

Research on the Relationship between Service Quality and Customer Loyalty for Fresh Food E-commerce in the Background of New Retail

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Abstract In the context of new retailing, fresh food e-commerce is increasingly blending with online and offline channels. Given the perishable and time-sensitive nature of these products, service quality has emerged as a key factor for competitive advantage and long-term growth. Using the SOR and PPM models, this study builds a relationship model between service quality and customer loyalty in fresh food e-commerce. Drawing on 516 valid questionnaires and structural equation modeling, the analysis offers recommendations for retailers to enhance service quality, user engagement, and competitiveness.

Keywords: new retailing, service quality, customer satisfaction, customer loyalty

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1. Introduction

The rapid development of the Internet has broken the limitations of time and space, and also brought the development of the fresh food industry into a brand new era. In recent years, the scale of China's fresh food retail market has maintained steady growth, and according to the data published by Avery Consulting, its market scale has grown from 400.78 billion yuan in 2016 to 546.97 billion yuan in 2021, and the online penetration rate has also increased from 2.9% in 2016 to 12.9% in 2021. The online fresh food market is expected to continue its rapid growth from 2.9% in 2016 to 12.9% in 2021. With the improvement of living standard, people pay more and more attention to the freshness of fresh products [1], however, fresh products have the characteristics of not easy to preserve, easy to perish, and high loss rate, which requires high requirements for all aspects of service, and Verbic (2006) [2] pointed out that the service quality has the primary influence on the quality of fresh products in the process of e-commerce transactions. Usually, quality service will improve customer experience, harvest good reputation, attract more potential customers' attention, improve customer satisfaction and loyalty, and become the core competitiveness of enterprises. On the other hand, with the change of consumption environment and consumption concept, the inherent shortage of traditional e-commerce is becoming more and more obvious, and consumers' online

experience is always inferior to offline physical stores. In the virtual Internet-based traditional e-commerce has been difficult to meet the diversified needs of people for high-quality, heterogeneous and experiential consumption. Therefore, "new retail", which aims to meet consumers' needs for diversity, personalization, convenience and immediacy, has become the development direction of today's retail industry. Customer loyalty is one of the core indicators of a company's marketing strategy because the cost of retaining existing customers is 5-10 times lower than the cost of acquiring new customers, and customer loyalty has a greater impact on the word-of-mouth spread of a company's brand and market share among people [3], so it is especially important to study how to improve customer perception of service quality to enhance the impact of customer loyalty. Compared with the traditional e-commerce model, the new retailing model puts consumers more at the core, and consumers' consumption behavior patterns change in the background of new retailing, which in turn promotes consumers' willingness to buy, improves user stickiness, cultivates user loyalty, and realizes the role of attracting traffic for online. Therefore, in the context of this new model of new retailing, the real needs and expectations of consumers for service quality in the fresh food retail industry are explored from the perspective of service quality, and the influencing factors affecting customer loyalty are analyzed, so that practical suggestions can be made to further improve their service quality based on the research results and combined with the current situation.

2. Research Hypothesis

2.1. Literature Review

2.1.1. New Retail

Since the practice of "new retail" is ahead of theoretical research, there is no standard definition of "new retail" in academic circles. Hu, Xiangpei, and Wang, Mingzheng et al. [4] argue that the new retail model is a new mode of operation management that is centered on consumer experience and operational transformation and upgrading, presenting interactive, collaborative, integrated, intelligent, and digitalized online and offline integration to meet the demand of consumer upgrading, achieve the purpose of collaborative optimization and cost reduction and efficiency enhancement of multiple stakeholders, and provide consumers with the ultimate consumer experience. The new operation management model of digitalized online and offline integration can meet the demand of consumption upgrading, achieve the purpose of collaborative optimization and cost reduction and efficiency enhancement of multiple stakeholders, and provide consumers with the ultimate consumption experience. According to Wang Fengquan and others (2023), "new retailing" is the reconstruction of "people", "goods" and "field" in the retail industry through digital technology, so that the three core elements of the retail industry can be integrated and integrated [5]. The new retail is a new business form that integrates online and offline through digital technology to reconfigure the three core elements of the retail industry: "people," "goods," and "field," making them seamlessly integrated and accurately matched. At present, China's retail industry has formed four typical retailing companies, including "Alibaba's New Retail", "Suning's Smart Retail", "Tencent's New Retail" and "Jingdong's Four typical new retail formats have emerged in China's retail industry, including "Alibaba's New Retail", "Suning's Smart Retail", "Tencent's New Retail" and "Jingdong's Borderless Retail". At present, the relevant research mainly focuses on the model, process and results, but there is a lack of research on fresh food e-commerce in the background of new retailing.

