Systematic investigation of the logistics service quality of cross-border e-commerce: a mixed-methods perspective

Yu Zhang and Yafen Yuan
School of Modern Posts, Chongqing University of Posts and Telecommunications, Chongqing, China, and
Jiafu Su
Chongqing Technology and Business University, Chongqing, China

Abstract
Purpose – This study explores the factors that characterize the logistics service quality (LSQ) of cross-border e-commerce and identifies the different relationships between these factors with respect to customer satisfaction.
Design/methodology/approach – The study applied a two-stage mixed-methods design. The first stage (Stage 1) was a qualitative study of 3,000 reviews from the Amazon China e-commerce platform. The second stage (Stage 2) included a quantitative study that analyzed survey data from 590 Chinese cross-border e-commerce customers using the Kano model.
Findings – Stage 1 involved developing a conceptual framework for the LSQ of cross-border e-commerce, including six dimensions: timeliness, safety, reliability, economy, personnel contact quality and information quality. In Stage 2, the study found that only reliability and personnel contact quality indicators are linearly related to customer satisfaction. Timeliness and the safety of packaging greatly contribute to customer satisfaction, but do not cause dissatisfaction when unfulfilled. Economics and information quality indicators, and the safety of goods, are basic requirements that tend to provoke customer dissatisfaction when unmet, but do not increase customer satisfaction when they are met.
Originality/value – This study is one of the first to construct a conceptual model of LSQ that applies to cross-border e-commerce and to identify the instrumental nature of various LSQ attributes and their impact on improved customer satisfaction.
Keywords Logistics service quality of cross-border e-commerce, Kano model, Customer satisfaction, Cross-border logistics
Paper type Research paper

1. Introduction
Logistics service quality (LSQ) refers to the process of providing the right service and products to meet the needs of the right customers at the right time and place at the right price and in the right way (Perreault and Russ, 1974). LSQ is a key variable affecting customer satisfaction and can decisively determine the competitive advantage of e-commerce platforms and enterprises (Meng et al., 2011). The rapid growth of cross-border e-commerce highlights the crucial role played by the associated logistics; the success of these logistics significantly influences the sustainable development of cross-border e-commerce (Giuffrida et al., 2017).

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Since acceptance of this article, the following author(s) have updated their affiliation(s): Jiafu Su is at the International College, Kriik University, Bangkok, Thailand.
However, cross-border e-commerce logistics face numerous challenges intricately linked to the distinct characteristics of cross-border e-commerce (Giuffrida et al., 2021). One of the primary challenges is navigating through diverse cultures, behaviors, and consumer habits. This includes different levels of trust and preferences concerning imported products, and different ways to verify the trustworthiness of sellers across different countries (Giuffrida et al., 2020). Moreover, the involvement of multiple stakeholders, such as local courier services, warehousing companies, and logistics providers, adds to the complexity of the cross-border e-commerce logistics ecosystem (Liu et al., 2021). Third, cross-border e-commerce logistics involves an intricate process, encompassing interconnected stages from cargo pick-up to customs clearance in both exporting and importing countries. The customs clearance process varies from country to country and is subject to government oversight (Giuffrida et al., 2021). These challenges reflect the distinct features of cross-border e-commerce logistics that is different from other industries. It leads to slow transportation, high costs, limited informatization, and more logistics service issues (Wang et al., 2021).

A survey by iiMedia Research found that over 60% of customers' complaints about these issues in cross-border e-commerce (iiMedia Research, 2021). Given the crucial role of B2C transactions in cross-border e-commerce (Wang et al., 2021) and the recognized significance of customer satisfaction in enhancing merchant competitiveness (Shao et al., 2021), understanding the factors affecting the LSQ of cross-border e-commerce and addressing existing logistics service issues is crucial for improving customer satisfaction and promoting the development of the B2C cross-border e-commerce.

Past research has focused primarily on constructing LSQ for specific industries, such as omni-channel retailing (Murfield et al., 2017; Huseyinoglu et al., 2018), e-tailing (Jain et al., 2021), and cold chain logistics (Zhang et al., 2020). However, consensus has not been reached about the overall relevant dimensions of LSQ. Previous studies have shown that the dimensions and meanings associated with LSQ vary across industrial and company characteristics. For example, the widely recognized service quality (SERVQUAL) model is often used to explore LSQ in many industries, but may not be applicable for investigating LSQ in sea freight transport (Kilibarda et al., 2020). This indicates that broader studies on LSQ dimensions may not apply to the specific field of cross-border e-commerce logistics.

