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# Development of Cross-border E-commerce English Language Services Based on Artificial Intelligence Technology

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***Abstract:*** *With the development of the times, the speed of globalization and computerization is getting faster and faster. Cross-border trade, cultural exchange and international trade are becoming more and more popular, and cross-border e-commerce is developing rapidly for consumer business (B2C). In this context, due to the rapid growth of demand for translation and multilingual information, the language service industry has created a new service format with high demand and rapid development. Based on this, this paper first analyzes the evaluation and application of AI and language service elements, and studies the impact of AI and language service industry and AI on language service industry. Then, this paper discusses the technical application of AI in English language services in depth, and proposes the application design of English language services in cross-border e-commerce. After that, precision algorithm is used to strengthen the application of cross-border e-commerce English language. After theoretical and practical verification, it can be concluded that B2C English language service under AI technology has improved e-commerce language service by 17.2%.*

***Keywords:*** *Artificial Intelligence Technology, English Language Service, Cross-border E-commerce, Cross-border E-commerce English Language*

## 1. Introduction

AI is starting to build translation machines using new technologies. Machine translation allows people to communicate in different languages in an accessible way and gradually enters the low-to-medium-level translation market that has a significant impact on the translation services industry. However, this doesn't mean they're not translators, and they would lose their jobs. In the case of machine translation itself, linguists create machine translation computers and mathematicians create and code corpora. The computer scientists provide software tools and hardware for machine translation and software development. This process illustrates the need for human translation, because the corpus cannot be updated in time, and machine translation cannot meet the needs of human translation. Therefore, there is still a need for high-quality translations.

AI is an area of computer science intended to create new intelligent systems that can understand human thought and respond in a way similar to human thinking. On the basis of understanding AI technology, Cui L expounded the application of AI technology in the management of personnel files in colleges and universities through theoretical analysis [1]. Bai B studied how AI technology applied to the problem of song on demand [2]. Xue Y thought that AI technology, as a disruptive emerging technology, was developing rapidly [3]. Liang F proposed that AI technology made leaps since its invention and it could be subdivided into many techniques, such as machine learning and deep learning [4]. Xu K combined AI technology and Internet of Things technology to build an efficient industrial equipment monitoring system [5]. Weize X U mainly focused on the research of AI algorithms, and designed according to the characteristics of cardiac audio data [6]. In the design of AI-based university teaching platform, Yuan X introduced in detail the development process of the intelligent comprehensive service system and the system requirements analysis, function design and database design [7]. The above researches with AI are relatively specific, but they are not related to B2C, nor do they talk about how to improve B2C English language services.

Language service is a social undertaking based on the diversity, difference, and asymmetry of

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languages, and realizing knowledge transfer, as well as achieving value recognition. Chen J studied the use of learning management systems in a primary school [8]. Chen tries to find out some problems still existing in the language service ability of English majors, and puts forward research on this problem and some innovative and effective methods [9]. Deniz E B believed that English as a common language paradigm was important for language teaching [10]. Ahmed Z gave a detailed analysis of the English content section of the test [11]. In order to reveal the English teachers' views on teaching English through teaching, Yaman S analyzed the collected data through content analysis in the stages of coding and elimination, data interpretation, etc. [12]. Kapranov O discussed a mixed method study was discussed to determine how pre-service English teachers from other countries self-assess their English pronunciation ability that may lead to their English pronunciation problems [13]. Garver R explored whether service learning significantly improved efficacy and examined whether there were significant differences in the development effectiveness of service learning websites during service learning [14]. These research works on English language services are relatively comprehensive, but they do not include B2C and AI technology related research.

In order to comply with the general trend of global economic integration, cross-border e-commerce is still an unavoidable trend in modern global business. Business English is undoubtedly an important part of business communication between buyers and sellers, and it is the communicator of business information between the two sides. In addition to literacy and business English communication skills, the familiarity with the local laws, regulations and customs of each country is required when working in international e-commerce. Therefore, cross-border e-commerce workers must continuously improve their professional English skills at work and acquire rich knowledge in daily life, so as to improve their comprehensive quality and promote the continuous development of business exchanges between countries.