2.1.2. Service Quality and Customer Loyalty

Satisfaction and loyalty are the core areas of service marketing research, satisfaction and loyalty are the guarantee of stable profit for the company, and research shows that 80% of the company's profit comes from 20% of the regular customers. The important influencing factor of satisfaction and loyalty is service quality. In 1984, scholar Gronroos [6] considered that service quality is composed of three dimensions: output technical quality (result quality), service performance quality (process quality) and organizational mental image. In 1985, the American service management research group Parasuraman [7] constructed "Service Quality Gap Model". In 1988 Parasuraman et al. established the SERVQUAL (Service Quality) scale, which reduced the service quality dimensions to five dimensions: reliability, responsiveness, assurance, empathy, and tangibility.

With the popularity of the Internet and the development of e-commerce, scholars' research on service quality has been gradually extended to the field of e-service, and based on the SERVQUAL scale, domestic and foreign scholars have summarized and developed many measurement scales applicable to e-service quality. Hongxin Zhao [8] (2016) summarized in his article that some of the measurement models in e-service quality that are commonly adopted now mainly include WEBQUALTM, WebQual4.0, PWQ, E-S-QUAL/E-RecS-QUAL, Web Quality, and other models, and the e-service quality dimensions that are generally recognized by scholars include website design, information content, and usability, security, and privacy, customer service, order fulfillment and delivery, convenience and flexibility, after-sales service, and reverse logistics dimensions [9].

Loyal customers are the source of competitive advantage and an important guarantee for the development of enterprises, and how to cultivate and maintain customer loyalty has become a key issue for the sustainable development of enterprises [10], and clarifying the formation mechanism of customer loyalty has become a research concern for many scholars. At a glance, research on the formation mechanism of customer loyalty can be divided into two directions: (1) to explore the formation path of customer loyalty from drivers and regulators, i.e., to build a customer loyalty model, which is static research; (2) to divide customer loyalty into multiple stages based on the customer relationship life cycle theory, and to explore the drivers and influence paths of customer loyalty in each stage separately, to build a multi-stage customer loyalty model, which is a dynamic study.

2.2. Research Hypothesis

2.2.1. The Relationship between Service Quality and Customer Satisfaction in the Background of New Retailing

To further analyze the correlation between service quality and customer satisfaction, scholars at home and abroad have done a lot of research and analysis. Kent N. Gourd [11] (2006) built a more complete model of e-commerce service experience from the actual situation of online shopping, and he believed that service, as an important part of consumer experience, the quality of enterprise services will seriously affect customer satisfaction and change consumers' evaluation of merchants. Wang Hongxin and Liu Yuhui [12] (2015) found through an empirical study that the service quality of fresh e-commerce affects customer satisfaction, which in turn affects the sales of fresh products.

H1: There is a significant positive effect of service quality on customer satisfaction.

H1a: Reliability has a significant positive effect on customer satisfaction.

H1b: Economical has a significant positive effect on customer satisfaction.

H1c: Empathy has a significant positive effect on customer satisfaction.

H1d: Responsiveness has a significant positive effect on customer satisfaction.

H1e: Experiential has a significant positive effect on customer satisfaction.

2.2.2. The Relationship between Lock-in Factors And Customer Inertia

Customer inertia refers to the tendency of customers to stick with their current buying behavior out of habit or convenience, rather than actively seeking out new options. This attitudinal tendency can be influenced by a range of factors, such as high switching costs, perceived risk, or a strong sense of loyalty to a particular brand or product. In the context of e-commerce, high levels of online involvement and familiarity with a particular platform or retailer can also contribute to customer inertia.