In addition, most studies have confirmed that a high LSQ level supports customer satisfaction (Murfield et al., 2017); this also applies to cross-border e-commerce (Liu et al., 2021). However, different service elements have different characteristics, and customers do not consider all service elements to be equally important (Tontini and Silen, 2017). As service quality attributes are not all linearly related to customer satisfaction (Zailani et al., 2018), and prior research on cross-border e-commerce logistics has not directly assessed customers' actual needs nor thoroughly investigated the LSQ-related factors, including which indicators are most vital for customer satisfaction. Thus, there needs to further investigate how different indicators of LSQ contribute differently to customer satisfaction in the cross-border e-commerce.

To address the above research gap, a two-stage study was conducted to construct and investigate the LSQ of cross-border e-commerce using qualitative and quantitative methods. The qualitative study used a content analysis involving significant amounts of review data to identify several key factors responsible for shaping LSQ in cross-border e-commerce. The quantitative study classified LSQ indicators and evaluated their contribution to customer satisfaction using the Kano model.

This study contributes to the cross-border e-commerce logistics research in three key ways. First, we constructed a conceptual framework for LSQ in cross-border e-commerce that effectively reflects its specific characteristics. This fills a research gap, because previous studies emphasized the importance of LSQ in cross-border e-commerce, but have not generated a conceptual framework describing the characteristics associated with this specific context. Second, we identified LSQ indicators that affect customer satisfaction,
providing practical insights for cross-border commerce businesses wishing to understand the importance of different LSQ attributes. This may help those businesses gain a competitive advantage by better understanding customer needs. Third, we adopted a two-stage mixed research method, describing the true nature of cross-border e-commerce logistics services, and analyzed the specific composition of LSQ of cross-border e-commerce from a customer perspective.

2. Literature review

2.1 LSQ and LSQ of cross-border e-commerce

Previous studies have extensively researched LSQ-related constructs and measurements. SERVQUAL was the first model developed to measure service quality (Murfield et al., 2017), and has been widely used to measure LSQ. However, SERVQUAL does not apply to all types of LSQ-focused studies (Hsiao et al., 2017). To better adapt to the unique characteristics of the logistics setting, scholars have constructed specific LSQ scales. For example, Mentzer et al. (1989) described three main dimensions contributing to the LSQ of physical distribution: timeliness, availability, and completeness. Subsequently, Mentzer et al. (1999) created a new LSQ measurement scale by combining the quality of physical distribution logistics services with factors influencing service quality. These scales have provided a foundation for subsequent studies, which have evaluated LSQ in different contexts and industries (Kilibarda et al., 2020).

Key studies on LSQ in business-to-consumer (B2C) context are summarized in Appendix 1 (“online supplemental material”), above all, timeliness is the most emphasized factor contributing to LSQ (Feng et al., 2007). Reliability and empathy (Saura et al., 2008; Oflaç et al., 2012) are also important LSQ subdimensions. In addition, it is worth noting that LSQ dimensions vary by industry. Some dimensions depend highly on industry-specific logistic characteristics. For example, Feng et al. (2007) noted that convenience is an important subdimension of LSQ when evaluating online shopping malls. Oflaç et al. (2012) emphasized the process characteristics of logistic services in retailing; that study divided LSQ into operational and relational components. Previous research shows that the LSQ of cross-border e-commerce has increased in importance as the demand for logistics services and customer service expectations have rapidly grown (Giuffrida et al., 2017). Cross-border e-commerce logistics involves numerous stakeholders and complex processes, which may result in differences in dimensions of LSQ compared to other industries, and there is limited research specifically addressing LSQ in this context. This highlights the need to investigate LSQ-related dimensions in the context of cross-border e-commerce.

2.2 LSQ of cross-border e-commerce and customer satisfaction

Studies across different industries have explored the relationship between LSQ and customer satisfaction within the B2C context from the consumer perspective (Kilibarda et al., 2020). These have included omni-channel retailing (Murfield et al., 2017; Sorkun et al., 2020), online shopping (Hu et al., 2016; Micu et al., 2013; Jain et al., 2021), online retail supply chains (Rao et al., 2011), and marketing (Uvet, 2020; Su et al., 2023).

