



Research on the Application of Artificial Intelligence in Empowering the Service Quality of Cross-border B2C E-commerce

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Abstract. The integration of artificial intelligence technology into modern industries holds significant value in driving industrial development and improving the quality of industrial services. This study takes cross-border e-commerce B2C as a starting point to analyze the existing problems in the service quality of cross-border e-commerce B2C. It also examines how to apply artificial intelligence technology in cross-border e-commerce B2C services, and the significance of empowering it to improve the service quality.

Keywords: Artificial Intelligence; B2C; Service Quality

1 Introduction

Artificial Intelligence (AI) refers to a simulated intelligent system created by humans. It is capable of simulating and performing certain intelligent behaviors of humans, such as problem solving, language understanding, autonomous learning, image recognition, etc. [1] AI is an interdisciplinary science and technology based on computer science, biology, psychology, neuroscience, mathematics and philosophy. It is an important research field in computer science and has been a hot topic in recent years in the development of technology that simulates human intelligence. This includes machine learning, deep learning, natural language processing, computer vision and other areas that play important roles.

The artificial intelligence industry belongs to the strategic emerging industry. According to the "Guidance Catalog for Key Products and Services of Strategic Emerging Industries (2016)" issued by the National Development and Reform Commission, China's artificial intelligence can be divided into three sub-industries: artificial intelligence software development, manufacturing of consumer-related equipment for artificial intelligence, and artificial intelligence system services. The "14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and Long-term Goals for 2035" has deployed multiple aspects such as development goals, core technological breakthroughs, intelligent transformation and application, as well as guarantee measures for China's artificial intelligence in the "14th Five-Year Plan" and

the next decade. [2]According to the "New Generation Artificial Intelligence Development Plan," by 2025, China will achieve major breakthroughs in the basic theory of artificial intelligence; some technologies and applications will reach a world-leading level; AI will become a major driving force for industrial upgrading and economic transformation in China; intelligent social construction will make positive progress; the scale of core AI industries will exceed 400 billion yuan, driving related industries to exceed 5 trillion yuan. By 2030, overall theoretical research on AI technology applications in China is expected to reach a world-leading level. [3]The application of AI in cross-border e-commerce is also valuable as it improves service quality and enhances management systems within this field. As show in figure 1.

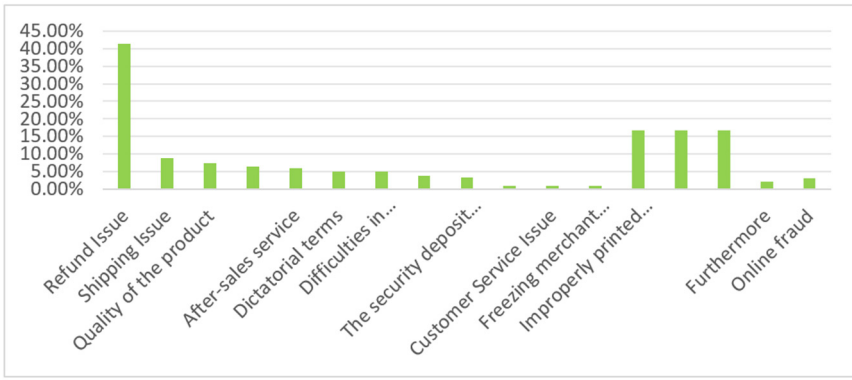


Fig. 1. Distribution of Cross-border E-commerce Complaint Types in China in 2023 from Dian su bao (2024) Net Economic and Social <https://www.100ec.cn/detail--6637002.html>

According to "Electric Complaints Treasure," the highest proportion of cross-border e-commerce user complaints in 2023 is for refund issues, reaching 41.47%. This is followed by delivery problems at 8.70%, and product quality issues at 7.36%. The remaining proportions are as follows: online counterfeiting (6.36%), after-sales service (6.02%), unfair terms (5.02%), difficult returns and exchanges (5.02%), logistics issues (3.68%), failure to return store deposits (3.34%), order problems (1%), customer service problems (1%), freezing of merchant funds (1%), incorrect goods received(1.67%) , false promotions(1.67%) , malicious fines(1.67%) , online fraud(0.01 %) etc.

To address these complaint issues, we can delegate some services to artificial intelligence, such as automatic review of refund requests without manual intervention once the customer provides a refund application.

The timeliness issue with deliveries stems from slow order processing and slow logistics efficiency due to time differences between different countries and regions globally that cannot be promptly handled manually for online orders; this problem can be resolved by assigning such tasks to artificial intelligence.[4]

Therefore, empowering cross-border e-commerce with artificial intelligence technology can integrate it into practical solutions for bottlenecks encountered during its development.