Studies by Wang, Jinli, and others have shown that these barriers to switching can be particularly strong in the online environment, where customers may feel overwhelmed by the abundance of options and uncertain about the quality or reliability of unfamiliar sellers [13]. As a result, they may default to their existing transactional relationships even if they are not entirely satisfied with the products or services they receive. Based on these findings, we propose the following hypothesis.

H2: There is a positive relationship between lock-in factors on customer inertia.

2.2.3. The Relationship between Customer Satisfaction and Customer Inertia

The consumer's purchase decision process is complex and multidimensional. The higher the satisfaction level or frequency of the consumer's shopping experience, the stronger his or her tolerance for that product or service, and the stronger the consumer's willingness to maintain a transactional relationship with that service provider. Lazarus RS [14] argued that consumers' perceptions of internal and external contexts drive changes in their emotions, which in turn influence their choice of rational coping behaviors. TO Hongbo [15] empirically investigated the factors and underlying mechanisms influencing repeat purchase willingness in online and offline integration (O2O) fresh food e-commerce platforms at three levels: push factor, pull factor, and lock factor, and the results showed that customer satisfaction has a significant positive effect on customer inertia. Therefore, the following hypothesis is proposed.

H3: There is a positive relationship between customer satisfaction and customer inertia.

2.2.4. The Relationship between Customer Satisfaction and Customer Loyalty

In 2000, Caruana proposed an integration model between customer satisfaction, customer loyalty, and logistics service quality and conducted an empirical study on this model, which showed that service quality has a significant effect on customer satisfaction and customer loyalty. Through an empirical study, Xu Ying [16] concluded that service quality, through influencing customer satisfaction, ultimately acts on customer loyalty.

H4: Customer satisfaction has a significant positive effect on customer loyalty.

2.2.5. The Relationship between Customer Inertia and Customer Loyalty

Customer inertia is the subconscious habitual buying behavior of customers, which is expressed as the tendency

of consumers to continue to maintain the existing transaction relationship rather than change the status quo and is a human self-protection mechanism. Sun Y [17] found that switching costs reflect the material, informational, and psychological sacrifices and penalties that individuals bear when they face consumption problems such as channel switching, brand switching, and supplier switching. High switching costs make consumers continue to choose their original products and suppliers, which is a key factor that hinders consumer switching behavior. It is therefore hypothesized that:

H5: Customer inertia has a significant positive effect on customer loyalty.

3. Model Construction and Data Collection

3.1. Theoretical Basis

3.1.1. SOR Model

The S-O-R model is a well-known theoretical model proposed by Mehrabian and Russel based on John Watson's stimulus-response model. Applied to this study, consumers are stimulated by various factors in the face of the website platform and thus have various responses corresponding to them. The model can well address the process that leads to the generation of behavior in the presence of stimuli, designing measurement terms from three levels of stimulus source, organism, and response, respectively, discussing the new retail platform's service quality as an antecedent influence factor and consumers' emotional customer satisfaction as an intermediate variable that which in turn influences consumers' loyalty to the brand.

3.1.2. PPM Model

PPM model, also called push-pull-mooring model, an extension of the push-pull theory in the field of population migration, is widely used in the field of sociology and marketing. The push effect is the factor that drives users away from the original service; the pull effect is the positive factor that pulls users toward the new service; the mooring effect is the factor that hinders users' transfer. Tu Hongbo [15] found that when consumers' impressions and relationships with O2O fresh food e-commerce platforms are formed, their behavior of switching purchase platforms or channels is influenced by factors such as switching costs, subjective norms, and online involvement.

3.2. Model Structure

This study examines the latest trends in retail development and aims to identify key factors that new fresh food retailers should focus on to increase customer satisfaction and loyalty. Using a combination of relevant literature and theories, the study constructs a horizontal framework using the SOR model, a vertical framework using the PPM model, and draws on the SERVQUAL model to evaluate service quality with six dimensions: responsiveness, economy, experience, empathy, reliability, and lock-in factor. The results are shown in Figure 1. The

study measures the impact of each dimension of service quality on customer loyalty using customer satisfaction and customer inertia as intermediate variables. By identifying areas where new fresh food retailers can improve customer satisfaction and loyalty, the study provides a basis for these retailers to adjust their strategic planning and invest their limited resources in key areas that affect customer loyalty. Overall, this research aims to provide insights for new fresh food retailers to conduct effective marketing activities in their local environment, increase their competitiveness, and ultimately ensure the sustainable and healthy development of their enterprise.

