

Customer satisfaction in online-to-offline commerce: a fresh product perspective

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Abstract

Purpose – This study examines how to improve customer satisfaction in online-to-offline (O2O) commerce of fresh products in China.

Design/methodology/approach – Structural equation modeling of 313 surveys of individuals with online shopping experience is adopted for testing and validating a conceptual model developed.

Findings – The study finds that corporate image has a positive impact on customer expectations, and customer expectations have positive impact on perceived quality. It reveals that perceived quality has a positive impact on perceived value. Furthermore, the study discovers that perceived value and perceived quality have a positive impact on consumer satisfaction.

Originality/value – This study contributes to O2O commerce research through testing and validating a research model for enhancing customer satisfaction. The findings are helpful for developing fresh product retailers in pursuing sustainable competitiveness.

Keywords Online-to-offline commerce, Customer satisfaction, Fresh products, Perceived value, Perceived quality

Paper type Research paper

1. Introduction

Online-to-offline (O2O) businesses are an emerging commerce model for providing customers with online services to guide them to offline stores for actual transactions (Ratchford *et al.*, 2022). They utilize the convenience and informatization that online services can offer (Lee *et al.*, 2022) and the real experience and service guarantee that offline stores can deliver (Wang *et al.*, 2020). O2O business, therefore, is growing rapidly across the world.

Fresh product markets consist of various goods such as vegetables, fruits, meats, fish and dairy products (Lu *et al.*, 2022). Such products share common characteristics including (a) minimally processed, (b) organic, (c) real ingredients, (d) seasonal and (e) highly perishable



(Hsu and Lin, 2020a, b). As a result, such markets are becoming complex and dynamic due to the need for ensuring the freshness of the product and the expectation for quality and safety products (Ma et al., 2022).

There is an increasing sale of fresh products through O2O business (Kang et al., 2021; Wang et al., 2024). This is because the adoption of O2O business provides customers with updated information about fresh products. It offers consumers a convenient and secure shopping experience (Guo et al., 2022). Furthermore, the adoption of O2O business directly connects fresh product producers with consumers (Li et al., 2020), therefore reducing the cost of fresh products. This leads to increasing O2O businesses participating in the market, resulting in growing competition. How to improve customer satisfaction, therefore, is becoming crucial.

There are various studies in understanding customer satisfaction in traditional commerce (Hsu and Lin, 2020a, b; Shao et al., 2024). O2O commerce of fresh products is carried out in a unique context due to the nature of O2O commerce (Liao et al., 2024) and the characteristics of fresh products (Hsu and Lin, 2020a, b). Existing findings, therefore, are no longer applicable. Furthermore, there is a lack of studies exploring customer satisfaction of O2O commerce of fresh products in China. This study addresses these issues with the research question as follows: *What affects customer satisfaction in selling fresh products through O2O commerce?*

This study investigates what affects customer satisfaction of O2O commerce in selling fresh products in China. A conceptual model is developed by extending the Chinese customer satisfaction index (CCSI). This model is then tested and validated using structural equation modeling (SEM) of 313 surveys of individuals with online shopping experience. The study finds that corporate image positively affects customer expectations, and customer expectations positively influence perceived quality. It reveals that perceived quality positively influences perceived value. Furthermore, the study shows that perceived value and perceived quality positively affect consumer satisfaction.

2. Related literature

Customer satisfaction is about how well specific products and services meet their expectations (Shao et al., 2024). It is an accumulated sensory response measured through comparing customer expectations with experience (Cui et al., 2023). In this study, customer satisfaction is related to whether fresh products meet their expectations or not (Che et al., 2022).

Satisfying customers is critical for individual businesses (Che et al., 2022). Customer satisfaction leads to personalized recommendations and repurchase intention (Dash et al., 2021). Satisfied customers often convince others to buy (Su and Tong, 2021). Organizations, therefore, strive to understand what affects customer satisfaction (Wang et al., 2020).

There are many studies on how to improve customer satisfaction in traditional commerce (Che et al., 2022; Negassa and Japee, 2023). Such studies are conducted from different perspectives, including (a) business reputation, (b) product characteristics and (c) services features. This helps identify various critical factors affecting customer satisfaction.

