Research on Logistics Service Quality and Customer Loyalty of Cross-border E-commerce Platform in China

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Abstract
Logistics service quality has always been a very important part of cross-border e-commerce. At the same time, as the only link to contact consumers offline, logistics service quality greatly affects consumers' perception and evaluation of e-commerce shopping. However, there are relatively few studies on the relationship between logistics service quality and consumer loyalty. This study aims to explore the logistics service factors that affect consumer loyalty in the context of cross-border e-commerce, build a "logistics service quality-customer loyalty" model, and put forward hypotheses.
Keywords: Cross-Border E-Commerce Platform, Logistics Service Quality, Customer Satisfaction, Customer Trust, Customer Loyalty

Introduction
The acceleration of global trade and the emergence of technological inventions at the end of the 20th century have greatly changed people's lives. The impact of digitalization and household participation in the digital environment as technological devices has brought about the concept of e-commerce by transferring global trade to the digital environment. E-commerce provides sellers with the opportunity to access markets and customers they cannot reach, engage in more sales, and even act as intermediaries for sales without the need for storage. It provides customers with many advantages, such as purchasing products that are not sold in their own market, saving time, and comparing prices. However, with the advantages of e-commerce attracting the attention of numerous cross-border e-commerce platforms, the number of cross-border e-commerce platforms is rapidly increasing, and this market is beginning to face fierce competition.

To survive in a fiercely competitive market, e-commerce platforms must firmly grasp customers, acquire and maintain a stable customer base, which is the direct source of profit and competitive advantage for e-commerce platforms. Completing e-commerce transactions cannot be achieved without offline logistics service support. It can be seen that e-commerce

needs to maintain a high level of customer loyalty, and logistics is an important link and basic guarantee of online shopping transactions. It is necessary to explore the influencing factors of logistics services on e-commerce customer loyalty. On the one hand, it can serve as a basis for e-commerce to improve logistics service systems or choose third-party logistics enterprises. On the other hand, it can also improve the level of e-commerce customer loyalty and profit.

Literature Review
Overview of cross-border e-commerce platforms

With the rapid development of technologies such as artificial intelligence, big data and cloud computing, the digital economy, characterized by digitization, informatization and intelligence, has gradually become a new engine for economic growth. As a new type of intermediary, cross-border e-commerce platforms have broken through the limitations of time and space, effectively reducing transaction costs, and reached consensus in the academic community. The relevant data of Gecit (2020) and other application Dunhuang network show that in international trade, cross-border e-commerce platforms can not only reduce the costs generated in the transaction process, but also minimize the fixed costs required forproduction.

Quality of logistics service

Zhang (2019) believes that logistics service should be understood as a series of activities, mainly the activities to ensure customer satisfaction, to ensure that customer needs are met, etc. Mentzer et al (2004) pointed out that marketing services and logistics services can be used to evaluate the quality of logistics services. This view has been widely accepted by scholars. There are also some research results on logistics service quality in China. Yang & Wang (2019) pointed out that logistics service quality belongs to service quality and changes with the change of customer demand. Based on the online shopping environment, Politis et al (2014) believes that logistics service quality is customers' perception of the services provided by logistics service providers.

Customer Satisfaction

Zlatkovic (2013) proposed that customer satisfaction would make customers have a good impression on the product, and thus make them have the desire to buy again, which laid a theoretical foundation for the study of customer satisfaction. Since then, many scholars at home and abroad have made explorations on customer satisfaction. From the perspective of customer cognitive evaluation, Gecit (2020) points out that customer satisfaction is an evaluation of the gap formed by comparing customers' expectations before purchasing goods with actual products and services. Fang & Yingqian (2023) further proposed that customer satisfaction refers to customers' evaluation of the process of obtaining products and services. Li & Ma (2022) states more explicitly that customer satisfaction refers to customers' expectations of products or services before consumption, compared with actual consumption.