Studies have also examined LSQ dimensions and their impact on customer satisfaction in the more specific field of B2C logistics services (Murfield et al., 2017). In general, the service quality attributes included in SERVQUAL and other LSQ models represent key factors in improving customer satisfaction. However, distinct industry-specific characteristics of LSQ (Vu et al., 2020) result in different factors influencing customer satisfaction. For instance, Jain et al. (2021) conducted a survey in e-tailing, finding that availability, timeliness, and condition significantly and positively affect customer satisfaction. Micu et al. (2013) focused on IT and electronic equipment within e-commerce platforms, finding that both relational
and operational LSQ factors are important for enhancing e-commerce customer satisfaction. Additionally, Sorkun et al. (2020) and Murfield et al. (2017) found that the operationally-related LSQ factors of timeliness, availability, and order condition positively impact LSQ improvements within the omni-channel. These studies further confirm that the LSQ attributes determining customer satisfaction vary across industries (Vu et al., 2020).

Though several studies have recognized the importance of LSQ for enhancing customer satisfaction in cross-border e-commerce (e.g., Liu et al., 2021; Shao et al., 2021), limited studies examined the relationship between LSQ and customer satisfaction in such context. Only Hsiao et al. (2017) found LSQ-related attributes, such as safety and accuracy, positively impact customer satisfaction from a technical perspective. Other studies just highlighted major customer satisfaction challenges caused by problems inherent in cross-border e-commerce logistics services. For example, Giuffrida et al. (2017) found that long order fulfillment times, inadequate market regulation, and inefficient distribution networks significantly affect the LSQ of cross-border e-commerce, leading to lower customer satisfaction. As the LSQ of cross-border e-commerce composition varies from other industries, and the attributes of LSQ impacting customer satisfaction may differ. Therefore, it is necessary to conduct research on the specific relationship between LSQ attributes and customer satisfaction in such context.

2.3 The Kano model and LSQ

Service quality is a multi-dimensional construct, and studies have demonstrated differences in the effects of each attribute on customer satisfaction (Meng et al., 2011; Yang et al., 2019). To evaluate the impact of different quality attributes, Kano (1984) proposed the Kano model, which has been widely used to categorize and prioritize customer needs.

The Kano model classifies service quality attributes into five categories: must-be, one-dimensional, attractive, indifferent, and reverse. A “must-be quality” is essential: its absence results in strong customer dissatisfaction, but its presence does not increase satisfaction. The “one-dimensional quality” represents the service elements that customers’ desire. Customer satisfaction is directly proportional to the degree that such elements are provided. An “attractive quality” represents attributes that exceed customer expectations. If these attributes are met, they significantly enhance customer satisfaction, but their absence does not result in dissatisfaction. An “indifferent quality” is one where its presence does not impact a customer’s perception. A “reverse quality” represents service elements that decrease customer satisfaction. Compared to a more linear view, these categories comprehensively describe the relationship between service quality attributes and customer satisfaction (Kano, 1984).

The model has been extensively adopted in the LSQ field to analyze customer preferences (Sohn et al., 2017). For example, Chen et al. (2020) applied the Kano model to assess the satisfaction and perceived importance of domestic pharmaceutical logistics services offered by medical institutions. Sohn et al. (2017) applied the Kano model to classify and compare the LSQ for small and medium enterprise (SME) companies, manufacturers, and third-party logistics (3PL) providers. These studies demonstrate the broad applicability of the Kano model in cross-industry LSQ research, and justify its use to explore how different LSQ quality indicators contribute to customer satisfaction in cross-border e-commerce.

3. Methodology

A mixed-methods approach is one that applies both qualitative and quantitative research methods in independent research (Venkatesh et al., 2016). This approach effectively addresses validation and interpretation problems, enabling a comprehensive and in-depth analysis of a research problem (Venkatesh et al., 2016). This study adopted a mixed-methods approach...
approach for the following reasons. First, the situational and uncertain nature of cross-border e-commerce logistics (Giuffrida et al., 2020), makes it challenging to draw useful conclusions from previous studies. Hence, in Stage 1, exploratory research examined the factors contributing to the LSQ in cross-border e-commerce. Based on these results, Stage 2 applied a questionnaire-based investigation method and integrated the Kano model to classify and prioritize the LSQ elements associated with cross-border e-commerce (Figure 1).

3.1 Stage 1: constructing an LSQ model for cross-border e-commerce

3.1.1 Research design. For Stage 1 of the study, we used customer reviews about LSQ from the Amazon China platform as a qualitative research sample for the following reasons. First, studies have identified customer reviews as an important information source for investigating customers’ real service needs and customer satisfaction (Cheong et al., 2020). Second, China is a major market for cross-border e-commerce, with import transactions reaching RMB 3.2tn in 2021. Cross-border e-commerce import users reached 155mn in 2021.

