

On the Application of Online Machine Translation in Translating Technical Terms in Cross-Border Ecommerce

Ziyu Zeng, Cuiying Zou*

Wuhan Business University, Wuhan, Hubei, 430056, China

ABSTRACT

In the context of rapid expansion of global trade, cross-border ecommerce has become an important component of international trade. Cross-border ecommerce involves communication, coordination, and cooperation between different countries, in which translation plays a significant role. The rapid development of machine translation and the continuous improvement of its translation quality have greatly facilitated multilingual communication in the process of cross-border ecommerce. However, machine translation may have certain limitations in handling specialized terminology. This article draws Functional Equivalence Theory as the theoretical framework, and selects 30 specialized terms from the field of cross-border ecommerce in Chinese and English respectively, each accompanied by standard translations from authoritative sources, to be automatically translated by Baidu Translate and DeepL for a further comparative analysis. The study finds that both machine translation tools exhibit instances of mistranslation during the automatic translation of specialized terms in cross-border ecommerce, with an accuracy rate of approximately 50%, and Baidu Translate performs slightly better than DeepL. The errors can be broadly categorized into four types: literal translation, term mismatch, neglect of cultural differences and lexical errors. Finally, based on the research findings, this article proposes several feasible strategies to better utilize machine translation tools for the translation of cross-border e-commerce terminology.

KEYWORDS

Cross-border ecommerce; Machine translation; Functional equivalence theory; Post-editing

1 Introduction

In the context of globalization, the development of cross-border ecommerce is accelerating. The importance of business text translation in cross-border ecommerce has been widely agreed upon by both the academia and the industry. As a core link in the digitalization process of global trade, translation is not only the conversion of language symbols, but also a key medium for cross-cultural information transfer, brand value shaping and business strategy implementation. Research shows that 67% of consumers prefer to browse product information in their native language, and accurate translation can increase product conversion rates by more than 30%^[1].

Online machine translation (MT) technology, offering convenience, low cost, and improving accuracy, is increasingly utilized in cross-border ecommerce and playing an increasingly pronounced role. Brynjolfsson (2019) conducted a natural experiment on eBay to study the impact of machine translation on international trade, finding that the introduction of machine translation systems significantly increased international trade on the platform, with exports increasing by 17.5%^[2]. This finding offers causal evidence for understanding the barriers of language obstacles to trade and how artificial intelligence can enhance economic efficiency. The research indicates that even moderate advancements in machine translation technology can considerably boost international trade, injecting new vitality into the development of cross-border ecommerce.

However, despite advancements, MT continues to face significant challenges, particularly in handling domain-specific terminology and cultural nuances, which are essential for accurate and culturally appropriate translations in specialized fields like ecommerce. Nonetheless, there is a lack of research in the application of online MT tools in handling cross-border ecommerce terminology. Therefore, this study will focus on this area to conduct an in-depth analysis of the application of online MT tools in the translation of cross-border ecommerce terminology.

2 Method

2.1 Theoretical framework

In the field of ecommerce text translation, the Functional Equivalence Theory has been widely validated as an effective framework. Firstly, ecommerce texts have distinct functional goals like promoting sales and building brand image, and the core of the Functional Equivalence Theory is "function-oriented". In cross-border ecommerce, the translation of product descriptions needs to satisfy both informational accuracy and emotional arousal, and Functional Equivalence

* **Corresponding Author:** Cuiying Zou, 3097822713@qq.com

Theory provides a systematic guideline for this purpose through three levels of hierarchical equivalence: lexical equivalence, syntactic equivalence and textual equivalence ^[3]. Secondly, ecommerce texts often involve culturally sensitive content, such as taboo language, while Li et al (2022) pointed out that Functional Equivalence Theory can effectively solve such problems through the strategy of cultural adaptation ^[4]. Gao (2018) also pointed out that translators need to take into account semantic, stylistic and cultural information transfer in the translation of ecommerce texts ^[5]. Therefore, this study picked the Functional Equivalence Theory as a guide to effectively analyze examples collected to explore the usage of online MT tools in translating cross-border ecommerce terminology.

2.2 Data collection and participants

In China, Google Translate, Baidu Translate and DeepL have been commonly used online MT tools, all with their own strengths.

Google Translate was once a widely used tool by domestic users. However, Google stopped providing translation service in mainland China in 2023, prompting domestic users to turn to other alternatives. According to statistics, Baidu Translate has the largest market share among all online MT tools in China. DeepL, launched in 2017, quickly gained recognition for its accurate handling of context, tone, and even terminology in China.