## 2. Evaluation and Application of Artificial Intelligence and Language Service Elements

(1) AI and language service industry

AI is simulated by artificial means [15]. AI simulates the function of the human brain during the use of machines and develops related technologies. AI is gradually entering various fields and playing a role after going through a series of stages such as maturity, design, concealment, information collection, and integration generation. Although the translation industry is still in a leading position, the scope is wider than the existing translation industry, and the service lines are fragmented. Language localization includes translation services, language assistance services and training services, as shown in Figure 1. The language services industry continues to grow due to the demand for more languages and advancements in language technology. With the development of science and technology, AI technology is gradually being applied to the language service industry. Based on modern information technology, the language industry combined with new technologies is gradually becoming an efficient and convenient industry.

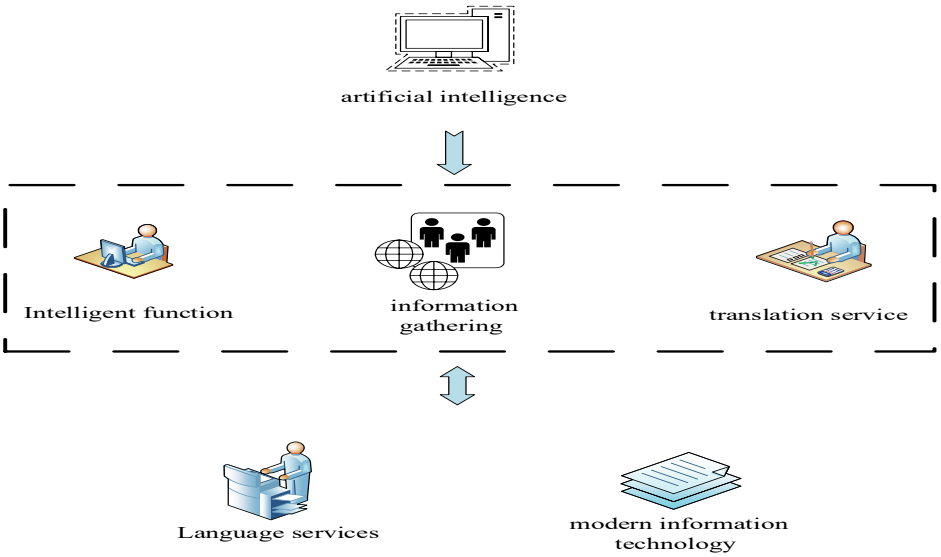


*Figure 1: Overview of the artificial intelligence and language services industry*

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(2) The impact of AI on the language service industry

With the advancement of globalization and the proliferation of computers, the demand for language services has grown exponentially. Due to the growing demand for global health management and increasing cooperation fields such as international engineering and B2C, global trade, B2C has become the second largest translation field after IT, which accounts for more than 20% of all translated documents. The number and skill level of freelance translators are limited, and some minor language skills are in short supply, which makes it difficult to meet the huge market demand. The use of AI solves this problem in the language service industry to a certain extent, as shown in Figure 2. At present, machine translation can meet the needs of some small languages, and the translation speed is fast and the translation quality is gradually improving [16]. In addition, with the improvement of AI technology, the corpus created by machines through continuous learning is more complete and systematic than the corpus created by human natural learning.

