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# Research on the Relationship Between the Logistics Service Quality and Customer Loyalty in C2C E-commerce

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**Abstract:** For the special relationship between logistics service quality and customer loyalty under the environment of C2C, on the basis of the three dimensions of Operation Logistics Service Quality, Relationship Logistics Service Quality and Cost Logistics Service Quality, the paper analyzed the relationship between customer satisfaction for third-party logistics service quality and customer loyalty for seller of C2C. The research shows that Relationship Logistics Service Quality and Cost Logistics Service Quality directly affects the customer satisfaction for the third-party logistics services, while Operation Logistics Service Quality does not, and Relationship Logistics Service Quality also affects the evaluation of Operation Logistics Service Quality and Cost Logistics Service Quality; Customer satisfaction directly affects customer loyalty to sellers with the third-party logistics service quality, so sellers need to choose the higher level logistics service providers in Operation Logistics Service Quality, Relationship Logistics Service Quality and Cost Logistics Service Quality in order to ensure the quality of customer loyalty.

Key words: C2C; Logistics service quality; Customer satisfaction; Customer loyalty; Structural equation model

## 1. INTRODUCTION

At present, the growth trend of China's online retail market is very evident. According to "2013 China's online retail market data monitoring report"<sup>[1]</sup> released by the China Electronic Commerce Research Center, the online retail market trading volume reaches 754.2 billion yuan in the first half of 2013, an increase of 47.3% from a year earlier, accounting for 6.8% of total retail sales of social consumer goods. In 2013, nationwide online shopping transaction volume is expected to reach 1.7412 trillion yuan. In the next five years, the scale of network shopping has nearly 7% of the total turnover scale in the total retail sales of social consumer goods, and the network shopping is more and more important in traditional retail markets. In our country, no matter the user scale or the transaction amount C2C shopping websites are leading in the B2C shopping websites, but users' satisfactions are obviously low, leading to the high customer churn rate in C2C market. So how to improve customer loyalty is a urgent problem in C2C e-commerce mode. Logistics service activity is a core part of C2C e-commerce business activities, and its quality directly affects the healthy development of this business form. Therefore, based on previous research, this paper will provide suggestion for C2C e-commerce development by discussing the relationship between third-party logistics service quality and customer loyalty in C2C E-commerce.

## 2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

### 2.1 Literature review

#### (1) Third-party logistics service quality

Third-party logistics service quality is that the degree of third-party logistics service features to meet customer needs and expectations<sup>[2]</sup>. In terms of logistics service quality, most research scholars at home and abroad studied it from the composition of logistics service quality dimension. The most traditional theory is 7Rs

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(Perreault & Russ, 1974) theory based on the time, place and utility , its core is that the enterprise can deliver the goods to exact location at the right time, right goods status and proper prices with accurate product information<sup>[3]</sup>. Stank, Goldsby , and Vickery (1999) proposed the evaluation model of logistics service quality from the three dimensions of operation logistics service quality, relationship logistics service quality and cost logistics service quality<sup>[4]</sup>, and divided logistics service into tangibles, reliability, responsiveness, assurance and empathy again from the own characteristics in 2003<sup>[5]</sup>. Brady and Gronin found that the logistics service quality composed of result quality, interaction quality and environmental quality<sup>[6]</sup>.

### (2) Customer satisfaction

In terms of customer satisfaction, Parasuraman, Zenithal and Berry proposed that service quality is the antecedents of customer satisfaction”, they thought “customer satisfaction will increase because of the high degree of service quality, and customer perceived service quality determines customer satisfaction ”<sup>[7]</sup>. Tian Jian (2012) studied the relationship between the customer satisfaction and the service quality in the C2C. He draw the conclusion that customers who got satisfaction in one transaction can become the loyal customers to bring sustainable benefits, so service providers need to focus on improving service quality levels<sup>[8]</sup>.