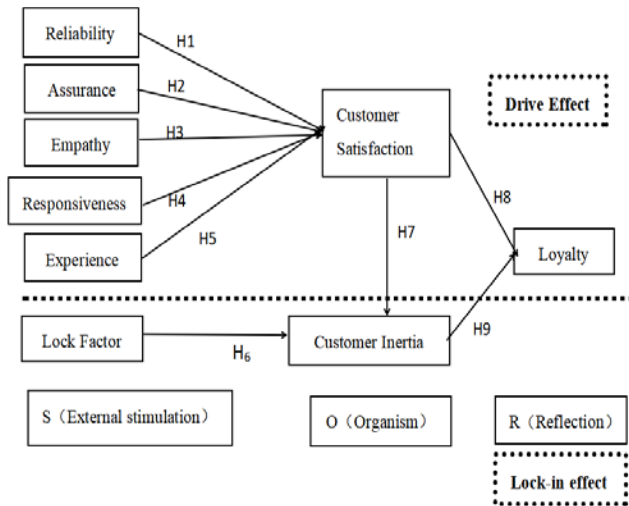


Figure 1. Model diagram based on SOR theory and PPM theory

4. Data Analysis

4.1. Questionnaire Distribution

The data collection of the questionnaire started from March 26th to May 25th, 2022, and the data collection lasted 61 days, and a total of 575 users filled out the questionnaire. After ranking invalid questionnaires, 516 valid questionnaires were screened out, and the effective recovery rate was 89.7%.

4.2. Data Analysis

4.2.1. Reliability and Validity Tests

The reliability test is to avoid random errors and to ensure the degree of consistency of the results obtained

from the measurements. Using SPSS 21.0 tool, the Cronbach's alpha coefficient of each potential variable was measured to be greater than 0.6, and the overall coefficient was 0.827, indicating that the questionnaire has good reliability.

Validity analysis was used to test how well the results of the questionnaire measurement items matched the content of the intended examination. In terms of content validity, the items of the measurement scales used were derived from mature foreign scales and were appropriately modified and supplemented according to the research topic to ensure that the current scale had good content reliability. Convergent validity is the degree of similarity of measurement results when different measures are used to measure the same characteristics. First, the KMO value of the scale was 0.809 using SPSS 23.0 tool, and the Sig value of Bartlett's sphericity test was less than the significant level of 0.05, indicating that it was suitable for factor analysis, and the test results are shown in Table 2. The results of each indicator test for convergent validity are shown in Table 1, and the loadings of each standardized factor were greater than the threshold of 0.5, and the range of CR values was 0.703- 0.961 which is higher than the standard value of 0.7, and the range of AVE values is 0.603-0.931, which is higher than the threshold value of 0.5, and the convergent validity of all potential variable indicators meets the standard.

Table 1. Convergent Validity Analysis Table

Potential Variables	Cronbach's α	CR	AVE
Reliability (RE)	.932	.703	.364
Assurance (AE)	.948	.961	.860
Empathy (EY)	.922	.823	.562
Responsiveness (RS)	.805	.865	.632
Experience (EX)	.910	.852	.626
Lock Factor (LK)	.930	.883	.654
Customer Satisfaction (CS)	.903	.797	.497
Customer Inertia (CI)	.910	.923	.750
Loyalty (LY)	.944	.933	.778

Discriminant validity is used to test the extent to which a given structure differs directly from other structures. In Table 2, the values on the diagonal line are the values of the square root of the measure AVE, which are greater than the values of the correlation coefficients of the remaining factors in the table beyond the diagonal line, indicating high discriminant validity among the variables.

