

Methods and Management of Scientific and Technical Terminology Translation

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This paper explores the importance of terminology translation and management in translation practice. It starts with the definitions of terminology and terminology translation, and highlights their critical role in cross-cultural communication. The paper then discusses the requirements for scientific and technical terminology translation, including accuracy, conciseness, standardization, and consistency, as well as the translation methods such as literal translation, free translation, and transliteration. The paper further analyzes the processes of terminology translation management, involving terminology extraction, application, review, and updating, and proposes management strategies like standardization, client-oriented approaches, and dynamic updates. Finally, it reveals the challenges of terminology translation in culture, language, and technology. This paper aims to emphasize the significance of terminology translation and management in ensuring translation quality and advancing scientific and technological development.

Keywords: terminology translation, terminology translation management, translation methods, cross-cultural communication, normalization and standardization

Introduction

In the context of globalization and rapid technological development, the accurate translation of scientific and technical terminology plays a crucial role in cross-linguistic knowledge dissemination. Terminology forms the foundation of professional communication, and improper translation may lead to misunderstandings, affect information accuracy, and compromise the quality of translated texts.

Scientific and technical terminology translation requires a high level of accuracy, conciseness, standardization, and consistency. At the same time, systematic terminology management is essential for improving translation efficiency and quality. This paper discusses the methods and management of terminology translation, including basic requirements, major translation methods such as literal, free, and transliteration approaches, terminology management processes and strategies, as well as cultural, linguistic, and technological challenges. The aim is to highlight the importance of terminology translation in promoting the effective dissemination of scientific and technological knowledge.

Definition of Terminology Translation

Translation is a cross-cultural communicative process that converts signs to convey meaning (Xu, 2015). A term is a lexical unit representing a specific scientific concept within a particular professional field. Terminology

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translation entails conveying the concept of a source term through an appropriate lexical form in the target language (Li, 2018), aiming to establish “equivalent terms representing the same concept” across languages policy (Xu, 2024).

Requirements for Scientific and Technical Terminology Translation

Scientific and technical terminology translation is a crucial medium for the dissemination and exchange of scientific knowledge, especially in a globalized context. High-quality translations require not only an accurate understanding of the source text but also adherence to the reading conventions of the target-language audience. To ensure professionalism and usability, the requirements for scientific and technical terminology can be categorized into four key aspects including accuracy, conciseness, standardization, and consistency.

Accuracy

As with any type of translation, accuracy is a fundamental criterion in terminology translation. A term can only be considered well-translated if it conveys the original meaning without error (Yuan & Hou, 2019). This requires translators to fully understand the concept of the source term and select the most appropriate equivalent in the target language, ensuring precise meaning transfer. Accuracy directly affects the quality of the translation, which is particularly critical in scientific and technical texts.

Conciseness

Unlike terminology translation in other fields, scientific and technical terms do not require embellishment. The translations should convey the source content clearly and succinctly, facilitating reader comprehension and recall. Concise translations help improve the efficiency of scientific communication.

Standardization

Standardization refers to adherence to terminological norms and national or international standards [6]. Organizations such as ISO (International Organization for Standardization) and GB (Chinese National Standards) define terms with authoritative guidance that should be strictly followed in translation. Moreover, as translation aims to facilitate communication, standardization also requires that the translation conform to the grammatical rules, expression conventions, and reading logic of the target language.

Consistency

Terminology must ensure that each term represents a single concept and that each concept is represented by a preferred term to avoid ambiguity. Polysemy and synonymy can lead to confusion (Zeng, 2020). Consistency in terminology translation is crucial for enhancing the professionalism and readability of a text, and it is a key factor in ensuring accurate information transfer.

Methods of Scientific and Technical Terminology Translation

The translation of scientific and technical terms plays a vital role in facilitating scientific communication. The following summarizes the commonly applied methods for terminology translation.

Conceptual Definition of Terms

Conceptual definition involves identifying the attributes of a term and determining the conceptual system to which it belongs. It clarifies the academic discipline of the concept and distinguishes whether it represents general knowledge or specialized knowledge (Li, 2018).

Disciplinary attribution. The term cell carries different meanings across disciplines. In electrical engineering, it is translated as “battery”; in botany, it refers to a “cell”; and in telecommunications, it denotes a “cell” or “cell area”.

Distinction between general and specialized knowledge. The term reaction has a general meaning of “response”, as in “He reacted quickly when he heard the bell”. In specialized domains, however, its meaning varies. In information science, it may be translated as “counteraction”, whereas in chemistry, it specifically refers to a “chemical reaction”, such as in combustion reaction.

Definition of emerging terms. For individuals with relevant knowledge, metaverse refers to the “metaverse”. For those without prior knowledge, translators need to provide clarification, rendering it as “a digital space combining virtual and real environments”.

Literal Translation, Free Translation, and Transliteration

Literal translation. Literal translation preserves the form and content of the source text by directly rendering a term into the target language with a semantically equivalent expression. Examples include virtual reality, genetic code, and photosynthesis.

Free translation. In most cases, free translation is applied to terms formed through compounding, derivation, or other word-formation processes in scientific texts. This method relies on a thorough understanding of the underlying concept of the source term (Gou, 2010). Examples include Big Bang, think tank, and silent killer.

