

Modeling the Consumer Satisfaction: Perspective from Service Quality

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Abstract

Amidst the backdrop of burgeoning online retail and escalating consumer complaints, this study delves into the factors influencing consumer satisfaction on the Pinduoduo (PDD) e-commerce platform in China. The research endeavors to achieve three primary objectives: (1) to empirically validate the impact of PDD's customer service quality on consumer satisfaction; (2) to explore the nuanced influence of perceived quality and perceived value on consumer satisfaction; and (3) to proffer actionable recommendations for enhancing customer service quality. Employing a quantitative research methodology, data were meticulously collected from a sample of 417 PDD users aged 24 to 43 through an online questionnaire. Structural equation modeling (SEM) was subsequently employed to rigorously analyze the interrelationships between service quality, consumer expectations, perceived quality, value, and satisfaction. The findings of this study unequivocally demonstrate that (1) PDD's customer service quality exerts a statistically significant and positive impact on consumer satisfaction; (2) perceived value wields a significant positive influence on satisfaction, whereas the impact of perceived quality is comparatively minor; and (3) consumer expectations positively affect both perceived value and overall satisfaction. These results underscore the importance of customer service quality, perceived value, and the fulfillment of consumer expectations in elevating consumer satisfaction on e-commerce platforms. Avenues for future research include investigating age-related disparities in satisfaction, integrating qualitative research methods to gain deeper insights, and refining the CCSI model to enhance its applicability within the dynamically evolving digital landscape.

Keywords: Consumer Satisfaction; Service Quality; CCSI Model; Perceived Value; E-Commerce Platforms

Introduction

According to data in 2023, the global internet user count has surpassed 5.3 billion, with an internet penetration rate of 67.9% (Stats, 2023b). China, contributing to over 1.04 billion internet users (Stats, 2023a), achieved an online retail sales volume of 13.79 trillion yuan in 2022 (Chong et al., 2023). With a per capita GDP reaching \$12,000, there's a noticeable trend of upgrading non-essential product consumption (Daniel Zipser et al., 2022). The pandemic has driven the surge in online consumption, and government policies position Chinese e-commerce as a driving force for consumption and industrial upgrades. However, the industry faces significant challenges, as evidenced by 137 closures in 2021 and intensified competition (Qiu et al., 2021). Consumer complaint center data indicates a 25.8% YoY increase in online shopping complaints in 2021, primarily related to product quality, customer service, after-sales service, and logistics (Kolasińska-Morawska et al., 2022). Addressing these issues is crucial to retaining customers and avoiding negative word-of-mouth impacts. Improving the service quality of e-commerce platforms can enhance consumer satisfaction, but precision in selecting the areas and directions for improvement is essential.

Pinduoduo is a comprehensive e-commerce platform in China that has rapidly risen to prominence through a unique business model and an operational focus on users in lower-tier cities. As of October 2022, Pinduoduo boasts 700 million monthly active users and a GMV of 3.3 trillion yuan (Xing, 2019). Despite its reputation for providing high-quality products at low prices, aligning with China's emphasis on product value for money, Pinduoduo faced a high complaint volume in 2021, reaching 428,300 and ranking as the most complained-about e-commerce platform. This suggests the need for an in-depth investigation into Pinduoduo's customer service quality.

Theoretical foundation

Consumer satisfaction originates from the perspectives of management and service, and current research in this area is quite mature. Consumer satisfaction is a metric that measures the degree of consumer contentment, representing the subjective feelings of consumers based on the comparison between their expectations and actual experiences. Scholars have developed various customer satisfaction models, among which the CCSI model is specifically designed for the Chinese market. It is an effective tool for measuring customer service satisfaction, offering significant advantages in assessing customer attitudes toward various aspects of the service experience. This model allows for a more comprehensive analysis of factors influencing consumer satisfaction during interactions with customer service. The CCSI model is based on the core architectures of the American Customer Satisfaction Index (ACSI) and the European Customer Satisfaction Index (ECSI). It removes customer complaint variables, considering customers themselves as the subjects of quality evaluation and customer needs as the criteria for quality assessment. The model emphasizes the relationship between customers' expected quality and perceived quality of products or services. The CCSI model's framework is depicted in Figure 1 (Fornell et al., 1996).