Business-reputation-based studies explore how business reputation affects customer satisfaction. Wang et al. (2012) discover that business reputation affects customer satisfaction through product reputation, service reputation and competition reputation. Sari (2018) shows that business reputation affects corporate image, thus influencing customer satisfaction. Rafiq et al. (2020) reveal that business reputation affects customer trust and corporate image, thus influencing customer satisfaction. Li et al. (2022) find that business reputation is related to brand association, brand awareness and brand identity that affect customer satisfaction.

Product-characteristics-oriented studies examine how product characteristics affect customer satisfaction. Long et al. (2014) discover that product characteristics can affect customer satisfaction through product quality and appearance. Gok et al. (2019) find that product characteristics affect user manual quality and product quality, thus affecting customer satisfaction. Bhowmick and Seetharaman (2022) reveal that product characteristics can affect customer satisfaction through product appearance, quality and function.

Services-feature-aligned studies investigate how services features influence customer satisfaction. Jun and Cai (2010) suggest that service features have a positive effect on reliability, responsiveness, competence, etiquette and customer intimacy, thus improving customer satisfaction. Rasli *et al.* (2011) reveal that service features promote information quality, functional quality and service experience, therefore influencing customer satisfaction. Kachwala *et al.* (2021) discover that service features affect service quality, reliability, responsiveness and security, thus influencing customer satisfaction.

The rapid development of O2O commerce leads to numerous studies on how to improve customer satisfaction in an online setting (Camilleri and Filieri, 2023; Liao *et al.*, 2024). Such studies are often carried out from the perspective of (a) digital platforms, (b) customers and (c) businesses.

Platform-based studies explore the characteristics of digital platforms that affect customer satisfaction. Shi *et al.* (2021) show that platform service quality and feedback mechanisms are critical for customer satisfaction. Ling (2022) finds that delivery timeliness, goods status, logistics personnel status, perceived price, diversified services and platform image influence customer satisfaction. Zhu *et al.* (2022) reveal that convenience and safety positively affect customer satisfaction.

Customer-oriented studies investigate the characteristics of customers that influence their satisfaction. Zhang (2011) demonstrates that customer unpredictability and two-way initiatives affect customer satisfaction. Hsiao *et al.* (2016) find that customer personality affects their emotional responses, therefore influencing their satisfaction.

Business-aligned studies examine business-related factors affecting customer satisfaction. Swaminathan *et al.* (2018) reveal that credibility, e-satisfaction, site knowledge, inertia, innovativeness and aggressiveness influence customer satisfaction. Xiao *et al.* (2018) state that trust affects customer satisfaction. Hsu and Lin (2020a) stress that application experience and platform enjoyment improve customer satisfaction.

O2O commerce of fresh products is conducted in a unique environment (Liao *et al.*, 2024). Existing studies examine customer satisfaction without considering the uniqueness of this environment. With the increasing popularity of O2O e-commerce of fresh products, better understanding how to improve customer satisfaction is then becoming critical.

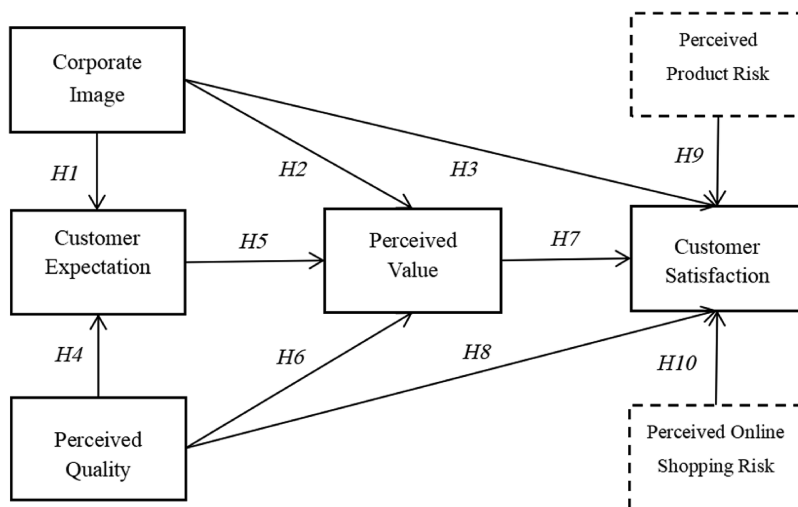
3. Conceptual model

This study explores what affects customer satisfaction in O2O commerce of fresh products in China. CCSI is used for developing the conceptual model due to its applicability in exploring customer satisfaction (Kachwala *et al.*, 2021) and the characteristics of O2O commerce (Ratchford *et al.*, 2022).