According to Cui and Liang's study, DeepL and Baidu Translate have an accuracy of 84.34% and 80.50% in the "C-E, bert-large-uncased" test respectively ^[6]. DeepL is more advantageous in terms of translation quality and naturalness, which is especially suitable for professional users pursuing precise expression; Baidu Translate, on the other hand, excels in terms of ease of use, format compatibility and Chinese-specific scenarios. The complementary nature of the two provides flexible choices for users with different needs. Therefore, this paper selected Baidu Translate and DeepL as the experimental online MT tools.

2.3 Data collection and analysis

Examples in this paper were taken from the textbook of *Business English Translation*, WTO legal texts, SCIdict, etc. A sample of 30 English and 30 Chinese technical terms in cross-border ecommerce were chosen, each with their corresponding suggested standard Chinese or English versions.

These terms were then put into Baidu Translate and DeepL respectively and translated into the target Chinese or English language. The results were gathered and comparatively analyzed in the following section based on the theoretical framework of Functional Equivalence Theory. Analysis was conducted from two aspects: overall accuracy rate and specific types of errors occurred.

3 Results

3.1 An overview of the translated versions by Baidu translate and DeepL

In the translation practice of the selected technical terms, the performance of the two tools shows a significant difference, which is not only reflected in the overall accuracy rate, but also deeply reflects the fundamental difference between the two in terms of linguistic logic, terminology base construction and cultural adaptation ability.

Through a comparative analysis of 60 terms in the two directions of C-E and E-C translation, Baidu is ahead of DeepL with an overall accuracy rate of 58.33%, compared to the 46.67% of DeepL (Figure 1). The core of this gap may lie in the fact that Baidu Translate has a greater advantage in the accurate matching of technical terms in industry, while DeepL has semantic bias due to its over-reliance on the logic of direct translation.

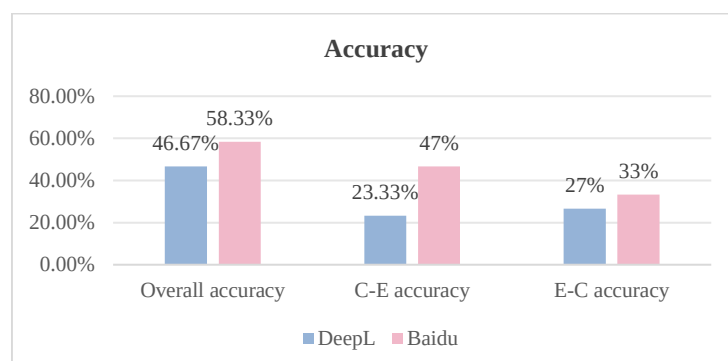


Figure 1 The accuracy rate of DeepL and Baidu

In-depth analyses based on the Functional Equivalence Theory show that Baidu and DeepL present big differences in translating cross-border ecommerce terminology, which is not only reflected in the simple correspondence of vocabulary but also maps the depth of understanding of the functional level of language between the two.

In terms of lexical equivalence, both DeepL and Baidu perform well. Baidu shows greater professionalism, and its translation results often accurately capture the true meaning of terms. However, there are also shortcomings, as both of them sometimes omit core terms and make translation errors. In terms of syntactic equivalence, DeepL's translations show redundancy in the structure of some phrases, and Baidu's processing of the text shows the phenomenon of non-contextualized translation. For textual equivalence, DeepL's error lies in the lack of industry consistency in some of the terms, and some of Baidu's translations deviate from the context. For stylistic equivalence, DeepL translations are formal in style with occasional colloquial expressions, while Baidu translations are culturally appropriate but lack flexibility in straightforward expression.

Through comparative analysis of machine translation outputs, the translation errors of technical terms generated by Baidu Translate and DeepL can be categorized into four types: literal translation, term mismatch, neglect of cultural differences and lexical errors. Figure 2. shows the percentage of error types occurred in DeepL and Baidu.