As global economic integration accelerates, B2C cross-border e-commerce plays an increasingly important role in international trade, accounting for a significant portion of total export trade volume due to its small-scale and fragmented nature with dispersed customers involving multiple intermediate links, long logistics routes, and extended time cycles per customer transaction.[4]

In order to enhance the overall shopping experience before, during and after purchase transactions for customers in B2C cross-border e-commerce model through integrating AI technology into critical aspects including language communication, logistics distribution, and payment settlement has been widely applied resulting in significant improvements in service quality.

2 Application of Artificial Intelligence in Cross-border E-commerce B2C Services

2.1 Language Translation and Customer Service Support

Through natural language processing technology and machine learning algorithms, artificial intelligence can achieve multi-language translation and intelligent customer service support, while solving the language communication barriers between consumers from different countries and improving user experience. [5] Currently, most of the customer services in cross-border e-commerce B2C are handled by humans. On one hand, human responses are not timely, especially when dealing with time differences across different countries globally; domestic online customer service cannot be available 24 hours to reply to customer inquiries. On the other hand, for some small language-speaking countries with specific terms or special languages, human translation may also have certain deviations. Therefore, integrating artificial intelligence technology into the field of cross-border e-commerce B2C not only solves the cost problem for cross-border e-commerce enterprises but also improves the quality of customer service for these enterprises by being able to address customers' issues 24/7 during their shopping experience."

2.2 Risk Control and Fraud Detection

By utilizing big data analysis and deep learning technology, artificial intelligence can conduct real-time monitoring of transaction risks and effectively prevent fraudulent activities to ensure transaction security.

2.2.1 Risk Control

Machine learning algorithms are utilized to analyze large amounts of data in order to identify abnormal patterns and potential risks. Intelligent systems automate the decision-making process to quickly respond to risks and fraud events. Predictive models are constructed to forecast future potential risks and fraudulent behaviors based on historical data. Compared with traditional methods, artificial intelligence is capable of processing a larger amount of data, providing more accurate predictions and detection

results.[6]Applying this technology in the field of cross-border e-commerce can effectively identify and reduce the risk of online fraud for buyers, thus minimizing personal financial losses. For sellers, leveraging historical data from cross-border e-commerce platforms enables them to accurately predict potential risks in the future. This is especially crucial when dealing with financial operations across different countries, as it involves inherent financial risks.

2.2.2 Fraud Detection

Fraud detection includes transaction fraud detection and identity fraud detection. Transaction fraud detection utilizes machine learning algorithms for real-time monitoring of transaction data in order to detect fraudulent behavior; deep mining of historical data is conducted to discover potential fraudulent patterns; multidimensional information such as transaction behavior and user profiles is used for risk scoring to assist decision-making.[7]

Identity fraud detection includes: Identity verification: Biometric technologies (such as facial recognition, fingerprint recognition, etc.) are used for identity verification to ensure the authenticity and reliability of user identities.Social network analysis: Potential identity fraud behaviors are detected through analyzing user behavior patterns in social networks. Multi-source data integration: Information from different sources such as public databases, blacklists, etc., is integrated to enhance the accuracy of identity fraud detection.[8]

Cross-border e-commerce involves personal information and financial account data, which, if leaked, directly impacts the buyer's financial and personal security. However, artificial intelligence can directly identify user's personal information to verify their identity reliability. Different buyers have different social network patterns. In order to prevent cross-border network fraud, artificial intelligence identifies the authenticity of consumer fraud behavior through the storage of their past behavioral data, resisting various fraudulent behaviors from the network and enhancing the security of cross-border e-commerce transactions.

2.2.3. Intelligent Recommendation and Personalized Marketing

Based on user behavior data and preference analysis, artificial intelligence can accurately provide product recommendations and develop personalized marketing strategies to improve shopping conversion rates. [9]Artificial intelligence utilizes data mining algorithms and technology to discover patterns and correlations hidden in consumer data, including cluster analysis, association rule analysis, and classification prediction modeling.

By analyzing consumers' purchase history and behavior, cross-border e-commerce companies can offer personalized product suggestions and promotional activities to each consumer, thereby increasing sales revenue. By predicting consumer demand, businesses can better plan production and inventory, reduce costs, and minimize the risk of excess inventory. Through cluster analysis and factor analysis, companies can segment the market into different sub-markets to develop tailored marketing strategies

and product combinations for each market. By analyzing competitors and market dynamics, businesses can gain a better understanding of the competitive environment in the market to formulate responsive strategies.

2.2.4. Enhancing the Efficiency of Cross-border Logistics

The buyers of cross-border e-commerce B2C come from different countries and regions around the world. In order to deliver goods to customers quickly and efficiently, a prompt response is needed after the customer places an order, and the delivery of packages needs to be completed as soon as possible. If this response is done manually, it will be relatively slow. By integrating artificial intelligence technology directly into the process, intelligent robots can automatically complete packaging and sorting work based on the customer's order, operating 24 hours a day. This will greatly shorten the delivery time and improve customer satisfaction.

