



Factors Affecting Translation Efficiency in Computer-Aided Translation and Countermeasures

Chang Wei

School of Foreign Languages and Cultures, Panzhihua University, Sichuan Province, China
Corresponding Author: Chang Wei

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ABSTRACT: Translation efficiency is one of the important indicators to measure the working ability of translators. Through the analysis of various aspects such as translation process, technical tools, translator ability, and translation project management, this paper deeply explores the factors affecting translation efficiency in the computer-aided translation mode, and analyzes the interrelationships among these factors and their mechanism of action on translation efficiency. At the same time, corresponding countermeasures are proposed for the factors affecting translation efficiency. The purpose of this study is to provide a comprehensive theoretical basis and practical guidance for optimizing the efficiency of computer-aided translation and promoting the more efficient development of the translation industry in the information age.

KEYWORDS: Computer-aided translation (CAT), Translation efficiency, Influencing factors, Countermeasures

I. INTRODUCTION

In the context of accelerated globalization, the rapid dissemination of information and the frequent development of cross-cultural exchanges have led to an explosive growth in translation needs. Computer-aided translation, as a key technical means in the modern translation field, combines computer science and linguistics knowledge and brings unprecedented convenience to translation work. However, in practical applications, the improvement of translation efficiency is not smooth sailing and is still restricted by many factors. Understanding these factors is crucial for improving translation quality and efficiency and meeting the growing demand of the translation market.

II. THE BASIC PRINCIPLES AND PROCESSES OF COMPUTER-AIDED TRANSLATION

2.1 The Basic Principles of Computer-Aided Translation

The computer-aided translation system is mainly based on translation memory (TM) and terminology management (TM) technologies. Translation memory stores and retrieves previously translated text fragments. When encountering similar or repetitive text segments, the system automatically prompts the translator with existing translation results, realizing the reuse of translation content. Terminology management ensures the consistency of specific domain terms throughout the translation project. In addition, some CAT tools also integrate machine translation (MT) functions. Although the results of machine translation usually require further editing and proofreading by translators, they can provide references for translators and accelerate the initial process of translation. The following are the principles of the core components involved in the computer-aided translation mode:

2.1.1 Translation Memory (TM)

Translation memory is the core technology of the computer-aided translation system. It reduces the workload of repeated translation by storing and reusing previously translated text fragments, thereby improving translation efficiency and quality. For example, when using CAT tools such as Trados, the system automatically compares the source language units to be translated with the existing translation memory database and extracts identical or fuzzy-matched translation units for the translator's reference.

2.1.2 Terminology Management

Terminology management plays a crucial role in computer-aided translation. It ensures the consistency and accuracy of terms in the translation process, thereby improving translation quality. Through terminology management tools such as Deja Vu and



Trados, translators can create and maintain standard terminology lists. These tools automatically identify and apply the defined terms during the translation process, ensuring the consistency of term translations. For example, in the translation of scientific and technological texts, the consistency of terms is a key point in proofreading. Using terminology management tools can effectively avoid inconsistent term translations and improve the quality of the translation.

2.1.3 Translation Project Management

The computer-aided translation system supports the effective coordination and organization of large translation projects through project management functions. These functions include progress control, task assignment, and quality management, enabling multiple translators to work efficiently at the same time and ensuring the consistency and high quality of the translation results. For example, CAT tools such as Trados can store translation results in the memory database in real time and provide terminology management support during the translation process, thereby helping translators improve translation efficiency and quality. In addition, these tools also support comprehensive terminology management at all stages of the translation project, ensuring the accurate and consistent use of terms in the translation, further improving the overall quality of the translation project.

2.1.4 Translation Process Automation

Computer-aided translation technology significantly improves translation efficiency and quality by automating mechanical and trivial tasks in the translation process, such as file format conversion and terminology proofreading. This technology relies on translation memory and terminology management systems, enabling translators to focus on more complex translation tasks, thereby optimizing the translation process and improving overall efficiency [1]. For example, CAT software can automatically identify and apply defined terms during the translation process, reducing the translator's workload in ensuring term consistency and ensuring the efficiency and accuracy of translation.

2.1.5 Human-Computer Interaction

In the computer-aided translation process, the efficient interaction between the translator and the computer is the key to achieving high-quality translation. The computer significantly reduces the translator's workload by providing translation suggestions and automatically handling repetitive tasks, enabling the translator to focus on more

complex translation decisions. This interaction not only improves translation efficiency but also ensures translation accuracy. For example, translation memory technology enables the translator to quickly access and reference existing translation resources through the establishment of a translation memory database, thereby avoiding repetitive work. In addition, the principle of optimal relevance guides the translator to select the most appropriate translation in computer-aided translation to ensure that the target language reader can accurately understand the intention of the source language author.