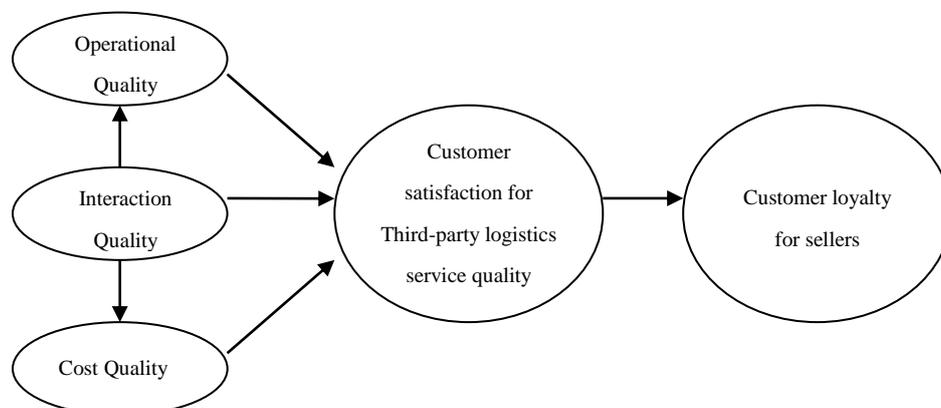
### (3) Customer loyalty

Customer loyalty has become an important mean of maintaining competitive advantages in C2C electronic stores<sup>[9]</sup>. Gu Pengfei (2010) studied the relationship between customer value and customer loyalty of C2C e-commerce. He thought that service value had a significant impact on customer satisfaction and customer loyalty when treating the service value as a whole<sup>[10]</sup>. Chen Jie (2010) concluded that the network customer satisfaction had a positive effect on customer loyalty based on the study of customer affect factors<sup>[11]</sup>. Wang Wei (2011) studied the relationship between logistics service quality and online purchasing behavior under C2C mode, then got the idea that service reliability and service flexibility have a positive effect on the online shopping, like the online shopping image to the customer loyalty as well<sup>[12]</sup>. Customer is the ultimate feeling and evaluator of logistics service quality, therefore, the method to improve network service quality must be based on customer needs. Customer satisfaction and loyalty are the important index for evaluation of their service shop operators<sup>[13]</sup>,which Fu Yongchao (2012) said.

## 2.2 Relationship model of logistics service quality and customer loyalty and the related hypothesis

### 2.2.1 Relational model and related metrics

Summarizing relevant literature and combining with PZB model (service quality gap model), we constructed the relationship model of logistics service quality and customer loyalty under C2C environment shown in Figure 1.



**Figure 1. The relationship model of logistics service quality and customer loyalty**

(1) The operation logistics service quality is the level of providing continuous effective logistics activities. The factors of operation logistics service quality which Stank (2003) proposed include timeliness, reliability, and accuracy. Combined with logistics service quality model which Mentzer (2001) proposed and the demand in C2C online shopping to improve indicators<sup>[14]</sup>. Design operation logistics service quality indicators into seven indicators of information quality, timeliness, reliability, error processing, service scope accuracy and convenience.

(2) The relationship logistics service quality is refer to the level of logistics activity to understand customer needs and make better meet customer demand by logistics service provider<sup>[15]</sup>. Combined with the characteristics of logistics services under the C2C online shopping environment , interaction quality indicators include eight indicators of understanding of level of understanding customer needs, customer care, professionalism, trust, service attitude, service initiative and timeliness of handling problems.

(3) The cost logistics service quality for logistics enterprises to provide quality services and operating costs of cost level, its indicators include overall prices, relative prices, and expected price of three<sup>[16]</sup>.

(4) Customer service satisfaction with the quality of third-party logistics company logistics is customer satisfaction with the quality of service after receiving service logistics companies. Its indicators include overall satisfaction , relative satisfaction, expected satisfaction.

(5) Customer loyalty business is customer loyalty in the degree of completion of the transaction businesses . Its specifications include buy again, price temptation, purchase proportion, oral advocacy emotional loyalty of five indicators .

