SNAP TO READ

EXPLORING THE INTERSECTION OF AI AND HUMAN TRANSLATION

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First received: November 30, 2025 Final proof received: June 6, 2026

Abstract:
The rapid advancement of artificial intelligence (AI) has significantly impacted the translation industry, raising questions about the role of human translators in an increasingly automated landscape. This paper explores the intersection of AI and human translation, examining the benefits and limitations of each approach and discussing the potential for hybrid models that combine the strengths of both. The researcher analyses the current state of AI-powered translation tools and human translation processes, highlighting the challenges and opportunities that arise when integrating these two approaches. The findings suggest that while AI can enhance translation efficiency and accuracy, human translators remain essential for handling complex texts, nuance, and cultural context. The researcher proposes a collaborative framework for AI and human translation, outlining the potential for future research and development in this area. This study contributes to a deeper understanding of the evolving translation landscape and informs strategies for effective human-AI collaboration in translation, especially in the Indonesian context.

Keywords:
Artificial intelligence; human translation; hybrid models; machine translation; translation industry

INTRODUCTION

In the past few years, since the introduction of Artificial Intelligence (AI), the field of translation has changed dramatically. It modifies process, interpretation, and communication of languages in a wide variety of contexts once thought impossible. Speed and fluency in translation are also increasing along with the development of Machine Translation (MT), in particular Neural Machine Translation (NMT) and Large Language Models (LLMs). Some well-known and widely available artificial intelligence (AI)-based translation software models include Google Translate, DeepL, Amazon Translate, Bing, Reverso, Microsoft Translator, and many others. These technologies now play a major role in global communication which have evolved from being just everyday mobile applications to inventions performing translation tasks in crucial fields such as education, law, and medicine.

Despite these technological achievements and their much-vaunted advantages, human-made technology certainly still has limitations in several areas, including idiomatic expression, situational subtleties, and cultural sensitivities. These complexities require human translators with cognitive and cultural insights that AI lacks. Accordingly, current developments in translation are no longer a competition between humans and AI but rather a collaboration between the two, where AI supports human translators, especially in increasing consistency and productivity by ensuring the suitability and quality of translations to cultural contexts, for example, which AI cannot perceive or 'feel'.

Numerous studies on AI-human translation have been conducted in international context, covering several concerns on AI and human translation. There is a research conducted by Ashraf (2024) examining Neural Machine Translation (NMT), an AI translation method, showing that it produces more natural translations and reduce errors compared to traditional methods. However, it still has several weaknesses in areas such as translation of idiomatic expressions, handling cultural nuances, and resource dependencies. Similar result obtained by a research conducted by Moneus and Sahari

(2024), showing that human translators excel at understanding context and handling ambiguity, but are weak in terms of speed and scalability as well as consistency, while AI tools are the opposite; concluding that human translation may thus be considered to provide higher quality translation. Additionally, Kembaren et al., (2023) who also stated that machine translation excels in speed and consistency, while human translation provides advantages in terms of depth of accuracy and greater flexibility, concluded that the choice of method depends on the specific needs of the user and the characteristics of the text, with the potential for integration between the strengths of both methods to achieve an optimal balance in effective and contextual translation without further explanation; which ultimately becomes one of reasons for writing this article.

Accordingly, several studies have explored the strengths and limitations of both AI and human translation. However, research examining the collaboration between the two is still very limited, especially in the Indonesian context where cultural richness, a multicultural society with multiple regional languages, and metaphors have become part of life. This paper explores the intersection of AI and human translation, aiming to provide not only a broad overview of their respective strengths and limitations but also how AI can enhance human translation, discuss hybrid translation, and examine the broader implications of this collaboration. By assessing current practices and theoretical frameworks, the study intends to contribute to a more nuanced understanding of how AI is transforming the translation industry without rendering human knowledge obsolete, especially in Indonesia.

