

---

# Analysis on influencing factors of customer satisfaction of cross-border e-commerce logistics service

Rui Wei

School of Economics and Management, Xidian University, Xi'an 710071, China

767644348@qq.com

---

## Abstract

The rapid rise of cross-border e-commerce has brought more development opportunities for cross-border logistics, and also put forward higher requirements for cross-border logistics service levels. Based on the online consumer reviews of cross-border e-commerce, using Data and text mining technology, combining with the existing research results of logistics service customer satisfaction and the characteristics of cross-border e-commerce logistics industry, under the background of cross-border e-commerce, this paper studied the influencing factors of customer satisfaction with logistics services. Studying factors affecting customer satisfaction from the perspective of review texts will provide an effective method for satisfaction research, helping cross-border e-commerce and logistics companies to accurately grasp weak links and improve service levels.

## Keywords

Online reviews, Cross-border e-commerce logistics, Customer satisfaction, Logistics service quality.

---

## 1. Introduction

In recent years, huge market demand has brought unprecedented development opportunities for cross-border e-commerce, cross-border e-commerce has become a new trend and an important part of foreign trade development. Under the background of the in-depth development of electronic information technology and economic globalization, major enterprises have undergone transformation and upgrading, relying on their existing advantages to rapidly rise in the cross-border e-commerce field. Cross-border e-commerce logistics, as the core supporting business of cross-border e-commerce, makes cross-border shopping more convenient and efficient, while cross-border e-commerce logistics itself is fragmented, service area is dispersed and costly, compared to domestic logistics. Need to face a more complex environment. In addition, due to differences in global logistics environment, development level, political culture, etc., domestic logistics, international logistics and destination country logistics are prone to connection problems, and it is difficult to establish a perfect cross-border logistics system. Therefore, cross-border logistics has become a key factor restricting the rapid development of cross-border e-commerce. The imbalance between logistics services and cross-border e-commerce has greatly affected consumers' experience in the shopping process.

This paper analyzes the influencing factors of logistics service customer satisfaction under the background of cross-border e-commerce by combining the collection, preprocessing, feature extraction and cluster analysis of review texts, and combining SERQUAL model and LSQ model, and proposes countermeasures to improve logistics satisfaction.

## 2. Literature review

(1) Current Status of Cross-border E-commerce Logistics Research

At present, the research on cross-border e-commerce logistics mainly focuses on the following aspects: current situation dilemma and countermeasure research, logistics model research, cross-border logistics and cross-border e-commerce collaborative development research, logistics service research, cross-border logistics and enterprise competitiveness. Research and research on cross-border e-commerce logistics of agricultural products. Compared with domestic, there are few research results on cross-border e-commerce logistics in foreign countries.

Maria Giuffrida and Riccardo Mangiaracina and others conducted research on the perspective of cross-border e-commerce logistics in China. On the one hand, they reviewed the research results of cross-border e-commerce in China's logistics field, and classified the existing knowledge systems in cross-border e-commerce logistics for the first time[1]. On the other hand, they compared the different logistics solutions of cross-border e-commerce in China through quantitative models[2]. Lv Hong[3], Wang Don Bo[[4] and Fan Qiaoyi[5] researched on cross-border e-commerce retail logistics, cross-border logistics of small and medium-sized foreign trade enterprises and cross-border e-commerce logistics in China from three aspects: logistics mode, current situation problems, development and solution path. Zhang Xiaheng and Zhang Ronggang's collaborative research on cross-border e-commerce and cross-border logistics based on the composite system synergy model indicates that the degree of synergy between the two systems depends on the order degree and orderly coupling of each subsystem[6].

