



Human-computer Collaborative Translation Work Model Based on the Use of Translation Management System

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Abstract

With the rapid development of translation technology and the high demand for intercultural communication, human-computer collaboration has emerged as a promising approach to providing high-quality and efficient translation services. This paper takes a real-world translation project with high complexity and tight time constraints as a case study. It elaborates on the human-computer collaborative translation workflow based on a translation management platform from four crucial aspects: selection of the platform, team composition and role division, design of collaborative workflow, and setting of editing and proofreading standards. The analysis not only highlights the advantages of this mode, such as increased efficiency and improved quality control but also discusses the challenges it poses, such as security and privacy issues, offering valuable insights for the future development of translation practices. This research provides a practical guide for leveraging human-computer collaboration in translation projects and paves the way for more innovative approaches in the field.

Keywords

Human-computer Collaborative Translation; Work Model; Translation Management System

In today's digital age, the human-computer collaborative work model has gradually become a focus of research in various fields, with the language translation sector being a typical application scenario (Wang Huashu et al., 2021). The collaboration between translation technology tools and human translators can achieve high-quality and efficient translations (Feng Zhiwei & Zhang Dengke, 2022). This work model involves close cooperation and interaction between humans and computer systems, aiming to complete tasks efficiently by leveraging the strengths of human intelligence and computer technology. In the field of language translation, this model usually entails close coordination between human translators and machine translation systems to provide faster, more accurate, and cost-effective translation services (Wang Junsong et al., 2023). The development of the human-computer collaborative work model has gone through several stages, evolving from simple collaboration to more complex integration and intelligence (Fan Junjun, 2018). Initially, human-computer collaboration focused mainly on using computers as auxiliary tools for automating simple tasks. However, with the rapid development of computer technology, especially with the rise of artificial intelligence and machine learning, human-computer collaboration has gradually transformed into a complex model that deeply integrates human and machine intelligence (Sun Xiaohua et al., 2020). The application of the collaborative work model is particularly prominent in the language translation field.

The study analyzes real translation project cases to elucidate the working model of human-computer collaborative translation. The paper also examines the advantages and challenges of the collaborative work model. The study finds

that the model has significant advantages in improving translation efficiency, reducing costs, and ensuring translation quality. At the same time, this model faces numerous challenges, including security and privacy issues, technical limitations, and difficulties in team collaboration. The paper will also provide suggestions for optimizing and integrating collaborative workflows to promote continuous innovation in translation services. These suggestions will directly impact practitioners, researchers, and policymakers, providing them with valuable evidence to lead the industry towards a more efficient and sustainable development path.

1. Related Studies

1.1 Human-computer Collaborative Work Model

The human-computer collaborative work model is a new way of working. In the field of language translation, translators utilize this work model to fully leverage their initiative and creativity by employing intelligent translation technologies or machine engines, thus enhancing translation efficiency and quality (Wang Junsong et al., 2023).

In the human-computer collaborative translation model, translation management systems play a crucial role, as their functions and features are essential for achieving an efficient and quality-controlled translation workflow (Guan Xinchao et al., 2015). Translation management systems improve overall translation efficiency through automated process management, integrating translation phases such as machine translation, editing, and proofreading. The platform coordinates various stages, making workflows smoother, reducing manual operations, and enhancing work efficiency. It centrally manages terminology databases, promoting consistency and aiding in improving translation quality. Furthermore, the platform incorporates real-time collaborative work functionalities, allowing team members to co-edit on the same platform while enabling supervisors to immediately check on the progress of other members. This facilitates team collaboration and enhances the timeliness of information transfer (Wei Dongliang et al., 2014). In summary, translation management systems act as coordinators and supporters in the human-computer collaborative model, and through the integration and optimization of their features, they promote effective teamwork, thereby improving the quality and efficiency of translation services.