METHOD

Employing a descriptive methodology, this study synthesizes findings from a variety of sources, including professional insights, scholarly literature, and reputable online resources. The primary focus is on analysing current state of AI-powered translation tools and human translation practices, highlighting strengths and weaknesses of the two followed by discussion of the integration

DOI: dx.doi.org/10.21274/ls.2026.18.1.17-32

of both. Choosing this strategy allows the researcher to provide a thorough understanding of the conceptual framework pertinent to this issue. The researcher utilizes theoretical frameworks to explain the intricate connection between people and AI, focusing on how human translations may see AI as a useful tool rather than a threat, especially in Indonesian context.

FINDINGS AND DISCUSSION

Current State of AI-Powered Translation Tools

The last decade has witnessed rapid and transformative developments in AI-powered translation. There has been a shift from traditional rule-based and statistical approaches to Neural Machine Translation (NMT), and more recently, Large Language Model (LLM)-based systems. NMT which includes some modern tools such as Google Translate, Microsoft Translator, DeepL, Baidu Translate, etc. utilizes deep learning techniques to mimic the translation process more naturally and efficiently (Naikoo & Ganai, 2025). Naikoo and Ganai (2025) explained that unlike RBMT (Rule-Based Machine Translation), which is based on manually designed linguistic rules, or SMT (Statistical Machine Translation), which requires statistical alignments and feature engineering, NMT trains to translate directly from large parallel corpora end-to-end. For that reason, such modern tools are able to handle a wider range of languages and more complex sentence structures than earlier generations.

Moreover, several studies have highlighted that NMT systems have significantly improved fluency and grammatical accuracy, generating outputs closer to natural human expression. NMT stands out as a new method that significantly enhances the correctness and fluidity of translated content, distinguishing itself from previous approaches that were based on statistical methodologies (Ashraf, 2024). LLM-powered translators, in turn, provide translations that are sensitive to context, can rephrase content in various styles, and offer interactive clarification features, moving beyond simple, one-way translations. Jiang (2023) in her study found that AI LLM has

numerous practical uses and offers improved technical support for language translation since it is already equipped with sufficient language proficiency to handle complex scenarios and produce more accurate translation results.

Despite these advances, studies still point out a few ongoing limitations. AI tools can struggle with domain-specific terminology, idiomatic expressions, and culturally bound references. Meaning also varies with speaker mood and intentions, as well as with situations of use. Some areas remain difficult for machine translation to fathom, particularly idioms, sarcasm, irony, humor, and other literary nuances (Das, 2020). Consequently, tools such as Google Translate often produce fragile translations, especially when dealing with abstract concepts and emotions. In line, Nguyen et al., (2025) found that in many cases of cultural awareness, idiomatic nuance, or subject-matter specificity, AI tools are not able to provide excellent translation which becomes a major barrier when translators tend to believe in the quality of AI translation results.

Additionally, over-reliance on AI without proper editing may lead to subtle mistranslations in sensitive contexts such as legal or medical documents. English legal documents are characterized by specific lexical features, including archaisms, formal vocabulary, technical terminology, synonyms, foreign words (often Latin or French), and modal auxiliaries (Dewi et al., 2020), which must not be simply translated to maintain the content accuracy. Accuracy, however, remains a challenge for AI-powered translation tools particularly in English-Indonesian legal document translation. Similar issues happen in medical documents, creating a poor translation of medical materials can result in misinterpretation or misunderstanding of crucial information used to help cure patients and even save lives. The ever-evolving national and international healthcare landscape demands that practitioners continually expand their knowledge and collaboration. Translation studies, in this regard, can help improve services, as high quality and accuracy translation can contribute to the advancement of knowledge and the prevention of malpractice (Susanthi, 2023). Therefore, translations performed

DOI: dx.doi.org/10.21274/ls.2026.18.1.17-32

by AI tools require in-depth proofreading by professional translators who have specific understanding in their field to avoid undesirable outcomes.

