

## Technology Trends in Translation: A Comparative Analysis of Machine and Human Translation

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### Abstract

The development of translation technology, whether through machines or humans, has created a new paradigm in cross-language information exchange. This research aims to carry out a comparative analysis between translation results produced by machine translation systems and human translations. The method used in this research is qualitative in a comprehensive literature review aimed at understanding the latest developments in translation technology, with a particular focus on comparing machine and human translation. The data collection technique is through a literature review system from the study of scientific articles and data analysis using a qualitative approach. The results show that comparisons between machine and human translation involve careful assessment of each method's accuracy, consistency, and flexibility. While machine translation excels in speed and consistency, human translation provides advantages in terms of depth of accuracy and greater flexibility. The results of this research will provide a valuable contribution to further understanding of the role of technology in the translation industry and its implications for the use of translation in various communication contexts.

### Keywords

Accuracy; Human Translation; Machine Translation; Technology



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## 1. INTRODUCTION

In the rapidly advancing era of globalization, cross-cultural communication has become an unavoidable reality. The increased movement of people, goods, and information across geographical borders has created an urgent need for cross-language understanding. Simultaneously, technology continues to undergo significant advancements, speeding up and simplifying global communication processes. In this context, translation emerges as a key element to facilitate cross-cultural interactions, ensure accurate understanding, and promote cross-border collaboration (Muhdi, 2019; Supriatnaningsih et al., 2019). With the progress of technology, both in artificial intelligence and natural language processing algorithms, traditional human-based translation methods face significant challenges (Asfahani, 2019). This research aims to investigate and analyze technological developments in the field of translation, specifically in the comparison between machine translation and human translation. To achieve this goal, the research will carefully examine the strengths and weaknesses of each method, explore the extent to which technology can replace human roles, and identify areas where the integration of both approaches can yield the best results (Nekoto et al., 2020); (Kawohan et al., 2021).

The goal of this research is inspired by a paradigm shift in the translation industry, where technology is increasingly becoming a determining factor. With the emergence of machine translators and natural language processing algorithms, fundamental questions arise about how the role of humans in the translation process will change. Therefore, this research aims to explore and analyze the latest technological developments in translation, identify the strengths and weaknesses of each method, and investigate their potential implications in professional and academic contexts.

An in-depth analysis of technological developments in translation will be the main focus of this research. By comparing machine translation and human translation methods, this research aims to understand the extent to which technological advancements can overcome the limitations inherent in traditional human approaches. The strengths and weaknesses of each approach will be systematically identified to provide a comprehensive overview of the current state and the future development direction (Rifat et al., 2023). Thus, this research not only depicts changes in the translation paradigm but also provides valuable insights for translators, researchers,

and technology developers involved in the continuous evolution of this field (Fatimah, 2019; Saha, 2023).

Although there have been a number of previous studies examining the development of machine translation and the role of technology in the world of translation (Sujaini, 2017); (Djamilah & Syarifah, 2023); (Defina et al., 2019); (Arba et al., 2023); (Alam, 2020), there is still a lack of in-depth understanding of current technology trends and their impact on the comparison between machine and human translation. Previous studies have described the evolution of translation technology but may have yet to focus on comparative analysis between machine and human translation, specifically results in the context of recent developments. Therefore, this research is aimed at filling this knowledge gap by exploring current trends in translation technology and conducting an in-depth comparison between machine- and human-generated translations. Thus, this research can provide additional contributions and a more detailed understanding regarding the effectiveness of machine translation in facing contemporary translation demands.

This research aims to carry out a comparative analysis between translation results produced by machine translation systems and human translations. The results of this research will provide a valuable contribution to further understanding of the role of technology in the translation industry and its implications for the use of translation in various communication contexts.