The advantages of the human-computer collaborative work model include increased work efficiency, reduced costs, and the ability to compensate for the limitations of machine translation systems (Xiao Zhiqing et al., 2023). However, it also faces challenges such as security and privacy issues, the complexity of technological integration, and teamwork hurdles, all of which need to be considered and addressed (Wang Huashu et al., 2021). With the ongoing development of artificial intelligence technology, the human-computer collaborative work model will become more intelligent and personalized. More complex and highly integrated systems may emerge in the future, further enhancing the effectiveness of human-computer collaboration while also necessitating attention to ethical and legal concerns (Wang Junsong et al., 2023). The definition and development of the human-computer collaborative work model hold significant practical implications in the field of language translation, not only driving innovation in translation services but also providing experiences and insights for human-computer collaboration research in other fields.

1.2 The Role of Translation Management Systems in Human-computer Collaboration

As a key technological tool, translation management systems are increasingly becoming an indispensable part of the human-computer collaborative work model, particularly in the field of language translation (Yan Xin et al., 2019). A translation management system is a comprehensive system that supports the management and collaborative work of translation projects. These platforms typically integrate modules for multilingual translation tools, collaborative editing functions, project progress tracking, resource management, and quality control, providing comprehensive technical support for human-computer collaboration (Zuo Shiliang, 2021).

In human-computer collaboration, translation management systems enhance collaborative efficiency by offering collaborative editing functions that allow multiple translators to participate in the same project simultaneously, sharing translation texts in real time. The version control feature ensures that any changes made to the translation texts can be traced and managed, ensuring consistency and quality in the final output (Zhou Xinghua, 2015).

Translation management systems assist in managing and distributing translation resources, including language professionals and machine translation engines. Through intelligent resource allocation algorithms, these platforms optimize task division based on the complexity and urgency of tasks, thereby improving overall translation efficiency (Wang Huashu et al., 2015). Additionally, translation management systems provide real-time project progress monitoring features, allowing project managers and stakeholders to clearly understand the status of translation tasks. This

helps timely detection and resolution of potential issues, ensuring that projects are delivered on time (Wang Chuanying et al., 2011).

To improve translation quality, translation management systems typically integrate quality management tools. Automated quality assessment systems and feedback mechanisms help translators understand translation quality standards and correct errors promptly, enhancing the overall quality of translations (Wang Chuanying et al., 2011).

Given the involvement of multiple languages and sensitive information, translation management systems need to take measures to ensure data security and privacy. These platforms often adopt encryption technologies and access control mechanisms to guarantee the confidentiality and integrity of translation data (Shuttleworth, 2019).

Overall, translation management systems play a key role in human-computer collaboration by integrating various functions and facilitating efficient collaboration and management in translation projects. The continuous development and innovation of translation management systems will further advance language translation services, providing more convenient and reliable solutions for multilingual communication.

1.3 Current Research Status of Human-computer Collaborative Work Models

Current research has extensively explored human-computer collaborative work models (Sun Xiaohua et al., 2015), particularly their application in the field of language translation (Xiao Fenghua et al., 2019). The impact of human-computer collaboration on translation efficiency is a popular discussion topic. Some scholars have found that by integrating machine translation technology with the expertise of human translators, the execution speed of translation tasks can be significantly improved (Xiao Zhiqing et al., 2021). The rapid output of machine translation provides human translators with more time to focus on proofreading and polishing, thereby achieving high efficiency while ensuring quality (Xu Bin et al., 2008).

Regarding the influence of the human-computer collaborative work model on translation quality, research indicates that combining the complementary advantages of machine translation systems and human translators can effectively enhance the accuracy and fluency of translations (Cui Qiliang et al., 2012). However, existing studies have also pointed out several challenges that need to be addressed, such as contextual understanding and the handling of technical terminology, to further improve translation quality (Li Hanji et al., 2020). Additionally, previous research has focused on the teamwork mechanisms within human-computer collaborative models. Researchers have emphasized that effective communication and collaboration are critical to the success of the entire translation project (Wang Chuanying et al., 2021). By analyzing the collaborative interactions among different team members, they have provided valuable insights for improving collaborative workflows. Some studies have also focused on the sustainability and development trends of the human-computer collaborative work model (Zhang Junjin et al., 2024), discussing the application prospects of emerging technologies such as neural machine translation, as well as suggestions for improving collaborative workflows (Xiao Zhiqing et al., 2021) to adapt to the industry's ongoing changes and innovations.