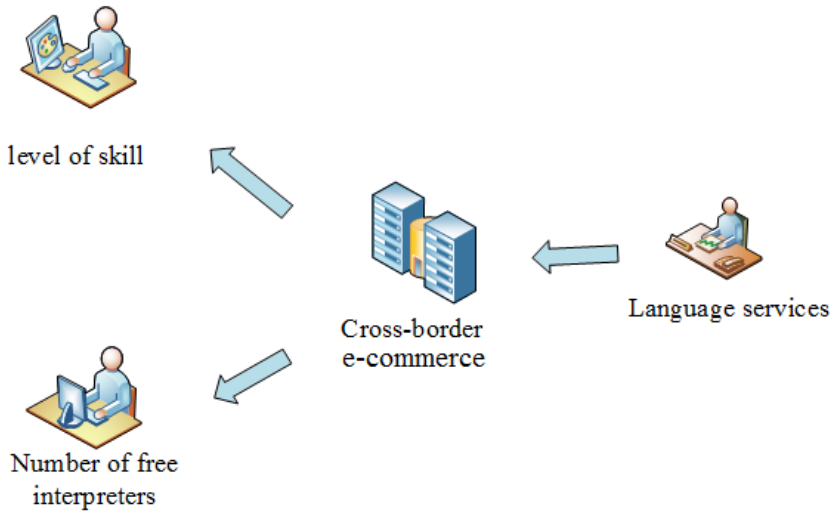


*Figure 2: The Influence of AI on the language service industry*

## 3. Technical Application of AI in English Language Services

With the continuous development of AI, the research and application of AI are also very extensive, which include natural language learning, automatic programming, intelligent search, machine learning, intelligent planning, pattern recognition and other fields. Among them, Natural Language Processing (NLP) is an important field of AI.

(1) Machine translation

There are many translation principles for machine translation: First, rule-based machine translation; second, statistics-based machine translation; third, neural network-based machine translation. Rule-based machine translation is too simplistic and prone to ambiguity due to English rules. More and more applications are based on statistical machine translation [17]. The translator automatically learns translation knowledge from a large English corpus of translation examples, and then uses that knowledge to automatically translate other sentences. As technology continues to improve, neural networks continue to improve machine translation, which greatly improves the readability and accuracy of translation results. Instead of translating word-for-word into English, machine translation can constantly look back like a human and understand complex sentence structures and each specific link in context. However, when text is translated into English, it is often necessary to assess the semantic understanding of a word and its specific contextual relationship to provide an accurate translation of the question, as shown in Figure 3. In the process of translation, the application of translation structure models can connect the context and meaning of papers, so as to produce the more acceptable translation results.

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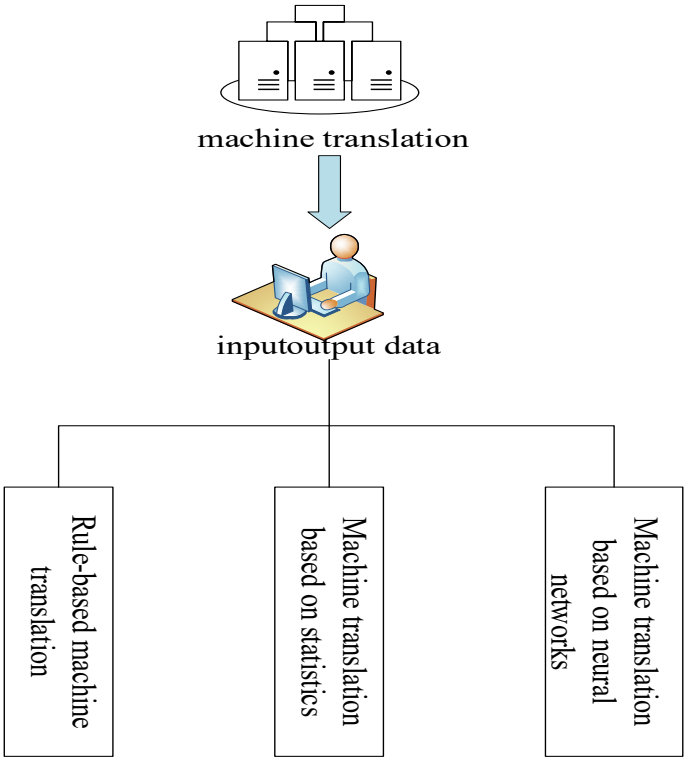


*Figure 3: Machine translation*

(2) English speech recognition

In the field of English service, interpretation is an indispensable part of the overseas communication process, and the translator's translation level and quality directly affect the effectiveness of communication [18]. The market demand for speech recognition is increasing due to the transient, flexible and fragmented nature of interpretation. In recent years, with the development of big data, English speech recognition as a language processing technology is gradually applied to mobile terminals. Speech recognition takes language as the research object to enable machines to automatically recognize and understand language. This paper uses neural network training to complete the speech training and compares it with the pattern matching model library, so as to obtain the speech recognition result finally.