## 2. METHODS

The method employed in this research is qualitative in a comprehensive literature review aimed at understanding the latest developments in translation technology, with a specific focus on comparing machine and human translation. This approach was chosen to provide a deep understanding of the conceptual framework and research methodology relevant to this topic. Firstly, a literature analysis was conducted on the advancements in machine translation. This literature review encompassed recent scientific studies, conference papers, and related articles discussing progress in artificial intelligence and machine learning. The focus was on identifying the latest techniques used in the development of machine translation systems, such as neural network-based language models, natural language processing (NLP) technology, and machine learning algorithms. A thorough understanding of this theoretical foundation became the primary basis for comprehending the strengths

and weaknesses of machine translation.

Subsequently, the research involved a literature analysis related to human translation. This study included understanding the human elements in translation, the involvement of cultural context, and the linguistic nuances that machines often struggle to capture. The analysis covered studies on the skills of human translators, their interpretation strategies for texts, and how they handle subjective aspects of language. Through this literature, the research aimed to identify the strengths of human translation that machines often find challenging to replicate. Furthermore, a literature review was conducted on recent developments in translation technology. The main focus was to understand how the use of NLP technology has permeated translation systems and how artificial intelligence integration increasingly dominates this industry. This literature review also included the use of technology to enhance collaboration between human translators and machines, elevating translation to a higher level through improved contextual understanding. The data collection technique is through a literature review system from the study of scientific articles and data analysis using a qualitative approach.

### **3. FINDINGS AND DISCUSSION**

In this section, there are several sub-chapters of discussion that include: Definition of Machine Translation, Advantages and Efficiency of Machine Translation, Human Translation, and Comparison between Machine and Human Translation. Below is a table containing literature reviews related to research that is relevant to the ongoing study by the researcher:

No	Writer's Name, Year & Title	Results
1	Adi Alam. 2020. Google Translate Sebagai Alternatif Media Penerjemahan Teks Bahasa Asing ke Dalam Bahasa Indonesia	Based on the research, using Google Translate can be useful for academics to access and understand texts in foreign languages or literary works. However, it is important for academics to understand the language structure and cultural context in both the source and target languages. This applies to texts regardless of whether they are the source or target language. By doing so, misunderstandings in the interpretation of the text can be minimized, and the use of Google Translate can be an effective solution in comprehending foreign language texts.

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- 2 Wahyu U, Teguh S. 2020. *Problema Mesin Penerjemah Berbasis AI Dalam Proses Penerjemahan Buku Inggris-Indonesia Dan Solusinya*
- Although Google Translate continues to improve the quality of its translations and supports translators, some issues still need to be addressed when translating books. This research suggests seven translation techniques from Molina and Albir as solutions to the main linguistic problems faced by translators. Transposition, borrowing, and description methods are employed to address issues with sentence structure, words without equivalents, and pronouns. Diction problems are tackled using the established equivalent method, while specific terms are addressed through generalization and adaptation. Methods. Literal translation techniques are applied to words or terms with direct equivalents. Some issues require a combination of methods, depending on the context of the text.
- While there are still some problems, the results of Google Translate translations demonstrate advantages, including coherence in finding the right words. Although yet to be consistent, experienced translators can identify and rectify these inconsistencies. The translation results are also in standard language, provided by the standard parallel corpus during training. This allows translators to focus on translation issues without being disrupted by typographical errors or pronunciation. In English to Indonesian book translation, Google Translate is effective as an initial assistant, helping translators understand the content of the source text and facilitating their initial work.
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| 3 | Laila Nur Aflah. 2020. <i>Komparasi Hasil Terjemahan Google Translate dan Bing Translator dalam Menerjemahkan Hedging Words</i> | <p>Translating the hedging words from the data taken from an opinion article titled "Why Indonesians should write about Indonesia in English more often" published in The Jakarta Post, no significant difference exists between the translation results from Google Translate and Bing Translator. Both in terms of accuracy and equivalence, they show accurate and acceptable translation results in the target language. Therefore, both are recommended as free translation assistance tools to be used in translation work. However, it should be noted that although they provide similar results, they are not intellectually identical, and the author believes that further research may reveal differences in translation outcomes.</p> <p>This article has four types of hedges, namely lexical verbs and modal auxiliary verbs, with the highest frequency of appearances reaching six times. Additionally, there are compound hedges and adverbs of frequency, each appearing once in the entire presented opinion article.</p> |
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Based on the results of the table, it can be concluded that there is no significant difference between the translation of hedging words from the opinion article "Why Indonesians should write about Indonesia in English more often" taken from The Jakarta Post using Google Translate and Bing Translator. Both translation engines show similar accuracy and equivalence in the target language. Although both are recommended as effective and cost-free translation assistance tools, it should be noted that these engines are intellectually different. Further research may reveal differences in translation outcomes. Specifically, the hedges in this article include lexical verbs and modal auxiliary verbs, with the highest frequency of occurrences reaching six times. Additionally, there are also compound hedges and adverbs of frequency, each appearing once in the entire presented opinion article.