### (2) Research Status of Logistics Service Quality

Foreign scholars have started early on the research of logistics service quality, and have many achievements, especially in the aspects of logistics service quality concept, evaluation scale and the relationship between logistics service quality and customer satisfaction or loyalty. Vinh V. Thai builds a conceptual model and verifies its effectiveness and reliability in measuring the quality of logistics services. It also points out that customer-focused services are a key factor in improving the quality of logistics services[7]. CC Bienstock et al. discussed the latest advances in the understanding and measurement of logistics service quality and combined the Technology Acceptance Model (TAM) to assess the use of logistics information technology[8]. Han Chaoqun constructed the customer satisfaction model of third-party logistics under the background of China's e-commerce from the aspects of entity delivery service quality and customer marketing service quality[9]. Zhang Zhenhua and others from the perspective of furniture e-commerce, based on service blueprint method, natural language processing and social network analysis, put forward the framework of e-commerce logistics service quality problem, and put forward the problem improvement countermeasures based on the theory of service interface management and service remediation[10].

### (3) Research Status of Cross-border E-commerce Logistics Service

Yu-Hsiang Hsiao et al. based on the theory of perceptual engineering and PLS to study the relationship between customer perception and service elements of cross-border e-commerce logistics services, and demonstrate the application of text mining technology in online content analysis of cross-border e-commerce logistics services, for cross-border E-commerce logistics service design provides a realistic reference basis[11]. Ying Liu studied the quality evaluation of cross-border e-commerce logistics service and proposed an improved AHP algorithm[12]. Xue Xiaofang and others believe that the factor, operational and information capabilities of cross-border e-commerce logistics services have a significant positive impact on customer value[13]. Quan Chunni and Fan Yuejiao used perceive value as a mediator to study the impact of cross-border logistics service quality on customer satisfaction[14].

In summary, most of the current research on cross-border e-commerce logistics solves problems from the perspective of logistics enterprises. There are few customer-oriented researches. Scholars usually use literature analysis and questionnaires to study the factors affecting customer satisfaction, lacking of realistic basis. The online review reflects the consumer's real shopping experience and experience, and the factors affecting customer satisfaction are more valuable. Therefore, based on the relevant research results, this paper studies the impact of cross-border e-commerce logistics services on customer satisfaction based on online reviews.

### 3. Comment data collection and processing

#### 3.1 Comment text collection

In this study, the collection of the review text data was completed by using the Jisouke web crawler tool. According to the characteristics of the product pages and comment pages of JD Global (now renamed Haitun Global), the appropriate crawler path, label mapping and cycle page turning rules were set to edit the collection rules. This article has climbed 2,168,17 online purchase data from JD.com, including maternal and child supplies, beauty care, nutrition and health care, digital products, watches and clocks, luxury goods, apparel and other categories, affected by the sales of various categories, maternal and child supplies and The most data on beauty care, accounting for 42% of the total number of comments, at the same time, the most relevant information about logistics services involved in the comments.

#### 3.2 Pretreatment

The word breaker used in this article is jieba participle. This tool is an integrated Python library, completely open source and easy to operate. The jieba library is able to add custom thesaurus and remove stop words. Stop words have no clear emotional orientation but are frequently used and need to be actively deleted to prevent noise.

Jieba's word segmentation model mainly includes three types:

Precise mode: The most accurate segmentation of sentences in sentences or texts, no redundant data, suitable for text analysis.

Full mode: all the words in the sentence that may constitute words are all segmented, the scanning speed is fast, but it is easy to produce ambiguity, and there is redundant data;

Search engine mode: based on the segmentation result of the precise mode, the segmentation of long words can improve the recall rate and is suitable for the field of search engine segmentation[15].

This article uses the jieba library of Python version 3.6 as a word segmentation tool for comment data. In order to ensure the accuracy of word segmentation results and reduce the impact of stop words on word segmentation processing, this paper has improved the word segmentation dictionary, added a professional custom dictionary on cross-border e-commerce and logistics, synonym dictionary and stop word dictionary. Through the maintenance of the jieba word segmentation dictionary, the online comment information collected is processed by deleting stop words and merging synonyms, and this paper completes the word segmentation operation of the comment data. In addition, the deletion of stop words in the data reduces the workload for the construction of the subsequent word vector space model.

