suggested that consumers' lifestyle choices are intimately connected to their upbringing, personal interests, and value orientations, significantly correlating with purchasing behaviors. Diverse groups exhibit different patterns in the usage of fresh produce e-commerce based on their lifestyles. As online shopping becomes a ubiquitous method of purchasing, consumer experience with it is also increasing, with past experiences often subconsciously influencing decision-making processes and, consequently, purchasing behaviors directly. Examining consumer preferences from multiple dimensions, it becomes evident that these preferences, alongside needs and purchasing behaviors, are intricately linked. Liu Jiang et al. (2012) found that online shoppers' behaviors are frequently swayed by herd mentality, leading to trend-based preferences. The perceived economic advantages of e-commerce products have imperceptibly drawn considerable consumer favor. Generally, consumers place a high premium on food safety; thus, the perceived safety of products is a critical determinant in the use of e-commerce for their purchases. Synthesizing the aforementioned explorations, the article proposes the following research hypotheses (Table 1).

Firstly, consumer characteristics have a significant relationship with the purchasing behavior of fresh produce on e-commerce platforms, and the four dimensions within consumer characteristics positively affect purchasing behavior.

Secondly, consumer characteristics have a positive impact on consumer demand, with all four dimensions within exerting a positive effect.

Thirdly, consumer demand has a positive impact on purchasing behavior.

Fourthly, during the purchase of fresh produce through e-commerce platforms, consumer demand mediates the effect of consumer characteristics on purchasing behavior.

Table 1 Research hypotheses of this research

1	H	Consumer characteristics have a positive impact on consumer purchasing behavior in fresh e-commerce
1a	H	Demographic characteristics have a positive impact on consumer purchasing behavior
1b	H	Consumer lifestyle positively influences consumer purchasing behavior
1c	H	Consumer online shopping experience positively influences consumer purchasing behavior
1d	H	Consumer subjective preferences have a positive impact on their purchasing behavior
2	H	Consumer characteristics have a positive impact on consumer demand
2a	H	Demographic characteristics have a positive impact on consumer demand
2b	H	Consumer lifestyle positively influences consumer demand
2c	H	Consumer online shopping experience has a positive impact on consumer demand
2d	H	Consumer subjective preferences have a positive impact on consumer demand
3	H	Consumer demand has a positive impact on consumer purchasing behavior
4	H	Consumer demand plays a mediating role in the process from consumer characteristics to purchasing behavior

3.3 Questionnaire design

The questionnaire of this study was meticulously crafted, grounded on our theoretical model and its accompanying hypotheses, with a focus on exploring the influence of consumer characteristics on their purchasing behavior, and determining if consumer demand plays a mediating role. The survey commences by delineating its objective to respondents, followed by a structured design across three distinct dimensions: demographic information of participants, basic usage patterns of fresh food e-commerce, and the core content of the questionnaire. The first section collates essential demographic data including gender, age, occupation, level of education, and monthly disposable income. The second section delves into participants' usage of fresh food e-commerce, encompassing preferences for purchasing channels, prior utilization of fresh food e-commerce platforms, and the frequency of online purchases of fresh products. The third section, forming the crux of the questionnaire, assesses participants' lifestyles, online shopping experiences, and subjective preferences, as well as their needs and behaviors relating to fresh food e-commerce.

4. Data analysis

4.1 Sample Descriptive Analysis

This article uses QuestionStar software to publish questionnaires in the area of Zhaoqing City in China. A total of 340 questionnaires were collected, and 325 valid questionnaires were obtained, achieving an effective response rate of 95.6%. We conducted sample descriptive analysis on the questionnaire, as shown in Table 2:

Table 2 Descriptive Statistical Analysis of Samples

Variable	Types	Number of samples	Percentage(%)	Cumulative percentage(%)
Gender	Male	123	37.8	37.8
	Female	202	62.2	100
Age	Under 20 years old	30	9.2	9.2
	21-30	168	51.7	60.9
	31~40	78	24	84.9
	41~50	35	10.8	95.7
	Over 50 years old	14	4.3	100