Through summary of variable indicators, sort out the measurement indicators and indicator explanation of this study, as shown in table 1:

**Table 1. The full model measurement index**

Latent variables	Indicators	Interpretation of indicators
Operation quality	Information quality	Whether the information that logistics company provide to the customer is true and comprehensive or not
	Timeliness	Whether the goods sent within the prescribed period of time to the designated place
	Reliability	Whether goods are in good condition when sent to the designated place and degree of damage
	Accuracy	Whether actually delivered and ordered the goods which are consistent
	Error processing	Handling and efficiency of dealing with error order
	Convenience	The degree of convenience of obtaining goods
	Service scope	Diversified services to meet customer needs
Interaction quality	Level of understanding customer needs	Understanding the service provider to the customers' demand
	Customer care	Targeted and personalized service for customers
	Professionalism	Professional knowledge and humility of service provider
	Trust	To convey trust to the customer through the service provider's performance
	Service attitude	Hospitality degree of service provider
	Service initiative	Service providers to provide customers with active service
	Timeliness of handling problems	A timely, continuous improvement for customer service issues
cost quality	Evaluate the efficacy of the improved	Customers evaluate the improvement effect
	The overall price	Whether the price is reasonable of a company for the services provided

	The relative price	The evaluation of the company's prices compared with other companies to provide services
	The expected price	The evaluation of existing price compared with expected price
Customer satisfaction	Overall satisfaction	Whether customers satisfied with the company's service
	Relative satisfaction	Compared with other logistics companies, customer satisfaction on the company services
	Expected satisfaction	Compared with the desired services, customer satisfaction on the company's actual service
Customer loyalty	Buy again	The reflection of customer behavior loyalty
	Price temptation	The price impact on customer loyalty
	Purchase proportion	The reflection of customer behavior loyalty
	Oral advocacy	The reflection of customer potential loyalty
	Emotional loyalty	The reflection of customer emotional loyalty

### 2.2.2 Hypothesis

According to previous literature, we found the logistics service provider for more understanding of customer needs, the higher the professionalism, more care from the customer, more able to better meet customer needs, establish a good relationship with customers, promote the establishment of logistics enterprises good practices. Thus the hypothesis H1:

H1: In C2C network environment, relationship logistics quality of logistics service providers has a significant positive effect on operation quality.

Scannell (2000) found that there is a very important relationship between business-to- supplier and cost performance<sup>[17]</sup>. Stank (2003) also believed that there is a correlation between relationship performance and cost performance . Therefore, based on these studies, the hypothesis H2:

H2: In C2C network environment, relationship logistics quality of logistics service providers has a significant positive effect on cost quality.

Research shows that the higher the logistics service quality, the higher customer satisfaction, and then the customer loyalty will improve. Logistics service quality can be evaluated by the three dimensions of interaction quality, operation quality and cost quality. He Yaoyu ( 2012 ) pointed out that the impact of logistics service on customer satisfaction and perception is significant which influences factors and customer loyalty study of logistics service quality<sup>[18]</sup>. Thus, according to the research and development of China's logistics level, the hypotheses H3-H5 are put forward:

H3: In C2C network environment, relationship logistics quality of logistics service providers has a significant positive effect on customer satisfaction of third party logistics service quality.

H4: In C2C network environment, operation logistics quality of logistics service providers has a significant positive effect on customer satisfaction of third party logistics service quality.

H5: In C2C network environment, cost logistics quality of logistics service providers has a significant positive effect on customer satisfaction of third party logistics service quality.

Customer satisfaction is an important influence factor of customer attitude. Lv ShuLi (2012), said third-party logistics enterprises will positively influence customer satisfaction attitudinal loyalty.

This means that the greater customer satisfaction will bring greater customer loyalty. Better quality of service, higher customer value will result in higher customer satisfaction, and a positive impact on customer attitudinal loyalty<sup>[19]</sup>. Therefore, here is the hypothesis of H6:

H6: In C2C network environment, customer satisfaction of third party logistics service quality has a significant positive effect on customer loyalty.

### 3. RESEARCH PROGRAM

#### 3.1 Questionnaire design

Comb and translate service quality evaluation scale of B2C e-commerce of classical literature at home and abroad, design the questionnaire of relationship studying of logistics service quality and customer loyalty under C2C environment. Likert 7 scoring method is used for all the items in the questionnaire. Since college students represent the most active online shoppers groups, so this study had several students C2C online shopping experience as research objects. 130 pretest questionnaires were returned 126 copies, with 121 valid questionnaires, and the effective rate was 93%.

