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Abstract: This paper constructs the index dimension of online logistics service quality review information from the two aspects of e-commerce logistics service quality factors and online review information characteristic factors, builds a structural equation model of online logistics service quality reviews information on consumers' purchase intention. Empirical method is used to verify and analyze the model and hypothesis. The results show that six variables of e-commerce logistics service quality, including timeliness, reliability, empathy and online review information, such as value, quality and amount, acting on consumers' purchase intention, timeliness indirectly affects consumers' purchase intention through the value and amount of online review information, while empathy indirectly affects consumers' purchase intention through the value of online review information. On this basis, the analysis results are discussed, and relevant suggestions are put forward for logistics enterprises and online shop sellers to create a good environment for consumers online shopping.

Keywords: Structural equation model, Online logistics service quality review information, Purchase intention

1.   RESEARCH BACKGROUND

With the rapid development of information technology, online shopping is becoming more and more popular with consumers because of the convenience, low price, spanning time and space. Online reviews have become an important source of product attitudes for contemporary netizen, with 70% of them checking online reviews before purchasing products to help them make purchase decisions, they believe that online reviews are more trustworthy and useful than manufacturer's information. Logistics service quality is one of the most important links in e-commerce transactions. With the increase of e-commerce transactions, consumers who have purchased goods review substantially on e-commerce logistics service quality. At present, there are few studies on online logistics service quality review information, and the literature on the impact of online logistics review information on consumers' purchase intention is even more scarce.

2.   ESTABLISHMENT INDEX DIMENSIONS FOR ONLINE LOGISTICS SERVICE QUALITY REVIEW INFORMATION

This research mainly constructs the online logistics service quality review index system from two aspects, one is the service quality of the e-commerce logistics, the other is the online review information characteristic.

Mentzer et al. propose the "9-dimension Logistics Service Quality Questionnaire (LSQ)" based on SERVQUAL theory, that is, communication quality, goods quality, goods integrity, goods accuracy, timeliness, error handing, order release quality, order process and information quality [0]. Xie thinks the B2C and C2C online shopping logistics service quality include tangibility, reliability, responsiveness, price, assurance, empathy, convenience seven dimensions by a review of literature [1]. Some logistics dimensions may no longer be suitable for the environment of online logistics service quality reviews with the rapid development of e-commerce logistics. In order to determine the dimensions of online logistics service quality reasonably, this study selected four major e-commerce platforms of JD.com, Vipshop, Tmall, Suning as well as product reviews with high sales

volume, two hundred reviews are extracted from it. The proportion of each dimension in the online logistics reviews are calculated by integrating the dimensions of Mentzer et al., Zhang, Xiao 错误！未找到引用源。,[2],[3], as shown in Table 1.

Table 1. Survey results of e-commerce platform

E-commerce platform or logistic dimensions	JD.com (cellphone)	Vipshop (clothes)	Tmall (cosmetics)	Suning (electric appliance)	Weighted average proportion
Reliability	20.0%	12.5%	30.1%	22.5%	23.8%
Timeliness	49.2%	35.0%	55.7%	52.1%	50.7%
Empathy	27.1%	32.1%	46.0%	33.7%	37.4%
Flexibility	0.4%	1.2%	2.8%	4.7%	2.7%
Informativeness	0.1%	0.2%	0.7%	1.7%	0.8%
Economy	0.2%	0.0%	0.5%	0.0%	0.2%
Logistics reviews rate	50.0%	35.4%	54.1%	62.1%	53.2%
Total reviews number	25737	21541	62685	45168	

According to the survey in Table 1, the reliability, timeliness and empathy are the most concerned dimensions of e-commerce logistics service quality, accounting for 23.8%, 50.7% and 37.4% of the total reviews respectively. Accordingly, this study summarizes the logistics service quality dimension as three dimensions: reliability, timeliness and empathy.

