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# Cross-border e-commerce service quality model construction and variable relationship analysis

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## Abstract

The study aims to explore the relationship between cross-border e-commerce service quality and consumer loyalty. With the goal of improving the service quality of cross-border e-commerce, combined with the theory of consumer behavior and cross-border e-commerce, the service quality model was constructed, and the relationship between the variables was analyzed. The specific issues related to the relationship between the quality of cross-border e-commerce services and consumer loyalty, switching costs, and perceived value. Utilizing quantitative analysis methods, this paper designs a variable relationship model and a questionnaire that includes measures of service quality, switching costs, perceived value, and loyalty. A total of 500 questionnaires were distributed to consumers with experience in international online commerce, and 470 valid responses were collected and analyzed. The results indicate a positive relationship between service quality in international online commerce and consumer loyalty, perceived value, and switching costs. Based on these findings, the study provides relevant research suggestions in the context of current international online commerce marketing practices.

**Keywords:** International Online Commerce, Quality of Service, Model Building, Variable Relationships

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## Introduction

### Research status

With the continuous development of global digital technology and applications, the cross-border e-commerce industry is booming, attracting many traditional enterprises to transform. The quality of cross-border e-commerce services has become an important criterion for evaluating the competitiveness of enterprises. The research of Wolfgang ULaga et al. shows that the role of service quality in customer value is much greater than that of price, so this study draws on the SERVQUAL model proposed by Parasuraman et al. to explore the current status and influencing factors of cross-border e-commerce service quality.

### Research Motivation

The rapid development of the international online commerce industry and the importance of service quality to the competitiveness of enterprises prompted this study to construct a model and analyze the variable relationship between international online commerce service quality. Although many scholars have made contributions in the field of service quality, no research can fully represent the current situation of international online commerce service quality, so this study aims to deeply explore the current situation of international online commerce service quality and its related factors in combination with the actual situation.

## Research Objectives

This paper aims to improve the service quality of international online commerce enterprises, and analyzes the variable relationships of service quality, switching cost, perceived value and customer loyalty of international online commerce enterprises, so as to further enrich the theory of international online commerce

### Research Questions

The main research questions of the paper are as follows:

1. How does the quality of international online commerce services affect the switching cost of consumers?
2. How does the quality of international online commerce services affect consumers' perceived value?
3. How does the switching cost of consumers affect their loyalty to international online commerce?
4. How does consumers' perceived value affect their loyalty to international online commerce?
5. How does the quality of international online commerce services affect consumer loyalty?
6. How does the quality of international online commerce services affect consumers' loyalty through their switching costs?
7. How does the quality of international online commerce services affect consumers' loyalty through their perceived value?

## Literature review

### Brief description of the principle

The increasing global digital technology and applications have provided huge growth opportunities for cross-border e-commerce, and many traditional enterprises have transformed into the e-commerce industry. At present, the technology of cross-border e-commerce is becoming more and more developed, and the government monitoring market mechanism is becoming more and more mature. In the context of a favorable cross-border e-commerce environment, the quality of cross-border e-commerce services is an important basis for evaluating enterprises and the cornerstone of enterprise competition. Therefore, the construction of a cross-border e-commerce service quality model and variable relationship analysis are of far-reaching significance to promote the development of cross-border e-commerce and foreign trade.

Empirical research confirms that among the drivers of customer value, the active role of quality is much greater than that of price, with the former being 63.3% and the latter being 36.7%. Therefore, this paper draws on the most representative definition of Parasuraman et al. (1985) Quality of Service Model (PZB Model), which is widely cited in academic practice.

The PZB model uses exploratory research to identify ten dimensions of consumer service quality. The 1988 SERVQUAL scale reduced the original 10 components of the PZB model to five, and formed the SERVQUAL scale (22 measurement items).

Although the SERVQUAL model is limited to a kind of ex-ante research, the proposed five dimensions affecting service quality are still widely recognized by experts in the international service quality research community (Joseph et al., 1993). The five facets of the SERVQUAL model are as follows: Tangibility, Reliability, Reactivity, Guarantee, and Caring. Although many scholars have carried out research on service quality in different fields, they cannot represent the current situation of cross-border e-commerce services, so this paper analyzes and discusses the construction of cross-border e-commerce service quality model and the relationship between variables based on the current situation of cross-border e-commerce service quality.