In summary, computer-aided translation significantly improves the efficiency and accuracy of translation through functions such as translation memory, terminology management, and project management. It plays an important role in modern translation practice, especially in handling a large number of repetitive and professional texts.

2.2 The Workflow of the Computer-Aided Translation Mode

2.2.1 Pre-translation Preparation

Before the start of a translation project, the translator needs to perform format filtering and sentence segmentation on the original text. This process can be achieved by using mainstream CAT software such as SDL Trados, which supports the conversion and processing of multiple file formats. In addition, term extraction and the creation of a term database are also crucial steps to ensure the consistency and accuracy of terms in the translation process. The creation of a term database can be completed by extracting terms provided by the client or using existing resources [2]. Through these steps, the translator can effectively prepare the translation environment and improve the efficiency and accuracy of translation.

2.2.2 Use of Translation Memory and Term Database

Translation memory (TM) technology plays a key role in computer-aided translation. By automatically storing and reusing previously translated text fragments, it significantly reduces repetitive work and improves translation efficiency and quality. In addition, the term database is used to manage and maintain professional terms, ensuring the consistency and accuracy of terms. These tools provide real-time suggestions and support for the translator during the translation process, effectively improving the efficiency and accuracy of translation.



2.2.3 Translation Process

The core of computer-aided translation lies in human-computer interaction. The translator can utilize the translation suggestions and automatic translation results provided by the computer in real time during the translation process. The computer-aided translation system significantly reduces the translator's workload by providing automated translation suggestions, improving translation efficiency and quality. This mode combines the advantages of machine translation and human proofreading, enabling the translator to focus on creative work while leaving mechanical tasks to the computer. For example, SDL-assisted translation software helps the translator screen and match high-quality corpus texts with the support of the term database and sentence database, thereby improving the accuracy and efficiency of translation [3].

2.2.4 Quality Control and Proofreading

The post-translation processing stage mainly includes proofreading and format adjustment of the translation to ensure that the quality and format of the translation meet the requirements. At this stage, the CAT system usually provides automated tools to help the translator perform grammar and spelling checks, thereby improving the accuracy and consistency of translation. CAT software such as SDL Trados provides automated quality assurance functions, which can perform spelling checks, find missing translation segments, and detect errors such as extra spaces, helping the translator quickly locate and correct problems. These tools significantly improve the accuracy and consistency of translation by running built-in quality assurance checks. In addition, CAT technology further ensures the consistency of translation style and the accuracy of terms through the accumulation of translation memory databases and the unified management of term databases. This not only improves translation efficiency but also greatly reduces translation costs and provides convenience for subsequent translation work.

2.2.5 Update and Maintenance of Translation Memory

After the translation work is completed, the translation is automatically stored in the translation memory database, and the translator can save the memory database for future project use. This not only improves translation efficiency but also helps maintain the consistency of translation style.

III. ANALYSIS OF FACTORS AFFECTING THE EFFICIENCY OF COMPUTER-AIDED TRANSLATION

3.1 Technical Tool Factors

3.1.1 Quality and Size of the Translation Memory Database

The translation memory database is a core component of the CAT system. If the quality of the memory database is low, such as the presence of incorrect translations, obsolete terms, or incomplete fragments, it will cause the translator to waste time in screening and modifying during use. The size of the memory database is also crucial. A too-small size may not provide sufficient matching information, while a too-large size may lead to slower retrieval speed, affecting translation efficiency.

3.1.2 Effectiveness of the Terminology Management System

The terminology management system needs to accurately identify and manage terms. If the terminology management system fails to update newly emerging terms in a timely manner or cannot effectively reuse terms in different translation projects, the translator may need to spend additional time determining the translation of terms, and even inconsistent terms may occur. [4]

3.1.3 Performance of the Machine Translation Engine

For CAT tools that integrate machine translation functions, the performance of the machine translation engine is crucial. If the accuracy of machine translation is low, the translator needs to spend a lot of time modifying the results of machine translation, and it may even be less efficient than direct manual translation. In addition, the display mode of machine translation results and the degree of integration with the translation editing interface will also affect the translator's user experience and efficiency.