The classification of online review information characteristics can be divided into review information valence, quality and amount, which have been unanimously recognized by scholars, such as Zhao, Du et al. [4],[11]. Online reviews have positive and negative effects, i.e. the value of online reviews. There is no consistent conclusion about the impact of online reviews on consumer purchase intention. Chinese scholar Jin notes that negative online WOM is more influential than positive online WOM on consumer purchase [5], while scholar Gershoff believes that positive online reviews have a greater impact on consumers' purchase intention than negative online reviews [6]. Most scholars consider the quality of review information when studying the impact of online reviews on purchase decisions. They believe that high-quality information describes the product function or use experience in detail, thus the information is highly usable and has a greater impact on consumers' online shopping intentions. For example, Petty and Cacioppo consider that high-quality objective review information is more convincing than low-quality emotional review information, thus has a stronger influence on consumers' purchase intention [7]. Meanwhile, they suggest the amount of online reviews directly reflect the sales of products or services, which have triggered consumers' follow suit and herd buying behaviors to some extent, Park, Lee&Han also argues that purchase intention increases with the amount of online reviews [8]. Grounded on the above characteristics of online review information in domestic and foreign literature studies, this study classifies the online reviews information characteristics into three dimensions: reviews information value, quality and amount.

3. RESEARCH HYPOTHESIS

Xia studies the relationship between logistics service quality and consumers' online shopping intention [9]. Zhang thinks that B2C logistics service quality measurement has the dimension of timeliness [2]. From the perspective of customer experience, the timeliness of logistics service quality would affects customer experience, time experience of logistics service quality can easily be transformed into the process of cognition and review of products or services through other media. It happens that online reviews are an excellent platform for expressing

one's own cognition and ideas. Therefore, the following assumptions are made:

H1: The timeliness of logistics service quality positively affects consumers' purchase intention.

H1a: The timeliness of logistics service quality positively affects review information value.

H1b: The timeliness of logistics service quality positively affects review information amount.

Xiao studies the relationship between logistics service quality and consumers' online shopping intention, also verifies that the reliability of logistics service quality as perceived gain has a positive impact on consumers' purchase intention using stepwise regression method [3]. According to the psychology of consumers: the shopping website cooperated by reliable logistics service providers is generally trustworthy, and the reliability of logistics service quality is equivalent to the reliability of the website, high reliability websites generally have high quality review information. Therefore, the following assumptions are made:

H2: The reliability of logistics service quality positively affects consumers' purchase intention.

H2a: The reliability of logistics service quality positively affects review information quality.

Zhang thinks that B2C logistics service quality measurement has the dimension of empathy [2]. Mentzer et al. proposes service quality models include the dimension of empathy 错误! 未找到引用源。. From the perspective of customer experience, the empathy of logistics service quality will affect customer experience, which includes emotional experience and functional experience. Customers' emotional experience can easily turn into the process of cognition and review of products or services through other media, thus affects the value of consumers in online reviews process. Functional experience will make consumers more willing to reviews online. Therefore, the following assumptions are made:

H3: The empathy of logistics service quality positively affects consumers' purchase intention.

H3a: The empathy of logistics service quality positively affects review information value

H3b: The empathy of logistics service quality positively affects review information amount.

Online review information value refers to the overall positive and negative tendency of online review. Generally speaking, positive review has a positive impact on purchase intention while negative review have a negative impact. Consumer's negative review information may reach thousands or even tens of thousands people in the network environment. Liu and Du also propose and verify that online review information value has an impact on consumers' purchase intention [10],[11]. Therefore, the following assumption is made:

H4: Online review information value positively affects consumers' purchase intention.

Online review information quality refers to level of detail, the credibility, adequacy, relevance, usefulness, objectivity of reviews information, the reliability of the language, and other information characteristics of the review. Jiménez, Fernando R et al. point out that reliable review will improve consumers' purchase intention [12]. Therefore, the following assumption is made:

H5: Online review information quality positively affects consumers' purchase intention.