### Concept of relevant variables

#### Quality of Service

Gronroos (1984) defines quality of service as the difference between what consumers expect in advance and what they perceive after receiving it. Service quality is the consumer's perception and measurement of service performance, that is, the customer's perception of the quality of the various services provided, when the perception degree is high, it represents good service quality, and conversely, when the perception degree is low, it indicates poor service quality

#### Conversion costs

Consumer switching cost is an important factor affecting the basic consumer group of international online commerce. Therefore, companies need to do everything possible to reduce consumers' willingness to switch products (Jackson & Schuler, 1985) proposed the concept of switching cost, which explains the economic

and psychological costs that customers must face when switching suppliers. Switching costs can lead to customer dependence on service providers.

Perceived value

Zaithaml (1988) first proposed the theory of perceived value from the perspective of the customer in 1988. Consumer behavior theory is the theoretical basis that explains all business and marketing activities, and international online commerce is no exception. The comprehensive evaluation of a service or product by a consumer is based on the perception of pay and benefit, and the perceived value of a consumer refers to the result of the consumer's perceived evaluation of a product or service. In addition to paying more attention to the quality of their own consumption experience, people are also affected by other factors such as perceived value (Ma et al., 2022).

Loyalty

Customer loyalty refers to how loyal a customer is to a business. Customer loyalty refers to the psychological tendency to trust, continue and repeat purchases of products or enterprises due to satisfaction, and is the continuous expression of customer purchase behavior. Jill Griffin, a senior marketing expert in the United States, believes that customer loyalty refers to the degree to which customers frequently repeat purchases due to their preference for a business or brand.

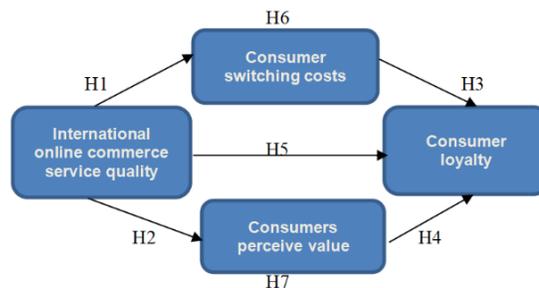
Personalization factors such as high-quality products, low-priced selling prices, convenient and fast websites, fast delivery logistics, and secure payment systems can help businesses ensure customer satisfaction and customer loyalty (Sujay et al., 2022).

Research framework design

The SERVQUAL evaluation model is a pre-study of the benefits of a service product that the customer experience. In the process of exploring the relationship between service quality, perceived value, satisfaction and loyalty, it is found that there is a positive relationship between each aspect.

Drawing on the SERVQUAL scale, this paper divides the service quality of international online commerce into five dimensions to quantitatively evaluate the service quality. Referring to the literature on consumer switching cost, consumer perceived value, and consumer loyalty, and based on the research of previous scholars, the model was constructed and a formal questionnaire was formed

The consumer loyalty model of international online commerce is constructed as follows (see Figure 1):



**Figure 1** The relationship between international online commerce service quality

and consumer switching cost, consumer perceived value, and consumer loyalty. Source: Compiled from the study

The research framework of this paper sets up the following seven path relationships, namely: first, the relationship between service quality and consumer switching cost; second, the relationship between service quality and consumers' perceived value; third, the relationship between consumer switching cost and consumer loyalty; fourth, the relationship between consumer perceived value and consumer loyalty; fifth, the relationship between service quality and consumer loyalty; Sixth, consumer switching cost has a mediating role in the relationship between service quality and consumer loyalty; Seventh, consumer perceived value plays a mediating role in the relationship between service quality and consumer loyalty.