Customer Trust

Customer trust refers to the customer's recognition and trust in a certain enterprise, a certain brand of products or services. It is the result of customer satisfaction. Through an empirical study, Flavian et al (2006) believes that network service quality affects customers'

loyalty to e-commerce by affecting their perceived value, trust and satisfaction. Zhang (2019) finds that customer satisfaction is an important source of customer trust in his study on the relationship between customer satisfaction and trust. Gommans et al (2001) believed that using the third-party guarantee service of C2C platform can enhance consumers' trust and stimulate consumers to make repeated purchases

Customer Loyalty

Chen (2006) first introduced the concept of loyalty in the category of trade, from which the concept of customer loyalty came into being. After that, researchers have made extensive studies on customer loyalty and have different understandings of customer loyalty from different perspectives. Early studies on customer loyalty focus on behavioral loyalty. They regard repeated purchase behavior of customers as a significant sign of customer loyalty, and more than three consecutive purchases are defined as customer loyalty (Cunningham, 1956). With the in-depth study, scholars put forward the concept of attitudinal loyalty. Oliver (1981) pointed out that customer loyalty is the commitment of consumers to the attitude and behavior of merchants in selling goods and services, and promises that they will continue to buy the goods or services of the original merchants in the future regardless of the price reduction marketing strategies of other enterprises. Later, scholars combined attitudinal loyalty and behavioral loyalty, arguing that only those customers who maintain a positive attitude toward the enterprise and continue to buy the enterprise's goods or services can be called as having real customer loyalty (Dick, 1994).

Research Models and Hypotheses
Research Framework

This study aims to explore the relationship between cross-border e-commerce platform logistics service quality and customer loyalty; The mediating effect of customer satisfaction and customer trust. The independent variable is service quality. Customer satisfaction and trust are the mediating variables, while customer loyalty is the dependent variable.
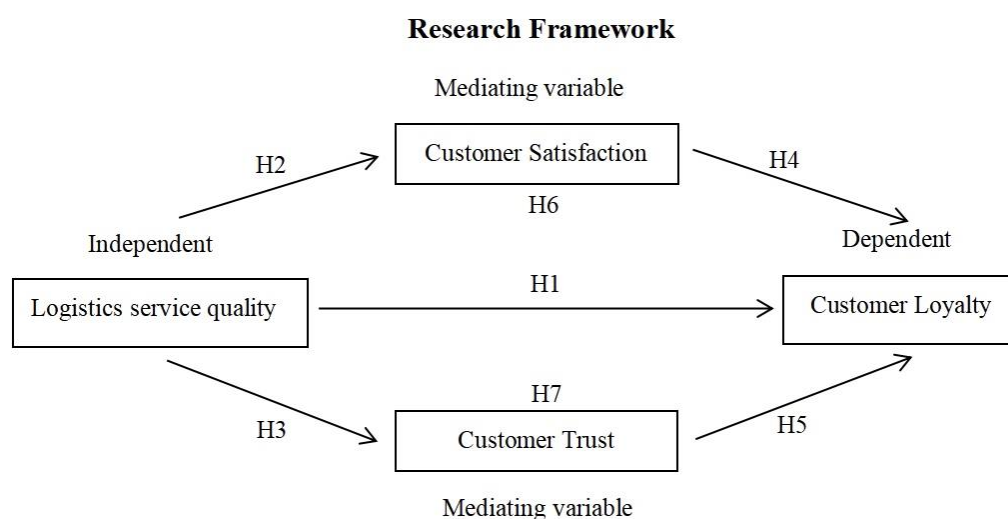

Figure 2.6.1 Research framework

The research model was constructed based on consumer behavior theory to explain the associations between variables (quality of service, customer satisfaction, trust, and loyalty).

First, logistics service quality is customers' evaluation of the difference between expected service and perceived service (Parasuraman et al., 1985). Second, customer satisfaction refers to the relationship between customers' service performance and customers'expectations (Oliver, 1997). Third, customer trust is a belief that the service provider will provide the service as promised and that the service provider takes the best interest of the customer as the starting point (Ribbink et al., 2004). Finally, customer loyalty refers to the attitude of viewing customers through repeated purchase behavior and recommendation intention (Zeithaml et al., 1990).