CCSI is developed by integrating several existing theories with respect to the characteristics of the Chinese market (Tontini *et al.*, 2017). It examines customer satisfaction through comparing customer expectations with perceived quality. The use of CCSI facilitates a systematic assessment of customer satisfaction in this study (Li *et al.*, 2022).

To better understand how to improve customer satisfaction, CCSI is extended with the addition of perceived product risk and perceived online shopping risk. Such an extension allows this study to fully integrate online marketing and offline purchases into assessing customer satisfaction. A conceptual model is then proposed as in Figure 1.

Customer expectation is what they think about specific products or services (Saut and Bie, 2024). Customers develop their expectations through combining experience and shopping information. O2O commerce is unique in which customers purchase their products online while enjoying offline services (Lee *et al.*, 2022). This means that customer expectation consists of product expectation and service expectation (Wang and Wang, 2024). Product expectation is related to product performance, including functionality, quality and standards (Zeina and Bassem, 2017). Service expectation is what customers want the service to meet.



Source(s): Authors' own work

Figure 1. A conceptual model

Corporate image is what the public thinks about a product or service (Lepistö *et al.*, 2024). A positive corporate image develops trust, credibility and goodwill (Saut and Bie, 2024). It leads to increased customer loyalty, better relationships with stakeholders and competitive advantages (Lee *et al.*, 2006).

Corporate image positively affects customer expectations (Saut and Bie, 2024). Lee *et al.* (2006) show that businesses with a positive corporate image can win customer trust, leading to higher expectations of their products and services. Businesses with a positive image can develop higher customer expectations, therefore enhancing customer satisfaction. A hypothesis is then proposed as:

H1. Corporate image positively influences customer expectation.

Perceived value is about the worth of a product or service a consumer thinks (Lee *et al.*, 2006). It is an individual's assessment based on personal beliefs, needs and experiences. Perceived value directly influences customers' purchase (Saut and Bie, 2024). Customers analyze the benefits and costs of making their purchase (Ling, 2022). This shows that perceived value is multifaceted, often assessed based on consumption demand, functional demand and emotional demand (Kang *et al.*, 2021).

Corporate image affects perceived value (Wu *et al.*, 2018). Maiyaki (2012) reveals that corporate image is positively correlated with perceived value. A positive corporate image helps increase customer trust, improve pre-sales expectations, enhance perceived product or service quality and elevate perceived value (Zameer *et al.*, 2015). A hypothesis is then proposed as:

H2. Corporate image positively influences perceived value.

Customer satisfaction reflects customers' experience with the purchase of products or services (Terpstra and Verbeeten, 2014). It is determined with respect to product quality, freshness, affordability, delivery punctuality and convenience of online ordering and payment (Wang and Wang, 2024).

Corporate image has a direct impact on customer satisfaction (Wu *et al.*, 2018). Ene and Özkaya (2014) find that customers are more inclined to choose businesses with a positive

corporate image. [Lee \(2017\)](#) states that customer satisfaction is related to trust, loyalty and corporate image. Establishing a reliable corporate image can increase customers' confidence in product quality, delivery and food safety, thereby enhancing their satisfaction. A hypothesis is developed as:

H3. Corporate image positively influences customer satisfaction.

Perceived quality is about the overall product or service quality based on customers' experience and expectation ([Oghuma et al., 2015](#)). O2O commerce of fresh products integrates online services with offline delivery for satisfying customer expectations ([Liao et al., 2024](#)). This means that perceived quality can be measured with respect to freshness, variety, safety ([Mascarellol et al., 2015](#)), discounts, rebates and comprehensiveness ([Wang and Wang, 2024](#)).