## Research Methodology

### Questionnaire design and

Based on the literature review of consumer behavior theory, international online commerce theory and other literature, the research framework is designed, the research hypothesis is proposed, the variable definition is found and the variable measurement is carried out. Drawing on the design ideas of mature questionnaires in the past, the research framework was designed based on the reference questionnaires used by previous scholars, and the research framework was designed according to the literature review. Formal questionnaires were designed according to the variables and scales of the theoretical model. The research questionnaire is discussed from the following aspects: the questionnaire consists of the following three parts: first, the questionnaire subjects are filtered, that is, adult consumers who meet the requirements of "international online commerce shopping experience" are allowed to fill in the questionnaire; Secondly, the descriptive questions in the three questionnaires of the three models all have 7 common items, namely, the gender, age, education level, occupation, monthly income, international online commerce shopping time, and average monthly expenditure of the respondents. Thirdly, the descriptive questions of variables in the model questionnaire; This questionnaire is mainly based on a seven-point Likert scale to measure the scores of each construct, and expresses the respondents' agreement in terms of strongly disagree, disagree, somewhat disagree, generally agree, somewhat agree, agree, and strongly agree. A total of 500 questionnaires were distributed and 480 questionnaires were recovered, of which 470 were valid, with a total effective recovery rate of 98%.

### Questionnaire Questions

Taking international online commerce service quality, consumer perceived value, and consumer switching cost as independent variables and consumer loyalty as dependent variables, the survey was carried out in the form of a structured questionnaire, including the following contents:

1. Demographic characteristic variables. Demographic variables mainly include: gender, age, education level, occupation, monthly income, international online commerce shopping time, average monthly expenditure, etc.
2. International online commerce service quality. In the part of the international online commerce

service quality measurement scale, drawing on the SERVQUAL scale, according to the references, the scale items are revised for the research purpose of the paper, and the service quality is divided into five dimensions, namely reliability (1-5 questions), responsiveness (6-9 questions), guarantee (10-13 questions), care (14-18 questions), and tangibility (19-22 questions), and the quantitative evaluation of service quality is implemented. According to the relevant description of each question and their own situation, the test participants subjectively scored and judged the questions one by one, and the scores were set in 7 levels, from 1 to 7, and the degree of agreement gradually increased.

### 3. Consumer Switching Costs

#### 1) Definition of operational:

Switching costs are the costs that consumers must pay when they change the products they buy from a business, as well as the various losses, tangible or intangible, that consumers lose when they switch to alternative merchants.

#### 2) Measurement method:

Drawing on the references, this paper researches and designs an international online commerce consumer switching cost measurement scale, and puts forward a total of five measurement items.

#### Perceived value

1) Definition of operational type. Perceived value refers to the overall utility measurement and evaluation made by consumers in the process of purchasing products or services, comparing "what they get" and "what they pay", that is, consumers' perceived evaluation of products or services, that is, the result of the exchange between perceived benefits and perceived costs (Zeithaml, 1988) This paper examines the gap between perceived costs (both monetary and non-monetary) paid by consumers and the perceived benefits obtained.

2) Measurement method. According to the questions used by Yang and Peterson (2004) as the basis for measurement, and then modifying, deleting, and revising the questionnaire according to the characteristics of international online commerce, a total of four questions were proposed.

### 5. Consumer loyalty

1) Definition of operational: Consumer loyalty refers to the willingness of consumers to continue shopping at a international online commerce company and to recommend them to their relatives and friends.

2) Measurement method: Referring to the research literature on consumer loyalty, the loyalty facet question scale was designed.

#### Model assumptions

1) The relationship between service quality and consumer switching costs Only by clarifying that service quality is the influencing factor of customer switching costs, can we better formulate an effective strategy to manage customer switching costs. Based on the 1995 research, analyzed the customer conversion behavior of online service enterprises and discussed the factors affecting the conversion behavior of online customers, which is of great reference value for the study of international online commerce consumer switching costs. Patterson

and Smith added a cultural element to the study of customer switching behavior, revealing the differences in customer switching costs in different countries. Therefore, the following hypotheses are proposed:

Hypothesis H1: The quality of international online commerce services has a positive impact on consumers switching costs.

2) The relationship between service quality and consumers' perceived value

From the perspective of marketing, a company's high-level service, and high-efficiency and high-quality production can enhance consumers' perceived value. Consumers demand high-quality goods for a more convenient and high-quality life. Doney and Cannon (1997) trust refers to the characteristics of brand trust possessed by consumers, such as consistency of brand quality and service, authenticity, reliability, honesty, and responsibility. Fang et al. (2008) argue that the research on corporate strategy focuses on the influence of consumers on the development of enterprises, which is manifested in perceived value, corporate innovation, and corporate performance improvement.