Transliteration. Transliteration converts a term based on the pronunciation of the source language into phonetically similar syllables in the target language. Examples include quark, clone, and ohm.

Application of Online Corpora

At present, computer-assisted translation (CAT) has become an indispensable tool and technology in the modern translation industry. It plays a significant role in enhancing translation speed, ensuring terminological consistency, and improving overall translation quality. Commonly used corpora include CNKI Translation Assistant, Terminology Online, and Tmxmall. Additionally, translators can organize previous translation projects into personal corpora and, in combination with CAT tools such as Trados and memoQ, facilitate terminology management and rapid retrieval.

Management of Terminology Translation

Importance of Terminology Translation Management

Terminology translation management is important in modern translation practice, particularly in the context of globalization, where its impact on translation quality and efficiency has become increasingly significant. For translators, effective terminology management ensures consistency in term usage, improves translation efficiency, and allows them to directly utilize entries from a term database when encountering texts in the same domain, avoiding repetitive verification and searches. For organizations, it enables the efficient use of existing terminological resources, reducing translation costs while maintaining consistency in brand representation.

Terminology Translation Management Process

Term extraction and creation. At the initial stage of a project, the project manager identifies and extracts specialized terms and proper nouns, such as personal names, place names, and job titles, from project documents to ensure accuracy and consistency (Lu, 2020). During this stage, tools such as Tmxmall, Trados, and memoQ can be used to automatically detect and extract high-frequency words and phrases from source texts, forming an

initial terminology list. Professional translators then consult printed or online resources to translate these terms, ensuring technical and domain-specific accuracy. The translated terms are subsequently reviewed and confirmed by clients and subject-matter experts to ensure correctness and readability, thereby establishing a terminology database.

Term application and addition. This stage involves the practical use of terms and the dynamic management of new terminology. Translators can retrieve translations from the terminology database to ensure accuracy and consistency in the target text. When new terms or updated translations are identified during translation, they are discussed among team members, finalized, and then added or updated in the system by designated personnel, making them available for all team members (Zhou, 2019).

Term review and updating. In this stage, the translations, scope of application, and contextual examples of terms are reviewed to ensure compliance with project requirements and industry standards. Disputed translations are further discussed, revised, and updated to maximize accuracy for both current and future translation tasks (Zhou, 2019). Additionally, the terminology database is regularly checked and updated to accommodate industry developments and language evolution, ensuring the accuracy and standardization of terms.

Strategies for Terminology Translation Management

Normalization and standardization strategy. Normalization and standardization of terminology translation not only help maintain consistency in the dissemination of concepts but also improve translation efficiency and quality. With China's growing presence on the international stage, research on the standardization of foreign-language equivalents of Chinese terms can maximize consistency and systematicness in cross-cultural concept communication, providing high-quality and efficient linguistic support for the international promotion of China's discourse (Liang & Li, 2022).

Client-oriented strategy. At the project outset, managers can request clients to provide term lists or reference materials and confirm the translation of proper nouns. Establishing a client-specific terminology database allows repeated use in subsequent projects, enhancing the consistency of the client's brand identity.

Dynamic updating strategy. During translation, new terms should be promptly added to the terminology database for immediate application, addressing changes in emerging technologies and industry terminology. In addition, regular review and removal of obsolete or unused terms, along with optimization of existing term translations and definitions, help improve the overall quality of the translated texts.

Challenges in Terminology Translation

Cultural Challenges

Different countries and regions possess distinct cultural backgrounds, which necessitate intercultural communication. Translation serves as the foundation and medium for cultural exchange, inevitably leading to "hybridity" (Han, 2020). Some terms are deeply rooted in specific cultural contexts, and direct translation may result in misinterpretation by the target audience. For example, in Chinese culture, the "dragon" symbolizes auspiciousness and authority, carrying positive connotations. In contrast, in Western culture, a "dragon" is generally perceived as a fierce creature representing threat and destruction. Directly translating "龙" as "dragon" may cause Western readers to misunderstand its positive meaning. In such cases, translators need to adopt culturally adaptive strategies, such as translating it as "Chinese dragon" or using a transliteration like "Long", depending on the context.

Linguistic Challenges

Many terms possess multiple meanings across different domains, particularly in technical fields. For instance, chip can refer to a computer chip or a physical fragment. Moreover, differences in expression habits and grammatical structures between languages may compromise the accuracy of terminology translation. In English–Chinese translation, it is especially important to balance conciseness with the complete conveyance of meaning.

Technical Challenges

In many translation projects, the lack of a systematic terminology database requires translators to repeatedly search for terms prior to translation, reducing efficiency. Even when a terminology database has been established, outdated, redundant, or erroneous entries may accumulate due to infrequent updates or the lack of a review mechanism, adversely affecting translation quality.

Conclusions

Terminology translation and management are vital in cross-cultural communication and the dissemination of scientific knowledge. By examining the definitions, requirements, and strategies of terminology translation, as well as analyzing the management processes and practical applications, this study underscores the central importance of principles, such as accuracy, conciseness, standardization, and consistency in terminology translation. Nevertheless, terminology translation continues to face challenges across cultural, linguistic, and technical dimensions. Therefore, translators must continuously enhance their professional competence and strengthen their cross-cultural communication skills to effectively address these challenges.

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