Perceived quality directly affects customer expectations ([Oghuma et al., 2015](#)). [Joung et al. \(2016\)](#) suggest that perceived quality affects customer expectations. [Kang and Namkung \(2019\)](#) find that customers have higher expectations when perceived quality is high. When customers perceive quality products, their expectations tend to rise. A hypothesis is then developed as:

H4. Perceived quality positively influences customer expectation.

Customer expectation influences perceived value ([Belanche et al., 2021](#)). Perceived value is related to product quality, service experience and customer expectation ([Uzir et al., 2021](#)). Customers develop their expectations based on experience, word-of-mouth, marketing communication and brand reputation ([Lee, 2017](#)). Such an expectation provides customers with a benchmark to evaluate perceived value. If the actual product or service can meet or exceed their expectations, perceived value can then be enhanced ([Hsu et al., 2015](#)). A hypothesis is then proposed as:

H5. Customer expectation positively influences perceived value.

Perceived quality affects perceived value. [Sullivan and Kim \(2018\)](#) find that perceived quality leads to higher perceived value. [Jin et al. \(2015\)](#) discover that perceived quality significantly affects perceived value. Better perceived quality can improve perceived value, leading to more satisfied customers. A hypothesis is then proposed as:

H6. Perceived quality positively influences perceived value.

Perceived value has a direct impact on customer satisfaction ([Uzir et al., 2021](#)). [Yeo et al. \(2017\)](#) find that perceived value is positively related to customer satisfaction. [Bailin \(2009\)](#) proves that there is a causal relationship between perceived value and customer satisfaction. A hypothesis is then proposed as:

H7. Perceived value positively influences customer satisfaction.

Perceived quality directly affects customer satisfaction ([Jin et al., 2015](#)). [Zhang et al. \(2019\)](#) suggest that perceived quality has a positive impact on passenger satisfaction. [Lee et al. \(2017\)](#) discover that perceived quality has a positive impact on consumer satisfaction. A hypothesis is, therefore, proposed as:

H8. Perceived quality positively influences customer satisfaction.

Perceived product risk is related to the uncertainty that consumers experience ([Khouryieh et al., 2019](#)). It consists of performance risk and physical risk. Performance risk is about whether the product meets customers' expectations or not. Physical risk is measured by consumers' concerns about chemical hazards and harmful pathogens ([Khouryieh et al., 2019](#)).

Perceived product risk directly influences customer satisfaction ([Wu et al., 2020](#)). [Hong et al. \(2011\)](#) find that perceived product risk negatively affects customer satisfaction. [Yang et al. \(2012\)](#) state that perceived product risk affects customer satisfaction. A hypothesis is then developed as:

H9. Perceived product risk negatively influences customer satisfaction.

Perceived online shopping risk is related to the uncertainty of payment system security, privacy risk and service performance risk (Hong *et al.*, 2017). The security of online payment is related to the concern of customers on the security of online payment. Privacy risk is linked to the possibility of the disclosure of private information of consumers (Bal *et al.*, 2015). Service performance risk is the uncertainty on the performance of the products purchased online.

Perceived online shopping risk affects customer satisfaction (Wu *et al.*, 2020). Park *et al.* (2017) show that perceived online shopping risk can reduce customer satisfaction. Rouibah *et al.* (2016) find that perceived risk negatively affects customer satisfaction. Perceived online shopping risk increases customers' uncertainty about their purchase, thus reducing their satisfaction. A hypothesis is formulated as:

H10. Perceived online shopping risk negatively influences customer satisfaction.

4. Research method

This study investigates what affects customer satisfaction in O2O commerce of fresh products. A survey-based quantitative method is used due to the confirmatory nature of this study (Hong *et al.*, 2021). Using a survey is appropriate because the model shown in Figure 1 can be tested and validated through the survey data.

To ensure the use of valid measurements, a review of the relevant studies is first carried out, followed by pilot tests and expert interviews to ensure the validity of the content (Duan and Deng, 2021). Table 1 shows the constructs, measurement items and their sources. All measurement items are assessed on a Likert-type scale ranging from strongly disagree (1) to strongly agree (5).