Stage 1: Exploratory study
1. Methodology: open and axial coding procedures based on grounded theory
2. Data collection: data for 3,000 reviews posted on the Amazon China platform
3. Identify main LSQ-related dimensions in cross-border e-commerce

Stage 2: Quantitative study
1. Methodology: Kano questionnaire survey
2. Data collection: 590 anonymous surveys
3. Apply the Kano model to categorize the LSQ attributes of cross-border e-commerce based on qualitative study results
4. Confirm the different contribution of each LSQ attribute to customer satisfaction with cross-border e-commerce

Figure 1. The relationship between the two stages of the study

Source(s): Author’s own creation
(iiMedia Research, 2021). Third, Amazon China has been conducting global online trade for many years and is a widely used cross-border e-commerce platform for Chinese consumers. As such, it provides rich and convincing online customer reviews.

With the validity of the platform established, the next step was to identify candidate consumer products for sampling. Product purchase preference reports from import cross-border e-commerce users in China (iiMedia Research, 2021) indicate that the two main purchase categories for Chinese customers are digital appliances and maternal and child products. Therefore, this study’s data included customer reviews of these two product types, published from September 2021 to April 2022.

The collected online review data were processed using the three principles of readability, relevance, and reliability (Meng et al., 2021). First, we removed duplicate and incomplete reviews. Second, we eliminated reviews that did not relate to logistics. Based on this, we selected 3,000 valid reviews from a total of 3,268 reviews. The coding examples and coding results are listed in Appendix 2.

3.1.2 Data analysis. The data were analyzed using open and axial coding procedures based on grounded theory using NVivo 12.0 software (Corbin and Strauss, 1990). We formed a coding team of six people, including four students and two teachers, to ensure the case coding process was systematic and the coding results were reliable. First, we implemented a pilot coding process using 100 of the sampled reviews, where two group members independently coded the same reviews back-to-back. Then, the group compared and discussed all coding results until consensus was reached.

Then, 2,700 reviews were analyzed using the formal coding process. Open coding, combining automatic and manual coding, was used to extract and categorize information related to research topics from raw materials. In this step, word frequency statistics were used to identify words occurring more frequently. These words were considered to be reference points for manual coding. We read these reference points line-by-line and identified the specific data related to the LSQ. Ultimately, this led to the identification of ten subcategories. Then, the open coding results were clustered to obtain the axial coding results, and six categories emerged (Appendix 2).

Finally, the remaining 200 sampled reviews were coded using the same process to test the theoretical saturation. Figure 2 shows the coding procedure.

**Figure 2.** The coding steps of Stage 1

**Source(s):** Author’s own creation
3.1.3 Findings. The coding process revealed six dimensions influencing the LSQ of cross-border e-commerce: timeliness, safety, reliability, economy, personnel contact quality, and information quality. The conceptual framework listing the factors influencing the LSQ of cross-border e-commerce is shown in Figure 3.

First, timeliness means delivering goods on time after receiving the customer’s order and delivering the goods to the correct destination (Saura et al., 2008). Timeliness was the most frequently mentioned factor in customer reviews, with a total of 1,311 reference points. Customer reviews expressed surprise and delight at the delivery speed and arrival time. Sample statements include: “Fast shipping, received the item faster than expected.”

Second, safety refers to the product packaging, and whether the product is intact (Xu and Cao, 2008). This was the second most frequently mentioned factor in the customer reviews, with 381 reference points. Most customer reviews mentioning safety expressed complaints about damaged goods and broken product packaging. Sample statements include: “The packaging was a plastic bag on the outside and a simple cardboard box on the inside.” The statement that “the packaging is completely intact” was mentioned 312 times.

Third, reliability reflects the company’s ability to fulfill its promises, providing customers with the promised services in a reasonable manner (Liu and Xie, 2013). This was the third factor contributing to the LSQ of cross-border e-commerce. Consumer reviews communicated that it was vital for companies to guarantee that a product accurately matched its description, and that there be return and exchange guarantees. These strengthen perceptions about the reliability of cross-border e-commerce logistics services.

Personnel contact quality indicates that the customer service staff has a good attitude and can solve problems professionally and promptly. Information quality means that customers perceive that information about products and services is timely and available. Personnel contact quality and information quality are closely interrelated with other LSQ-related factors and positively impact them; this makes them “functional services” (Mentzer et al., 2001). These factors may change customer perceptions about service quality, thereby affecting customer satisfaction. Sample customer reviews include: “Due to the delivery time, I didn’t receive the goods. Later, the after-sales customer service staff helped me solve this problem very well.”