In Indonesian context, with its abundance and diversity of cultural elements, translating a language is not simply changing one language to another, but is more complex. It means that translating language requires translators to also understand culture. The word ‘Bu’, for example, in Indonesian means mother, which might be translated literally as such by AI-powered translation tools, leading to misunderstandings for readers, especially foreigners. Rizka, (2022), in her research, used this as an example: the translator translated 'Bu' as 'My dear Madam', satirizing the person intended as a lady boss who arbitrarily gives orders and tasks. The word 'Bu' in the source language (SL) is used for women with a higher and respected social status, such as occupation, whereas in the story, the person is still a teenager. This kind of contextual translation certainly cannot be directly translated by AI tools and requires assistance from human translators.

Current State of Human Translation Practices

Amidst increasingly sophisticated technological developments in translation, human translation practices have developed greatly over the years, also driven by shifting market demands and the necessity for high-quality translations. Along with the growth of AI-powered translation tools, human translators remain irreplaceable in many fields, as many researchers agree, particularly when nuance, cultural sensitivity, and complicated content are involved (Das, 2020; Falempin & Ranadireksa, 2024; Moneus & Sahari, 2024; Nguyen et al., 2025).

Moreover, human translators often specialize in specific fields, such as legal, medical, technical, or literary translation. This specialization allows them to develop in-depth knowledge and expertise to ensure accurate and contextually relevant, appropriate, and proper translations. Indonesia, in particular, boasts a wealth of literary works originating from every island and even village, such as short stories, legends, and folktales passed down through generations. By translating those masterpieces, readers can access

and appreciate literary works from Indonesia, as well as any country, breaking down the language barrier. However, unlike other forms of translation, literary translation is a more complex process. Translators are required to first grasp the entirely the works, including the author's unique style and ideology, before rendering it into a new language (Mardiana, 2021). This careful approach is crucial for successfully conveying the excellence of a literary text.

Translators in Indonesia face at least two challenges: linguistic challenges and cultural challenges. Linguistic challenges include language structure and idiomatic expressions. Indonesia and English have different grammatical structures which make direct translation trickier. In this case, for instance, English uses a lot of tenses for Indonesian needs to add adverbs of time to convey the same intended meaning. In terms of idiomatic expressions, translating idioms and colloquialisms can be challenging due to cultural nuances. We, the human translators, are required to understand the context and find equivalent expressions in the target language. In addition, cultural challenges include cultural nuances and tone and style. Indonesian culture is rich in nuances in which the translators need to understand the cultural context so that they can transfer intended meaning appropriately. Tone and style, as well, are crucial. In creative works like literature and marketing materials, for instance, the translators need to preserve the tone and style of original text with suitable substitute words so that readers can understand the meaning conveyed by the source language.

As a multilingual country, Indonesian people speak many languages other than the national language. This linguistic diversity poses significant challenges for translators who need to translate essential information clearly and respectful of different cultures. They must ensure that the translation is both comprehensible and culturally sensitive to avoid any misunderstanding and possible legal repercussions.

Concerning quality and contextual understanding, as previously stated, human translators indeed excel in understanding context, idiomatic expressions, and cultural nuances that machines may struggle with. However,

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slower speed, higher costs, and potential for human error are some of the limitations of human translations. Several issues may arise when human translators need to work on large volume translation jobs or complex documents with tight deadlines. Translating word-for-word without machine assistance could be difficult. Human translators need a considerable amount of time to read, analyse, and precisely translate content.

Importantly, in terms of cost, human translation is usually more expensive than using AI-powered translation tools because professional translators require significant time and expertise, especially for complex and large projects. In fact, it can be major challenges since clients' budgets may be limited. Despite their expertise, human translators are not immune to translation errors. Other factors such as fatigue, distraction, or misinterpretation can lead to errors that impact documents accuracy. In the world of translation, especially when it comes to sensitive documents, even small errors can have serious consequences, including lawsuits and diplomatic misunderstandings.