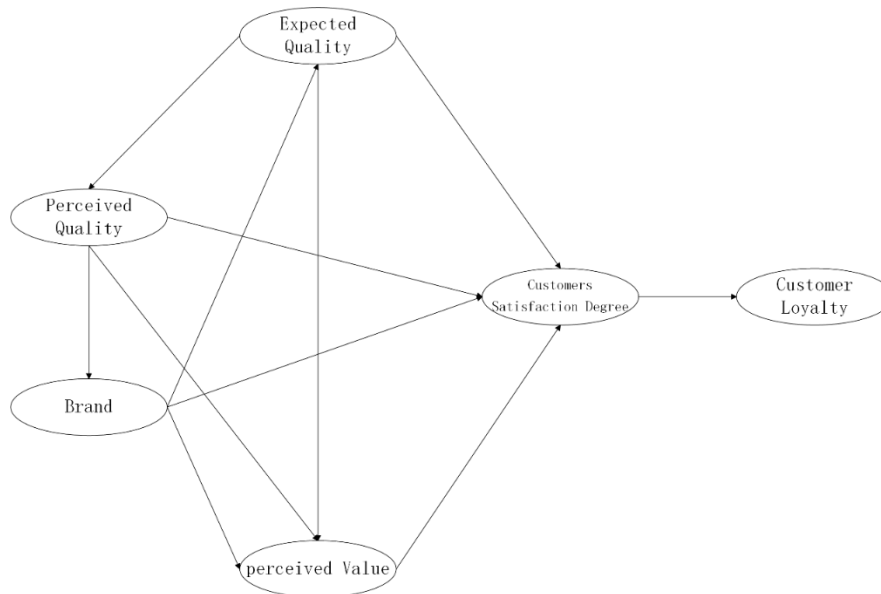


Figure 1 China Customer Satisfaction Index Model (CCSI)
From: Longqing Wang (2021)

Grönroos defines service quality as the gap between customer expected and perceived service quality (Grönroos, 1982). During consumption, customers evaluate their satisfaction by comparing the perceived service quality with their expectations of the service provider's service. Service quality theory aims to assist the service industry in delivering high-quality services that better meet customer needs. This paper extracts three variables from satisfaction, consumer expectations, and perceived value from satisfaction theory. Additionally, two variables, service quality, and consumer perceived quality, are extracted from service quality theory.

Theoretical Framework and Hypotheses

Building on previous research and combining the foundational theories with the characteristics unique to Pinduoduo, this study has constructed a model of factors influencing consumer satisfaction in Pinduoduo. The model comprises five variables: service quality, consumer expectations, perceived quality, perceived value, and consumer satisfaction. Service quality and consumer expectations are independent variables, while perceived quality and value function as mediating variables, and consumer satisfaction is the dependent variable.

Based on the original paths of the CCSI model and in conjunction with satisfaction and service quality theories, the following research hypotheses are proposed: Customer service quality has a significant positive impact on consumer-perceived quality (H1); Consumer expectations have a significant positive impact on perceived quality (H2); Consumer expectations have a significant positive impact on perceived value (H3); Consumer expectations have a significant positive impact on satisfaction (H4); Consumer-perceived quality has a significant positive impact on perceived value (H5); Consumer-perceived quality has a significant positive impact on satisfaction (H6); Consumer perceived value has a significant positive impact on satisfaction (H7). The research hypothesis path relationships are shown in Figure 2.