Research Hypothesis

In the research model, the perceived Logistics Service Quality of cross-border e-commerce platforms is mainly measured by combining nine main indicators of the LSQ model (Logistics Service Quality) model proposed by Tenessee University in the United States in 2001. In addition, it is assumed that the perceived service quality of cross-border e-commerce platform logistics directly affects customer satisfaction, their level of trust and loyalty. In order to examine the causal relationship between perceived service quality, customer satisfaction, trust and loyalty, this study examines three hypotheses. These are

H1: The quality of logistics services has a positive impact on customer loyalty.
H2: Logistics service quality has a positive impact on customer satisfaction.
H3: Logistics service quality has a positive impact on customer trust.

In the fierce competitive environment, many companies are trying to improve and expand customer satisfaction. Customer satisfaction is necessary to maintain existing customers (Guo et al., 2009). According to Ittner & Larcker (1998), service quality is positively correlated with customer satisfaction. Customer satisfaction is caused by service marketing activities, post-purchase behaviors and several interrelationships in the consumption process. Churchill & Surprenant (1982) argued that the concept of customer satisfaction can be directly included in the concept of service marketing, and this concept includes meeting consumer demand while generating corporate profits. Customer satisfaction directly affects customer loyalty, and customer loyalty can be obtained through customer satisfaction (Lai et al., 2009). Therefore, in view of the previous research, the following hypothesis is assumed:

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

The most effective way for a business to convince customers of its work ethics is to provide them with a wealth of experience during the time when a service transaction takes place. Customers are likely to have confidence in suppliers if they have already experienced their competence and work ethics in meeting customer needs and demands (Helfert & Gemunden, 1998). Customer trust is the primary term for establishing a long-term relationship with a business (Gronroos, 1995; Morgan & Hunt, 1994). Customer trust is an important part of explaining loyalty (Chaudhuri & Holbrook, 2001; Moorman et al., 1993; Morgan & Hunt, 1994). Therefore, given previous research, assume the following:

H5: Customer trust has a positive effect on customer loyalty.

Building on the above, a two-level analysis is used to draw a causal inference about the hypothetical relationship between the variables under study. First, this level investigates whether customer satisfaction has an intermediary relationship between service quality and customer loyalty. The second level investigates the mediating role of customer trust between service quality and customer loyalty. Therefore, the following assumptions are made:

H6: Customer satisfaction mediates the relationship between logistics service quality and customer loyalty.
H7: Customer trust mediates the relationship between service quality and customer loyalty.

The level of logistics service quality, customer satisfaction and trust are positively correlated with customer loyalty. Scholars generally believe that customer satisfaction is the cognition formed after customers' actual feelings about online shopping goods and logistics service quality are compared with their previous expectations after receiving the goods, and the measurement standards are relatively consistent. In the context of e-commerce, it can also be used as a standard to measure the quality of logistics services provided by online shops. Wu (2019) compares customers' actual perception with their subjective expectation, and judges the level of e-commerce logistics service quality by the gap between the two. Liu et al (2021) concluded in the study of marketing channels that there is a significant relationship between trust level and customer loyalty. Guo (2018) There is a certain correlation between customer trust in e-commerce and risks in the network environment. Cross-border e-commerce platforms and customers are interdependent, and customer loyalty is a strong desire based on the mutual relationship between customers and enterprises. Customer trust can be measured by measuring customers' perception of risk. The higher the perceived risk, the lower the customer trust. Customer satisfaction and trust help enterprises gain competitive advantage, expand market share and enhance customer loyalty. This study assesses the relationship path in the research structure. Better logistics service quality should make customers feel more satisfied and gain their trust and loyalty. Customer satisfaction and trust levels are assumptions that affect service quality and customer loyalty. A summary of the hypothesis tests is shown in Table 2.1