Table 2. Differential validity analysis table

	AVE	RE	AS	EY	RS	EX	LK	CS	CI	LY
RE	.364	.603								
AS	.860	.000	.927							
EY	.562	.000	.000	.750						
RS	.632	.000	.000	.000	.795					
EX	.626	.000	.000	.000	.000	.791				
LK	.654	.000	.000	.000	.000	.000	.809			
CS	.497	.101	.100	.097	.049	.042	.000	.931		
CI	.750	.038	.038	.037	.018	.016	.122	.113	.866	
LY	.778	.068	.068	.066	.033	.028	-.006	.201	-.001	.882

5. Model Testing and Validation Analysis

5.1. Model Fit Test

With the help of Amos 26.0 tool and using the maximum likelihood estimation method to determine the fit of the model to the sample data, the test results are shown in Table 3. The actual fit index values are within the range of the reference fit index, indicating that the overall fit of the structural equation model is good.

Table 3. Structural equation model goodness-of-fit test

Indicators		Actual Fitted Indicator Value	Reference fitting index range	Test results
Absolute fit	X2/DF	1.944	<3	Meet
	AGFI	.814	>0.8	Meet
	RMSEA	.056	<0.08	Meet
Value-added fit	CFI	.935	>0.9	Meet
	NFI	.876	>0.9	Acceptable
	PNFI	.831	>0.5	Meet
Parsimonious fit	PGFI	.735	>0.5	Meet
	X2/DF	1.944	<3	Meet
	AGFI	.814	>0.8	Meet

5.2. Model Validation Analysis

The path coefficients of the structural equation can reflect the interrelationship and degree of influence between the relevant variables. Figure 2 reflects the path coefficients among the observed variables, and it can be seen that of the nine research hypotheses proposed in the previous paper, eight hold true and one does not, and the research findings are analyzed as follows.

(1) All five hypotheses under the service quality dimension constructed in this paper hold. Reliability positively affects customer satisfaction (hypothesis H1 holds), generally speaking, reliable products, services and reputation will make consumers have a good impression of the platform; economy positively affects customer satisfaction (hypothesis H2 holds), at present, one of the main advantages of new retail platforms is cost effectiveness, and products with good value for money attract a large number of consumers to buy fresh products from new retail. The new retail platform has a significant impact on consumer satisfaction due to its cost effectiveness or package shipping; empathy positively affects customer satisfaction (hypothesis H3 holds), which shows that employee service attitude and personalized care are very important to customer satisfaction; responsiveness positively affects consumer satisfaction (hypothesis H4 holds), because the new retail platform does not have expensive stores and other costs compared to traditional offline physical stores. The experience positively affects customer satisfaction (assuming H5 holds). Currently, several domestic retail giants provide offline experience stores, and other retailers have also started to layout offline experience stores. satisfaction.

(2) In the study of the factors influencing the lock-in factor, the lock-in factor positively affects customer inertia, and the hypothesis H6 holds. When consumers are

satisfied with the services of a platform, they will become dependent on this platform this platform, and therefore will increase the frequency of purchase in this platform and become a loyal customer group.

(3) In the study of the factors influencing customer satisfaction, customer satisfaction positively affects customer inertia, and the hypothesis H7 holds. When consumers are more satisfied with the service of a platform, it also means that they have trust in that platform, so they will habitually rely on that platform.

(4) In the study of factors influencing customer satisfaction, customer satisfaction positively influences customer loyalty, and hypothesis H8 holds. When consumers are satisfied with their shopping experience on one of your platforms, they will give priority to that platform when shopping and become loyal target customers.

(5) In the study of factors influencing customer inertia, customer inertia positively influences consumer loyalty, and hypothesis H9 does not hold. Although there is customer inertia among consumers, the new retail economy has stimulated competition among major companies, often with price subsidies, and other marketing measures make consumers also shift to other companies, so the effect of customer inertia on customer loyalty is not significant.