#### 3.2 Reliability and validity of pretest questionnaire

##### 3.2.1 Reliability analysis

The questionnaire used Cronbach  $\alpha$  coefficient for reliability analysis, from table 2, the value of Cronbach  $\alpha$  coefficient of each variable is greater than 0.7. This shows that the reliability is high, and the questionnaire has good stability and consistency.

**Table 2. The value of Cronbach  $\alpha$**

The analysis object	Cronbach's Alpha
Operation quality	.838
Interaction quality	.903
Cost quality	.829
Customer satisfaction	.861
Customer loyalty	.801
Scale analysis	.946

##### 3.2.2 Validity analysis

Using exploratory factor analysis method to factor analysis for the operation quality, relationship quality and cost quality, calculate the factor loadings of each variable indicator variables to explain the extent, KMO value and Bartlett 's test of sphericity. For the whole questionnaire structure, because  $KMO = 0.897 > 0.7$ , it is suitable for factor analysis, and has better degree of data correlation. We can see that the load factor for each variable metric indicators are much larger than 0.4, the degree of interpretation is much larger than 30%, KMO values are greater than 0.60, Bartlett 's test of sphericity Sig. is less than 0.001. In summary, the measurement scale is effective, with validity of 26 projects which comply with test standards, so scale has a better structure, and does not need to be amended.

**Table 3. KMO and Bartlett's test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.897
Bartlett's Test of Sphericity	Approx.Chi-Square	1948.341
	df	325
	Sig.	.000

**4. EMPIRICAL ANALYSIS**

The results of this formal questionnaire show like that, a wide range of distributed questionnaires, 200 questionnaires of paper, recycling 195, 192 valid questionnaires which recovery was 96%, 50 questionnaires of electronic, recycling 30, 26 valid questionnaires which recovery was 52%, 218 valid questionnaires which recovery was 87.2% in total.

**4.1 Goodness of fit test model**

With AMOS7.0 analysis, the full model  $df = 293 > 0$ , excessive identification, the model can be evaluated. The load factor of measurement indicators is greater than 0.50, indicating a good model fits. Most of the indicators have reached the acceptable level in this model, therefore, the measurement model fits better.

By fitting the initial model, the value of measurement error is 0.076 to 0.135, without negative error variance. The standardized regression coefficient table shows that the absolute value of standardization coefficient is 0.190 to 0.881, no more than 0.95. The results show that this model does not violate any estimate of the situation, so it can be tested on the overall model fit.

Using AMOS7.0 software to test the initial fit of the model, table 4 lists the initial model fit index. Overall, the model fitting degree can be accepted basically, but can also be modified better. In the causal path, all the path parameter C.R. values were more than 1.96,  $p < 0.05$ , indicating this model can past the significant test.

**Table 4. Initial model fitting index**

Type	X <sup>2</sup> /df	RMSEA	NFI	IFI	CFI
Result	2.491	0.083	0.781	0.857	0.855
Accept or Not	Accept	Not accepted	Not accepted	Accept	Accept

**4.2 Revision and evaluation of the full model**

**4.2.1 Revision of the full model**

Since these hypothetical paths are very significant, therefore, the article revises the model by adding a path relationship with theoretical basis. The double arrows in table 6 mean covariance index of residual variable, and MI is the less Chi-square value of two variables or residual variables due to increasing the causal path. This paper established the relationship between E14 and E15, e25 and E26, E12 and E10, as shown in the following table 5:

**Table 5. Covariance**

Residual variable	Relationship	Residual variable	M.I.	Par Change
e15	<- ->	e14	55.473	0.529
e25	<- ->	e26	20.504	0.450
e12	<- ->	e10	29.517	0.368

Increasing e15 and e14 residuals relative path, the chi-square value is smaller than 55.473; increasing e25 and e26 residuals relative path, the chi-square value is smaller than 20.504; increasing e12 and e10 residuals relative path, the chi-square value is smaller than 29.517. From a theoretical point of view, there is a correlation among all three groups. Therefore, the amendment will add the correlation paths of e15 and e14, e25 and e26, e12 and e10, which add relative paths of ‘Evaluate the efficacy of the improved’ and ‘Timeliness of handling problems’, ‘Oral advocacy’ and ‘Emotional loyalty’, ‘Service attitude’ and ‘Professionalism’. According to the

above ideas, fitting and modifying the model many times, the final model of the standardized estimates has been gotten, as shown in Figure 2.