Table 2.1
Summary of hypothesis tests

No	Research hypothesis	Analytical technique
H1	Service quality has a positive impact on customer's loyalty	regression
H2	Service quality has a positive impact on customer's satisfaction	regression
H3	Service quality has a positive impact on customer's trust	regression
H4	customer's satisfaction has a positive impact on customer's loyalty	regression
H5	customer's trust has a positive impact on customer's loyalty	regression
H6	Customer satisfaction plays a mediating role in service quality and customer loyalty	multiple regression
H7	Customer trust plays a mediating role in the relationship between service quality and customer loyalty	multiple regression

Research Methods
Research Design
The basic research design adopted in this study is survey design. Data collection was completed by using the survey tool (questionnaire) of the "WenZhuoxing" mobile APP. Questionnaires are often used in marketing and consumer research (M Easterby-Smith et al., 2012). The questionnaire is then distributed to customers who have shopping experience in cross-border e-commerce platforms through social platforms and forums related to cross-border e-commerce. Specifically, the purpose of this study is to: (1) determine whether the quality of logistics services will affect the customer satisfaction, trust and loyalty of cross-border e-commerce platforms; (2) Determine whether customer satisfaction will affect the customer loyalty of cross-border e-commerce platforms; (3) Determine whether customer trust will affect the customer loyalty of cross-border e-commerce platforms; (4) Determine the intermediary effect between the service quality of cross-border e-commerce platforms and customer loyalty; (5) Determine the mediating influence of cross-border
e-commerce platform customer trust on the relationship between service quality and customer loyalty.

Sample and Data Collection
Population and Sample
Based on the problem statement and objective, the population in this study includes consumers in Hunan Province, China, who have shopping experience on cross-border platforms as of November 11, 2023. In terms of age, they are concentrated between 18 and 45 years old, because most of them accept the form of cross-border e-commerce and are willing to use it. The occupations of the respondents are mainly students, enterprises also account for a part, and other occupational groups are relatively average. From the perspective of educational background, most of the interviewees have high school education level or above, and most of them have a certain level of education, which also ensures the quality of

the questionnaire. The questionnaire data is collected first by editing the questionnaire through the professional questionnaire making website "Juanxing", and then distributing the questionnaire to consumers on social platforms. The main thing is that the survey objects of the questionnaire are people who have cross-border shopping experience.

Data Collection

Data collection for this study used two types of data, namely primary data and secondary data. The primary data was collected via the Questionstar APP and a secondary review of the relevant literature was conducted to investigate the results of previous studies related to the measurements used in this study. The main data collected were service quality, customer satisfaction, customer trust and customer loyalty. Customers are randomly distributed to customers who have shopping experience on cross-border e-commerce platforms through social platforms and forums related to cross-border e-commerce as of November 11, 2023. Respondents were asked to select and specify their opinions on the quality, satisfaction, trust and loyalty levels of logistics services provided by different cross-border e-commerce platforms, which are provided for each item on the Likert5 scale.

Methods of Data Analysis

The research design of this study adopts the questionnaire survey method. The Social Science Statistical Package (SPSS, version 21) was used to analyze the questionnaire data. Descriptive and inferential analyses were performed for respondents in all parts of the questionnaire.

Descriptive Statistical Analysis

Descriptive analysis is the conversion of raw data into a form that researchers can understand and interpret (Zikmund et al., 2013). In this study, descriptive statistics were performed to report the frequency, average score, standard deviation, score range, skewness, and kurtosis of individual identification, company identification, and normality tests. Respondents were asked to indicate their opinions on logistics service quality, customer satisfaction, customer trust and customer loyalty on a 5-point Likert scale, ranging from 1 (completely disagree) to 5 (completely agree).

Inferential Analysis
a. Factor Analysis

Factor analysis The factors used to test the proportion of a sample. The main applications of factor analysis are: (1) reducing a large number of relevant variables to a more manageable amount before using them in other analyses, such as multiple regression or multivariate analysis of variance; And (2) to detect the structure of the relationship between variables in order to classify variables (Sekaran & Bougie, 2013). Therefore, factor analysis was used as a data reduction or structure detection method in this study. Factor analysis includes two main methods:; Exploratory and confirmatory. Exploratory factor analysis is used in the early stages of research to gather information about how a set of variables relate to each other. Confirmatory factor analysis, on the other hand, is a more sophisticated and sophisticated set of techniques used later in the research process to test specific hypotheses or theories related to the structure of a set of variables. Techniques for factor analysis are principal component analysis (PCA) and factor analysis (FA). Both attempt to produce a small linear combination of the original variables in a way that captures most of the variability in the correlation pattern.