The questionnaire collects respondents' basic information and their perception of individual measurement items. The sample selected is the customers with experience in purchasing fresh products through O2O commerce. The questionnaires are distributed in the field and online. Field distribution is carried out in supermarkets and community convenience stores in Beijing. Online distribution is completed using Wechat, QQ, emails and other social networking tools. This leads to the collection of 406 questionnaires, including 69 from the field and 337 from online.

The collected data have been examined on missing values, outliers, normality and multicollinearity (Hair *et al.*, 2010). About 93 cases are removed. This leads to 313 responses retained for further analysis.

A *t*-test is used to examine the potential differences between online and paper surveys (Chau *et al.*, 2020). Table 2 shows the results. It demonstrates that there is no significant difference between the two types of respondents at the 95% confidence level.

Harman's one-factor test is adopted for examining the common method bias (Podsakoff *et al.*, 2003). The result shows that the common method variance is 39.2%, which is smaller than the threshold of 50%. This proves that the common method bias is not an issue in this study.

The demographic profile of the respondents is examined. Table 3 presents the result. It shows that there are 40.26% men and 59.74% women answering the survey. Most respondents are young, with 52.72% aged between 18 and 25. These respondents are well educated, with 42.81% having a bachelor's degree and 44.73% having a master's degree. Furthermore, 41.85% of participants can earn up to 6,000 yuan a month.

To assess the representativeness of the sample, this study compares the sociodemographic characteristics of the sample with the latest population statistics of Beijing. The result shows that the sample's distribution of gender, age, education and income closely matches the overall population distribution of Beijing. This demonstrates the representativeness of the sample in the population, therefore ensuring the generalizability and applicability of the research findings.

Table 1. An overview of the constructs and measurement items

Constructs	Items	Sources
Corporate image (CI)	CI1 O2O online platform reputation CI2 O2O offline business reputation	Li and Ko (2021) , Che et al. (2022)
Customer expectation (CE)	CE1 Expected experience CE2 Expected quality CE3 Expected demand	Barber et al. (2012) , Yi and Natarajan (2018)
Perceived quality (PQ)	PQ1 Customer evaluation PQ2 Product safety PQ3 Product integrity PQ4 Propaganda authenticity PQ5 Comprehensiveness of information PQ6 Logistics speed PQ7 Convenient return and exchange PQ8 Timely handling of complaints	Mascarellol et al. (2015) , Kim et al. (2021) , Prassida et al. (2021)
Perceived value (PV)	PV1 Transaction cost PV2 Shopping experience PV3 Cost-value alignment	Pan et al. (2017) , Leong et al. (2019)
Customer satisfaction (CS)	CS1 Products and services CS2 Overall experience CS3 Demand satisfaction degree	Caruana and Ewing (2010) , Liang et al. (2021) , Yao et al. (2022)
Perceived product risk (PPR)	PPR1 Meet expectation PPR2 Security risk	Khouryieh et al. (2019)
Perceived online shopping risk (POSR)	POSR1 Payment security POSR2 Privacy security POSR3 Consistent with picture and text	Park et al. (2017) Rouibah et al. (2016)

Source(s): Authors' own work

Table 2. Independent sample *t*-test for survey type bias

Dimensions	<i>t</i>	df	<i>p</i>	Mean Online (<i>n</i> = 265)	Paper (<i>n</i> = 48)	Difference	Std. error difference
CI	1.741	311	0.098	3.624	3.538	0.086	0.0494
CE	1.974	311	0.074	3.689	3.584	0.105	0.0532
PQ	−0.530	311	0.083	3.578	3.606	−0.028	0.0528
PV	−1.196	311	0.122	3.573	3.637	−0.064	0.0535
CS	0.766	311	0.076	3.496	3.458	0.038	0.0496
PPR	−0.539	311	0.058	3.721	3.749	−0.028	0.0519
POSR	1.335	311	0.064	3.706	3.635	0.071	0.0532

Source(s): Authors' own work

5. Data analysis

A two-step approach is utilized in analyzing the data, including measurement model analysis and structural model examination ([Duan et al., 2023](#)). Measurement model analysis evaluates the contribution of the measurement item for demonstrating the measurement model

Table 3. An overview of the demographic profile of the respondents

Variables		Frequency	Percentage (%)
Gender	Male	105	46.26
	Female	122	53.74
Age	18–25	120	52.86
	≥ 26	107	47.14
Education	College degree or below	24	10.57
	University degree	98	43.17
	Master's degree or above	105	46.26
Profession	Student	82	36.12
	Office staff	84	37.00
	Self-employed workers	10	4.41
	Other's professionals	51	22.47
Monthly income (¥)	≤ 6,000	139	61.24
	6,000–15,000	72	31.72
	≥ 15,000	16	7.04
Monthly purchase frequency	1–2 times	155	68.28
	3 times or above	67	31.72

Source(s): Authors' own work

adequacy. Structural model examination validates the hypotheses based on the measurement model.