American scientist Parasuraman studied the quality of e-commerce service. The initial view was that the quality of service depends on the degree to which the e-commerce website can meet the needs of consumers for efficient browsing, shopping, and delivery, and after the pre-purchase is turned to the purchase, he believes that the quality of service depends on the convenience of the website's purchase and delivery, the speed and efficiency of transactions.

Quality of service and perceived value are high-dimensional attribute variables. Zeithaml (1998) pointed out that in the research model of perceived value and purchase intention, service quality will positively affect perceived value. That is, in the research on the relationship between service quality, customer satisfaction, perceived value and customer loyalty, it is confirmed that service quality has a significant positive impact on customer perceived value.

Therefore, the following hypotheses are proposed:

Hypothesis H2: International online commerce service quality has a positive impact on consumers' perceived value.

The relationship between consumer switching cost and consumer loyalty

Fornell (1992) was the first to introduce the concept of switching cost into the interpretation of consumer loyalty in the field of marketing and introduced switching cost into the conversion relationship between consumer satisfaction and consumer loyalty. Kotler et al. (2022) point out that there are two basic ways to retain loyal consumers, namely improving consumer satisfaction and increasing consumer switching costs.

The available research literature suggests that higher switching costs lead to higher consumer loyalty. When consumer satisfaction rises to a certain level, it has the effect of weakening consumer loyalty, and in this case, the impact of switching costs on consumer loyalty will play a leading role.

From a practical point of view, the implementation of customer switching cost management strategies to cultivate customer loyalty can provide a good way for enterprises to develop and implement customer loyalty programs. Therefore, the following hypotheses are proposed:

Hypothesis H3: International online commerce consumer switching cost has a positive impact on consumer loyalty.

The relationship between consumer perceived value and consumer loyalty

The theory of perceived value of customers, proposed by Zaithaml (1988) takes consumers' perceived value as the key element, and defines perceived value as the consumer's feeling of measuring gains and losses in the process of purchasing goods, that is, the overall evaluation of gains and costs. Zaithaml advocates a comprehensive innovation in the overall quality of goods and services, which is particularly important to improve competitiveness and maintain existing customers. Sustainable visual merchandising will also largely influence the variation of retailers' store loyalty (Kseniya et al., 2022). Sophisticated and efficient online platform shopping apps are particularly important ways to increase customer satisfaction and loyalty (Kathrin et al., 2022)

It can be seen that perceived value dynamically influences consumers' choice of products and services. Utilitarian consumers, on the other hand, are more focused on perceived value. Consumers with a higher level of perceived value can perceive higher utilitarian value because they have more information about the service costs and benefits of international online commerce enterprises, such as product price, service quality, and shopping time. Make more efficient decisions. Therefore, the following hypotheses are proposed:

Hypothesis H4: International online commerce consumer perceived value has a positive impact on consumer loyalty.

The relationship between service quality and consumer loyalty

Regarding the relationship between service quality and consumer loyalty, most scholars believe that service quality has a direct impact on customer loyalty. Boulding (2023) showed that repeat demand and willingness to recommend are positively affected by the quality of service. Zeithaml (1988) found that service quality has a positive impact on consumer loyalty. Parasuraman et al. (1994) found that the association between service quality and consumer perceived preferences varies across industries. Allred and Lon Addams (2000) point out that service quality is an important variable that affects the perceived value of customers, and it is also a necessary condition for customer loyalty.

Therefore, the following hypotheses are proposed:

Hypothesis H5: International online commerce service quality has a positive impact on consumer loyalty.

Service quality affects consumer loyalty through consumer switching costs

According to Bolton (2000), loyalty depends on the quality of services that customers provide to those that serve their own businesses compared to those that serve them. Dick and Basu (1994) define switching cost as the time, money, and mental cost of switching customers to a service provider, so that they become dependent on the service provider. The reasons for customer dependence in the above two studies are, on the one hand, the cost of switching service providers; On the other hand, there is the quality service of the service provider.