	Junior high school and below	10	3.1	3.1
Education level	Senior high school	41	12.6	15.7
	Junior college education	73	22.5	38.2
Occupation	Undergraduate	176	54.2	92.3
	Master's degree and above	25	7.7	100
	Student	109	33.5	33.5
	Enterprise workers	117	36	69.5
	Government and public institutions	48	14.8	84.3
	Freelancers	38	11.7	96
	Individual businesses	11	3.4	99.4
Disposable monthly income	Others	2	0.6	100
	Below 1000 yuan	38	11.7	11.7
	1000-3000 yuan	127	39.1	50.8
	3000-5000 yuan	64	19.7	70.5
	5000-8000 yuan	65	20	90.5
	Over 8000 yuan	31	9.5	100
Online shopping experience	Within 1 year	38	11.7	11.7
	2-4 years	79	24.3	36
	5-7 years	150	46.2	82.2
	Over 8 years	58	17.8	100
Fresh e-commerce usage frequency	1 - 3 times per month	124	38.2	38.2
	4 - 6 times per month	143	44	82.2
	6 or more times per month	58	17.8	100.00

The survey captured a range of demographic information from participants, including gender, age, educational attainment, occupation, and monthly disposable income. Within the sample of 325, over half were women, outnumbering men by 24.4%, predominately due to a higher incidence of invalid responses from men regarding previous use of fresh food e-commerce and shopping experience. The age distribution indicated that consumers between 21 to 30 years old constituted 51.7%, serving as the primary force behind community fresh food e-commerce consumption; those aged 31 to 40 accounted for 24%, representing the secondary driving demographic, with representation across all age groups. The educational background revealed that individuals with at least an associate degree made up 84.4% of the sample, suggesting a generally high level of education among respondents. Company employees comprised 36% of those surveyed, marking one of the key participant demographics. To gauge economic status, the study used monthly disposable income as a metric, with data showing that 39.1% of the sample had a disposable income between 1,000 to 3,000 yuan, and 39.7% earning between 3,000 to 8,000 yuan, indicating that the respondents were economically well-off, reflective of the continuous improvement in the general economic development and living standards of the population. Additionally, 46.2% of participants had an online shopping history stretching 5 to 7 years, with a balanced distribution across other time intervals beyond one year, revealing that the subjects generally possessed online shopping experience. Regarding the frequency of fresh food e-commerce use, the segments of 1-3 times per month and 4-6 times per month accounted for 38.2% and 44% respectively, demonstrating that the majority of respondents engaged in frequent purchasing activities in the realm of fresh food e-commerce.

4.2 Reliability and Validity

This article employs the Cronbach's Alpha coefficient to measure the reliability of the questionnaire. As a rule of thumb, a coefficient exceeding 0.8 indicates high reliability, while a value between 0.7 to 0.8 signifies commendable reliability. The specific outcomes are presented in Table 3.

Table 3 Reliability Analysis

Variable	Number of items	Cronbach's Alpha
Consumer characteristics	15	0.743
Consumer demand	2	0.842
Consumer purchasing behavior	2	0.779
Total	19	0.864

As indicated in Table 3, the Cronbach's alpha coefficients for the consumer characteristic variables, consumer demand variables, and consumer purchasing behavior variables all exceed 0.7, with the overall questionnaire surpassing a Cronbach's alpha of 0.8. This demonstrates the high reliability of the survey,

rendering it suitable for empirical analysis and effectively evaluating the impact of consumer characteristics and consumer demand on purchasing behavior.

This article utilizes the KMO and Bartlett's test of sphericity. As demonstrated in Table 4 below, the data from this questionnaire are highly suitable for factor analysis, evidenced by a KMO value of 0.920, which exceeds the threshold of 0.9. Additionally, the Bartlett's test yields a p-value of 0.000, indicating significant inter-variable correlations.