5.1 Measurement model analysis

A confirmatory factor analysis (CFA) is carried out in several steps using AMOS version 24. First, it specifies the structure of the measurement model. Second, it estimates the model parameters. Third, it assesses the goodness-of-fit (GOF) of the overall model. The statistics used include the likelihood ratio chi-square (χ^2), the ratio of χ^2 to degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA) and the comparative fit index (CFI) (Duan *et al.*, 2023). Table 4 shows the result.

Convergence validity and discriminant validity are examined. Evaluating convergence validity involves three steps (Duan *et al.*, 2012). First, the χ^2 value for each construct is calculated. Second, modification indices are used to identify the common construct among items if any χ^2 values reject a construct at $p < 0.05$. Third, items are dropped if they do not fit into any constructs from the analysis (Duan *et al.*, 2023).

Convergence validity is assessed by using factor loadings (FL) and composite reliability (CR). The basic rule is that FL and CR values should be at least 0.50, ideally 0.70 or higher and all FLs should be statistically significant (Deng *et al.*, 2023). Following this rule, three items (PQ4, PQ5 and PQ8) are removed. Table 3 indicates that the remaining items exhibit high levels of convergence validity.

Discriminant validity is evaluated by comparing the average variance extracted (AVE) of a construct with the squared correlation between this construct and others (Hair *et al.*, 2010). Table 5 presents the result. It demonstrates high levels of discriminant validity.

Construct reliability is about the consistency between multiple items of a construct (Hair *et al.*, 2010). This study adopts the Cronbach's reliability coefficient for examining the reliability of constructs (Duan and Deng, 2021). The threshold for assessing construct reliability is $\alpha > 0.7$. All seven constructs have higher Cronbach's reliability coefficient values above 0.75. This reveals that these seven constructs have strong construct reliability (Duan *et al.*, 2023).

Table 4. Measurement model analysis statistics

Constructs	Item	FL	IR	CR	χ^2/df	p	CFI	RMSEA	α
CI	CI1	0.87***	0.68	0.84	1.97	0.08	0.897	0.065	0.83
	CI2	0.75***	0.56						
CE	CE1	0.85***	0.73	0.78					0.82
	CE2	0.72***	0.59						
PQ	CE3	0.75***	0.72	0.81					0.85
	PQ1	0.84***	0.68						
	PQ2	0.82***	0.63						
	PQ3	0.74***	0.72						
	PQ6	0.84***	0.69						
PV	PQ7	0.85***	0.74	0.87					0.75
	PV1	0.91***	0.81						
	PV2	0.90***	0.82						
	PV3	0.83***	0.71						
CS	CS1	0.79***	0.64	0.77					0.75
	CS2	0.77***	0.59						
	CS3	0.81***	0.63						
PPR	PPR1	0.86***	0.65	0.83					0.83
	PPR2	0.85***	0.61						
POSR	POSR1	0.78***	0.55	0.79					0.79
	POSR2	0.83***	0.62						
	POSR3	0.80***	0.59						
Recommended value		≥0.70	≥0.50	≥0.50	≤3.00	≥0.05	≥0.90	≤0.08	≥0.70
Note(s): *** $p \leq 0.001$, ** $p \leq 0.01$, * $p \leq 0.05$									
Source(s): Authors' own work									

Table 5. An AVE and squared correlation matrix

	CI	CE	PQ	PV	CS	PPR	POSR
CI	0.68						
CE	0.43	0.71					
PQ	0.25	0.38	0.63				
PV	0.36	0.34	0.39	0.69			
CS	0.41	0.29	0.26	0.27	0.57		
PPR	0.37	0.27	0.41	0.35	0.22	0.62	
POSR	0.29	0.40	0.32	0.25	0.31	0.28	0.65
Source(s): Authors' own work							

The GOF statistics of the final measurement model are assessed. The value of χ^2/df is 1.97, which is lower than the recommended value of 3.0. The RMSEA value of 0.065 is less than the recommended value of 0.08. This demonstrates that the model and the data have a good fit (Hair *et al.*, 2010). The final measurement model can then be used for hypothesis testing.