Integration of AI and Human Translation

The integration of AI-powered translation tools with human translation processes marks a major change in the translation industry, shifting from purely human or machine-based work to a new collaborative, hybrid model. The typical method is called Machine Translation Post-Editing (MTPE), where a human translator improves upon an initial draft created by an AI. This combines the speed of AI with a human's deep knowledge and cultural awareness. Haiyudi et al., (2023), by research, stated that translation processes utilizing MTPE is the most effective way chosen which offers speed and accuracy, showing that technology is being used effectively while maintaining translation quality through post-editing process.

In recent years, many human translators work in tandem with Computer-Assisted Translation (CAT tools) such as SDL Trados, MemoQ, OmegaT, Memsource, etc. which have emerged as powerful resources that aid human translators in their work and help them manage translation memories,

glossaries, and repetitive content. CAT Tools are aided with several powerful features such as: Translation Memory (TM) for saving sentences translated previously that can be reused and to make sure consistency; Term Base (TB) for controlling terminology and consistent use of terms across project; Machine Translation (MT) for providing automated translations that can be edited for accuracy; Alignment for matching segments in source and target languages to help translators in terms of comparison and editing; and Quality Assurance (QA) for checking errors and inconsistencies in the text translated (Falempin & Ranadireksa, 2024).

The integration of AI and human translators offers three main benefits: firstly, improved efficiency; secondly, enhanced quality; and thirdly, increased productivity.

Improved efficiency. AI-powered translation tools are able to handle large volumes of translation works, while human translators can focus on high-value tasks. A research conducted by Nguyen et al., (2025) on teachers and students regarding the use of AI in translation found that both teachers and students agreed that AI aided them in completing tasks faster, freeing up time for post-editing, critical reflection, or supplementary tasks. Tavares et al., (2023) also stated that students utilized Neural Machine Translation (NMT) tools for speeding up draft development, giving them more time for revisions.

Enhanced quality. Human translators can refine machine-generated translations in order to ensure accuracy, fluency, and cultural appropriateness. A hybrid strategy that combines Computer-Aided Translation (CAT) tools with AI capabilities is gaining traction. AI swiftly generates draft translations, which are subsequently refined by human translators, combining efficiency with nuanced comprehension (Falempin & Ranadireksa, 2024). CAT systems facilitate this collaboration with capabilities such as Machine Translation (MT) and Translation Memory (TM), which streamline the process while maintaining human control. Additionally, AI in CAT tools can handle repetitive tasks and provide information from TM and glossaries that allows

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them to focus on improving the content instead of starting from the very start.

Increased productivity. Collaborative translation platforms and CAT tools can streamline workflows which can reduce translation time and costs. Recent literature emphasizes that substantial productivity gains can be achieved with such a hybrid approach, especially for large-volume projects with limited time. Translators, in this case, can save time and effort rather than having to translate text from the scratch (Stasimioti, 2020). They can focus on ensuring quality, consistency, and stylistic adaptation based on the draft that has been initially translated by machine.

In Indonesia, specifically, collaboration between human and AI translators begins to have an interesting potential, in terms of preserving, maintaining, and introducing the nation's rich literary and cultural heritage on the global stage. The use of AI-based translation tools is becoming more prevalent in translating Indonesian texts into English, yet human translators remain indispensable for preserving the cultural depth and metaphorical richness of Indonesian literature, including modern works and traditional folktales. There is an old poem called pantun, four-verse poem or four lines if it is written down, with each line consisting of eight to twelve syllables and rhyming a-a-b-b or a-b-b-a that functions to express ideas or social messages (Rosliana, 2024), which also requires human expertise in its translation. AI can provide a foundational translation of Javanese or Balinese texts, but human translators are needed to fine-tune the translation, ensuring that subtle meanings and cultural references are accurately conveyed. This, of course, maintains the cultural depth. Indonesia's linguistic landscape, featuring 700 local languages, poses a challenge for machine learning due to limited training data. A hybrid approach, blending AI with human translation, is crucial for overcoming this limitation. Accordingly, AI-human collaboration not only improves efficiency but also contributes to preserving and disseminating Indonesia's cultural identity internationally.