Finally, economy means the costs customers pay are reasonable for the logistic services received (Zhang et al., 2020). For cross-border e-commerce users, distribution costs, return and exchange costs are main factors for measuring the LSQ of cross-border e-commerce. Sample statements include: “Returning or exchanging goods is a hassle. I have to pay for the shipping costs in advance.”

3.1.4 Theoretical saturation test. To assess research reliability, we conducted a theoretical saturation test on the results above, using 200 reserved reviews. These reviews were then coded using the previous coding process. No new concepts or category nodes emerged during
this subsequent coding process, and the analysis results were largely consistent with the six core factors already presented. Therefore, the theoretical model obtained through the previous coding process was determined to be saturated.

3.2 Stage 2: investigating the LSQ of cross-border e-commerce

3.2.1 Research design. Study 2 introduced the Kano model to explore the different impacts of LSQ attributes on customer satisfaction. To ensure questionnaire reliability and validity, the measurement items for each LSQ attributes were designed in three steps. First, based on the coding results of Stage 1, the sentences with the basic connotation of each LSQ indicators were selected from the original data at that stage. These selected sentences were then processed and sorted by fully drawing on the measurement items of similar indicators of LSQ in the other field, thus to establish initial indicator measurements. Specifically, timeliness was measured based on “prompt delivery of the goods” and “on-time delivery of the goods” (Feng et al., 2007; Thai, 2013). Personnel service quality was assessed based on “positive attitude of the merchant staff who supports with necessary information” and “expertise of personnel on the cross-border e-commerce platform.” Information quality was measured using “efficiency of real-time delivery information updates on cross-border e-commerce platform” and “the availability of order information on the cross-border e-commerce platform” (Mentzer et al., 2001). Economy was assessed through the “reasonable distribution cost of the goods” and “reasonable returns and exchanges cost of the goods” (Zhang et al., 2020). Reliability was measured using “accuracy of the product description” and “return and exchange guaranteed.” Safety was measured based on “the packaging is completely intact” and “the purchased goods are completely intact” (Thai, 2013).

At last, the initial items were adjusted, verified, and validated through interviews with five experts, including three industry experts and two research scholars in the field of cross-border e-commerce logistics. The initial items was restructured and reworded based on their review, with the end goal of measuring LSQ in cross-border e-commerce.

Next, the questionnaire and an evaluation table of five quality attributes were designed using the Kano model (Table 1). The questionnaire included functional (positive) and dysfunctional (negative) questions for each quality attribute. Functional questions assessed the customer’s response when a specific service element was satisfied; dysfunctional questions assessed the customer’s response when a service element was not satisfied. For example, a functional statement is, “How do you feel when the merchant delivers goods on time?” A dysfunctional statement is, “How do you feel when the merchant does not deliver goods on time?”

Participants were given five options for each question: “It is pleasant,” “It is expected to be like that,” “No difference,” “It is okay for me,” and “I do not like it.” These five options correspond to “like,” “expect,” “neutral,” “accept,” and “dislike” categories in Table 1. Using

<table>
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<td>I</td>
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<td>R</td>
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<td>R</td>
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</table>

Table 1. Kano model evaluation table

Note(s): A: attractive quality; O: one-dimensional quality; M: must-be quality; I: indifferent quality; R: reverse quality; Q: questionable
Source(s): Sohn et al. (2017)
the Kano model evaluation table (Table 1), respondent answers to the functional and dysfunctional questions were combined to determine the quality attribute categories of each LSQ indicator. For instance, if the respondent’s answer to a functional question is, “It is pleasant” (like); and the answer to a dysfunctional question is “I do not like it” (dislike), then the associated quality element was determined to be a “one-dimensional quality.”

Then, we counted the frequency of respondent answers in the returned valid questionnaires and summarized the frequency of the same quality attribute for each indicator. Finally, the quality attribute of the indicator was set by determining which quality attributes were most frequent.

Subsequently, the better–worse coefficient analysis method was applied to calculate customer satisfaction and dissatisfaction levels (Berger, 1993). The satisfaction coefficient (SC) refers to the increased level of customer satisfaction when a certain service element is provided. Customer SC values range from “0” to “+1.” Higher satisfaction coefficient values indicate greater sensitivity, a higher priority, and a more significant increase in satisfaction. The formula used to calculate SC is “SC=(A + O)/(A + O + M + I).” The dissatisfaction coefficient (DSC) refers to the decreased level of customer satisfaction when a certain service element is not provided. The customer DSC values range from “−1” to “0”, with smaller values indicating greater sensitivity and higher priority. The formula used to calculate DSC is “DSC = −1*(O + M)/(A + O + M + I).”