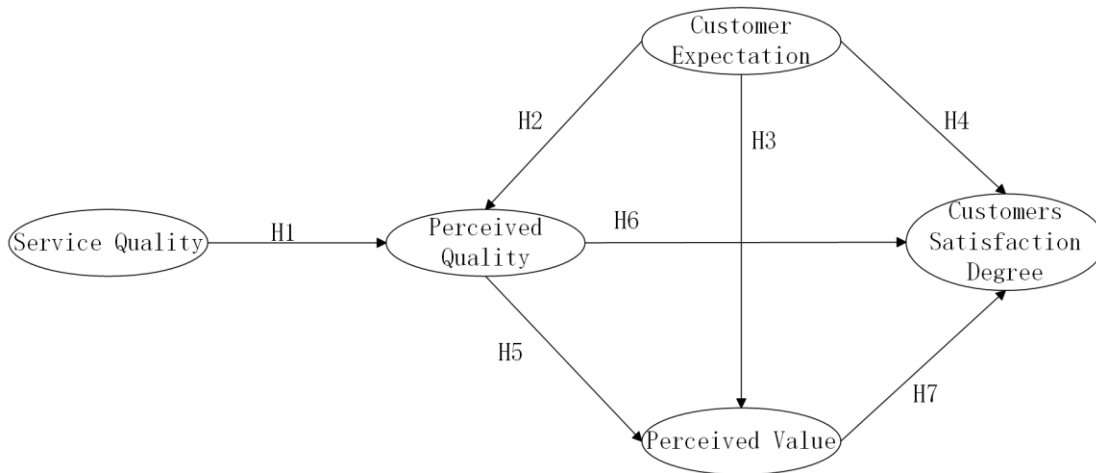


Figure 2 PDD Consumer Satisfaction Model

Methodology

The study commenced with formulating model hypotheses, designing scales, and creating questionnaires. Data were collected through social tools such as WeChat using a quantitative research approach. Statistical analysis methods were employed to process, interpret, and empirically analyze the collected data. The data indicate that the "80s-90s" generation plays a dominant role in the online shopping market, with this demographic exhibiting the greatest potential for online consumption (Zhang et al., 2018). A consumer report released by Pinduoduo in 2023 reveals that the platform's user base is primarily concentrated among individuals from the "80s" and "90s" generations (Gai, 2023). Considering the trends in the distribution of online shopping demographics in China and the characteristics of Pinduoduo users, we chose to investigate Pinduoduo users from the "80s" and "90s" generations. To ensure objectivity, this study employed the Likert five-point scale to assess customer service satisfaction. This method is widely used in various studies due to its simplicity and ease of understanding.

Results

A customer service satisfaction survey was conducted with Pinduoduo users as the subjects. Based on the design of the initial questionnaire, data collected through a pre-survey were used to assess the reliability and validity of the questionnaire. The pre-survey indicated that the α coefficient, KMO value, and cumulative variance explained by common factors met the standards. The pre-survey results demonstrated that the questionnaire was meaningful and that formal distribution could proceed. The survey was conducted from September 20 to October 30, 2023. By the end of the survey, 442 questionnaires were collected. After excluding 24 invalid questionnaires and removing 1 with erroneous data, 417 valid responses were obtained, resulting in a questionnaire validity rate of 94%.

Descriptive Statistical Analysis

Table 1 Basic characteristics of the surveyed population (N=417)

Variable	Options	Frequency	Per cent	Cumulative per cent
Gender	Male	161	38.6	38.6
	Female	256	61.4	100.0
Age	24-28 years	187	44.8	44.8
	29-33 years	158	37.9	82.7
	34-38 years	52	12.5	95.2
	39-43 years	20	4.8	100.0
Monthly Salary (¥)	Below 1,000	53	12.7	12.7
	1000-2999	118	28.3	41.0
	3000-4999	72	17.3	58.3
	5000-6999	95	22.8	81.1
	7000-8999	54	12.9	94.0
The frequency of using the PDD app for online shopping	9000 and above	25	6.0	100.0
	Occasional use 1 time	25	6.0	6.0
	1-2 times per month	109	26.1	32.1
	1-2 times per week	175	42.0	74.1
	3-4 times per week	74	17.7	91.8
	Almost daily use	34	8.2	100.0

The survey data indicates a higher proportion of female users, constituting 61.4%. Regarding age, the majority falls in the 24-28 age range, accounting for 44.8%. Users with a monthly income between 1000 and 2999 yuan are the most prevalent, and the usage frequency is typically once or twice a week. These findings align with the latest research report on Pinduoduo users.