Furthermore, a study conducted by Setiyono, (2024) comparing Google Translate to human translation of an Indonesian short story found substantial

structural differences, including increased word count and changes to finite clauses in machine-translated text, emphasizing the limitations of machine translation and the need for human refinement. Similarly, research by Pudjiati et al., (2024) showed that machine translation can generate initial drafts of Indonesian poems in English, but human translators outperformed them in terms of accuracy, readability, and overall acceptability. In educational settings, studies examining post-editing by Indonesian students of English-to-Indonesian machine translations reveal persistent challenges, from grammar and structural differences to proper name handling and mechanical errors that underlines the indispensable role of human expertise in refining AI outputs (Harto et al., 2021). In addition, a broader competency-based analysis among Indonesian professional translators further emphasizes that, although AI tools can accelerate translation and save time, they fall short in capturing cultural nuances, requiring human translators to bring in cultural awareness, critical thinking, and post-editing skills to ensure quality and contextual fidelity (Asmar et al., 2025). Altogether, these findings suggest that a hybrid approach, combining AI's ability to generate initial drafts with human refinement, is the most effective way to preserve meaning, style, and cultural nuances in Indonesian-English translation.

Challenges in Integration

Collaboration between human translators and AI does offer many benefits, but it still comes with several challenges, especially in translating Indonesian into English and vice versa. One of major challenges is in terms of post-editing. AI can speed up the process by generating drafts, but post-editing often takes a lot of time because the resulting translations tend to be ambiguous or unnatural. In practice, many Indonesian translators report that post-editing literary or creative texts is particularly demanding, as it requires reconstructing aesthetic qualities that AI cannot yet capture (Baihaqi & Mulyana, 2021; Pudjiati et al., (2024); Asmar et al., (2025). In literary or academic texts, it is often more difficult to improve a machine translation than to translate from scratch.

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Another challenge is in terms of translators' professionalism and ethics. A professional translator is someone who has a wide range of knowledge in many fields, for example science, technology, law, philosophy, etc. To be a good translator, one should have wide horizon in seeing the world who are expected to be mind-readers and capable of producing a flawless translation without having to consult the author of the original text (Pesurnay et al., 2017). Excessive use of AI in translation can risk AI domination over the existence of translators themselves. It can also have an impact on language skill degradation and loss of employment for professional translators. The Jakarta Post's coverage reinforces these concerns that the use of AI threatens certain jobs, particularly those of translators and other creative workers (Belinda, 2024).

Finally, the success of collaboration between AI and humans in translation can be achieved with the support of an internet connection as one of the requirements for operating AI-powered translation tools. In fact, not all translators can use AI tools because of limitations like a lack of internet access, geographical barriers, and a lack of technical skills, particularly for older translators in rural or low-income areas (Nguyen et al., 2025). Computer-Assisted Translation (CAT) tools, for example, need an internet connection for their cloud-based versions to access resources like Machine Translation (MT), Translation Memory (TM), or editing across a team. For some CAT tools, this connectivity facilitates online access through web browsers, eliminating the need for software installation on every device.

CONCLUSION

The intersection of AI and human translation reveals that technological advancements and human expertise complement one another. AI-powered tools, particularly those based on Neural Machine Translation (NMT) and Large Language Models (LLMs), have significantly improved translation efficiency, speed, and consistency, offering valuable support in handling large volumes of text. However, their limitations in handling idiomatic

expressions and cultural nuances show the crucial role of human translators. Human expertise remains central in terms of contextual understanding and aesthetic quality especially in Indonesian–English translation context which demands cultural depth and linguistic complexity. Hybrid models, such as Machine Translation Post-Editing (MTPE) and the use of Computer-Assisted Translation (CAT) tools, demonstrate promising potential of AI and human collaboration. Ultimately, this study underscores the need for a balanced and collaborative framework in which AI is regarded not as a replacement for human translators but as an ally that enhances their work.

DOI: dx.doi.org/10.21274/ls.2026.18.1.17-32

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