2. Translation Case Analysis

The paper uses a complex and time-constrained translation project as an example to illustrate the collaboration between machine translation and human translators based on a translation management system. The project was commissioned by a vocational college, which required the translation of specific online open course materials into English, along with voiceover. The course materials involve complex technologies and specialized knowledge in the field of railway transportation. The textual content includes various types of documents such as lecture scripts, presentations, and lesson plans, totaling 168 files. The project timeline was only 14 days. After discussion, the project team decided to implement a human-computer collaborative translation approach based on a translation management system. The paper will analyze this collaborative work model from five aspects: selection and characteristics of the translation management system, team composition and role division, design of the collaborative workflow, establishment of editing and review standards, and actual operations and challenges.

2.1 Selection of the Translation Management System

We chose the YiCAT translation management cloud platform as the primary tool for the translation project for the following reasons:

First, the platform integrates multiple machine translation engines, allowing us to compare and select the machine

translation that best fits the project, thereby enhancing semantic understanding and translation accuracy. This provides a strong foundation for human-computer collaboration, ensuring high quality in the machine-generated translation results and reducing the workload for human editing and review. Second, the platform offers real-time collaborative features, enabling translators and reviewers to simultaneously edit and review on the same platform. The real-time capability brings about a high level of team collaboration efficiency, avoiding issues of information asynchronism and communication delays. Third, the platform focuses on user experience by providing an intuitive and user-friendly interface, allowing team members to easily get started. In human-computer collaborative translation, an easy-to-use interface helps translators and reviewers concentrate on the translation tasks themselves rather than spending excessive time learning how to use the platform.

The YiCAT translation management system connects multiple machine translation engines and facilitates real-time collaboration. Its user-friendly design and instant communication mechanisms create an excellent environment for human-computer collaborative translation, enabling the team to efficiently, collaboratively, and securely complete the translation project.

Table 1. Features of YiCAT Translation Management Cloud Platform

Peculiarity	Advantage
Access to multiple machine translation engines	Improve semantic understanding, improve translation accuracy and quality, and reduce review workload
Coordinate work in real time	Improve team coordination efficiency and avoid information synchronization or communication lag
Focus on user experience	The user interface is user-friendly and easy for beginners to learn

2.2 Team Composition and Role Division

In the translation project, the team composition and role division were clearly defined to ensure efficient human-computer collaboration. The project manager serves as the coordinator of the entire team, responsible for project planning, management, and coordination, ensuring timely delivery, resolving internal team issues, and effectively communicating with the client. The project manager organized three subgroups, each responsible for different stages of the translation work, such as machine translation editing and human translation editing, making the overall translation process smoother and more efficient.

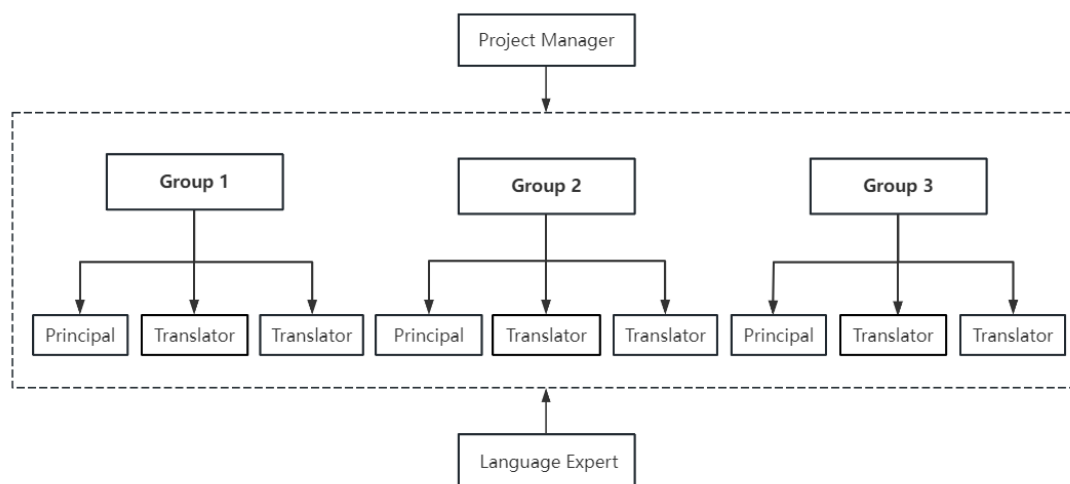


Figure 1. Schematic diagram of team division of labor.