Online review information amount reflects the popularity of a product or service. In general, the amount of review of a product or service is related to its sales volume. The more reviews a product or service have, the more sales it will sell, which will attract more consumers to buy it. Zheng conducts that the amount of review is significantly related to consumer behavior and market outcomes [13]. Therefore, the following assumption is made:

H6: Online review information amount positively affects consumers' purchase intention.

4. RESEARCH METHODOLOGY AND QUESTIONNAIRE DESIGN

In this study, the corresponding data are obtained through questionnaire survey to verify the model, and the questionnaire is designed on the basis of the existing literature. The questionnaire is measured by Likert five point scale, 1-5 represents five levels from complete disagreement to complete agreement. First, a small range of

filling in advance is carried out, then some semantic ambiguities are modified, and finally a formal questionnaire is obtained, which includes 7 latent variables and 21 items, the dimensions and operational definitions of the questionnaire are shown in Table 2. The questionnaire is divided into three parts, the first part is consumer basic information survey, including gender, age, monthly income, online shopping frequency, online shopping commodity types, etc. the second part is the measurement of logistics service quality factors, the third part is the measurement of online review information characteristics. Questionnaires are issued through professional website -- questionnaire stars. Those who fill out the questionnaires gets corresponding small red envelopes or online lottery opportunities, each IP address can only be filled out once. Questionnaires are collected from 1 July to 4 September 2018, 260 questionnaires are collected, the valid questionnaires are 225 and the effective rate of the questionnaire is 86.54%.

Table 2. Variable and operational definitions

Latent variable	Number	Definitions	Reference sources
Timeliness	TIME1	Logistics shipment is fast	Xiao Ahui [3]
	TIME2	Logistics transportation is fast	
	TIME3	Logistics delivery process is fast	
	TIME4	Return and exchange of logistics goods is fast	
Empathy	EMP1	The express personnel will negotiate the delivery time with me	Zhang Yanyan [2]
	EMP2	Express personnel have good service attitude and provide door-to-door service	
	EMP3	Good attitude towards after-sales service	
Reliability	REL1	The packaging of goods are complete	Parasuraman, Zeithaml&Berry[14]
	REL2	The goods are intact	
	REL3	The goods are delivered accurately	
Review information value	RIV1	The general tendency of logistics service quality review is positive	Chan[15]
	RIV2	Logistics service quality review information is recommend that I buy first	
	RIV3	Overall, the reviews about logistics service quality are very consistent	
Review information quality	RIQ1	Logistics service quality review information is true	Chatterjee[16]
	RIQ2	Logistics service quality review information is objective	
	RIQ3	Logistics service quality review information is useful	
Review information amount	RIA1	Many people review about logistics service quality	Park, Lee&Han[8] Zheng Xiaoping[13]
	RIA2	Reviews about logistics service quality attract much attention	
	RIA3	Both positive and negative reviews about logistics service quality	
Purchase Intention	PI1	The logistics service quality reviews I read make me willing to buy the goods I needed in this website	Bansal&Voyer[17]
	PI2	The logistics service quality reviews I read make me willing to recommend my relatives and friends to buy goods in this website.	

SPSS v22.0 software is used to analyze the collected data. The data could be divided into seven factors and the interpretation rate is 79.12%, thus the data satisfy the following analysis conditions.

5. RESULT ANALYSIS OF STRUCTURAL EQUATION MODEL

5.1 Reliability and validity of the model

The reliability and validity are obtained by using Smart PLS 2.0 software with the partial least square method. The main reliability indexes are Cronbach's alpha coefficient and combination reliability(CR) value. Generally, CR value greater than 0.7 indicates that the model has good internal consistency reliability, meanwhile the threshold value of Cronbach's alpha coefficient is 0.7. The reliability indexes and T values of the seven dimensions of timeliness, reliability, empathy, review information value, quality, amount and purchase intention are shown in Table 3, the CR values of all variables are higher than 0.86 and Cronbach's alpha coefficients are higher than 0.72 by the PLS algorithm results, which show that the model has a high reliability.