Especially during the peak season of global e-commerce, integrating artificial intelligence technology into cross-border e-commerce logistics operations is essential to improve the timeliness of buyer delivery. For example, after a customer places an order, the system should immediately initiate packaging and sorting work, and provide logistics information to the buyer in a timely manner. This not only improves the timeliness of logistics but also reduces error rates.

3 The Improvement of B2C Service Quality in Cross-Border E-Commerce Empowered by Artificial Intelligence

The theoretical core of the SERVQUAL model is still the gap model of service quality proposed by Parasuraman, Zeithamal, and Berry, which means that service quality depends on the degree of difference between customer perception and their expectations of service level."

From the perspective of cross-border e-commerce B2C buyers, it is necessary to continuously improve service quality according to customer needs. In the SERVQUAL model, an evaluation index system should be established to identify the gap between service expectations and perceptions, in order to find a breakthrough in improving customer service quality. This provides an opportunity for empowering related fields with artificial intelligence. As show in figure 2.

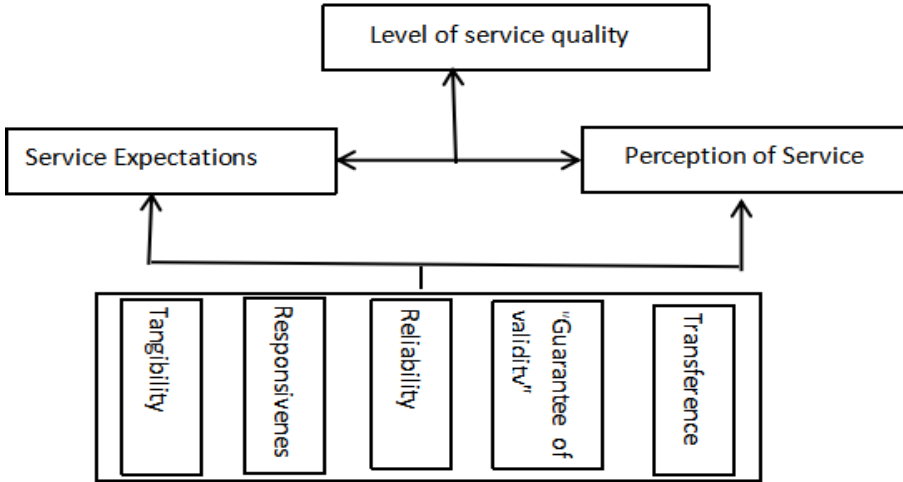
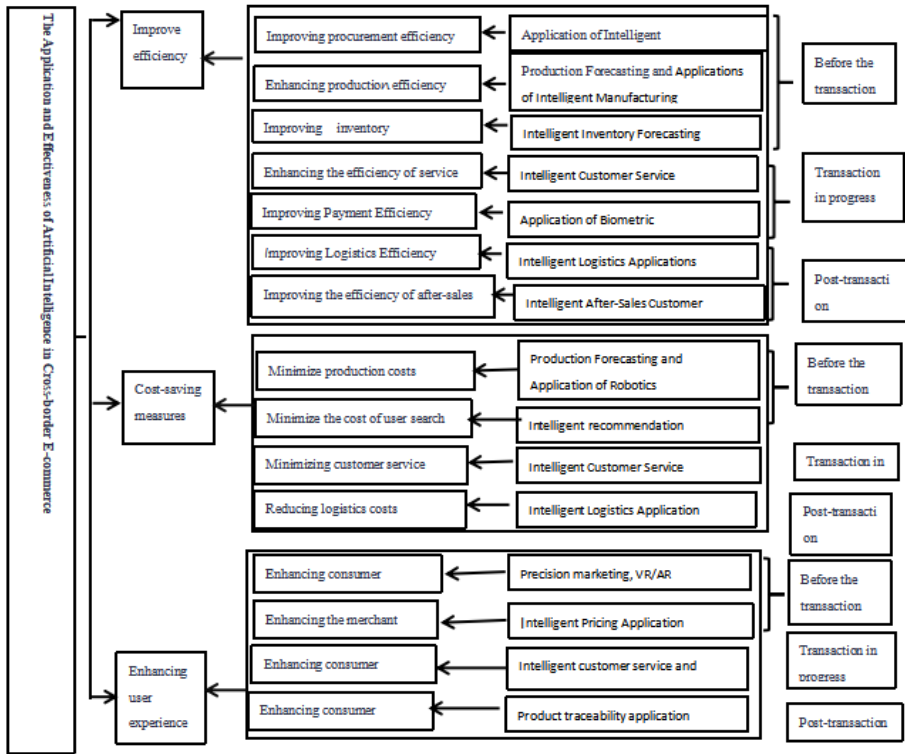


Fig. 2. SERVQUAL Model from Fan, H. X. 2021, Analysis of the Motivation and Effect Evaluation of Artificial Intelligence Application in Cross-border E-commerce. South China University of Technology, (2021).4.