## 4. Application Design of English Language Service in Cross-border E-commerce

(1) The use and operation of English in cross-border Internet transaction

Many cross-border e-commerce companies provide email communication during business cooperation, which requires basic English language skills to read and disseminate information so that customers can better understand products and services. In the process of e-commerce, qualified employees should continuously enhance their business English level and reading comprehension ability, and improve the efficiency and accuracy of processing various business emails and various sales materials. When promoting products and services online, knowledge of local culture and English would also be included to better understand the meaning of words.

(2)Application of language services in cross-border e-commerce

Cross-border e-commerce is one of the current links of the trade, and the email is one of the ways to deliver business information between enterprises. Cross-border e-commerce practitioners must clearly express their thoughts and opinions as well as the basic knowledge and characteristics of the goods and services they provide. The strictest aim is to write in English, and consumers must respond promptly and completely. In addition, in the process of creating cross-border e-commerce transactions, employees should follow the standards and principles of business English writing, as shown in Figure 4. Generally speaking, employees who are proficient in business English have not only good reading skills, but also accurate writing skills.

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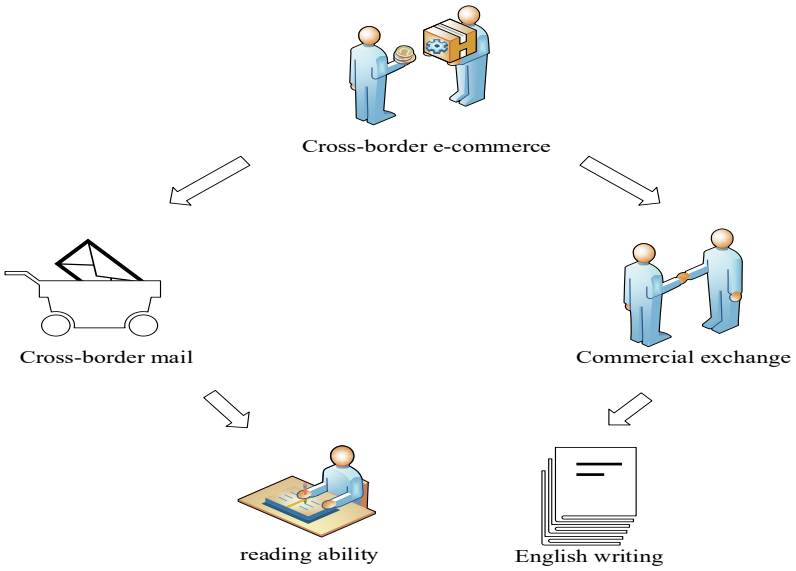


*Figure 4: English-English application and English writing for cross-border e-commerce*

(3) English language services for cross-border e-commerce applications

At present, the speed of global integration is accelerating and the trade between countries is frequent, and the role of English in communication is becoming increasingly prominent. English is an inter-country culture, and the way that culture is expressed has changed a lot. Buyers and sellers make full use of the mobile Internet to conduct transactions, and the smooth, timely and efficient exchange of trade information between buyers and sellers needs to be guaranteed. English plays an important role in B2C Internet communication. The relevant business personnel of the company should firstly communicate quickly and improve the Internet communication ability according to the Internet communication technology of the commonly used electronic platform, as shown in Figure 5.