Table 3.   Factors loading, T value, CR, AVE and Cronbach's alpha values of the measurement model

Latent variable	Number	Factor loading	T value	CR	AVE	Cronbach's Alpha
TIME	TIME1	0.85	37.94	0.90	0.70	0.85
	TIME2	0.70	17.37			
	TIME3	0.88	38.67			
	TIME4	0.90	45.39			
REL	REL1	0.89	32.90	0.92	0.80	0.87
	REL2	0.86	23.90			
	REL3	0.92	50.70			
EMP	EMP1	0.98	30.82	0.96	0.89	0.95
	EMP2	0.95	41.57			
	EMP3	0.90	37.23			
RIV	RIV1	0.92	54.68	0.93	0.81	0.88
	RIV2	0.93	57.81			
	RIV3	0.85	25.87			
RIQ	RIQ1	0.92	55.92	0.94	0.83	0.89
	RIQ2	0.89	34.00			
	RIQ3	0.91	36.64			
RIA	RIA1	0.72	49.68	0.87	0.70	0.78
	RIA2	0.89	36.78			
	RIA3	0.85	27.89			
PI	PI1	0.86	47.34	0.86	0.75	0.72
	PI2	0.87	57.08			

The validity of the measurement model is estimated by content validity, convergent validity and discriminant validity. Since the measurement indexes are derived from previous research results, it can be considered that these variables and items are accurately expressed, the measurement model has content validity. In the measurement of convergent validity, it is widely recognized that the load value is greater than 0.7 and the t test of load value of each item is significant, just consider the convergent validity of each index is appropriate. From table 3, we can see that the AVE value of all latent variables is greater than 0.7, and the load value t test of each item is significant, which indicates that the measurement model in this study has good convergence validity.

In the measurement of discriminant validity, Fornell et al. suggests that the discriminant validity could be tested by examining the size of AVE of latent variable and comparing the correlation coefficient between AVE square root of latent variable to other latent variables, AVE value need greater than 0.5 and the square root of AVE need larger than the correlation coefficient with other latent variables [18]. The cross-loading values of each item are calculated by software Smart PLS 2.0. From table 4, it can be seen that the AVE values of each latent variable are greater than 0.5, the load values of each variable are higher in the corresponding factors, while the load values of other factors are relatively lower, which show that the measurement model in this study has a high discriminatory validity.

Table 4.   The correlation coefficient of latent variables and the square root of the average variation extraction estimate

Latent variable	TIME	REL	EMP	RIV	RIQ	RIA	PI
TIME	0.84						
REL	0.51	0.89					
EMP	0.62	0.52	0.94				
RIV	0.69	0.58	0.57	0.9			
RIQ	0.70	0.62	0.52	0.62	0.91		
RIA	0.58	0.57	0.78	0.55	0.68	0.83	
PI	0.64	0.71	0.64	0.58	0.72	0.68	0.87