Bitner (1990) shows that loyal consumers usually use service quality and interaction effect as the judging criteria, and recommend or praise companies with good service quality to others that when customers feel

that the quality of service is poor and the switching costs are low, they will switch to other companies to find another service.

Therefore, the following hypotheses are proposed:

Hypothesis H6: International online commerce service quality positively affects consumer loyalty through consumer switching cost (consumer switching cost plays a mediating role in the relationship between service quality and consumer loyalty).

Service quality affects consumer loyalty through consumers' perceived value

The review of consumer behavior theory and framework, this paper analyzes the influencing factors of consumers' behavior and attitude from multiple dimensions by taking cognitive attitudes and emotions as mediators, and then uses consumption intention as the measurement outcome variable, so as to make a good research on the impact of online marketing on consumption intention.

A good brand image can reduce the purchase risk of consumers, help enterprises obtain a good image, love and trust the company's products and services, enhance product quality and service perception, and make customers have a positive association with service quality, thereby stimulating customer purchase behavior and enhancing customer loyalty (Park et al., 1986). Romaniuk and Sharp (2003) believe that customers have a positive image perception of product and service quality, which can increase the perceived value of corporate image, and then affect customers' purchase intention and loyalty.

Therefore, the following hypotheses are proposed:

Hypothesis H7: International online commerce service quality positively affects consumer loyalty through consumer perceived value (consumer perceived value plays a mediating role in the relationship between service quality and consumer loyalty).

## Research Results

### Statistical analysis of data

The results showed that the responsiveness and care of service quality had the most significant impact on consumer loyalty, and the tangible impact of service quality was moderate, while the assurance and reliability of service quality had no significant impact on consumer loyalty. Therefore, the responsiveness, care and tangibility of international online commerce service quality, international online commerce service quality, consumer perceived value and consumer switching cost can have a significant positive impact on consumer loyalty. However, the reliability and guarantee of service quality did not have a significant impact on consumer loyalty.

Focusing on the influence and relationship between model variables can help solve the problem of international online commerce service quality. SPSS27.0 was used to statistically analyze the basic information of the collected questionnaire samples.

Basic population data

From June to August 2023, a total of 44 formal questionnaires will be issued, and 500 valid questionnaires will be distributed to adult consumers with international online commerce shopping experience in Chinese mainland through the Internet, and 470 valid questionnaires will be collected and deleted.

The results of the basic information frequency survey show that the proportion of male and female samples to the total number of adult consumers with international online commerce shopping experience is 45.74% and 54.26%, respectively, which is relatively close to that of men and women, which is within a reasonable range. The subjects of the survey are distributed in multiple age groups, which can clearly express the evaluation and expectations of consumers of different ages on international online commerce service quality, consumer switching cost, consumer perceived value and consumer loyalty.

**Table1** Variable reliability analysis results

| Variable         | Cronbach's alpha | Variable questions |
|------------------|------------------|--------------------|
| reliability      | .871             | 5                  |
| Reactivity       | .950             | 4                  |
| Guarantees       | .892             | 4                  |
| Caring           | .963             | 5                  |
| Materiality      | .940             | 4                  |
| Perceived value  | .954             | 4                  |
| Conversion costs | .912             | 5                  |
| Service loyalty  | .971             | 6                  |

The data analysis in Table 1 confirmed that the Cronch reliability coefficients of the variables were all 0.87 or above, indicating that the internal consistency of the questionnaire was high and it was completely acceptable. The data suggest that the reliability is of high quality.

**Table 2** Results of validity analysis

| variable                                      | Factor load factor |          |         |         | Commonality (common factor variance) |
|---|--------------------|----------|---------|---------|--------------------------------------|
|   | factor1            | factor2  | factor3 | factor4 |                                      |
| Characteristic root value (before rotation)   | 4.741              | 1.896    | 1.885   | 1.758   | -                                    |
| Variance explanation rate % (before rotation) | 32.04 %            | 13.157 % | 12.42 % | 15.79 % | -                                    |