5.2 Structural model analysis

The overall fitness of the structural model is assessed using the GOF statistics. Table 6 summarizes the results. The chi-square (χ^2) value normalized by the degree of freedom (χ^2/df) is at 1.97, which is smaller than the recommended threshold value of 3. The goodness-of-fit index (GFI) (0.907) and the adjusted goodness-of-fit index (AGFI) (0.846) exceed the recommended threshold value of 0.8. The CFI (0.897) is higher than the recommended threshold value of 0.80. The RMSEA (0.065) is less than the recommended threshold value of 0.08. These statistics demonstrate a strong fit between the structured model and the data.

Table 6. Summary of the GOF statistics

Fit index name		Judgment value	Evaluation
Absolute fit index	χ^2/df	<3	The smaller, the better
	GFI	≥ 0.85	The closer to 1, the better
	AGFI	>0.8	The closer to 1, the better
	SRMR	0.05< and<0.08	The smaller, the better in the range of 0.05~0.08
	RMSEA	0.05< and<0.08	The smaller, the better in the range of 0.05~0.08
Relative fitting index	NFI	>0.85	The closer to 1, the better
	CFI	>0.9	The closer to 1, the better

Source(s): Authors' own work

The hypotheses in the proposed model in [Figure 1](#) are assessed. [Table 7](#) presents the result. It reveals that there is statistical support for five hypotheses, including [H1](#), [H4](#), [H6](#), [H7](#) and [H8](#). There is, however, insufficient evidence to support hypotheses [H2](#), [H3](#), [H5](#), [H9](#) and [H10](#).

6. Discussion

This study reveals that corporate image and perceived quality have a significant impact on customer expectations, which is consistent with the findings of [Lee et al. \(2006\)](#), [Oghuma et al. \(2015\)](#), [Joung et al. \(2016\)](#) and [Kang and Namkung \(2019\)](#). This is because customers rate the platform's brand reputation highly (Q1 mean = 4.29, Q2 mean = 4.21). It indicates that corporate image plays a positive role in attracting new customers and building trust in the platform. Businesses with a positive image tend to build customer trust ([Liao et al., 2024](#)), thereby raising customer expectations. When customers perceive high quality products, they are more likely to trust the business, therefore improving their expectation.

The study discovers that perceived quality has a significant impact on perceived value. This is exemplified in the high customer expectation on product quality and shopping experiences (Z1 and Z3 mean = 4.18, Z2 mean = 4.11). The highest mean score of product quality demonstrates its importance in enhancing customer expectation. This finding is supported in [Jin et al. \(2015\)](#) and [Sullivan and Kim \(2018\)](#). When customers consider that product quality matches their expectation, their perceived quality would be higher, leading to higher perceived value ([Wang and Wang, 2024](#)).

The study finds that perceived quality and perceived value significantly influence customer satisfaction. This finding is consistent with the findings of [Yeo et al. \(2017\)](#) and [Lee et al.](#)

Table 7. Hypothesis testing results

Hypothesis	Path	Estimate	S.E.	C.R.	p-value	Support for model
H1	CI → CE	0.316	0.056	5.629	***	Supported
H2	CI → PV	0.033	0.074	0.447	0.655	Not supported
H3	CI → CS	0.026	0.047	0.551	0.582	Not supported
H4	PQ → CE	0.631	147	4.289	***	Supported
H5	CE → PV	−0.001	0.132	−0.009	0.993	Not supported
H6	PQ → PV	1.123	0.242	4.635	***	Supported
H7	PV → CS	0.455	0.122	3.741	***	Supported
H8	PQ → CS	0.729	0.212	3.442	***	Supported
H9	PPR → CS	−1.477	6.395	−0.231	0.817	Not supported
H10	POSR → CS	−0.041	0.183	−0.227	0.821	Not supported

Source(s): Authors' own work

(2017). When customers perceive a product or service to be of high quality, they tend to be satisfied. This is because quality products or services meet customer expectations. Customers perceive a product or service to be of high value when they believe that its quality and functionality are reasonable than the price they pay (Liao *et al.*, 2024). This perceived value has a direct impact on customer satisfaction.