3.1.4 User-Friendliness of the CAT Tool Interface

The user-friendliness of the interface has a direct impact on the translator's user experience and translation efficiency. Research shows that a simple and clear interface design and an intuitive operation process can significantly improve the translator's work efficiency and satisfaction. For example, the memoQ software integrates multiple machine translation plugins, allowing users to easily use different translation engines without having to register accounts one by one, thereby improving the user-friendliness and ease of use of the interface. In addition, the interactive machine translation system further enhances the user's interaction experience by



providing real-time feedback and intelligent replacement functions. These designs not only reduce the translator's training costs but also lower the operation complexity, enabling the translator to focus more on optimizing and adjusting the translation content. [5] If the interface design of the CAT tool is unreasonable, such as complex operations, inconvenient shortcut key settings, and unclear text display, it will increase the translator's operation difficulty and reduce translation efficiency. An intuitive and convenient user interface can enable the translator to focus more on the translation content itself.

3.2 Translator Factors

3.2.1 Language Ability and Professional Knowledge

The translator's proficiency in the source and target languages directly affects the quality and efficiency of translation. If the translator has inaccurate understanding of the source language or has difficulties in expressing in the target language, it will lead to repeated modifications in the translation process. In addition, for translation projects in specific fields, the translator needs to have corresponding professional knowledge; otherwise, a large amount of time may be spent consulting materials to understand the original text content. [6]

3.2.2 Computer Skills and Familiarity with CAT Tools

The translator needs to master computer operation skills proficiently, including file processing, software installation, and use. Familiarity with CAT tools is even more crucial. Translators who are familiar with various functions (such as the use of translation memory, term query, and operation of the quality assurance module) can use these tools more efficiently for translation, while novice translators may need a long time to adapt and master these functions.

3.2.3 Work Experience and Translation Strategies

Experienced translators usually have more effective translation strategies. For example, they can quickly judge which content can be reused with translation memory and which needs to be focused on and retranslated. They are also more methodical in handling complex sentence structures and ambiguous semantics, which can improve translation efficiency. Inexperienced translators may take detours and waste time in the translation process.

3.3 Translation Project Management Factors

3.3.1 Project Scale and Complexity

Large-scale and complex translation projects often

involve a large number of documents, various file formats, and different subject matters. This requires more time for document preprocessing, translation coordination, and quality control. For instance, a technical documentation translation project that includes a large number of images and charts requires additional time to handle the integration of these non-text elements with the translated content.

3.3.2 Project Scheduling and Progress Control

A reasonable project schedule allows translators to have enough time for high-quality translation work without rushing to complete it due to tight deadlines, which could lead to a decline in quality. Effective progress control can identify issues in the translation process, such as delays in a particular stage, in order to adjust strategies in a timely manner. If the project schedule is unreasonable or progress control is not properly managed, it may affect the translators' work status and translation efficiency.

3.3.3 Team Collaboration and Communication

In translation projects involving multiple participants, collaboration and communication among team members are crucial. If there is inconsistency in the understanding of terminology, non-uniformity in translation style, or problems in file handover and communication, it can lead to a significant amount of rework and coordination time, reducing translation efficiency.

IV. RECOMMENDATIONS AND COUNTERMEASURES

4.1 Optimizing the Use of Technical Tools

4.1.1 Regularly Updating and Maintain Translation Memory and Terminology Management Systems

The updating and maintenance of translation memory and terminology management systems are crucial for ensuring translation quality and terminology consistency. Regularly cleaning up erroneous information in the translation memory, updating outdated terms, and continuously expanding the memory based on new translation projects are essential for efficiently conducting translation work. For terminology management systems, establishing a timely update mechanism is necessary to ensure the accuracy and consistency of terms.

4.1.2 Selecting the Right Machine Translation Engine and Optimize Its Settings

When selecting a machine translation engine, factors such as translation quality, language support, and domain adaptability must be considered. The mainstream translation engines on the market currently include Google Translate, Baidu Translate,



and Youdao Translate, each with its own advantages in terms of translation quality and language support. For instance, Google Translate excels in handling complex contexts, especially in Chinese to English translations, by providing idiomatic expressions due to its extensive language support and smooth translation outcomes. Baidu Translate is more suitable for English to Chinese tasks with its rigorous grammar and accuracy, making it ideal for text translation with high grammatical requirements. Youdao Translate stands out in terms of user satisfaction, particularly among high-educated and high-income demographics, capturing a significant market share. Additionally, domain adaptability is an important factor in selecting an engine. Through domain adaptation techniques, translation engines can provide more accurate translation services in specific fields such as medicine and law. Choosing a machine translation engine with better performance based on the characteristics of the translation project and adjusting machine translation parameters, such as translation models and domain adaptation, based on feedback from translators, can greatly improve the accuracy and usability of machine translation. [7]

4.1.3 Selecting CAT Tools with User-Friendly Interfaces and Customize Settings

There are various CAT tools available on the market. For example, Trados is favored by translators for its aesthetic interface and ease of use. MemoQ is suitable for beginners due to its clear interface and low device requirements. [8] When selecting CAT tools, translators usually consider the interface design, terminology management functions, and how well the tool fits with their personal workflow. For instance, Trados can import files in various formats and undergo a diversified review process after translation. YiCAT is popular for its ergonomic interface design and personalized view modes, which not only increase translation efficiency but also enhance the comfort of the translator. [9] Translators can choose CAT tools based on their work habits and customize the interface, such as setting up frequently used shortcuts and adjusting text display formats, to improve the convenience of operation.