### 4. Customer satisfaction factors

#### 4.1 Feature extraction

By analyzing the collected online comment information, it is found that the part of speech of the feature word is usually a noun, a gerund or a noun phrase. Since the collected comment data is the consumer's comment on the platform goods and services, it not only includes logistics, but also the evaluation of the shopping quality of the product itself, price, customer service, etc. There are a lot of information in the data that is not related to the logistics characteristics. In order to ensure the accuracy and completeness of logistics feature word extraction, reduce the impact of word segmentation error, and consider the logistics characteristics, in the process of actual processing, verbs, gerunds and place words are also treated as feature words. Therefore, this paper uses jieba.posseg to perform part-of-speech tagging on the segmentation results of the comment data, and extracts nouns, gerunds, verbs and other proper nouns as candidate feature words, and manually removes words that are not related to logistics features, such as products. Characteristics, brand nouns, etc., finally obtained 126 logistics feature words, as shown in [Table 1](#).

Table 1: Feature word extraction results

Number	Feature word
1	Cross-border, genuine, source of goods, tax, tax exemption, tariff tax, bill, postage, price, delivery
2	Logistics, Express, Direct Mail, Direct Supply, Customs, Clearance, Customs clearance, Packaging, Packaging Box
3	Plastic packaging, return exchange, return, exchange, refund, seal, service attitude, experience, efficiency, loss
4	Personnel, Haitao, Ningbo Port, Tianjin Port, Stock, Out of stock, Stocking, Warehousing, Bonded Warehouse, Warehouse
5	Receipt, manufacturer, import, purchase, security mark, invoice, geographical, distance, cost, channel
6	Import port, Customer service, Duty-free shop, Direct store, International goods, Order number, Customs declaration, Personal information, Information, Recipient
7	Policy, Guarantee System, Pass, Supplier, Agent, SF Express, Zhongtong, Post, Network, Aviation
8	Cross-border arrival, delivery, pick-up, accuracy, effectiveness, economy, dispatch, transfer station, cold chain
9	Product chain, tracking service, customs supervision, service fee, handling fee, error rate, cycle, self-operated, transportation, mailing
10	Delivery, parcel, notice, purchase, complaint, unloading, unpacking, signing
11	Delay supervision, compensation, authorization, acceptance, inspection, departure, return, replacement, tax package
12	Reimbursement, Rejection, Payment, Claim, Wrong, Damage, Supply, Warranty, Signing
13	Post, overseas, domestic, courier, customer service, administrator

#### 4.2 Feature word clustering

Cluster analysis refers to dividing a group of unlabeled data into several groups, and the data in the group is similar, and the data between groups is greatly different as the ultimate goal of clustering. Compared to classification, clustering is unsupervised machine learning, and classification needs to know the classification goals and criteria in advance. Clustering algorithms generally include methods based on partitioning, density, network, model, and hierarchy. There are many kinds of text clustering methods. This paper will use k-means clustering algorithm to complete the clustering operation. K-means algorithm is a classic distance-based clustering algorithm, and it is the simplest and most efficient algorithm in unsupervised learning. It belongs to the top ten. One of the classic data mining algorithms[16].

According to the comment information after the word segmentation obtained in the previous article and the extracted logistics feature words, this paper analyzes the feature words based on Python 3.6. In order to evaluate the clustering effect, the Silhouette Coefficient was used to investigate the cohesion within the group and the separation between the groups. Firstly, the word2vec of gensim library in Python is used to construct the comment text vector model, and the word vector of each word is obtained. Secondly, the vector representation of 126 logistics feature words is extracted, and the K-means clustering algorithm is used to complete the clustering of the obtained word vectors. analysis. Finally, the Euclidean distance is used as the distance measure of the silhouette coefficient, and the number k of clusters is set from 4 to 15, and is repeated 30 times. The results of the contour coefficient and the results of the cluster analysis are shown in [Fig. 1, Table 2](#).