Reliability Analysis

The Cronbach's Alpha values for this study, as shown in Table 3, indicate that the Cronbach's α coefficient for service quality is 0.791, exceeding 0.7, and for other dimensions, it is above 0.8. The overall Cronbach's α coefficient is 0.882, surpassing 0.8. This suggests that the data exhibits good reliability.

Table 2 Reliability Analysis

Dimension	Question item	The Cronbach's Alpha, after the removal of items	Cronbach's α	Total Cronbach's α
Quality of service	FW1	.752	.791	
	FW2	.753		
	FW3	.761		
	FW4	.751		
	FW5	.741		
Consumer expectations	QW1	.877	.885	.882
	QW2	.877		
	QW3	.877		
	QW4	.878		
	QW5	.876		
	QW6	.877		
Perceived quality	ZL1	.847	.868	
	ZL2	.826		
	ZL3	.846		
	ZL4	.843		
	ZL5	.839		
Perceived value	JZ1	.818	.851	
	JZ2	.787		
	JZ3	.769		
Consumer satisfaction	MY1	.844	.869	
	MY2	.837		
	MY3	.825		
	MY4	.824		

Note: FW: Quality of service; QW: Consumer expectations; ZL: Perceived quality; JZ: Perceived value; MY: Consumer satisfaction

Validity Analysis

As shown in Table 3, the Kaiser-Meyer-Olkin (KMO) measures for each dimension in this study are as follows: service quality 0.826, consumer expectations 0.899, perceived quality 0.874, perceived value 0.728, and consumer satisfaction 0.807. All values exceed 0.7, indicating a relatively consistent correlation among variables, making the data suitable for factor analysis. Additionally, the results of Bartlett's sphericity test are all below 0.05. Therefore, it confirms the appropriateness of applying factor analysis to this dataset.

Table 3 Validity Analysis

Dimension	Question item	KMO	Sig.
Quality of service	FW1	.826	.000
	FW2		
	FW3		
	FW4		
	FW5		
Consumer expectations	QW1	.899	.000
	QW2		
	QW3		
	QW4		
	QW5		
	QW6		
Perceived quality	ZL1	.874	.000
	ZL2		
	ZL3		
	ZL4		
	ZL5		
Perceived value	JZ1	.728	.000
	JZ2		
	JZ3		
Consumer satisfaction	MY1	.807	.000
	MY2		
	MY3		
	MY4		

Note: FW: Quality of service; QW: Consumer expectations; ZL: Perceived quality; JZ: Perceived value; MY: Consumer satisfaction

Confirmatory Factor Analysis

Confirmatory factor analysis uses convergent validity, discriminant validity, and model fit indices to determine the reliability of the confirmatory factor analysis model.

Table 4 Convergence Validity

Latent variables	Observation indicators	Factor loading	CR	AVE
FW	FW1	0.676	0.791	0.431
	FW2	0.67		
	FW3	0.622		
	FW4	0.67		
	FW5	0.644		
QW	QW1	0.823	0.886	0.564
	QW2	0.769		
	QW3	0.782		
	QW4	0.67		
	QW5	0.76		
	QW6	0.693		
ZL	ZL1	0.77	0.869	0.570
	ZL2	0.738		
	ZL3	0.727		
	ZL4	0.814		
	ZL5	0.722		
JZ	JZ1	0.854	0.853	0.659
	JZ2	0.808		
	JZ3	0.772		
MY	MY1	0.809	0.870	0.626
	MY2	0.821		
	MY3	0.781		
	MY4	0.751		