4.2 Improving Translation Project Management

4.2.1 Reasonably Planing Project Scale and Complexity

Assessing the scale and complexity of a project is an essential part of project management, directly affecting the rational allocation of resources and time planning. The assessment process needs to consider factors such as the professional field of the project, the composition of documents, and the

complexity of specific content. For example, in translation projects, project managers first need to define the professional field of the project, a step that is crucial for subsequent translation references and vocabulary preparation. Additionally, project complexity assessment can be conducted through methods such as systematic complexity measurement and perceptual complexity measurement, which help quantify project complexity and thus better guide resource allocation and time planning. In the early stages of a project, a detailed assessment of the project's scale and complexity should be carried out, and resources should be allocated reasonably based on the assessment results, including the number of translators and translation time. For complex projects, translation can be carried out in stages or modules to reduce project difficulty.

4.2.2 Scientifically Arranging Project Time and Strengthen Progress Control

When formulating a project time plan, it is first necessary to analyze the workload of the project in detail and estimate the time required for the project in conjunction with the average translation speed of translators. This process not only involves a comprehensive assessment of the project scale but also a reasonable expectation of the translators' work efficiency to ensure the accuracy of time estimation. Moreover, to cope with potential unexpected situations, such as changes in customer requirements or technical issues, it is crucial to reserve some flexible time. This practice can effectively prevent project delays caused by sudden situations and help project managers maintain plan flexibility in the face of changes. In summary, translation project managers should regularly check project progress during the translation process, identify problems in a timely manner, and adjust plans to ensure the project is completed on time.

4.2.3 Strengthening Team Collaboration and Communication Mechanisms

Establish a unified terminology list and translation style guide within the translation team to ensure consistency among team members in terms and style. At the same time, use effective communication tools, such as project management software and communication tools, to enhance communication and document handover among team members and improve collaboration efficiency. Instant messaging tools like WeChat and QQ play an important role in the translation process, significantly enhancing the communication efficiency between teams. [10] These tools not only support real-time information transmission but also facilitate file



sharing and version control, ensuring effective collaboration among team members.

V. CONCLUSION

In the context of globalization, the rapid spread of information and the increasing frequency of cross-cultural communication have driven a surge in the demand for translation. Computer-Aided Translation (CAT), as an important technological means in the modern translation field, has greatly improved the efficiency and quality of translation work by integrating functions such as translation memory, terminology management, and project management. This paper delves into the basic principles and workflow of CAT, analyzes various factors affecting CAT efficiency, and proposes corresponding optimization strategies.

Firstly, the quality of technical tools is directly related to the effectiveness of the CAT system. The quality and scale of translation memory, the effectiveness of terminology management systems, the performance of machine translation engines, and the user-friendliness of CAT tools are all key elements that determine translation efficiency. Therefore, regularly updating and maintaining translation memory and terminology management systems, selecting high-performance machine translation engines, and using user-friendly CAT tools are crucial for improving translation efficiency.

Secondly, the personal abilities of translators and their proficiency in using CAT tools also have a significant impact on translation outcomes. High-level language skills, solid professional knowledge, good computer skills, and extensive translation experience are the foundations for translators to efficiently utilize CAT tools. Therefore, strengthening the training of translators, especially in the application of CAT tools, is of great importance for improving translation quality and efficiency.

Furthermore, the management of translation projects cannot be overlooked. The scale and complexity of the project, scheduling and progress control, and team collaboration and communication mechanisms are all key to the success of the project. Reasonable planning of project scale, scientific scheduling of project time, and strengthening collaboration and communication within the team can effectively prevent project delays and quality issues.

In summary, Computer-Aided Translation plays an irreplaceable role in improving translation efficiency and quality. However, to fully realize its potential, efforts must be made from multiple angles, including optimizing technical tools, enhancing the

capabilities of translators, and improving project management, to jointly promote the healthy development of the translation industry. With the continuous advancement of technology and the accumulation of industry practices, it is believed that Computer-Aided Translation will show a broader application prospect in future translation work.

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