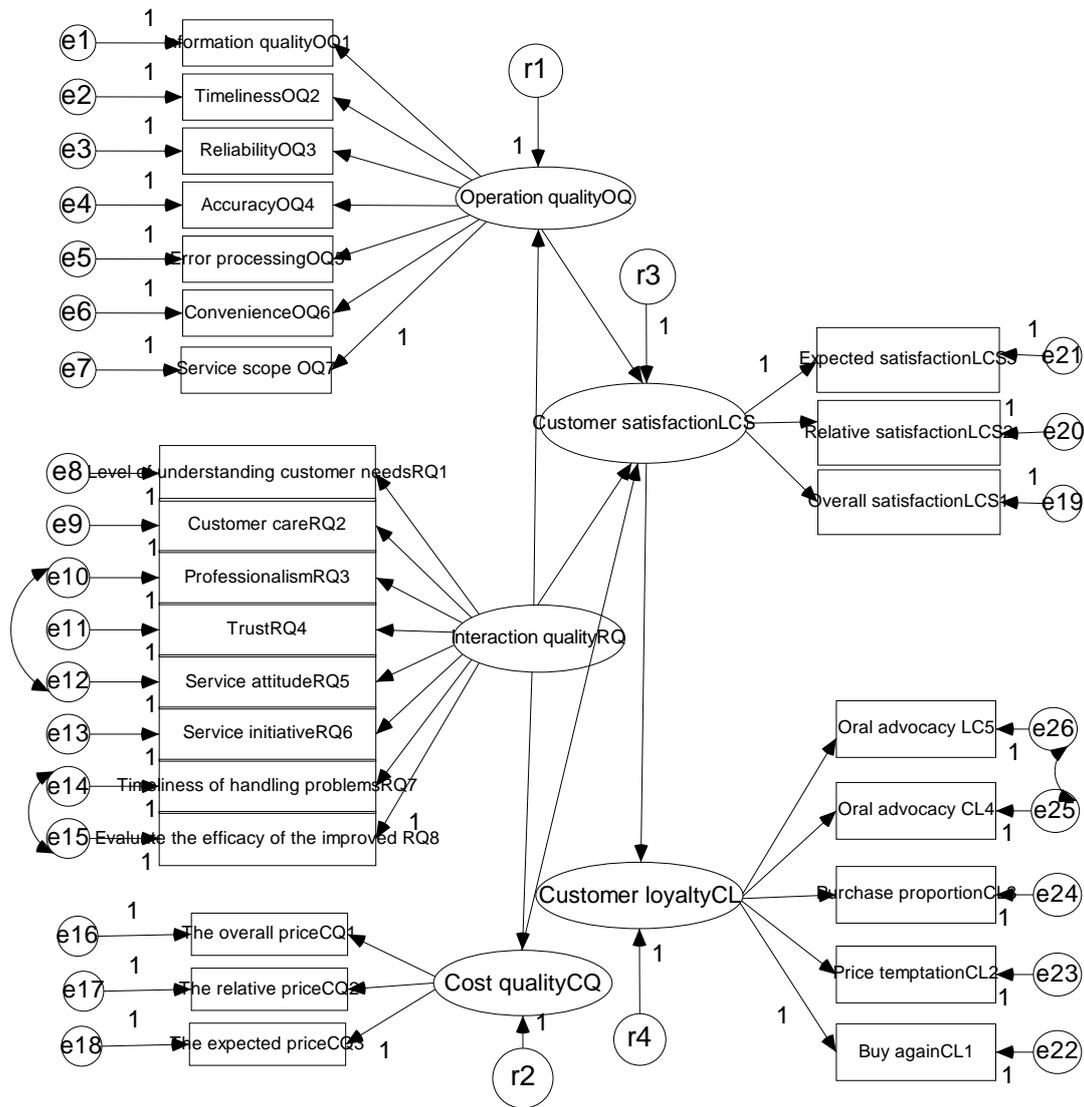


Figure 2. Standardized estimate model diagram

(2) The revised evaluation model

After comparing the fitting index of revised model with the fitting index of initial model, such as the fit indexes RMSEA and NFI not meet the requirements of the initial model in table 6, revised fitting indexes meet the requirements.