Within these three subgroups, team members focused on specific tasks to ensure that the translation results met high standards of quality and consistency. Additionally, language experts acted as reviewers, responsible for reviewing and proofreading the entire project's translation output to ensure the accuracy and professionalism of the language used. Meanwhile, technical experts provided technical support, handling issues related to translation tools and platforms, and offering assistance to the team in using the translation management system, thus ensuring the entire team

could fully leverage the technological tools to enhance efficiency.

2.3 Collaborative Workflow Design

In the collaborative workflow of this translation project, the project team completed the tasks of machine translation and human translation efficiently and in an organized manner. During the project initiation phase, the project manager broke down the overall task into different stages and assigned them to three translation groups to work concurrently. First, the translators used the YiCAT translation management cloud platform to edit the preliminary translation results generated by machine translation, enhancing the accuracy and fluency of the translations. Once the editing was completed, the results were submitted to the platform. Next, the leaders of each group received the edited machine translation results, taking responsibility for further manual editing to ensure that the translated text adhered to professional terminology and industry standards. During this process, a terminology glossary was generated synchronously.

In the final review phase, language experts (reviewers) received the edited and exported target language text for final examination and proofreading to ensure the accuracy, professionalism, and consistency of the language expression. Once the review was completed, the text was marked as the final version. The project manager then created a translation memory based on the final version produced in each stage for use in the next phase of the translation work.

Throughout the process, technical experts were responsible for handling issues related to the YiCAT platform and other technical tools, providing necessary technical support to ensure that team members could fully utilize the platform's features and resolve any potential technical challenges.

Team members communicated and provided feedback at scheduled intervals using instant messaging tools, which helped address issues related to translation choices and terminology explanations. This facilitated real-time communication both within and outside the team, aiding in proofreading, quality control, and error correction, thereby ensuring the integrity and consistency of the text.

Finally, the project manager conducted a final check of the completed version. After confirming that it met the quality requirements, the translated text was delivered to the client. This collaborative workflow maximized the advantages of machine translation and human editing, achieving high-quality and efficient project delivery with the support of the YiCAT platform.

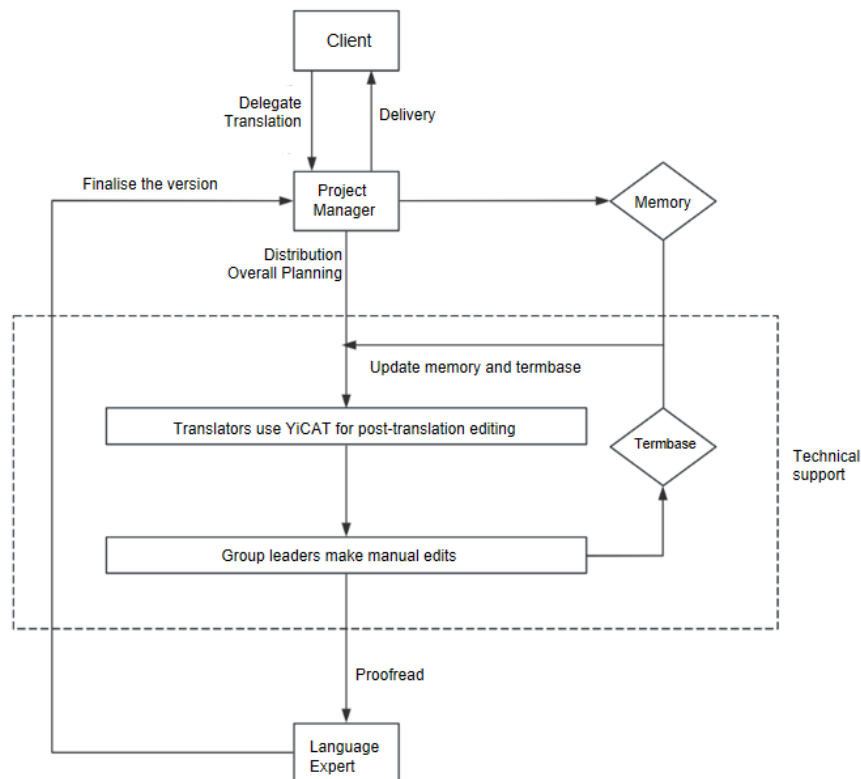


Figure 2. Collaborative workflow.