Table 4 KMO and Bartlett's test

KMO value	0.920
Bartlett sphericity test	Approximate chi-square
	<i>df</i>
	<i>p</i> value
	2885.807
	171
	0.000

Table 5 Total variance analysis

Component	Total variance explained									
	Initial eigenvalue				Extract the sum of squared loads				Rotating load sum of squares	
	Total	Variance percentage	Cumulative percentage	Cumulative percentage	Total	Variance percentage	Cumulative percentage	Cumulative percentage	Total	Variance percentage
1	.287	8.353	38.353	38.353	.287	8.353	38.353	38.353	.361	8.217
2	.651	.690	47.043	47.043	.888	.690	47.043	47.043	.601	3.689
3	.280	.737	53.780	53.780	.280	.737	53.780	53.780	.878	8.882
4	.217	.405	60.185	60.185	.217	.405	60.185	60.185	.227	4.60
5	.004	.287	65.471	65.471	.004	.287	65.471	65.471	.149	0.47
6	.828	.358	69.830	69.830	.828	.358	69.830	69.830	.052	5.535
7	.764	.002	73.852	73.852						
8	.710	.737	77.589	77.589						
9	.647	.403	80.992	80.992						
10	.583	.069	84.061	84.061						
11	.481	.533	86.594	86.594						
12	.464	.444	89.039	89.039						
13	.420	.211	91.249	91.249						
14	.389	.048	93.297	93.297						
15	.324	.704	95.002	95.002						
16	.301	.583	96.584	96.584						
17	.262	.379	97.963	97.963						
18	.207	.089	99.053	99.053						
19	.180	.947	100.000	100.000						

Extraction method: principal component analysis

Employing principal component analysis, this paper extracts six common factors, achieving a cumulative variance contribution rate of 69.830% as delineated in Table 5. The extent to which these common factors elucidate the components within the table is deemed acceptable. Consequently, the questionnaire design of this study meets the criteria for hypothesis testing.

4.3 Hypotheses testing

The initial step of this study involves examining the impact of consumer characteristics on purchasing behavior, necessitating an analysis articulated through demographic attributes, lifestyle patterns, e-commerce experience, and subjective preferences.

Table 6 Independent sample t-test for gender

gender		Independent sample test						
		Levin's test for homogeneity of variance	Significance	t	Sig. (double tailed)	Mean value difference	Standard error difference	
purchasing behavior	Assuming equal variance	.509	0.481	.000	8	0.05	0.4	0.208
	Not assuming equal variance			.817	.952	0.11	0.4	0.229

The influence of demographic characteristics on consumer purchasing behaviors can be observed in Table 6, which indicates a significance level (p-value) of 0.481 for these attributes. Consequently, the test result rejects the null hypothesis, signifying that gender has an insignificant effect on consumer purchasing behavior.

Table 7 ANOVA test for age, education level, occupation, and disposable monthly income

		ANOVA				
		Sum of squares	df	mean square	F	significance
age	Inter group	39.924	4	9.981	9.787	0
	With in group	326.345	320	1.020		
	total	366.269	324			
education level	Inter group	37.293	4	9.323	9.069	0
	With in group	328.976	320	1.028		
	total	366.269	324			
occupation	Inter group	85.370	5	17.074	19.390	0
	With in group	280.900	319	0.881		
	total	366.269	324			
disposable monthly income	Inter group	78.167	4	19.542	21.706	0
	With in group	288.102	320	0.900		
	total	366.269	324			

As Table 7 elucidates, the variables of age, educational attainment, occupation, and disposable monthly income all hold a significance value of zero, thus markedly influencing consumer purchasing behavior. Synthesizing this data, it becomes evident that consumer purchasing behavior is significantly affected by the demographic dimensions of age, education level, occupation, and disposable income, while remaining unaffected by gender. Drawing upon the findings of Yang Peihong (2014), which suggested the variables within demographic characteristics each have a significance value greater than 0.05, and Yu Jiawei's (2021) research indicating no significant impact of demographic characteristics on consumer purchasing behavior, this study consequently rejects the H1a hypothesis in its entirety.

The influence of consumer lifestyle on purchasing behavior is a focal point of this research, for which correlational analyses are employed to test relevant hypotheses regarding its effect. Table 8 clearly indicates that each variable possesses a significance value less than 0.05. Thus, the five variables pertaining to lifestyle exhibit a statistically significant correlation with purchasing behavior at the 0.01 level. The pace of life is inversely related to consumer purchasing behaviors, while the remaining four variables show a positive correlation. Consequently, hypothesis H1b is validated.