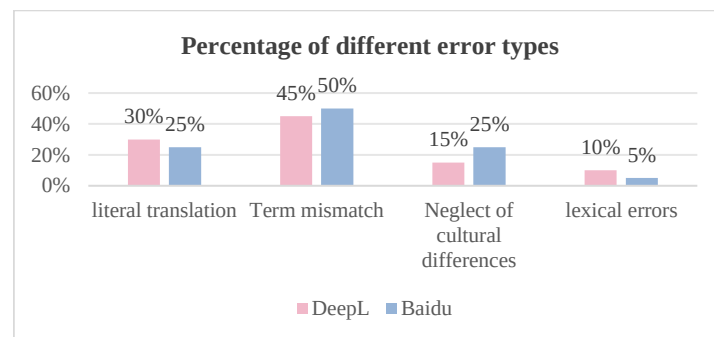


Figure 2 Percentage of different error types

It is worth noting that although Baidu Translate is 11.66% ahead in terms of overall accuracy, its terminology mismatch errors account for 47%, slightly higher than DeepL's 45%, revealing the common defects of professional terminology databases. The terminology mismatch problem dominates both types of tools, highlighting the contradiction that terminology base updates lag behind the development of the industry. 30% of the errors in DeepL originated from mechanized word-for-word conversion, which was more prominent than the 24% of Baidu Translate, reflecting the shortcomings of semantic understanding algorithms.

As for mistranslations caused by cultural differences, the percentage is 25% for Baidu and 15% for DeepL respectively. This may be related to the lack of adaptability of their cross-cultural semantic models, such as the failure of localization conversion of specific regional business terms. In contrast, the error rate of DeepL at the lexical level (10%) is slightly higher than that of Baidu Translate (5%), but both show weak ability to deal with complex grammatical structures, such as the contextual selection of polysemous words still requires manual intervention.

3.2 Classification and analysis of common mistakes in the translated versions

In the following part, examples of different types of errors occurred in the process of automatic translation of cross-border ecommerce terminology will be listed and analyzed.

Literal Translation. This type of error means that the translation mechanically corresponds to the vocabulary or grammatical structure of the source language word by word, ignoring the expression habits of the target language or the professional context of ecommerce, resulting in semantic deviation, redundancy or non-compliance with the industry norms even though the translation is literally correct.

Example 1

Source text: 缺货

Target text: out of stock

DeepL version: unavailable goods

Baidu version: out of stock

The Chinese term “缺货” refers to the temporary unavailability of goods, while the English term “out of stock” directly corresponds to this meaning, and is the usual expression used by ecommerce platforms or contracts. Baidu Translate uses standard terminology and accurately achieves the functional equivalence.

The DeepL version “unavailable goods” is literally correct, but it has a broader scope, and does not accurately correspond to the temporary stock status. The DeepL version ignores the fixed collocations of the industry's terminology,

and is only a formal equivalence of the terminology.

Example 2

Source text: general average

Target text: 共同海损

DeepL version: 一般平均数

Baidu version: 共同海损

"General average" is a marine insurance term referring to the legal mechanism by which loss from a marine casualty is shared between the ship and cargo parties. In the context of insurance contracts, "general average" is directly linked to the rules of apportionment of costs and affects legal rights and liabilities. The Baidu version "general average" accurately corresponds to the international convention, so Baidu's version of the translation meets the requirements of the theory of functional equivalence. DeepL only translates "average" according to the common meaning of the word, and puts "general average" as "一般平均数", misinterpreting "average" as a mathematical concept, which is a serious literal translation error. The DeepL version may cause cargo owners to misunderstand that there is a data problem, which may lead to disputes over refusal of payment.

Term Mismatch. Term mismatch refers to a failure to use established industry-standard terminology in the target language, leading to inaccurate or ambiguous delivery of specialized information. Such errors usually stem from lack of synonyms or unfamiliarity with professional knowledge.

Example 3

Source text: 免税

Target text: tax exemption

DeepL version: tax exemption

Baidu version: duty-free

"免税" refers to the exemption of all kinds of taxes including income tax, value-added tax, etc., the standard English term is "tax exemption", but the Baidu version "duty-free" specifically refers to the exemption of tariffs, which is commonly found in imported goods scenarios. In cross-border ecommerce scenarios, "免税" may involve value-added tax exemption. At this time, the Baidu version "duty-free" can not be accurately expressed, and the DeepL version "tax exemption" is precise, which is in line with the concept of broad tax-free.