2.4 Establishing Editing and Review Standards

In the translation project, the establishment of editing and review standards was crucial for ensuring the quality of the final translated text. During the machine translation editing phase, the translators' task was to optimize the preliminary translation results generated by the machine translation engine. They needed to check the accuracy of the translations, adjust the fluency of the language, and ensure that the text aligned with the project context and industry terminology. The focus of this phase was on adjusting grammatical structures to ensure that the translated text was natural and smooth.

In the human translation editing phase, translators further edited the text to ensure the professionalism and consistency of the language. They needed to guarantee that the text accurately conveyed the meaning of the original content, adhered to the industry terminology and standards specified by the project, and maintained overall stylistic consistency.

The review standards were executed by language experts during the review stage. These experts were responsible for certifying and proofreading the translation results of the entire project. During the review stage, language experts needed to ensure the accuracy, professionalism, and consistency of the language used in the translated text. Special attention was paid to nuances in language, the use of technical terms, and cultural differences to ensure that the final translated text met high-quality language standards.

Terminology consistency was a key consideration throughout the editing and review process; both translators and language experts needed to use the industry-specific terminology glossary designated by the project and ensure that consistent terminology was applied throughout the text. Additionally, consistency in text style was also a standard, encompassing aspects such as sentence structure, expression styles, and the use of specific vocabulary.

The editing and review standards also emphasized checking for grammar and spelling errors to ensure that the translated text was free from such mistakes, thereby improving overall linguistic accuracy. Lastly, both translators and language experts needed to ensure consistent formatting of the text, including punctuation, paragraph spacing, and font, to guarantee that the final text presented a professional and uniform appearance. These detailed and comprehensive standards ensured that the entire translation process met the project requirements in terms of quality and consistency.

Table 2. Setting editing and review standards

Stage	Role	Task	Precautions
Machine Translation Editing	Translator	Optimize preliminary translation results	Translation accuracy Language fluency Grammatical structure
Human translation editing	Translator	Edit the text further	Professionalism and consistency in language expression Terminology consistency Text style consistency
Validation stage	Language expert	Validate and proofread translation results	Subtle linguistic differences Use of Terminology Cultural differences Grammar and spell checks
Finalization stage	Translators, language expert	Make sure the text is formatted consistently	Punctuation mark Paragraph spacing Font

2.5 Issues and Solutions

In the practical operation of the translation project, we needed to collaborate to address various issues and challenges. First, the quality of the machine translation engine could be unstable, leading to additional time spent by translators in adjusting the translation results. To tackle this issue, the team established a clear feedback mechanism through regular communication, allowing translators to promptly report any issues encountered during the editing process and make necessary adjustments.

Specialized terminology and industry knowledge also presented challenges, as the project involved specific field-

related terms. To address this, the development of a terminology database needed to be conducted in advance. However, due to the project's tight schedule, the team implemented a strategy of enhancing the terminology database concurrently while translators edited the content. Language experts participated in real-time to provide professional terminology support to the team. Continuous learning and knowledge sharing enabled the team to effectively tackle the challenges posed by terminology.

Real-time collaboration presented both advantages and challenges, especially when team members did not have fully synchronized work hours. To cope with this, we adopted flexible work arrangements, allowing members to leave messages and feedback on the platform, while also organizing regular online meetings to promote effective communication.

The proficiency in using the technical platform was a potential barrier, as some team members were not fully familiar with the translation management system. To resolve it, we designated technical experts as a solution. These experts provided training and support to ensure that all team members could familiarize themselves with the platform's functionalities, establishing a technical support channel to promptly address any issues that arose during use.

Additionally, handling client feedback and change requests could be a sensitive and complex process. The translation project manager's skills were essential here, including the ability to quickly respond to client needs and feedback, maintain close cooperation with the client, and ensure that the project proceeded according to client expectations.