**Table 2** (Cont.)

| variable   | Factor load factor |             |                  |             | Commonality (common factor variance) |
|--|--------------------|-------------|------------------|-------------|--------------------------------------|
|  | factor1            | factor2     | factor3          | factor4     |                                      |
| Cumulative variance explanation rate % (before rotation) | 31.60<br>2%        | 45.437<br>% | 54.76<br>9%      | 78.547<br>% | -                                    |
| Characteristic root value (after rotation)               | 2.378              | 2.374       | 2.379            | 2.364       | -                                    |
| Variance explanation rate % (after rotation)             | 15.98<br>6%        | 15.941<br>% | 15.85<br>3%      | 15.942<br>% | -                                    |
| Cumulative variance explanation rate % (after rotation)  | 15.76<br>1%        | 34.763<br>% | 42.96<br>42<br>% | 79.359<br>% | -                                    |
| KMO value  | 0.854              |             |                  |             |                                      |
| Bart's spherical value                                   | 3897.039           |             |                  |             |                                      |
| df   | 107                |             |                  |             |                                      |
| p value  | 0.000              |             |                  |             |                                      |

From Table 2, it can be seen that the KMO and Bartlett spherical test values, in which the KMO value is 0.854, which is greater than 0.7, and the significance of the Bartlett spherical test is 0.000, less than 0.05, indicating that it is suitable for factor analysis. The construct validity of the questionnaire was good. The 37 questions in the scale were divided into 4 common factors, and the variance contribution rate of the 4 common factors accounted for 79.359%, indicating that the 4 common factors could explain 79.359% of the information of the original variable. The factor load coefficient showed that the factor division with the larger load was consistent with the dimension division preset by the questionnaire. The validity of the questionnaire was good.

**Table 3** Discriminative validity: Pearson correlation vs. square root of Average Variance Extracted (AVE)

| Variable                                      | Quality of service | Consumers perceive value | Consumer switching costs | Consumer loyalty |
|---|--------------------|--------------------------|--------------------------|------------------|
| International online commerce service quality | 0.814              |                          |                          |                  |
| Consumers perceive value                      | 0.392              | 0.857                    |                          |                  |
| Consumer switching costs                      | 0.385              | 0.379                    | 0.837                    |                  |
| Consumer loyalty                              | 0.361              | 0.368                    | 0.369                    | 0.878            |

Note: The diagonal number is square root of the AVE

Table 3 analyzes the discrimination validity, and for the quality of international online commerce services, square root of AVE is 0.814, which is greater than the maximum value of the absolute value of the correlation coefficient between factors of 0.392, which means that it has good discrimination validity. For consumers' perceived value, square root of AVE is 0.857, which is greater than the maximum value of the absolute value of the correlation coefficient between factors of 0.392, which means that it has good discriminative validity. For the consumer switching cost, square root of AVE is 0.837, which is greater than the maximum value of the absolute value of the correlation coefficient between factors of 0.385, which means that it has good discriminative validity. For consumer loyalty, square root of the is 0.878, which is greater than the maximum value of the absolute value of the correlation coefficient between factors of 0.369, which means that it has good discriminative validity.

**Table 4** Correlation analysis results

|   | Quality of service | Consumers perceive value | Consumer switching costs | Consumer loyalty |
|---|--------------------|--------------------------|--------------------------|------------------|
| International online commerce service quality | 1                  |                          |                          |                  |
| Consumers perceive value                      | .392**             | 1                        |                          |                  |
| Consumer switching costs                      | .285**             | .279**                   | 1                        |                  |
| Consumer loyalty                              | .251**             | .256**                   | .259**                   | 1                |

\*\*Correlation is significant at a confidence level (double test) of 0.01

The data in Table 4 show that there is a significant positive correlation between service quality, consumer perceived value, consumer switching cost, and consumer loyalty at a significance level of 0.01.

**Table 5** Analysis of variance

| Model |            | Sum of Squares | df  | Mean Square | F       | Sig. |
|-------|------------|----------------|-----|-------------|---------|------|
| 1     | Regression | 223.491        | 5   | 44.304      | 471.392 | .000 |
|       | Residual   | 37.798         | 387 | .085        |         |      |
|       | Total      | 261.012        | 398 |             |         |      |

From the F-test results of the model in Table 5 above, it is known that the model passed the F-test (F=471.392, p=0.000<0.05), indicating that the constructed model has existential significance.