3.2.2 Data collection. The first step in the Stage 2 study was to conduct a pretest with 70 cross-border e-commerce consumers. Some items, such as “expertise of personnel,” had factor loadings below 0.4, so we removed these items. Ten question items were ultimately retained as indicator measurements in the questionnaire. The survey was conducted from August 1 to 15, 2022. Questionnaires for both the pretest and main survey event were distributed using the website “Wenjuanxing” and the social networking sites Douban and WeChat. “Wenjuanxing” specializes in distributing and collecting questionnaires, primarily targeting white-collar workers with a focus on practical consumption. Questionnaires on Douban and WeChat primarily target young people who prioritize enjoyment-oriented consumption. This approach provided multiple perspectives to inform a comprehensive analysis of the factors influencing customer satisfaction in cross-border e-commerce.

A total of 700 consumers responded to the formal questionnaire. Participants were screened using the question, “Have you purchased any goods on a cross-border e-commerce platform in the last three months?” If the response was “no,” the questionnaire was marked as invalid; this eliminated 21 questionnaires. To ensure response accuracy, questionnaires completed in less than three minutes were excluded. Ultimately, 590 valid questionnaires were obtained, for a total valid response rate of 84%. Table 2 provides study subject characteristics.

3.2.3 Data analysis. We used the software tool SPSSAU (https://spssau.com/) to analyze the valid questionnaires, which is an intelligent and professional online statistical analysis system that efficiently and accurately processes questionnaires. The Cronbach’s alpha coefficient was used to assess the reliability of each construct; coefficient values exceeded 0.7 for both the functional questions (0.855) and dysfunctional questions (0.799). Additionally, each dimension exhibited coefficients exceeding 0.7. This indicated that the questionnaire had good reliability. Table 3 shows the analysis results of the LSQ indicator classification for cross-border e-commerce, based on the statistical frequency of different quality attributes associated with different indicators.

Specifically, four indicators were identified as “must-be quality” attributes: two “economy” indicators (reasonable distribution cost and return and exchange cost), one “safety” indicator (“the purchased goods are completely intact”), and one “information quality” indicator (“efficiency of real-time delivery information updates on cross-border e-commerce platform”). The SC values of these indicators ranged from 0.39 to 0.51; the
### Table 2.
Profile of respondents (N = 590)

**Source(s):** Author’s own creation

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### Table 3.
The classification of LSQ indicators based on the Kano model

**Note(s):** A: attractive quality; O: one-dimensional quality; M: must-be quality. SC: satisfaction coefficient; DSC: dissatisfaction coefficient; SC = (A + O)/(A + O + M + I); DSC = -1*(O + M)/(A + O + M + I)

**Source(s):** Author’s own creation
relative DSC values ranged from \(-0.56\) to \(-0.49\). The absolute values for DSC were significantly higher than the SC values. This indicated that customers were more sensitive when these service elements were not provided. Among the four indicators, “the purchased goods are completely intact” had the lowest DSC value. This shows that this indicator had the greatest impact on dissatisfaction; in other words, satisfaction decreased the most when this need was not properly met.

“One-dimensional quality” attributes included two “reliability” indicators (“accuracy of the product description” and “return and exchange guaranteed”) and the “personnel contact quality” indicator (“positive attitude of the merchant staff who supports with necessary information”). The values for these three indicators were close: the SC values ranged from 0.47 to 0.53, and the absolute values of DSC ranged from \(-0.53\) to \(-0.46\). This indicated that customers were sensitive to both the provision and non-provision of these service elements. Among these three indicators, “return and exchange guaranteed” had the lowest DSC value, indicating its importance in preventing customer dissatisfaction in the “one-dimensional quality” category. The “positive attitude of the merchant staff who supports with necessary information” had the highest SC value among all indicators, at 0.53. As such, this service element had the largest effect in increasing customer satisfaction.

Three indicators were “attractive quality” attributes: two “timeliness” indicators (prompt delivery and on-time delivery of the goods) and one “safety” indicator (“the packaging is completely intact”). The SC values of these three indicators exceeded 0.5. The absolute values of DSC ranged from \(-0.47\) to \(-0.41\), making them lower than the SC values. This indicates that customers were more sensitive about the provision of these service elements than their non-provision. In addition, the SC values of these three indicators were close: they were equally important in improving customer satisfaction.