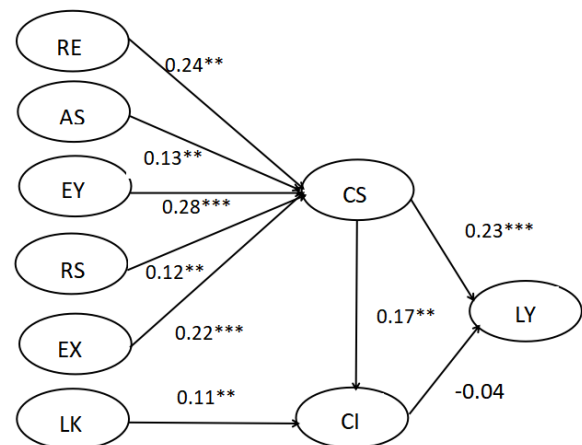


Figure 2. Structural equation model diagram (Note: *** $P \leq 0.01$, ** $P \leq 0.05$)

6. Recommendations and Limitations

Combining qualitative and quantitative research, establishing conceptual models and validating them to analyze the factors influencing the relationship between service quality and customer loyalty in fresh produce e-commerce in the background of new retailing not only enriches domestic research on user stickiness and loyalty in the emerging field of fresh produce e-commerce in the background of new retailing, deepens and validates that SOR and PPM theoretical models can be applied to the fresh produce e-commerce field to analyze consumer satisfaction and loyalty. This paper provides new research ideas for future research and helps to understand users' willingness to use fresh produce e-commerce, thus providing suggestions and countermeasures for the healthy and orderly development of fresh produce e-commerce in the future. This paper combines the research results with

the questionnaire feedback to make the following suggestions for fresh food retailers to improve service quality and enhance user stickiness.

To enhance supply chain management and improve product quality, it is necessary to establish a mechanism for supply chain synergy within the e-commerce platform to improve product quality. On the one hand, this can be done by creating an alliance of fresh produce e-commerce platform supply chain enterprises. On the other hand, to strengthen the application and popularization of intelligent supply chain, intelligent supply chain using big data, Internet of Things, cloud computing and other technologies can share the data collection of each link, which can not only increase the transparency of each link operation so that the division of power and responsibility, but also help to understand the consumer market, adjust the direction of supply chain operation, and provide consumers with more satisfactory products and services. Finally, it is necessary to develop regionalized product supply strategies based on local consumer preferences and consumption levels to optimize the product structure and thus improve the quality of products and services.

Improve the construction of cold chain logistics. Due to the characteristics of fresh products perishable, cold chain logistics has become a necessary part of its development. According to the data of the cold chain committee of the China Federation of Logistics, the cold chain circulation rate of fresh (fruits and vegetables, meat and aquatic products) in China in 2021 is 22%, 34% and 41%, and the cold chain transportation rate is 35%, 57% and 69%, while the developed countries are 80%-90%. At present, the level of cold chain logistics construction varies among fresh food e-commerce enterprises in China. For some fresh food e-commerce enterprises, they can establish a logistics system in line with the company's development strategy and product characteristics by building their own cold chain logistics, so as to form their own core competitiveness. For small and medium-sized companies with limited capital, they should strengthen strategic cooperation with third-party logistics, efficiently integrate and optimize the allocation of enterprise resources, increase technological innovation, rely on technological empowerment, improve the level of enterprise intelligence, reduce the operating costs of each link, provide customers with high-quality standard uniform logistics services at affordable logistics prices, and improve customer satisfaction.

Enhance overall customer satisfaction and improve customer loyalty. In terms of online service, firstly, we should ensure the humanization of website interface design and system operation efficiency to enhance the user's pleasure when visiting the website; secondly, we should improve the quality and richness of information content, which can help users' decision making by adding some nutrition matching information and the practice of fresh product related dishes. In terms of offline services, build multi-scene experience services to make consumers feel the pleasure of the shopping process. For example, the box horse fresh food stores provide consumers with multiple types of consumption scenarios, allowing the organization of content to serve different consumption themes. In terms of product organization, the various products in BoxMart are not limited to partitioning by product type but instead use scene classification. In the

experience area, you can see that the placement of various products fully serves the theme of the section.

However, there are some limitations in this study. Firstly, the questionnaire is placed online based on the author's interpersonal network, which is a single way of collection. Future studies can combine field interviews with online surveys to expand the sample scope; secondly, the fresh food enterprises defined are new retail fresh food enterprises in a broad sense, specifically referring to enterprises that adopt online and offline marketing with the help of the Internet.

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