Note: FW: Quality of service; QW: Consumer expectations; ZL: Perceived quality; JZ: Perceived value; MY: Consumer satisfaction

Typically, factor loadings greater than 0.6 and Composite Reliability (CR) values exceeding 0.7 are considered reasonable. For the Average Variance Extracted (AVE), values are generally expected to be greater than 0.5 or fall within the range of 0.36 to 0.5, which is also considered reasonable (Mueller & Hancock, 2018).

This table comprehensively evaluates convergent validity for various latent constructs, emphasizing their correlation and reliability with observed indicators. Robust factor loadings and satisfactory CR and AVE values affirm the rigor and reliability of the measurement model employed in the study.

Table 5 Discriminant Validity

	MY	JZ	ZL	QW	FW
MY	0.657				
JZ	0.393	0.751			
ZL	0.431	0.279	0.755		
QW	0.297	0.191	0.255	0.812	
FW	0.312	0.357	0.372	0.366	0.791

Note: FW: Quality of service; QW: Consumer expectations; ZL: Perceived quality; JZ: Perceived value; MY: Consumer satisfaction

Table 5 comprehensively examines discriminant validity for the studied latent variables. In the discriminant validity analysis of this model, the diagonal values (square roots of AVE) for each construct consistently exceed their respective off-diagonal correlations with other constructs. As shown in Table 5, this model indicates a strong discriminant validity among the five constructs: service quality, consumer expectations, perceived quality, perceived value, and consumer satisfaction. This demonstrates that the structures employed in this study are distinct and capture unique variance, a critical criterion for assessing the robustness and effectiveness of measurement models in academic research.

Table 6 Confirmatory factor model fit metrics

Fit index	χ^2/df	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	[0.7,0.9]	>0.9	>0.9	>0.9
Result	1.953	0.048	0.919	0.898	0.908	0.945	0.952

Table 6 delves into the fit indices of the Confirmatory Factor Analysis (CFA) conducted in this study, offering a rigorous assessment of the alignment between the model and observed data. The table utilizes several fit indices, juxtaposing the model results with established reference standards to ensure accuracy and validity.

The results show a χ^2/df value of 1.953, an RMSEA value of 0.048, GFI of 0.919, AGFI of 0.898, NFI of 0.908, TLI of 0.945, and CFI of 0.952. These values meet the reference standards, indicating a good fit between the model and the observed data. Table 7 provides compelling evidence that the confirmatory factor model used in this study has a robust fit with the observed data.

Structural Equation Modeling

Table 7 Confirmatory factor model fit metrics

Fit index	χ^2/df	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	[0.7,0.9]	[0.7,0.9]	>0.9	>0.9
Result	2.196	0.054	0.910	0.889	0.895	0.931	0.939

Table 7 comprehensively assesses the goodness of fit of this study's structural equation modeling (SEM) models. This comprehensive assessment provides insight into the consistency of the proposed model with the empirical data, ensuring the robustness and credibility of the findings (Mueller & Hancock, 2018). All fit indices of the model met the criteria. Therefore, Figure 3 depicts the SEM model of PDD consumer satisfaction.