Table 6. The fitting index comparison of initial model and modified model

Index Name	Initial statistics	Correction value	Reference value	Evaluation results
X <sup>2</sup> /df	2.491	2.130	≅ 3	Accord
RMSEA	0.083	0.072	0.05 ≅ RMSEA ≅ 0.08	Accord
NFI	0.781	0.815	NFI>0.8	Accord
IFI	0.857	0.893	IFI>0.8	Accord
CFI	0.855	0.891	CFI>0.8	Accord

The path relationship of latent variables in the revised model and coefficient values of each error term were shown in table 7. In the causal relationship path, all path parameter values of C.R. were greater than 1.96, and  $p < 0.05$ , which indicates that the model passes the test of significance, and the standard error of each error coefficient value is smaller than correction, evaluation of correction model is better.

**Table 7. parameter estimation between latent variables of correction model**

Assumptions and Path Relation	Estimate	S.E.	C.R.	P	Assumptions established or not
H1:Operation quality <--- Relationship quality	.747	.093	7.190	***	Yes
H2:Cost quality <--- Relationship quality	.742	.088	7.777	***	Yes
H3:Customer satisfaction <--- Relationship quality	.368	.102	3.288	.001	Barely yes
H4:Customer satisfaction <--- Operation quality	.170	.073	2.053	.040	No
H5:Customer satisfaction <--- Cost quality	.489	.080	5.356	***	Yes
H6:Customer loyalty <--- Customer satisfaction	.967	.075	10.211	***	Yes

#### 4.3 The interpretation of model result

(1) From the standard estimate value model, the path coefficient of interaction quality and operation quality is 0.75,  $P < 0.001$ , which shows the path coefficient is significant, so suppose H1 is proved. Similarly, from the path coefficient of interaction quality and operation quality, it can still be seen that hypothesis H2 is also established. This shows that in the C2C environment, interaction quality has an effect on the evaluation of operation quality and cost quality for customer.

(2) The path coefficient of relationship quality for customer satisfaction is 0.36,  $P = 0.001$ , indicating that there is significant positive effect on relationship quality and customer satisfaction. The path coefficient of operation quality for customer satisfaction is 0.17,  $P > 0.001$ , indicating that there is no directly significant positive effect on operation quality and customer satisfaction. The path coefficient of cost quality for customer satisfaction is 0.49,  $P < 0.001$ , indicating that there is significant positive effect on cost quality and customer satisfaction. In C2C environment, relationship quality and cost quality impact on the quality of third-party logistics for customer satisfaction, especially the relationship quality, because exist indirect positive correlation in operation quality and cost quality as mass-mediated. Therefore, logistics service providers should pay attention to the relationship quality by improving the quality of customer relationship operation quality and cost quality logistics services to further improve customer satisfaction

(3) The path coefficient of customer satisfaction and customer loyalty is 0.97,  $P < 0.001$ , indicating that these path coefficients were significant, then H6 was verified. This suggests that a third-party logistics service quality customer satisfaction and customer loyalty business has a directly positive correlation. For a merchant, the logistics provider selection is also a key factor in improving customer loyalty, so businesses need to choose the higher level logistics service providers of relationship quality, operation quality and cost quality to ensure quality of customer loyalty.

#### CONCLUSIONS

(1) This study analyzed the relationship between customer satisfaction of third-party logistics service quality and customer loyalty, basing on the three dimensions of logistics service quality of operation quality,

relationship quality and cost quality ,and used structural equation model to test hypothesis, ultimately to establish a relationship model of logistics service quality and customer loyalty under C2C environment.

(2) Research shows that the relationship quality is the most important factor of third-party logistics customer satisfaction. The relationship quality will not only affect the evaluation of operation quality and cost quality, but also direct impact on third-party logistics services to customers satisfaction. Logistics service providers should be based relationship quality , cost quality and operation quality as supplement , improve the quality of logistics services. Customer satisfaction with the third-party logistics service quality directly affects customer loyalty to merchants, businesses need to choose high level of logistics service providers to ensure customer loyalty.

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