4. Discussion and conclusions

4.1 Factors composing the LSQ of cross-border e-commerce

This study identified six significant factors contributing to the LSQ of cross-border e-commerce: “timeliness,” “reliability,” “economy,” “safety,” “personnel contact quality,” and “information quality.” This is consistent with previous logistics service studies, which identified the same dimensions as being important for measuring and improving LSQ (Zhang et al., 2020). However, the study found that the factors composing the LSQ of cross-border e-commerce differ from other industries. This is due to cross-border e-commerce logistics processes, such as overseas warehousing, international logistics, and domestic distribution. From this perspective, the LSQ of cross-border e-commerce is more of a service process, rather than a single concept or secondary structure. Moreover, some dimensions were associated with different meanings compared to previous studies. Specifically, due to customers shown low expectations for the logistics speed of cross-border e-commerce, thus, when they received orders within a shorter time than expected, they expressed feelings about the timeliness of the logistics service in a surprised tone and positive emotion. This indicates that in the context of cross-border e-commerce, timeliness is not only an important factor affecting LSQ, but also an important factor to induce customer satisfaction.

In addition, while safety is generally a factor contributing to LSQ (Thai, 2013; Sohn et al., 2017), safety-related reviews in this study were dominated by negative attitudes. An example includes: “the packaging is very poor. It is almost impossible to see the outer packaging intact for everything from Amazon in Europe.” This indicates that product quality is an important factor for consumers shopping using cross-border e-commerce platforms (iMedia Research, 2021). Damaged packaging or goods reduce the customer’s perception of product quality, increases the customer’s sense of insecurity with respect to cross-border e-commerce logistics services, and may lead to dissatisfaction.
4.2 Classification of the LSQ attribute of cross-border e-commerce

This study determined the instrumentality and priorities of each LSQ indicator associated with cross-border e-commerce. The results indicate that not all indicators are linearly related to satisfaction.

First, the economy and information quality indicators, and the safety-related “the purchased goods are completely intact” indicator are “must-be quality” attributes. They are more likely to trigger customer dissatisfaction when not met, and are basic customer requirements that must be fulfilled. These quality attributes are highly related to the characteristics of cross-border e-commerce logistic services.

Some scholars propose that consumers in cross-border e-commerce prioritize the cost-performance ratio (Wang et al., 2021), underscoring the significance of reasonable distribution costs, an economy indicator, as a key factor in evaluating LSQ of cross-border e-commerce. In addition, cross-border e-commerce customers are more sensitive to information on shipping channels and logistics progress (Shao et al., 2021). However, despite efforts, challenges persist in fully tracking logistics information in cross-border e-commerce, and effective product tracking remains incomplete (Giuffrida et al., 2021). Customers with information disadvantages are more likely to feel dissatisfaction (Shao et al., 2021), making information quality a basic need. Furthermore, cross-boundary cargo transportation is associated with a greater risk of product damage (Liu et al., 2021). As such, guaranteed product quality is a main factor affecting the choice to use cross-border e-commerce platforms (iiMedia Research, 2021). Thus, the safety element “the purchased goods are completely intact” is a basic customer concern.

All indicators associated with the reliability and personnel contact quality dimensions are “one-dimensional quality” attributes. In other words, these are service elements that customers want from cross-border e-commerce businesses. These findings imply that the relationships between these service elements and customer satisfaction are consistently linear. This highlights the important role of reliability and personnel contact quality in improving the LSQ of cross-border e-commerce. This is consistent with previous empirical evidence in the LSQ field (Thai, 2013).

Finally, the indicators associated with the timeliness dimension, and the “packaging is completely intact” indicator are “attractive quality” attributes, representing potential customer needs. These results enable a nuanced analysis of the findings of Thai (2013) and Murfield et al. (2017). Their research confirmed that timeliness and safety are important LSQ components; however, this study focused more on the instrumentality of these indicators with respect to customer satisfaction. We found that timeliness and the safety of packaging contribute to satisfaction, but do not significantly impact dissatisfaction. This indicates that cross-border e-commerce customers do not demand those services, but rather consider them to be a service that may exceed expectations.

With respect to timeliness, the impact of this variable may be influenced by the later start of cross-border logistics systems compared to domestic systems. In addition to the long cross-border logistics process, inadequate infrastructure and customs make it difficult to meet the timeliness requirement (Giuffrida et al., 2021).