Example 4

Source text: A-to-z Guarantee claims

Target text: 亚马逊商城交易保障索赔

DeepL version: A-to-z 保证索赔

Baidu version: A-to-z 保证索赔

"A-to-Z guarantee claims" is the exclusive service of Amazon platform, and the Chinese standard translation needs to include "Amazon mall" to clarify the platform attributes and realize style and text equivalence. DeepL and Baidu translate directly into "A-to-z 保证索赔", although the abbreviation is retained, but the key information of "Amazon" and "transaction" is lost, which belongs to some functional equivalence. The simplified "A-to-z 保证索赔" can not be related to Amazon's specific policies, ignoring the concept of brand or platform exclusivity, and users may mistakenly believe that it is a general term, affecting the accuracy of operation.

Neglect of Cultural Differences. Neglect of cultural differences means that the translations are not adapted to the cultural context or expression of the target language, resulting in literal translation which can not convey the accurate information, negative associations, or inconsistency with the user's perceptions. This type of error requires a balance between linguistic and cultural equivalence.

Example 5

Source text: 物美价廉

Target text: high quality and inexpensive

DeepL version: good quality and cheap

Baidu version: high quality and inexpensive

"物美价廉" emphasizes the coexistence of high quality and low price, and Chinese is often used in promotional scenarios to convey the meaning of high cost-performance ratio. "High quality and inexpensive" accurately corresponds to the core meaning, while "cheap" in DeepL's translation of "good quality and cheap" implies the negative meaning of poor quality and cheap in English, which is easy to cause misunderstanding. "价廉 (便宜)" in Chinese is a positive expression, but "cheap" in English may make consumers doubt the quality. "Inexpensive" is a neutral word in English, which is more in line with Western consumers' perception of "low price but reliable". Therefore, in translation, we should avoid words like "cheap" that might illicit negative meaning.

Example 6:

Source text: windfall

Target text: 外快

DeepL version: 横财

Baidu version: 意外之财

“Windfall” refers to unexpected gains (such as extra profits from promotional activities), while “外快” in Chinese emphasizes informal or small extra income, often with a neutral or positive meaning. The DeepL version “横财” in Chinese implies illegal or unjust wealth, with a strong negative connotation. Although the Baidu version “意外之财” is literally correct, it often emphasizes the unpredictability and large amount of wealth. In Chinese culture, “横财” carries moral criticism and may raise questions about the legitimacy of the fortune. “外快” is more closely related to daily spoken language and is suitable for describing promotional benefits in e-commerce scenarios without negative associations.

Lexical Errors. Lexical errors refer to improper choice of words, mistranslation of polysemous words or grammatical structures that do not conform to the norms of the target language, resulting in redundancy, ambiguity or lack of professionalism in the translated text. Such errors are mostly due to imprecise vocabulary mastery or insufficient understanding of the context.

Example 7

Source text: 指示式提单

Target text: order bill of lading

DeepL version: indicative bill of lading

Baidu version: indicative bill of lading

“Order bill of lading” is an accurate translation of “指示式提单”, which is a standard term in the fields of shipping and logistics, clearly indicating the indicative nature of the bill of lading, that is, the bill of lading specifies that the goods should be delivered to the designated consignee or its agent, achieving functional equivalence. Although “indicative bill of lading” literally means “指示的”, it is only used in shipping to describe information prompts and does not involve the transfer attribute of the bill of lading. It is more commonly used to indicate certain trends or suggestive information. Therefore, it is not accurate enough in professional contexts, which affects the achievement of functional equivalence. Incorrect translation may render the transfer terms of the bill of lading invalid, leading to trade disputes. DeepL and Baidu Translate both used approximate words incorrectly here, failing to achieve functional equivalence.

Example 8

Source text: subscribe to

Target text: 认购

DeepL version: 订阅

Baidu version: 订阅

“Subscribe to” usually refers to “认购” or “订阅” in the financial and business fields, depending on the context. For example, in stock or bond issuances, “subscribe to” means “认购”; in journalism, it means “订阅”. DeepL’s and Baidu’s translation of “subscription” failed to distinguish the specific meanings in different scenarios, resulting in insufficient functional equivalence. In investment contracts, “订阅” may be misunderstood as an act of receiving information rather than capital investment, leading to unclear rights and responsibilities. Therefore, DeepL and Baidu failed to achieve functional equivalence due to incorrect word meaning selection.