In principal component analysis, the original variable is converted into a smaller set of linear combinations, using all the variance in the variable. In this factor analysis, however, a mathematical model is used to estimate the factors so that only the shared variance is analyzed (Tabachnick et al., 2019).

b. Test the reliability and validity of the instrument

Reliability and validity are often used in quantitative studies. Because reliability and validity are rooted in positivist perspectives, they should be redefined for use in naturalistic methods (Winter, 2000).

Reliability: Reliability is a concept used to test or evaluate quantitative research. The reliability of the scale indicates that it has no random error. In this study, Cronbach's Alpha (obtained via SPSS version 21) was used to test the reliability of the instrument. The recommendation of Hair et al (2010) was to perform reliability analysis for the extracted factors. Used to test the internal consistency of measuring instruments.

Validity: Validity refers to the extent to which a scale or set of measures accurately represents the structure of interest. The main types of validity are content validity, standard validity, and structural validity. Content validity refers to the adequacy of a measure or scale sampled from the intended range of the content domain. Standard validity deals with the relationship between scale scores and some specific, measurable criterion. Structural validity involves testing the scale not according to a single criterion, but by deducing hypotheses based on theories about the underlying variable or structural nature. Structural validity is explored by investigating its relationship to other relevant and unrelated structures (Streiner & Norman, 2008).

c. Correlation Analysis

Correlation analysis is used to describe the strength and direction of the linear relationship between two variables. In this study, procedures are proposed to obtain and interpret the Pearson product moment correlation coefficient (r) as well as the Spearman rank order correlation (rho). Pearson r is designed for interval level variables. It can also be a dichotomous variable. Spearman rho is designed for ordinal level or ordering data and is especially useful when the data does not meet Pearson's correlation criteria.

The Pearson correlation coefficient (r) can take a value between -1 and +1. A perfect correlation representation of 1 or -1 can be used to precisely determine a variable value by knowing the value of the other variable. A scatter plot of this relationship will show a straight line. On the other hand, a correlation of 0 indicates that there is no relationship between the two variables. The scatter plot will show a circle of dots with no obvious pattern. However, if the correlation between the two independent variables in the correlation matrix is greater than 0.80, multicollinearity may be a problem (Hair et al., 2010).

d. Multiple Regression Analysis

Multiple regression analysis can be used to explore the relationship between one continuous dependent variable and multiple independent variables or predictors (Aczel & Sounderpandian, 2006; Sekaran & Bougie, 2013). Multiple regression is based on correlation, but allows for a more sophisticated exploration of the interrelationships between a set of variables. Multiple regression can be used to solve a variety of research questions. It can tell the researcher the ability of a set of variables to predict a particular outcome.

The three main types of multiple regression analysis are: standard or simultaneous, hierarchical or sequential, and stepwise. In standard multiple regression, all independent variables are evaluated for their predictive power, which is higher than the predictive power of all other independent variables. This is the most commonly used type of multiple regression analysis. In hierarchical multiple regression, independent variables are entered into the equation in an order specified by the researcher based on theoretical evidence. After the preceding variables are controlled, the variables or sets of variables are entered in steps with each independent variable. In stepwise multiple regression, the researchers provide a list of independent variables and then allow the program to choose which variables will be entered and the order in which they enter the equation based on a set of statistical criteria. There are three different versions of this method: forward selection, reverse deletion, and stepwise regression.

In this study, hierarchical multiple regression was used to determine the mediating effects of customer satisfaction and customer trust on the relationship between logistics service quality and customer loyalty on
cross-border e-commerce platforms.

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