With respect to safety, “the packaging is completely intact” emerged as a service that exceeds expectations. This is likely due to the uncertainty of cross-border logistics, which often lead to accidental damage to outer packaging. Also, individual sellers and overseas e-commerce platforms generally use overseas combined shipping models. This means that goods from several different buyers are shipped overseas in the same parcel. The parcel is then split and sent to individual customers once in the destination country. As a result, goods may be vulnerable to damage when separated, including damaged outer packaging. Companies that respond more effectively to these indicators may outperform competitors.
5. Contributions and limitations

5.1 Theoretical contributions

This study makes several contributions to the LSQ-related literature on cross-border e-commerce, and provides insights about specific LSQ components in this context. Previous studies about cross-border logistics have mainly emphasized the importance of service quality, without empirical evidence about the specific dimensions of LSQ with respect to cross-border e-commerce. By extensively analyzing customer review data, this study identifies timeliness, economy, safety, reliability, personnel contact quality, and information quality as main factors contributing to LSQ in cross-border e-commerce. This provides a framework for further studying the mechanism by which these factors influence service outcomes.

Second, this study examined LSQ components in cross-border e-commerce and their impact on customer satisfaction, utilizing Kano model indicators and three kinds of quality attributes to determine the instrumentality and priority of each indicator. This study reached different conclusions than other studies. For example, in some industries, timeliness is an important subdimension of LSQ. However, in cross-border logistics service, it is a potential requirement that may exceed customer expectations if met. As such, it can be prioritized after “must-be quality” attributes, such as safety. This study empirically examined the different relationships between LSQ indicators and customer satisfaction in cross-border e-commerce, contributing to broader research on LSQ and customer satisfaction.

Finally, most LSQ-focused studies apply conceptual or single questionnaire-based quantitative research methods, but have not explored the logistics service characteristics specific to particular industries. The study collected a significant amount of customer review data and adopted a qualitative method to provide empirical evidence about the factors contributing to the LSQ of cross-border e-commerce. This enriches descriptions of the importance of different logistics service elements from multiple perspectives.

5.2 Practical contributions

This research has important practical implications for managers working for logistics service providers and cross-border e-commerce businesses.

First, four service elements are basic requirements for cross-border e-commerce customers: “reasonable distribution cost of the goods,” “reasonable returns and exchanges cost of the goods,” “the purchased goods are completely intact,” and “efficiency of real-time delivery information updates on cross-border e-commerce platform”. Companies should integrate these elements into service offerings to prevent customer dissatisfaction. To achieve this, companies need comprehensive and standardized service standards; they need to promptly address transportation issues; and should utilize information technologies to enhance transparency and efficiency in cross-border transportation.

Second, meeting customers’ expected needs, such as “accuracy of product description,” “return and exchange guaranteed,” and “positive attitude of the merchant staff who supports with necessary information,” is crucial for maintaining competitiveness. However, the current cross-border e-commerce landscape lacks reliable and consistent return and exchange policies. This may lead to potential inconsistencies in product descriptions due to lengthy logistics processes and limited legal regulations. To bridge the gap between customer demands and services provided, companies should strengthen shipment management to protect the condition of goods and packaging, and establish effective return and exchange channels. For example, China’s “Tmall Global” has implemented a progressive 7-day no-reason refund policy to enhance customer satisfaction. Finally, service elements that exceed customer expectations, such as “prompt delivery of the goods,” “on-time delivery of the goods,” and “the packaging is completely intact,” tend to increase a company’s competitive advantage when fulfilled. Therefore, if a company already fulfills the
must-be and one-dimensional attributes, it should also provide these three elements where possible. For instance, establishing overseas warehouses and collaborating with reliable domestic logistics providers may address timeliness and safety needs, significantly contributing to customer satisfaction.

5.3 Limitations and future research

This study does have some limitations, which highlight future research opportunities. First, one limitation is the absence of differentiation between logistics service providers. There may be differences in professionalism and flexibility between third-party logistics providers and e-commerce providers themselves, which may affect the conclusion of the instrumentality of some dimensions. Future research can explore the impact of varying logistics models on overall cross-border e-commerce efficiency and quality.

Second, this study focused on the LSQ of cross-border e-commerce in China. However, unbalanced development in logistics infrastructure and customs between countries, and different customer preferences toward imported goods, may lead to different customer service demands. This could influence outcomes with respect to the relationship between LSQ sub-dimensions and customer satisfaction. Further studies are needed to compare the LSQ associated with cross-border e-commerce in different countries to evaluate the applicability of this study’s conclusions.

References


**Further reading**


**Supplementary material appendix**

The supplementary material for this article can be found online.

**Corresponding author**

Jiafu Su can be contacted at: jiafu.su@hotmail.com

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