5.2 Model verification

In this study, Smart PLS 2.0 software and PLS algorithm are used to build and calculate the structure model, the results are shown in Figure 1. Then the bootstrapping method is used to re-sample the original data with a capacity of 5000, which is follow the recommendation of 500 samples 错误! 未找到引用源。, Table 5 lists the path coefficient, T value and hypothesis testing.
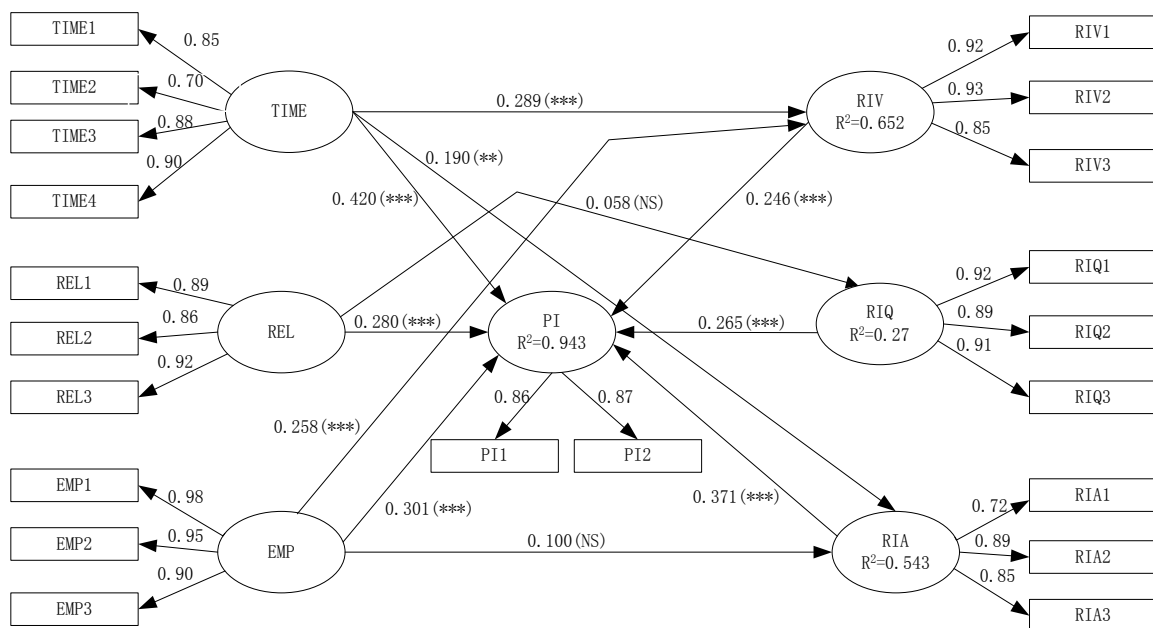

Figure 1.   The running path coefficient and R^2 of the structural model

Note: the figure *** represents a significant level of 0.001, ** represents a significant level of 0.01, * represents a significant level of 0.05, and NS represents an insignificant level.

Table 5.   Path coefficient , T value and hypothesis test result

Hypothetical relationship	Path	Path coefficient	T value	Supported VS Rejected
H1	The timeliness of logistics service quality → Purchase intention	0.420	5.870	Supported
H1a	The timeliness of logistics service quality → Reviews information value	0.289	3.560	Supported
H1b	The timeliness of logistics service quality →Reviews information amount	0.190	2.700	Supported
H2	The reliability of logistics service quality → Purchase intention	0.280	3.410	Supported
H2a	The reliability of logistics service quality → Reviews information quality	0.058	1.204	Rejected
H3	The empathy of logistics service quality → Purchase intention	0.301	4.480	Supported
H3a	The empathy of logistics service quality → Reviews information value	0.258	3.301	Supported
H3b	The empathy of logistics service quality →Review information amount	0.100	1.708	Rejected
H4	Reviews information value →Purchase intention	0.246	3.470	Supported
H5	Reviews information quality →Purchase intention	0.265	3.865	Supported
H6	Reviews information amount→ Purchase intention	0.371	4.850	Supported

The direct and indirect effects between online logistics service quality review information on purchase intention in this study are calculated , as shown in Table 6. The indirect effects are the sum of the product of the indirect paths, the total effects are the sum of the direct effects and the indirect effects.