Table 8 Correlation analysis between lifestyle and purchasing behavior

Variable	Purchasing behavior	
	Pearson correlation	Sig. (Double tailed)
Life rhythm	-.218**	0
Daily online shopping	.470**	0
Online shopping during COVID-19	.519**	0
Use frequency of e-commerce platform under COVID-19	.510**	0
Average cooking frequency per week	.413**	0

** At the 0.01 level (double tailed), the correlation is significant.

The impact of consumers' online shopping experience on their purchasing behavior represents the core of this analysis. An ANOVA test was conducted to examine the hypothesis concerning this influence. According to the data presented in Table 9, the significance value of online shopping experience exceeds 0.05, indicating no significant effect on consumer purchasing behavior, and therefore, hypothesis H1c is rejected.

Table 9 ANOVA test of online shopping experience

		Sum of squares	f	mean square	significance
Online shopping experience	Inter group	6.095		2.03	.811
	Within group	360.17		1.12	
	total	366.26	21	2	
		9	24		

The influence of consumer subjective preferences on purchasing behavior is scrutinized in this study, with the use of correlational tests to validate related hypotheses. As illustrated in Table 10, each variable holds a significance value of less than 0.05, thereby affirming a statistically significant relationship at the 0.01 level between the four variables of subjective preference and purchasing behavior. Furthermore, each variable's Pearson value is positive, indicating a directly proportional relationship with consumer purchasing actions, thus confirming hypothesis H1d.

Table 10 Correlation analysis between subjective preferences and purchasing behavior

Variable	Purchasing behavior	
	Pearson correlation	Sig. (Double tailed)
Economy	.761**	0
Convenience	.760**	0
Security	.727**	0
Epidemic	.511**	0

** At the 0.01 level (double tailed), the correlation is significant.

This paper probed the effect of consumer characteristics on purchasing behavior through linear regression analysis. Table 11 reveals that when consumer characteristics serve as independent variables and purchasing behavior as the dependent variable, the adjusted R² value is 0.541, indicating that the model accounts for 54.1% of the variance, justifying the establishment of a regression equation. The consumer characteristics have an unstandardized coefficient of 1.657 and a standardized coefficient of 0.736, with a p-value significantly less than 0.001. The regression analysis demonstrates a positive correlation between consumer characteristics and purchasing behavior. Given that hypotheses H1a and H1c were not supported, while H1b and H1d were, it can be concluded that the hypothesis H1 is partially confirmed.

Table 11 Regression analysis of consumer characteristics on purchasing behavior

Model	Unstandardized coefficient		Standardized Coefficient Beta	Significance	R ²	Adjusted R ²
	B	standard error				
(Constant)	1.375	0.271	5.080	0		
Consumer characteristics	.657	0.085	0.736	0	.542	0.41

Dependent variable: Consumer purchasing behavior

In the second phase, we examine the impact of consumer characteristics on purchasing behavior mediated by consumer demand, employing linear regression analysis to verify the ensuing hypotheses. Firstly, the influence of consumer characteristics on demand is confirmed, as evidenced by Table 12, where consumer characteristics as the independent variable and demand as the dependent variable, demonstrate an unstandardized coefficient of 1.608, a standardized coefficient of 0.707, and a p-value of less than 0.001, indicating a positive correlation and supporting hypothesis H2. Secondly, the effect of consumer demand on purchasing behavior is illustrated in Table 13, where consumer demand as the independent variable and purchasing behavior as the dependent variable yield an adjusted R² value of 0.760, signifying that 76% of the variance in the model is accounted for, endorsing the establishment of a regression equation. The characteristics present an unstandardized coefficient of 0.863, a standardized coefficient of 0.872, with a p-value significantly below 0.001, confirming a positive correlation with consumer purchasing behavior and validating hypothesis H3. Lastly, the role of consumer demand as a mediating variable is considered.