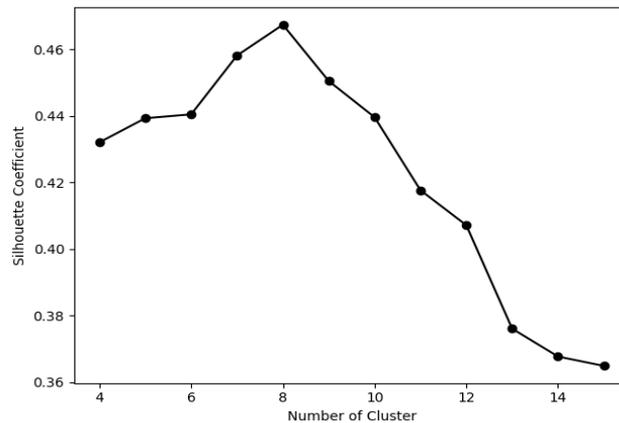


Fig. 1 Silhouette Coefficient result

Table 2:Logistics feature clustering result

cluster ID	size	example	feature
1	5	Service attitude, personnel, administrator, courier, customer service	Personnel service
2	6	Authentic, source, order number, personal information, information, tracking service	Information service
3	35	Delivery, logistics, express, direct mail, receiving, dispatch, transportation, mailing, delivery, acceptance, signing, delay	Delivery service
4	22	Packaging, packing, return, refund, seal, customer service, transfer, notice, complaint, indemnity, return, replacement, tax package, package, application, warranty	customer service
5	27	Cross-border, customs, customs clearance, customs clearance, Tianjin Port, duty-free shops, direct sales stores, customs declarations, policies, guarantee systems, passes, customs supervision, supervision, authorization, overseas	Cross-border service
6	8	Taxes, exemptions, customs duties, tax bills, postage, prices, service fees, handling fees	economy
7	1	speed	Responsiveness
8	22	Inventory, stocking, warehouse, bonded warehouse, manufacturer, purchase, channel, supplier, agent, outlet, transit, product chain, cycle, purchase, supply	Supply chain service

It can be seen from the figure that the contour coefficient is the largest when  $k=8$ , and the larger the value is, the better the effect is. The final choice is 8 as the optimal number of clusters. Through the cluster analysis of feature words, it can be concluded that the factors affecting the satisfaction of logistics service when consumers are doing cross-border shopping mainly include personnel service, distribution service, information service, customer service, cross-border service, cost and response. Sex and supply chain services.

**4.3 Analysis of influencing factors**

The SERVQUAL model was proposed in 1988 by Parasuraman, Zeitham and Berry based on the TQM theory. The core idea is to define the concept of service quality as the degree of difference between the service quality that the user truly perceives and the expected service quality. It is a typical

gap model[17]. The five dimensions of the SERVQUAL model are tangibility, reliability, responsiveness, assurance, and empathy.

The LSQ model divides the customer's entire experience in receiving logistics services into the ordering and receiving process, and proposes nine indicators. The ordering process includes the quality of personnel communication, the quantity of order releases, the quality of information, the ordering process, and the receiving process includes orders. Accuracy, cargo integrity, cargo quality, timeliness and error handling[18].

According to the clustering analysis results and logistics feature words of the review text, combined with the SERVQUAL model and LSQ model and the characteristics of cross-border e-commerce logistics industry, this paper considers 14 factors including economy, responsiveness, accuracy, cargo safety and express packaging and so on ,see Fig. 2.