The study shows that perceived product risk and perceived online shopping risk have an insignificant effect on customer satisfaction. This finding is a surprise given that there is so much uncertainty related to e-commerce (Park *et al.*, 2017). An examination of the characteristics of O2O commerce of fresh products finds that O2O commerce has the capacity to overcome the challenge that traditional e-commerce presents. With the increased awareness of e-commerce uncertainty and the provision of offline services, perceived product risk and perceived online shopping risk have been minimized (Wu *et al.*, 2020; Wang and Wang, 2024). Customers are aware of the uncertainties associated with the purchase of fresh products, such as quality fluctuation and delivery delay (Liao *et al.*, 2024). When they encounter such risks, they are better prepared for them.

This study demonstrates that customer expectation has an insignificant impact on perceived value. This could be due to the high stability of fresh products, where there is little difference in the same type of products across different brands or retailers. In such cases, customer expectation has a minor influence on perceived value. Furthermore, this may also be attributed to the high level of information transparency in the O2O model, allowing customers to gain clearer understanding of products' origin, quality and other information. As a result, perceived value is not entirely dependent on customer expectation.

This study has made several theoretical contributions. First, it has tested and validated a comprehensive model for exploring how to improve consumer satisfaction in O2O commerce of fresh products. Such a model can help better understand consumer behaviors in the increasingly popular O2O commerce of fresh products.

Second, this study explores the impact of online shopping risks on customer satisfaction, which is often overlooked in existing research. With the improvement of living standards and internet penetration, consumers are increasingly purchasing fresh products in O2O commerce. Existing research focuses on the impact of product quality and service quality on customer satisfaction (Chang and Fong, 2010; Ene and Özkaya, 2014; El-Adly, 2019) without distinguishing between online and offline. This study extends existing research in this direction through a holistic consideration of online and offline channels in O2O commerce.

Third, this study delves into the impact of perceived quality on customer satisfaction. Perceived quality is measured as a structural variable with a more comprehensive set of observed variables than in previous studies. In measuring perceived quality, this study considers not only product and service quality but also other factors such as payment security and convenience, which are often ignored in existing studies (Wang and Wang, 2024).

The findings of this study have practical implications. The study finds that improving perceived value and perceived quality is critical for enhancing customer satisfaction. By providing quality products, excellent after-sales service and a convenient transaction experience, customer satisfaction can be enhanced. This ultimately promotes sustainable development of the business.

The findings of this study emphasize the importance of offline services. Although O2O commerce is conducted through online platforms, the quality of offline services is crucial to the overall customer experience. This suggests that O2O businesses need to pay close attention to the coordination and consistency of online sales and offline services to provide customers with a quality shopping experience.

7. Conclusion

This study has investigated what affects customer satisfaction in O2O commerce of fresh products in China. It finds that corporate image positively affects customer expectations, and

customer expectations positively influence perceived quality. The study reveals that perceived quality positively affects perceived value. It shows that perceived value and perceived quality positively influence consumer satisfaction. This study contributes to O2O commerce research through testing and validating a conceptual model for exploring how to enhance customer satisfaction. The findings are helpful for developing fresh products for retailers in pursuing sustainable competitiveness in a dynamic market.

There are several limitations that can be researched in the future. First, this study adopts the survey method for data collection. Future research can try to apply other methods for better understanding customer satisfaction in O2O commerce. Second, customer behavior analysis based on available platform data such as click rate, purchase behavior and browsing time can be used to discover customers' preferences and behavioral habits. Third, machine learning techniques can be adopted for identifying customer behavior patterns to better predict customer satisfaction. Fourth, this study adopts the CCSI model as the theoretical foundation. There are other theories that can be used. Fifth, the collection of data in this study is from Beijing. The study can be conducted in other cities.

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