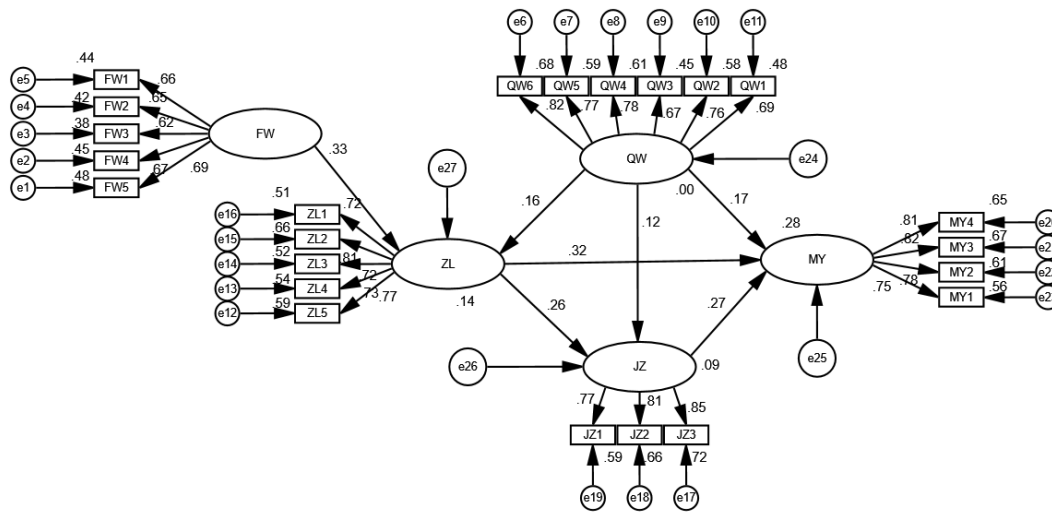


Figure 3 PDD Consumer Satisfaction SEM Model

Path Analysis

In summary, all the research hypotheses in this study have been validated through path analysis.

Table 8 Structural equation model path test

Hypothesis	Path Relationship	Standardized Path Coefficients (β)	Standard Error (S.E.)	Critical value (C.R.)	P Value	Conclusion
H1	FW → ZL Service quality → Perceived quality	0.162	0.054	2.852	0.004	support
H2	QW → ZL expectations → Service Quality	0.333	0.089	5.179	***	support
H3	QW → JZ expectations → Perceived value	0.256	0.074	4.448	***	support
H4	QW → MY Expectations → satisfaction	0.124	0.069	2.197	0.028	support
H5	ZL → JZ Perceived quality → Perceived value	0.165	0.056	3.145	0.002	support
H6	ZL → MY Perceived qualities → atisfaction	0.272	0.047	4.958	***	support
H7	JZ → MY Perceived valuesatis → faction	0.317	0.061	5.728	***	support

Note: FW: Quality of service; QW: Consumer expectations; ZL: Perceived quality; JZ: Perceived value; MY: Consumer satisfaction

***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$

Conclusion

This study focuses on consumer satisfaction. Considering the actual development of e-commerce platforms in the current socio-economic context of China and based on consumers' practical experiences in online shopping on e-commerce platforms, the study analyzes the main factors influencing consumer satisfaction on Pinduoduo. Through induction and summarization, targeted recommendations and strategies are proposed, considering the identified issues and practical situations.

The research results validate that customer service quality has a significant positive impact on consumer satisfaction in Pinduoduo. This implies that high customer service can enhance consumer satisfaction and improve their shopping experience. Perceived value and perceived quality have a significant positive impact on Pinduoduo's consumer satisfaction. This finding reinforces the correlation between service quality and satisfaction theory, further confirming the importance consumers place on perceived value and perceived quality in shopping decisions. Consumer expectations also significantly positively impact perceived value and satisfaction for Pinduoduo consumers. Our study emphasizes the importance consumers place on having their expectations met and efficient problem resolution, highlighting the significance of various aspects of service quality in enhancing satisfaction.

This study focuses on the impact of service quality, consumer expectations, perceived value, and perceived quality on customer satisfaction in Pinduoduo. Future research directions include delving into age-group differences in customer satisfaction, exploring new characteristics of customer satisfaction in e-commerce platforms in the digital era, expanding sample scope for comprehensive results, optimizing the CCSI model for better applicability, and incorporating qualitative research methods like interviews and focus group discussions to delve deeper into consumer experiences and expectations during service interactions. These expansions provide practical recommendations for e-commerce platform customer service management and advance service quality and satisfaction theory.

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