All of the aforementioned challenges represented real issues encountered during the project. However, through collaboration and continuous optimization by the team, these problems were gradually addressed and resolved, ensuring the successful delivery of the translation project. The collaborative model of machine translation and human translators based on a translation management system achieved significant advantages in this project. The platform provided efficient task allocation and collaborative editing tools; the machine translation engine quickly delivered preliminary translation results, while human translators enhanced the translation quality through collaborative efforts. Version control and quality assessment ensured consistency and high standards throughout the process. This model not only improved translation efficiency but also guaranteed translation quality, providing an effective solution for complex technical content translation projects.

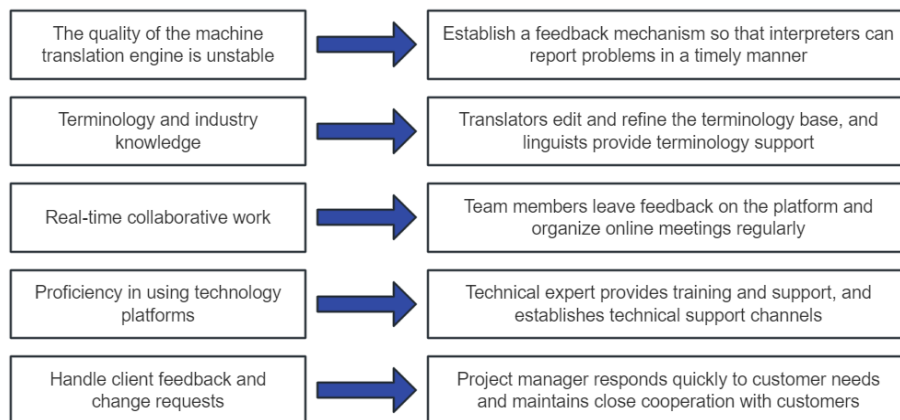


Figure 3. Problems and solutions.

3. Advantages and Challenges

With the continuous development of technology, the collaborative model of machine translation and human translators based on Translation Management Systems (TMS) has gradually become an important trend in the language services industry. The model combines computer-assisted translation technology, machine translation technology, and the professional skills of human translators to provide higher quality and more efficient language translation services. While the model has various advantages, it also faces numerous challenges.

3.1 Advantages

The human-computer collaborative work model based on TMS has numerous advantages, particularly in enhancing

efficiency, quality control, real-time feedback and correction, multilingual collaboration, flexibility, and convenience.

First, in terms of efficiency improvement, the automated processes enabled by TMS—such as machine translation, editing, and review—reduce the need for manual operations, effectively increasing work efficiency. The real-time collaboration feature allows team members to edit and discuss on the same platform, and instantly view the progress of others' work, further enhancing team collaboration efficiency.

Second, regarding quality control, TMS provides built-in quality control tools that assist in proofreading and error correction, ensuring the integrity of the text. Additionally, the platform centrally manages the terminology database, promoting terminology consistency and ensuring the use of uniform industry terms throughout the project. The translation memory guarantees consistency in text style.

Real-time feedback and correction are another significant advantage of this model. The platform's built-in translation and review synchronization feature enables team members to translate and review simultaneously, allowing for quick problem resolution and avoiding information delays. During the external review phase, language experts can provide immediate corrections and suggestions, enabling translators to make rapid adjustments and thus improve translation quality.

Moreover, the model excels in flexibility and convenience. Team members can access the translation management system anytime and anywhere via the Internet, enhancing work flexibility and reducing geographical and temporal constraints. The immediacy of the platform allows team members to quickly obtain feedback and make timely adjustments, improving overall work efficiency.

In summary, the advantages of the human-computer collaborative work model based on TMS lie in its efficiency and controllable quality, providing a better collaborative work experience and laying a solid foundation for the successful delivery of translation projects.

3.2 Challenges

The human-computer collaborative work model of the translation management system faces a series of security and privacy issues.

First, translated texts often contain sensitive information, such as trade secrets or personal privacy. There is a risk of malicious access or theft during data transmission and storage. Additionally, the platform itself may become a target for attacks, necessitating strengthened security measures to prevent potential risks. Compliance with data protection regulations is also a challenge, especially in multilingual projects involving various languages and cultures, where it is essential to ensure that data is adequately protected under different regional regulatory requirements.