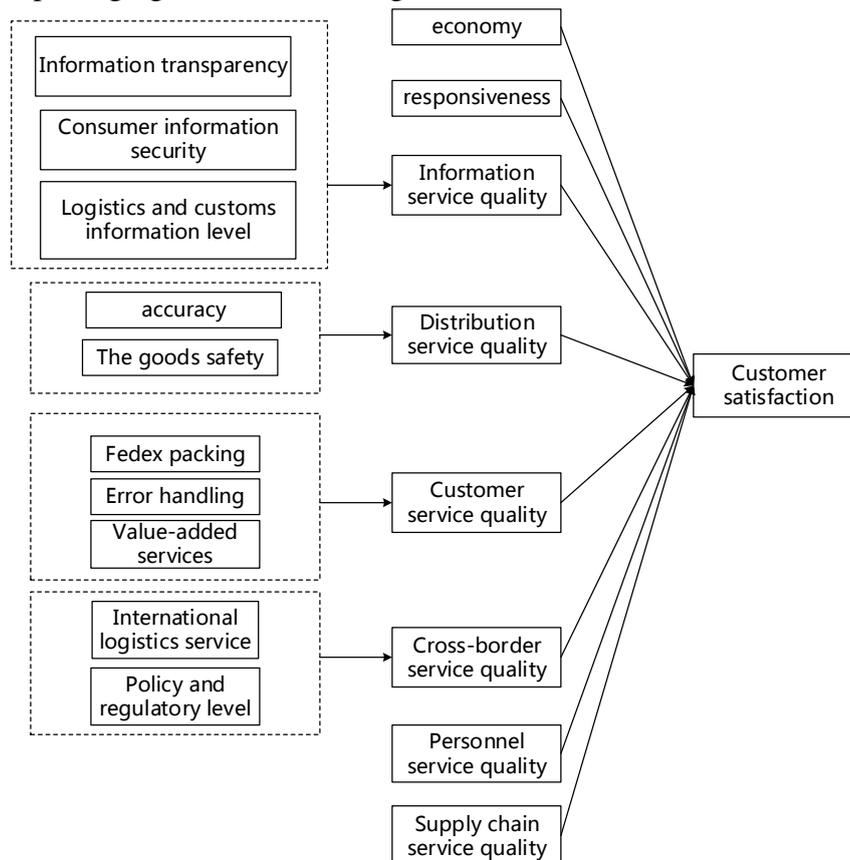


Fig. 2:Influencing factor system

Among them, the information service quality, cross-border service quality and supply chain service quality extracted from the results of clustering analysis data are the unique concerns of cross-border e-commerce consumers. Compared with domestic logistics, cross-border logistics involves a wider range and far-reaching impact. Cross-border logistics is not only closely linked to the social and economic activities of many countries, but also affected by many factors and factors. Due to factors such as tariffs, logistics costs, spatial distances, and policy differences, consumers are more concerned about the economics of logistics costs, the availability of goods, and the impact of national policies and regulations on cross-border shopping compared to domestic logistics. In addition, cross-border e-commerce is carried out in different countries, and goods need to go through customs clearance procedures. The personal information provided by customers in this process involves identification. Therefore, the level of information security and customs clearance affects customer satisfaction. Consumers buying goods from abroad, the biggest concern is the true and false products, so in the logistics should actively ensure information transparency and information timeliness, including delivery locations, delivery methods, logistics models.

## 5. Conclusion

Based on the online comment text mining, this paper analyzed the influencing factors of cross-border e-commerce logistics service customer satisfaction, and through the work of review data collection, text preprocessing, logistics feature word extraction and text clustering, the 14 factors that affect the satisfaction of logistics service customers are concluded. The factors are economics, responsiveness, information transparency, consumer information security, logistics and customs information level, accuracy, cargo security, express delivery packaging, error handling, value-added services, international logistics services, policy and regulatory levels, personnel. Service and supply chain services.

Based on the above research, this paper proposes the following suggestions for improving logistics services: First, focus on strengthening logistics operation capabilities, improving operational efficiency and management level of cross-border logistics enterprises, making up for weak links and improving soft environment construction, rather than blindly adding Large hardware infrastructure construction. Secondly, actively construct and improve the logistics information system to ensure the visibility, real-time and security of the data of the entire information platform, and provide customers with real-time logistics information from placing orders to global transportation and distribution. Finally, government departments should conduct relevant research, improve the policy requirements and regulatory systems needed for the healthy development of cross-border e-commerce, and clarify the development goals and positioning of cross-border e-commerce and logistics.