Table 12 Regression analysis of consumer characteristics on consumer demand

Model	Unstandardized coefficient		Standardized Coefficient Beta	Significance	R ²	Adjusted R ²
	B	standard error				
(Constant)	1.197	0.286	4.185	0		
Consumer characteristics	.608	0.089	0.707	0	.5	0.498

Dependent variable: Consumer demand

Table 13 Regression analysis of consumer demand on purchasing behavior

Model	Unstandardized coefficient		Standardized Coefficient Beta	Significance	R ²	Adjusted R ²
	B	standard error				
(Constant)	.509	0.109	.688	0		
Consumer demand	.863	0.027	0.872	0	.760	0.60

Dependent variable: Consumer purchasing behavior

The method detailed by Zhou Lei (2015) outlines steps for analyzing mediating variables: First, the significance of the main effect regression coefficient is assessed; hypothesis H1's confirmation suggests a significant main effect. Second, the relationship between the independent variable and the mediating variable is examined for significance; the validation of hypothesis H2 indicates a significant regression coefficient. Third, the linear regression influence of both the independent and mediating variables on the dependent variable is investigated for significance. As shown in Table 14, the unstandardized coefficient of the mediating variable is 0.695, the standardized coefficient is 0.703, and the p-value is less than 0.001, demonstrating significance. Fourth, the impact of the independent and mediating variables on the dependent variable is analyzed via linear regression; Table 14 reveals the independent variable's unstandardized coefficient at 0.539, the standardized coefficient at 0.240, and a p-value less than 0.001, indicating a significant independent variable coefficient. Thus, a significant mediation effect is present, evidencing a partial mediating effect and confirming hypothesis H4.

Table 14 Regression analysis of consumer characteristics, consumer demand, and purchasing behavior

Model	Unstandardized coefficient	standard error	Standardized Coefficient Beta	Sig nificance	²	Adjusted R ²
(Constant)	0.543	0.189		0.004		
Consumer characteristics	.539	0.081	0.240	.618		0.788
Consumer demand	.695	0.036	0.703	9.416		

Dependent variable: Consumer purchasing behavior

4.4 Discussion of Results

This study proposed 8 hypotheses, and through data analysis, it can be concluded that 6 of them were supported and 2 were rejected, namely H1a and H1c in the total hypothesis H1 were rejected. The specific results are shown in Table 15.

Table 15 Verification of Hypothesis Results

Hypotheses content	Results
H1: Consumer characteristics positively influence consumer purchasing behavior	Partial accept
H1a: Demographic characteristics have a positive impact on consumer purchasing behavior	Reject
H1b: Lifestyle positively influences consumer purchasing behavior	Accept
H1c: Online shopping experience positively influences consumer purchasing behavior	Reject
H1d: Subjective preferences have a positive impact on consumer purchasing behavior	Accept
H2: Consumer characteristics have a positive impact on consumer demand	Accept
H3: Consumer demand has a positive impact on consumer purchasing behavior	Accept
H4: The impact of consumer characteristics on consumer purchasing behavior will have a positive effect through consumer demand	Accept

Based on the above analysis, we need to adjust the model in Figure 1. The revised model is shown in Figure 2, where the solid line represents the supported hypotheses path and the dashed line represents the unverified hypotheses path.