**Table 6** Regression coefficients

| Model            |                          | Unstandardized |            | Standardized | t     | Sig. |
|------------------|--------------------------|----------------|------------|--------------|-------|------|
|                  |                          | Coefficients   |            | Coefficients |       |      |
|                  |                          | B              | Std. Error | Beta         |       |      |
| 1                | Constant                 | .091           | .092       |              | 1.047 | .287 |
|                  | Materiality              | .179           | .035       | .189**       | 5.851 | .001 |
|                  | reliability              | .085           | .047       | .090         | 1.682 | .093 |
|                  | Guarantees               | .094           | .059       | .088         | 1.629 | .105 |
|                  | Caring                   | .312           | .043       | .321***      | 7.224 | .000 |
|                  | Reactivity               | .313           | .059       | .294***      | 4.968 | .000 |
|                  | International online     | .311           | .054       | .290***      | 4.769 | .000 |
|                  | commerce service quality |                |            |              |       |      |
|                  | Consumers perceive value | .314           | .058       | .291***      | 4.993 | .000 |
| Conversion costs | .310                     | .057           | .293***    | 4.894        | .000  |      |

Note: \*P<0.05, \*\*P<0.01, \*\*\*P<0.001

From the above data analysis, it can be seen that the tangibility, caring, and responsiveness of service quality, have a significant positive impact on consumer loyalty. However, the two dimensions of reliability and guarantee have no significant impact on consumer loyalty. Service quality, consumer perceived value and consumer switching cost have a significant positive impact on consumer loyalty.

**Mediation effect test analysis**

The research model takes the cross-border e-commerce service quality as the independent variable, cross-border e-commerce consumer loyalty as the dependent variable, and cross-border e-commerce consumer conversion cost and perceived value of cross-border e-commerce consumer as the intermediary variables. In this

paper, Hayes (2013) was used to test the mediation effect. The Bootstrap number was set to 5000 and the confidence interval was 95%. If the indirect effect is not included in the confidence interval of 95%, the mediation effect exists. The results of each path coefficient of the model are as follows:

**Table7** Results of the mediating effect test of switching costs

| Path  | Original | standard  | T-statistic | 95% confidence |             |
|---|----------|-----------|-------------|----------------|-------------|
|   | sample   | deviation |             | interval       |             |
|   | (O)      | (STDEV)   | ( O/STDEV ) | Lower Limit    | Upper limit |
| <b>Direct effects</b>   |          |           |             |                |             |
| Cross-border e-commerce service quality->Consumer loyalty                           | 0.123    | 0.095     | 2.201       | 0.016          | 0.266       |
| Cross-border e-commerce service quality->Consumer switching costs                   | 0.225    | 0.063     | 4.418       | 0.121          | 0.383       |
| Consumer switching costs->Consumer loyalty  | 0.143    | 0.054     | 4.790       | 0.195          | 0.371       |
| <b>Indirect effects</b>   |          |           |             |                |             |
| Cross-border e-commerce service quality->Consumer switching costs->Consumer loyalty | 0.051    | 0.021     | 3.901       | 0.074          | 0.082       |
| <b>Total effect</b>   |          |           |             |                |             |
| Cross-border e-commerce service quality->Consumer loyalty                           | 0.046    | 0.018     | 3.210       | 0.027          | 0.094       |

The mediating effect of switching cost on the impact of service quality on consumer loyalty was analyzed (see Table 7). The mediating effect test showed that the lower bound of the 95% confidence interval of service quality-> switching cost-> consumer loyalty was 0.074 and the upper limit was 0.082. None of them contain 0, indicating that switching cost is used as an intermediary variable to affect the relationship between service quality and consumer loyalty, and the analysis results show that the mediating effect of switching cost is partially mediated.