## References

- [1] Maria Giuffrida, Riccardo Mangiaracina, Alessandro Perego, Angela Tumino. Cross-border B2C e-commerce to Greater China and the role of logistics: a literature review, *International Journal of Physical Distribution & Logistics Management*, Vol. 47 (2017) No. 9, p. 772-795.
- [2] Maria Giuffrida, Riccardo Mangiaracina, Alessandro Perego, Angela Tumino. Logistics Solutions to Support Cross Border E-Commerce Towards China: The Case of the Apparel Industry, *Business Models and Ict Technologies for the Fashion Supply Chain*, Vol. 413 (2017), p. 163-177.
- [3] Lv Hong. Analysis on the Cross-border E-commerce Retail Logistics, *Practice in Foreign Economic Relations and Trade*, (2014) No. 5, p. 87-89.
- [4] Wang Dongbo. Small and medium-sized foreign trade enterprises carry out logistics problems and solutions to cross-border e-commerce, *Practice in Foreign Economic Relations and Trade*, (2018) No.11, p. 33-36.
- [5] Fan Qiaoyi. Logistics Mode and Development Status of Cross-border E-commerce in China, *Journal of Commercial Economics*, (2017) No. 22, p. 99-101.
- [6] Zhang Xiaoheng, Zhang Ronggang. Research on Construction and Application of Collaborative Model of Cross-border E-commerce and Cross-border Logistics Complex System, *Management World*, Vol. 34 (2018) No. 12, p. 190-191.
- [7] Vinh V.Thai. Logistics service quality: conceptual model and empirical evidence, *International Journal of Logistics Research and Applications*, Vol. 16 (2013) No. 2, p. 114-131.
- [8] CC Bienstock, MB Royne, S Dan, TF Stafford. An expanded model of logistics service quality: Incorporating logistics information technology, *International Journal of Production Economics*, Vol.113 (2008) No. 1, p. 205-222.
- [9] Han Chaoqun. Research on Customer Satisfaction to Third-party Logistics Services—In an E-commerce Context, *Technoeconomics & Management Research*, (2014) No. 7, p. 62-67.
- [10] Zhang Zhenhua, Xu Baiming. E-commerce logistics service quality problem based on internet word-of-mouth data mining, *China Business And Market*, Vol. 33 (2019) No. 01, p. 43-55.
- [11] Yu-Hsiang Hsiao, Mu-Chen Chen, Wei-Chien Liao. Logistics service design for cross-border E-commerce using Kansei engineering with text-mining-based online content analysis, *Telematics & Informatics*, Vol. 34 (2016) No. 4, p. 284-302.

- 
- [12] Ying Liu. Research on cross border e-commerce logistics service based on improved AHP algorithm, RISTI [Revista Iberica de Sistemas e Tecnologias de Informacao], (2016) No. 7, p. 235-243.
- [13] Xue Xiaofang, Li Xue, Zhang Cuimin, Zhang Chengxin. Research on the impact of cross-border e-commerce logistics service capability on customer value, Journal of Commercial Economics, (2017) No. 6, p. 79-81.
- [14] Quan Chunni, Fan Yuejiao. Logistics service quality under the background of cross-border online shopping empirical research on the impact of customer satisfaction-intermediary with perceived value, Journal of Harbin University of Commerce: Social Sc, (2018) No. 5, p. 98-107+1116.
- [15] Xing Biao, Genrongqiejiduoji. E-Commerce shopping system based on jieba participle search and SSM framework, China Computer & Communication, (2018) No. 7, p. 104-105+108.
- [16] LI Zhengbing, LUO Bin, ZHAI Sulan, et al. Kmeans algorithm based on partition of correlational graph, Computer Engineering and Applications, Vol. 49 (2013) No. 21, p. 141-144.
- [17] Parasuraman A, Zeithaml V, Berry LL. A conceptual model of service quality and its implications for future research, Journal of Marketing, Vol. 49 (1985), p. 41-45.
- [18] John T-Mentzer, Daniel-Flint, G-Tom. Logistics service quality as a segment customized process, Journal of Marketing, Vol. 65 (2011), p. 82-104.