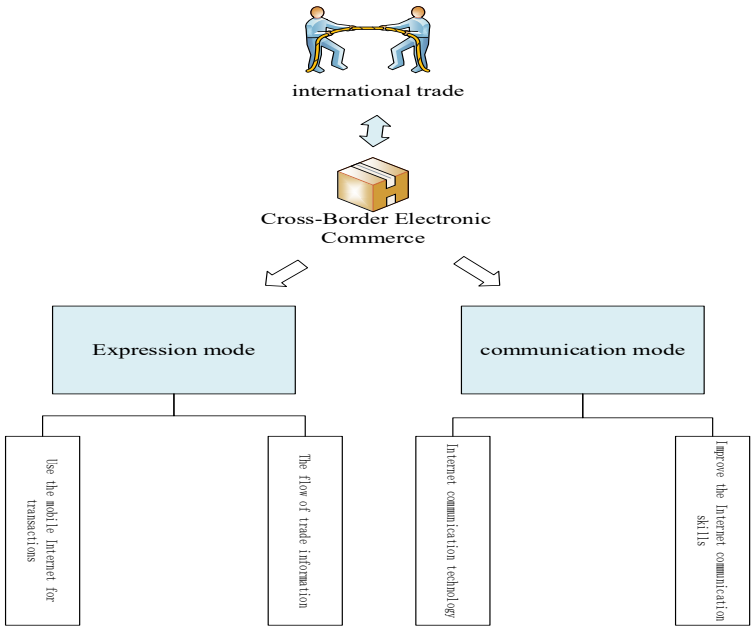


*Figure 5: Cross-border e-commerce application of English language services*

## 5. Application of Accuracy Algorithm in Cross-border E-commerce English Language

The accuracy algorithm is the average value measured over multiple experiments, which is often used to calculate language accuracy and so on. In cross-border e-commerce English language work, control experiments are usually carried out with reference materials or standard methods. When the

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error is small, not only good precision but also good accuracy is required for an ideal analysis method and result. The algorithm first calculates the language translation accuracy. $T$ is assumed to be the evaluation of the content $C$ by the user $P$.

According to different calculation methods of similarity, the satisfaction value of $\alpha$ and user $\beta$ is assumed to have a high similarity, and the calculation formulas of score $T$ are as follows:

$$T(C)=\frac{\beta-\alpha\beta_n}{P\beta-\alpha\beta_n} \tag{1}$$

$$T(C)=\frac{P\beta-C}{P\beta-LC} \tag{2}$$

Among them, $Z$ represents the satisfaction relationship between user *H* and *C*. Through the weighted relationship between the target user and other users, the feature vectors of the target user are calculated:

$$Z_n=\sum_{i=1}^{m}\sum_{j=1}^{n}H_n+\sum_{j=1}^{n}\sum_{i=1}^{m}L_iC \tag{3}$$

$$Z_n=\sum_{i=1}^{m}\sum_{j=1}^{n}H_n+\sum_{j=1}^{n}\sum_{i=1}^{m}\beta_j\alpha_i+p\sum_{i=1}^{n}sim(H_1-L_1) \tag{4}$$

Through the analysis of Formulas (4) and (5), it is concluded that the user feature vectors obey the probability distribution:

$$\sum_{i=1}^{n}Z_i=1, i=1,2,...,i; Z=1,2,...Z \tag{5}$$

$$\sum_{n=1}^{j}L_i=1, i=1,2,...,n; L=1,2,...L \tag{6}$$

$$\sum_{j=1}^{m}H_i=1, j=1,2,...,j; H=1,2,...H \tag{7}$$

The specific scoring formulas for prediction are:

$$T_n(\beta_n)\geq\beta_i, i=1,2,...,n \tag{8}$$

$$\mathrm{f}(P,H)=\frac{2}{\sum_{i=1}^{n}H_i+\sum_{\mathrm{i}=1}^{\mathrm{n}}P_i}\sum_{j=1}^{m}L_i \tag{9}$$

Through the analysis, the absolute error is used as the comprehensive evaluation index of the accuracy algorithm:

$$sim^2(i,j)=\frac{\sum_{j=1}^{m}P_i}{H\left(\sum_{i=1}^{n}L_i\right)} \tag{10}$$

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$$\mathrm{sim}(i,j)=(1-P_{\mathrm{n}})sim(i,j)-p_n sim(i,j)=sim+sim(i,j) \tag{11}$$

The collection is performed according to the user's degree of accuracy of the translated content. Through the accuracy, the optimal values of parameters $\alpha$ and $L$ are calculated:

$$T_n^j=simt(\alpha+\beta)^2 \tag{12}$$

$$T\left(L=\frac{1}{\beta}\right)=\frac{\beta^{sim\alpha}}{L+\alpha^{sim\beta}} \tag{13}$$

$$T=\frac{\beta^{i+1}}{t+\alpha^{n+1}} \tag{14}$$

Among them, $\alpha$ and $T$ are the parameters of the accuracy; $\alpha$ represents the similar relationship between the user $\beta$ and the $L$.