**Table8** Results of the mediating effect of perceived value

| path  | Original | standard  | T-statistic | 95% confidence interval |             |
|---|----------|-----------|-------------|-------------------------|-------------|
|   | sample   | deviation |             | Lower Limit             | Upper limit |
|   | (O)      | (STDEV)   | ( O/STDEV ) |                         |             |
| <b>Direct effects</b>   |          |           |             |                         |             |
| Cross-border e-commerce service quality->Consumer loyalty                           | 0.183    | 0.036     | 2.172       | 0.139                   | 0.275       |
| Cross-border e-commerce service quality->Consumers perceive value                   | 0.289    | 0.053     | 4.381       | 0.134                   | 0.183       |
| Consumers perceive value->Consumer loyalty  | 0.274    | 0.048     | 4.916       | 0.148                   | 0.237       |
| <b>Indirect effects</b>   |          |           |             |                         |             |
| Cross-border e-commerce service quality->Consumers perceive value->Consumer loyalty | 0.072    | 0.016     | 3.120       | 0.023                   | 0.086       |
| <b>Total effect</b>   |          |           |             |                         |             |
| Cross-border e-commerce service quality->Consumer loyalty                           | 0.045    | 0.028     | 3.142       | 0.027                   | 0.094       |

The mediating effect of perceived value on the influence of service quality on consumer loyalty was analyzed. The results of the mediating effect test show that the lower bound of the 95% confidence interval of service quality-> perceived value-> consumer loyalty is 0.023 and the upper limit is 0.086. None of them contain 0, indicating that consumer perceived value is used as an intermediary variable to affect the relationship between service quality and consumer loyalty, and this mediating effect is partially mediated.

According to the above analysis results, the independent variables have a significant impact on the dependent variable and the mediating variable, and the mediating variable has a significant impact on the dependent variable.

The direct and indirect effects of H6 and H7 were significant ( $p < 0.01$ ) and the confidence interval did not contain 0, so the mediating effect existed, and H6 and H7 were established.

Hypothesis H6: International online commerce service quality is verified by the positive impact of

consumer switching cost on consumer loyalty (consumer switching cost has a mediating role in the relationship between service quality and consumer loyalty).

Hypothesis H7: International online commerce service quality is verified by the positive impact of consumer perceived value on consumer loyalty (consumer perceived value has a mediating role in the relationship between service quality and consumer loyalty).

The mediating role of perceived value has been divided into three dimensions: perceived usefulness, perceived enjoyment, and perceived value, and the impact on customer intention has been studied. Other literature explores the mediating role of consumers' perceived value on brand relationship performance (Zhao et al., 2022). This paper focuses on the mediating relationship between switching cost and perceived value between service quality and loyalty, and improves the research on the influence relationship between switching cost and perceived value as mediating variables.

### Conclusions and Recommendations

combined with the results of questionnaire survey and analysis, suggestions for reference are put forward. Firstly, it is observed that the quality of international online commerce services has a positive impact on consumers' switching costs and consumers' perceived value, indicating that hypothesis H1 and hypothesis H2 are valid. Secondly, it is found that international online commerce service quality, international online commerce consumer switching cost, and international online commerce consumer perceived value have a positive impact on consumer loyalty, which proves that hypothesis H3, hypothesis H4, and hypothesis H5 are valid. Thirdly, there is a partial intermediary relationship between consumer switching cost and consumer perceived value between international online commerce service quality and consumer loyalty, which proves that hypothesis H6 and hypothesis H7 are valid, which further supports the research hypothesis of this paper. These new findings provide an important supplement to the understanding of international online commerce service quality research, and are of great significance for further exploration in this field.

The results of this paper are consistent with some views in the existing literature, especially on the positive impact of e-commerce service quality on consumer loyalty. However, there is also a trend different from previous studies, and the impact of international online commerce service quality reliability and assurance on consumer loyalty is not significant, which may be due to the fact that with the digital development of international online commerce, the reliability and guarantee of international online commerce service quality have been enhanced, and have been fully recognized by consumers, so the impact is not significant. This highlights the uniqueness of the study and the refinement and richness of the knowledge of the field.

Although the study has made some important findings, it is limited by certain reasons. Among them, there are some limitations in the interpretation of causality in the paper due to the single source of data. Due to the large number of parents, the large demand for samples, and the limitations of time and space, the sources of paper data may lack extensiveness. It is suggested that future research should try to overcome these limitations

and explore other aspects of international online commerce service quality research, such as obtaining continuous consumption data of multi-platform customer groups with the help of digital technology, and empirical research on the customer value of multi-platform channels.

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