Second, despite the advanced machine translation engines integrated into the translation management system, there are still technical limitations. Machine translation engines may perform poorly in certain fields or with specific terminology, requiring translators to spend more time on manual editing. Technical limitations also include the platform's performance, its ability to handle large volumes of data, and its adaptability to different languages and cultures. Furthermore, platform updates and maintenance may cause work interruptions, necessitating careful scheduling to minimize impact.

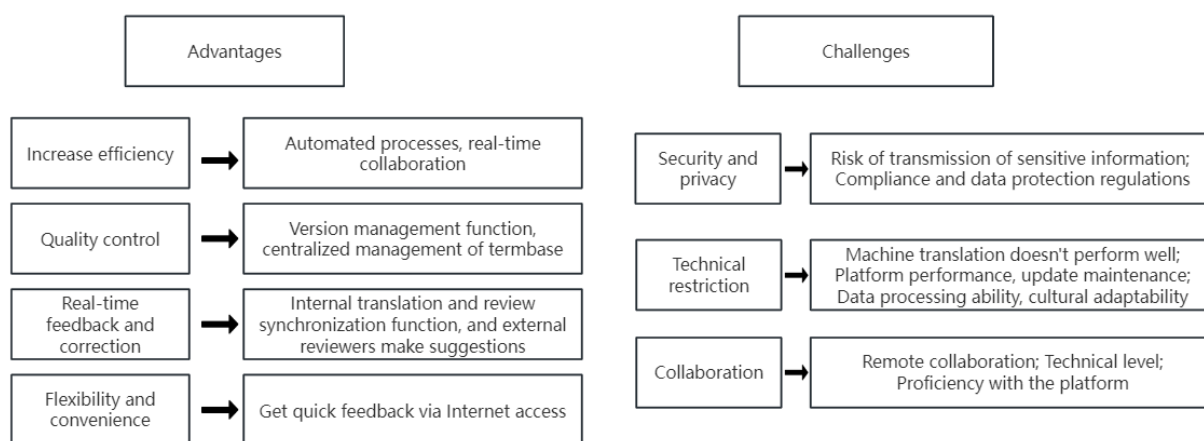


Figure 4. Advantages and challenges of the mode.

Collaboration is the core of this model; however, team cooperation may face some challenges. First, remote collaboration among team members can lead to difficulties in working together, especially in situations requiring real-time communication and discussion. Differences in team members' technical skills and familiarity with the platform may also hinder collaboration, making training and technical support crucial.

In addressing these challenges, we need to adopt comprehensive measures, including strengthening security measures, continuously optimizing the technical platform, developing appropriate team collaboration strategies, and providing training and support to ensure that translation projects can be completed efficiently, securely, and with high quality.

4. Conclusion

The paper has explored the collaborative work model that combines machine translation and human translators, with a focus on the practical application of Translation Management Systems. Through a comprehensive understanding of the construction and features of TMS, along with an in-depth analysis of real-world cases, we have thoroughly investigated the collaborative work model between machine translation and human translators.

The study reveals multiple advantages of the collaborative work model. First, the automated processes of machine translation allow for efficient handling of translation tasks, thereby improving overall translation efficiency. Second, the version management and terminology consistency features of the translation management system contribute to enhancing translation quality, ensuring consistency of translation results across different language versions. The real-time feedback and correction mechanisms further enhance team collaboration efficiency, facilitating timely communication and problem-solving during the translation process.

However, we also identified some noteworthy challenges. Security and privacy issues require careful handling when using translation management systems to ensure the safe transmission and storage of sensitive information. In terms of technical limitations, the performance of machine translation engines still has certain constraints that need ongoing optimization. Challenges related to team collaboration include time zone differences and cultural disparities, necessitating appropriate communication and training strategies to promote team collaboration.

In summary, our study provides strong evidence for practitioners, researchers, and policymakers in the field of language translation. We propose recommendations for optimizing and integrating collaborative workflows to advance language translation services to a higher level. By better understanding and overcoming the challenges in the collaborative work model, we can further promote the synergy between machine translation and human translators, thus laying a solid foundation for the future development of translation services.

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