Table 6.   The effects of independent variable and dependent variable on purchase intention

Intermediate variable or independent variable	Direct effect	Intermediate variable	Indirect effect	Total effect
TIME	0.420	RIV	0.289*0.246=0.07	0.560
		RIA	0.190*0.371=0.07	0.560
REL	0.280	NS	NS	0.280
EMP	0.301	RIV	0.258*0.246=0.06	0.361
RIV	0.246	NS	NS	0.246
RIQ	0.265	NS	NS	0.265
RIA	0.371	NS	NS	0.371

6.   DISCUSSION

6.1 Conclusions

We construct and validate the model of online logistics service quality review information on consumers' purchase intention based on the existing research. The data of this study shows that the factors of e-commerce logistics service quality, including timeliness, reliability and empathy positively affect consumers' purchase

intention. The information factors of online reviews, including online review value, quality, amount also positively affect consumers' purchase intention. In addition, this study also verifies that the timeliness of logistics service quality positively affects the value and amount of review information, the empathy of logistics service quality positively affects the value of review information. The reliability of logistics service quality has no effect on the quality of review information, which may be due to the threshold of online shopping is very low, the quality of online reviews of different types of groups is high or low, reliable logistics companies and shopping websites cannot avoid some low-quality review information, it is also possible that competitors deliberately make low-quality reviews by swiping orders. The empathy of logistics service quality has no effect on the amount of review information, which may be related to the substantial false information such as the order-brushing in online shopping.

6.2 Managerial implications

In terms of theoretical contribution, this study, on the basis of ensuring the comprehensive and complete research variables, better explains the impact of online logistics service quality review information on consumer's purchase intention, broadens previous studies on the relationship between online review information, logistics service quality and consumer's purchase intention. In practical sense, this study can provide some management advice for logistics enterprises and online shop sellers.

Online reviews are a excellent link and bridge between logistics enterprises and consumers. Logistics enterprises can find the advantages and problems of logistics services through online logistics review information, Which is conducive to the development of logistics enterprises. For logistics enterprises in e-commerce, first of all, they should put the timeliness of goods in the first place and ensure goods are shipped, transported, delivered, returned and exchanged rapidly. Then they should focus on humanized logistics service, train the service attitude of express delivery personnel, deal with problems in time, take into account the consumers' emotional factors and communicate with customers more to strength the empathy of logistic service. Finally, they should consider the reliability of logistic service, such as pay attention to the goods and packages without damage while ensure the delivery of goods as soon as possible. At the same time, they should set up a special section for collecting opinions and information of logistics service quality, which can find and feedback problems to logistics enterprises in time.

Online reviews are also an excellent link and bridge between online shop sellers and consumers. Online shop sellers can timely understand their shipment and delivery dynamic situation in the logistics service quality review information, master consumers' psychology timely. Which is beneficial to attract more consumer and win consumer's trust. For online shop sellers, they should attach importance to online review information, make full use of the influencing factors of online review information to improve consumers' purchase intention, encourage consumers to provide high-quality positive reviews, establish a good reputation and image of the store. Furthermore, they should strengthen the quality control of reviews, deal with malicious and false reviews in time, and maintain the green environment and good atmosphere of online shopping. In addition, a special logistics service quality review channel system should be established to enable sellers understand the logistics problems encountered by consumers and feedback timely, give customers a high-quality shopping experience and better serve consumer. Last but not least, it is not only necessary for logistics enterprises to provide high-quality services and transport efficiency, but also for online shop sellers and consumers to coordinate and communicate with each other in order to build a healthy online shopping environment. Only by the joint efforts of the three parties can online shopping achieve progress and development.

6.3 Limitation and future research

There is no doubt that this study has several limitations. First, only some good-selling commodities are selected in the survey, the massive online logistic review information selected less, which may make the research conclusion not universal. Secondly, the questionnaire is published online and the demography of respondents who participate in this study mainly by young people, so the survey sample has some limitations. Therefore, we need to be cautious about the sample representativeness in the explanatory power of the research conclusions. Finally, there are some limitations in the questionnaire research method of online review recall, which is vulnerable to the subjective factors of the respondents. For future research, we can try to subdivide the research according to different goods type, such as fragile goods and non-fragile goods. It is also possible to explore the impact of negative logistics service quality reviews and it's coping strategies on consumers' purchase intention.

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