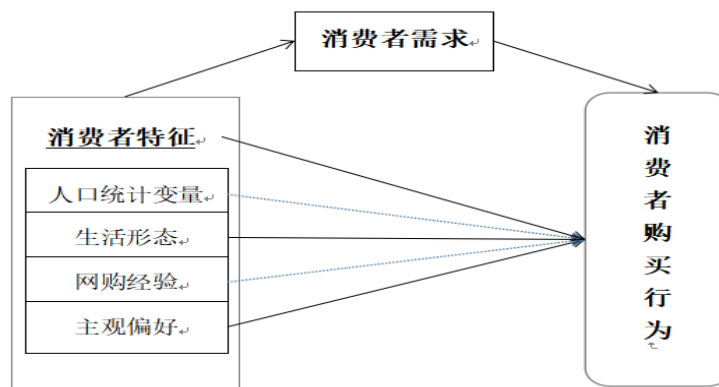


Figure 2 Adjusted model

5. Conclusions and recommendations

5.1 Conclusions

Following an extensive review of the literature, this study principally posits a relationship between consumer characteristics, consumer demand, and purchasing behaviors within the fresh food e-commerce sector, positing eight hypotheses. Subsequently, via the construction of a theoretical model, the design and collection of survey data, and statistical analysis using SPSS 26.0 software, the collected data was scrutinized. Based on these analyses, the research model was refined, culminating in the following inferences: Firstly, consumer characteristics exert a direct and positive effect on purchasing behavior within the fresh food e-commerce domain. The paper meticulously examines four dimensions of consumer characteristics: demographic profiles, lifestyle patterns, online shopping experience, and subjective preferences, probing their influence on purchasing behavior. Findings suggest that within this sphere, consumers predisposed to cooking at home frequently, leading a fast-paced lifestyle, and possessing a clear orientation towards online shopping, are more inclined to adopt and recommend fresh food e-commerce; further, the stronger their preferences for cost-effectiveness,

convenience, safety, and trendiness, the more these influence their purchasing activities. Therefore, it is deduced that consumer characteristics positively impact purchasing behaviors in fresh food e-commerce, with the majority of purchasing activities being habitual and economically driven. Secondly, the influence of consumer characteristics on purchasing behavior is mediated by consumer demand. Within community-based fresh food e-commerce, it is partially mediated, suggesting that consumer characteristics impact purchasing through the mediating role of consumer demand. Thus, for consumers matching the profiles described, their willingness to purchase is heightened upon perceiving a need for community fresh e-commerce services, which in turn affects their buying decisions. It is also observed that most consumer purchasing behavior is rational.

5.1 Recommendations

Elevating the quality and safety of fresh produce, whilst diversifying the range of products, is fundamental to addressing consumers' primary concerns and encouraging their purchasing actions. The fresh food e-commerce industry must enforce stringent controls over product quality and safety. Enhancing the caliber of fresh produce can be achieved through integrated quality control technologies that incorporate cold chain processes, advanced preservation packaging, and efficient logistics. Optimizing cold chain storage technology, prioritizing the preservation environment of fresh products, improving preservation techniques, and rigorous inspection for microbes to prevent spoilage are essential. Employing scientific and appropriate packaging methods tailored to the unique characteristics of different products, boosting the efficiency of distribution, and monitoring during transit to ensure the transportation environment and minimize damage are imperative. Finally, verification of the products' shelf life is critical. Moreover, fresh food e-commerce enterprises should expand their product offerings to increase consumer choice and cater to the diverse needs of different consumer segments.

Enhancing the service quality of fresh food e-commerce platforms is essential. Customer satisfaction with these platforms translates directly into purchasing behavior, necessitating an elevation in service standards. Fresh food e-commerce platforms can bolster service quality by streamlining the shopping process, presenting comprehensive, accurate, and clear product information on the platform to meet consumer needs; deploying dedicated and responsive customer service personnel to promptly address inquiries; and by fortifying platform credibility, safeguarding consumer privacy, and ensuring the integrity of online transactions.

To accommodate the rapid pace of consumer lifestyles, convenience becomes a significant competitive edge for fresh food e-commerce. The expansion of pick-up point accessibility and the augmentation of logistics efficiency are critical. By extending the reach of pick-up locations across urban and rural areas, more consumer demographics can be accommodated, necessitating faster dispatch times to ensure timeliness in pick-ups, thereby enabling consumers to promptly obtain their desired fresh products and thus attract a broader consumer base.

Fine-tune price positioning and promotional activities. The economic aspect of consumer subjective preferences reveals that a majority of consumers value cost-effectiveness in fresh food e-commerce products. Thus, pricing should reflect the product's competitive advantage. Approach product pricing by staying abreast of market trends to minimize procurement costs and lower product prices; adjust inventory to control wastage and formulate comprehensive sales plans; integrate sales strategies with promotional pricing, offering coupons to new patrons and a points system for loyal clients, including points redemption, coupons, and lotteries, to attract new customers and maintain existing ones.

Intensify the promotional efforts of the fresh food e-commerce platform. Surveys suggest that the popularization of fresh food e-commerce inspires some consumer usage, necessitating enterprises to bolster their promotional activities to heighten consumer awareness of e-commerce significance and stimulate demand. With the majority of fresh food e-commerce consumers being experienced online shoppers familiar with the internet, businesses may expand advertising outreach by purchasing ads across multiple social media platforms and search engines, ensuring clientele encounter product advertisements during their browsing activities.

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