Artificial intelligence empowers cross-border e-commerce B2C by enhancing service quality at three stages: pre-transaction, during transaction, and post-transaction, thus empowering the entire process of cross-border e-commerce B2C transactions. Specifically, this empowerment focuses on improving transaction efficiency, saving transaction costs, and enhancing user experience in cross-border e-commerce transactions.

3.1 Artificial Intelligence Enhances Trading Efficiency

Artificial intelligence monitors user search and shopping behavior, as well as product sales data, to analyze user preferences and predict product trends through deep learning algorithms. This provides scientific references for cross-border e-commerce platforms or sellers in making informed decisions on product selection. As artificial intelligence algorithms continue to optimize, they can effectively predict current market consumer demands, further enabling production forecasting and smart manufacturing. [10]By integrating back end data, intelligent inventory forecasting can be conducted to provide targeted intelligent services and logistics based on different consumer needs. This meets the diverse requirements of consumers and provides timely feedback to enhance transaction success rates and efficiency. [11] As show in figure 3.



Figuer3:The Application and Effectiveness of Artificial Intelligence in Cross-border E-commerce

Fig. 3. from Fan, H. X. 2021, Analysis of the Motivation and Effect Evaluation of Artificial Intelligence Application in Cross-border E-commerce. South China University of Technology, (2021).4.

The buyers of cross-border B2C e-commerce come from different countries and regions around the world. These buyers have different demands for products. Therefore, in order to meet the needs of different buyers and improve the accuracy of transactions, it is necessary to use artificial intelligence to acquire and analyze buyer data to enhance transaction efficiency. For example, when Buyer A wants to purchase a dress, they input keywords related to dresses and browse relevant web pages and images. The acquisition of these browsing traces becomes the basis for subsequent recommendations and trend predictions.

3.2 Cost Savings Enabled by Artificial Intelligence

Based on acquired data, artificial intelligence conducts production forecasting to reduce ineffective production, minimize capital utilization, and decrease inventory space usage. During the process of searching for products, customers can automatically activate intelligent recommendations to reduce their search costs. [12]Throughout the purchasing process, customers may inquire about logistics services and product features; at this

point, artificial intelligence can promptly provide smart services to address customer issues in real time. In terms of logistics, which was previously manually handled; with the application of artificial intelligence now operates 24 hours a day based on back end order placement situations—significantly reducing labor costs. From the perspective of today's labor costs, hiring a customer service specialist requires a minimum monthly salary of 5000 RMB, which still cannot guarantee that the employee will be available 24 hours a day. However, if these tasks are assigned to artificial intelligence, it not only reduces the company's costs but also improves work quality.

3.3 Enhanced User Experience Through Artificial Intelligence

User experience is crucial for the success of cross-border e-commerce enterprises; therefore empowering B2C cross-border e-commerce with artificial intelligence allows for precise marketing based on back end data analysis that offers products tailored to individual customer preferences using suitable marketing methods—thereby increasing order volumes significantly.

Additionally leveraging consumer spending level data mining enables businesses to implement intelligent pricing strategies that align more closely with consumers' psychological price points.[13]During transactions processes, artificial intelligence takes into account cultural characteristics, values, preferences across different countries or regions providing accurate intelligent customer service & translation thus reducing problems associated with manual translations. To enhance consumer experience after transactions are completed, artificial intelligence further traces applications back ensuring resolution of any concerns faced by consumers during their purchases."

For example, Buyer A is a customer from the UK who is planning to purchase gifts for himself and his family as Christmas approaches. By utilizing AI technology to analyze the customer's previous search information and areas of interest, intelligent recommendations can be provided to guide the customer in quickly finding their desired gifts. From the seller's perspective, it is important to efficiently identify potential customers when using cross-border e-commerce platforms. This requires targeted marketing based on the unique characteristics of their products, which relies heavily on AI for obtaining buyer data. Therefore, the integration of AI technology with cross-border e-commerce enhances the overall experience for both buyers and sellers.

4 Conclusion

With the rapid development of technology and the rise of global digital economy, artificial intelligence will continue to be deeply integrated into the field of cross-border e-commerce, greatly changing our way of life. As a major module for China's foreign trade expansion, cross-border e-commerce B2C plays a significant role in enhancing the overall economic strength of the country and promoting regional economic development. The deep integration of artificial intelligence technology in the field of cross-border e-commerce addresses pain points in the development process of cross-border

e-commerce B2C, thereby adding significant value to the industry's growth. Furthermore, it enhances customer service quality and improves efficiency in expanding overseas markets.

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