In order to reduce the complexity of the calculation, the logarithm can be taken first, which is the value of the formula:

$$T(p,x)=\sum_{i=1}^{m} simp(\alpha,/\beta_i l) \tag{15}$$

$$T_i=T_{n+1},F(T_{ij})\le F(T_{nm}) \tag{16}$$

$$simT=sim\alpha+1 \tag{17}$$

## 6. Combine the Accuracy Algorithm with the Evaluation of Practical Application Results

In order to further understand the B2C English language service, the survey was conducted on the users of the B2C platform. By taking the form of a questionnaire, the impact of English language services on the presence of e-commerce platform users is investigated. Survey users are 100 people and are calculated as a percentage. The survey contents are: communication ability, comprehension ability, language service quality, and translation accuracy. The user satisfaction is divided into excellent, good, general, and dissatisfied. The basic situation of the user survey is shown in Table 1.

*Table 1: The impact of English language services on the presence of e-commerce platform users*

| | excellent | good | general | dissatisfied |
|---|---|---|---|---|
| communication skills | 17% | 21% | 32% | 30% |
| understanding power | 21% | 13% | 31% | 35% |
| Language service quality | 14% | 22% | 25% | 39% |
| Translation correctness | 18% | 21% | 27% | 34% |

It can be seen from Table 1 that the 100 users surveyed are satisfied with the English service ability of the cross-border trading platform, 21% with the understanding ability, 14% with the quality of language service and 18% with the accuracy of translation. Among them, 30% are dissatisfied with English communication ability, 35% with understanding ability, 39% with language service quality and 34% with translation accuracy. It can be seen from the data that the English communication ability of the cross-border trading platform has low satisfaction and high dissatisfaction, which can not meet the user's language requirements. There are many complex problems in the voice service of the B2C network platform. From the perspective of the overall level of language services, if the English service architecture is not perfect, new problems may arise, which will increase costs and reduce profits in serious cases.

B2C English service capabilities should be improved, and intelligent AI e-commerce platforms and English service systems should be developed. The field of language services should be done well, and the cost of language services should be reduced. The income must be increased, and the language registration data must be obtained to learn, so that the language service quality of the entire platform framework can be continuously improved. In order to find out the effect of AI on the B2C English

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language service ability, the satisfaction of the users of the four cross-border e-commerce platforms after AI participation in the English service is investigated, and the user's satisfaction with the reformed B2C English service is evaluated and tested. The four cross-border e-commerce platforms are set as A, B, C, and D respectively, and the sample size is 400. The evaluation results are divided into four levels: satisfied, good, average, and not interested. The specific effects are shown in Figure 6.

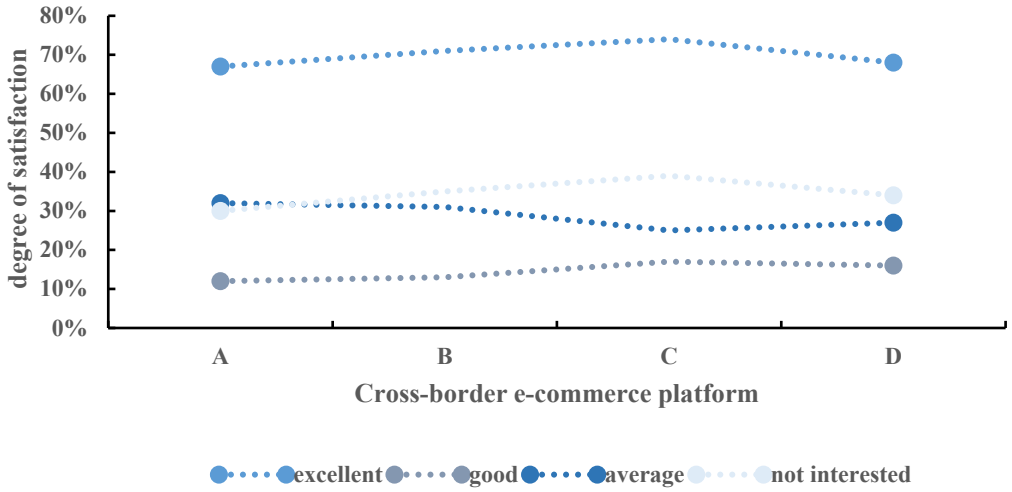


*Figure 6: Users' satisfaction with the modified cross-border e-commerce English service*

As shown in Figure 6, users have a relatively high degree of recognition for the transformation of the four cross-border e-commerce platforms. Among them, 67% are satisfied with platform A; 71% are satisfied with platform B; 74% are satisfied with platform; 68% are satisfied with platform D. It can be seen that satisfaction accounts for the majority. Among them, the two cross-border e-commerce platforms B and C had the highest satisfaction with English services.