At the same time, there are some common terms in business English that are easily confused. For example, “customer” and “client”. “Client” usually refers to an individual or organization seeking professional services, usually in a long-term relationship with a company, etc., often accompanied by the signing of an agreement. A “customer” is usually an individual or organization that purchases goods or standardized services, mostly on a one-off or short-term basis, without the need for a legal agreement. There are many other examples like this. For example “collaboration” and “cooperation”. Although both words mean “合作, 协作”, there are some differences in their meanings. “Cooperation” means working with others to achieve one’s goals, while “collaboration” means working with others to achieve a common goal. In the process of translation, we need to choose appropriate words according to different occasions, thus avoiding misunderstanding.

3.3 Suggestions for improvement

Based on the analysis above, this paper puts forward the following improvement suggestions to enhance the translation quality and efficiency when using online MT tools to translate technical terms in cross-border ecommerce.

Combining Different Tools and Comparing the Results. In terms of E-C, Baidu Translate is slightly better than DeepL, but both have low accuracy. In terms of C-E, Baidu Translate is significantly better than DeepL, especially in terms of stable handling of professional terminology. Overall, Baidu Translate performed better (58.33% vs. 46.67%), especially in handling professional terminology and complex structures with greater stability. DeepL is more flexible in translating

some common vocabulary. In the translation process, we can use several MT tools to compare their translation results and choose the most suitable translation, because different tools have different emphases when processing the same text. By comparing their translations, we can select the translation that best meets the expression habits of the target language, is semantically accurate and fluent.

Optimizing Post-Translation Editing. With the development of artificial intelligence and neural networks, the quality of machine translation has approached or even exceeded that of human translation. However, this does not mean that machine translation will replace human translation. Post-translation editing is the key to ensure the quality of translation. It is not only a simple correction of typos and grammatical errors, but also a better polishing of the language so as to make it closer to the reading habits and cultural cognition of readers of the target language. We should do a good job of post-translation editing, and only by paying full attention to and doing a good job of post-translation editing, combining the high efficiency of machine translation with the unique creativity of human translation, can we maximize the efficiency of translation.

4 Conclusion

This study explored the application of online MT tools in rendering technical terms within cross-border ecommerce texts, guided by the principles of Functional Equivalence Translation Theory. By analyzing translated outputs from Baidu Translate and DeepL, the research identified systematic patterns in translation errors and proposed targeted strategies for enhancing accuracy and equivalence. The findings reveal that while MT tools demonstrate efficiency in processing large volumes of ecommerce content, their performance in translating specialized terminology remains inconsistent.

The research results contribute to improving translation efficiency and quality by using different kinds of online MT tools and optimizing post-editing. However, this study also has limitations. This is mainly reflected in the analysis of only two machine translation tools, and the limited coverage of the technical terms used in the analysis, which may affect the comprehensiveness of the research results.

Future research can involve more MT tools as well as combining artificial intelligence technology to explore how to optimize translation models through deep learning, and develop intelligent post-translation editing systems that can more accurately translate professional terminology in ecommerce.

Funding

This work was supported by the research project titled "Machine translation as an aid in writing and publishing scientific research papers in English" (NO: 22G078) granted by Hubei Provincial Department of Education.

About the Author

1. Ziyu Zeng, female, Hubei Province. Undergraduate student. Research interest: Business English.

2. Cuiying Zou, female, Hubei Province. Master, Associate Professor, School of Foreign Languages, Wuhan Business University. Research interests: English Education, English Translation.

References

- [1] Li Y, Luo B. Cross-border e-commerce product introduction: Needs and characteristics for localized machine translation[J]. *Journal of Business and Management Studies*, 6(3): 125-133 (2024).
- [2] Brynjolfsson E, Hui X, Liu M. Does machine translation affect international trade? Evidence from a large digital platform[J]. *Management Science*, 65(12): 5449-5460 (2019).
- [3] He X Y, Ni J C. A study on English-Chinese translation of business contracts based on the Functional Equivalence Theory[J]. *Sino-US English Teaching*, (5): 121-126 (2021).
- [4] Li S H , Wu J Y, Tang J H . A probe into translation techniques of literary works under the guidance of functional equivalence theory[J]. *Journal of Education and Educational Research*, 1(1): 25-27 (2022).
- [5] Gao L. A study on the application of functional equivalence to business English EC translation[J]. *Theory & Practice in Language Studies*, 8(7), 759-765 (2018).
- [6] Cui Y, and Liang M. Automated scoring of translations with BERT models: Chinese and English language case study[J]. *Applied Sciences-BASEL*, 14(5): 1925 (2024).