In order to test the comparison between the B2C English language service mode and the cross-border e-commerce English language service mode under AI, two different e-commerce platforms in two English language service modes were surveyed on the users' attitude towards their recognition, and the changes are shown in Figure 7.

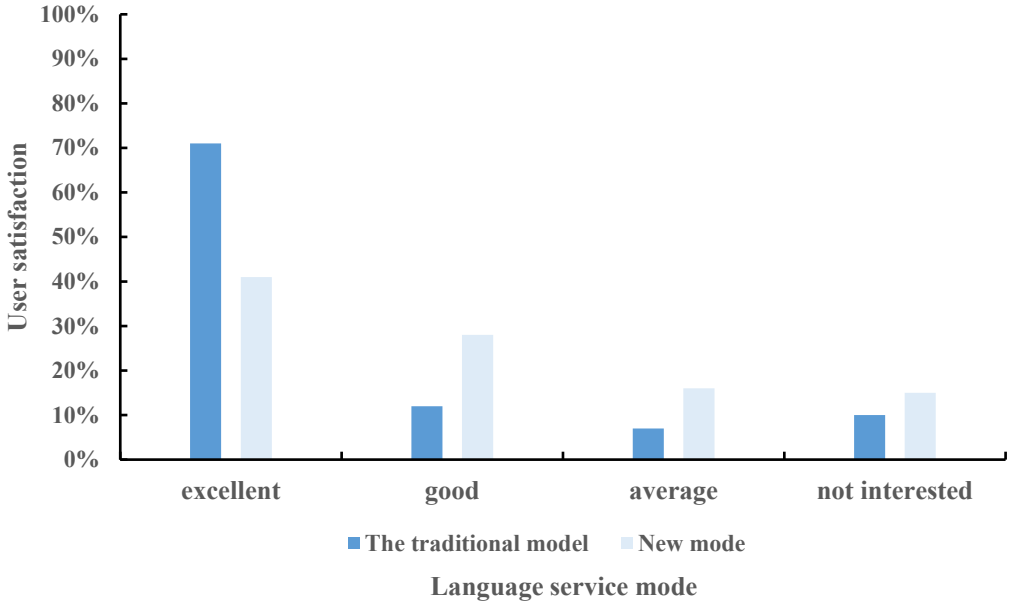


*Figure 7: Comparison between cross-border e-commerce English language service model and cross-border e-commerce English language service model under AI*

As can be seen from the bar chart in Figure 7, the two English language service system models show different states. Compared with the two English language service system models, the translation

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and writing efficiency of the traditional English language service system model is relatively low and fluctuates greatly. Although the efficiency of the new English language service system has fluctuated and changed, it has not changed much. After theoretical and practical verification, it can be concluded that the B2C English language service under AI technology improves the e-commerce language service by 17.2%.

## 7. Conclusions

To sum up, the main function of B2C network platform is to combine trust and emotion with product display and transaction completion. English services in B2C are mainly provided by sellers and native speakers. In terms of the overall quality of language services, the most reliable linguists are native speakers. There are many types of voice services in the B2C network platform, among which three factors play a leading role: people, information and technical tools. At present, the biggest problem of language services in B2C social networks is that they cannot process translation data: how to unify the relationship between human and machine interpretation, and how to process these data. In the future, the English service of the B2C network platform will become the main body of the new cross-border trade or the driving force of the service model. Through the analysis of the language service of B2C network platform, this paper finds the problems in the current English language service, analyzes and solves the problems, and uses precision algorithms to improve the application of cross-border e-commerce English language. Although the research sample of the B2C network platform language service in this paper is limited, which cannot accurately reflect the development of the B2C network platform language service; the experimental results can provide some reference value and theoretical knowledge for the follow-up research of the network platform language service.

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