Machine translation, also known as Machine Translation (MT), is a computational system designed to automate the process of translating text or speech from one language to another without human intervention. The main goal of machine translation is to facilitate cross-language communication efficiently and quickly,

overcoming language barriers that are often a major challenge in the context of globalization. The definition of machine translation involves the use of technology, particularly artificial intelligence and natural language processing, to analyze and interpret the meaning of text in one language and reproduce it with equivalent accuracy in another language (Aher et al., 2023).

Machine translation has evolved significantly since its concept first emerged in the mid-20th century. Initially, a statistical approach was the main foundation in the development of machine translation, where probability calculations and data-driven models powered systems to determine how far a particular phrase or word could be translated into the target language. However, recent developments, especially with the emergence of Neural Machine Translation (NMT) technology, have introduced a more sophisticated approach using neural networks to understand language context and nuances better.

The workflow of machine translation involves several complex stages. Firstly, the source text is broken down into smaller units, such as sentences or phrases. Then, the system translates these units into the target language, taking into account grammatical, lexical, and semantic rules. This process is aided by a large corpus of previously provided data, allowing the machine to learn and improve its performance over time. Machine translation can also be conditioned to handle variations in context, language styles, and specific terms in various domains (Nekoto et al., 2020).

Machine translation has several advantages, making it a valuable tool in cross-language communication. Its speed and efficiency in translating large texts in a short time enable quick information exchange in this digital era. Machine translation can also handle multiple languages, overcoming the complexity arising from linguistic diversity worldwide (Agustina et al., 2023). However, despite its advantages, there are also criticisms of machine translation, especially concerning its limitations in capturing language nuances, cultural context, and a deep understanding of emotional expressions in the text.

With the continuous development of technology and research in the field of artificial intelligence, machine translation continues to improve and enhance its capabilities. The combination of machine translation efficiency with humans'

uniqueness and sensitivity to specific contexts raises the potential for the integration of human and machine methods in translation. In its broad definition, machine translation represents the ongoing technological advancements to address cross-language communication challenges in an increasingly interconnected global world (Munandar & Newton, 2021); (Untara & Setiawan, 2020).

Machine translation possesses significant advantages, especially in terms of speed and translation efficiency. One of the main advantages of machine translation is its ability to produce translations in a very short amount of time. By leveraging natural language processing technology and artificial intelligence algorithms, machine translation can perform instant translations, overcoming delays often encountered in human translation. This speed is crucial when time is a key factor, such as in business communication, international conferences, or online platforms that demand quick responses.

The efficiency of machine translation is also reflected in its ability to quickly handle large volumes of text. Machine translators can automatically process and translate lengthy documents, saving the time that would previously be required for manual translation. This is particularly beneficial in the context of globalization, where information exchange often involves diverse languages.

Despite its striking advantages, machine translation is also confronted with limitations that need attention. One of the main limitations is the need for more understanding of language context and nuances. Machine translators tend to be literal and sometimes need help to capture deeper meanings or hidden nuances in a text. This becomes a challenge, especially in languages rich in idioms, peculiar expressions, or specific cultural contexts that are only possible to accurately interpret with a good understanding of the context.

The limitation in understanding nuances is also reflected in machine translators' difficulty handling texts containing humor, irony, or double meanings. Additionally, machine translators might need help to identify highly contextual or reference-dependent languages. This leads to machine translation results sometimes needing to be more natural and occasionally misleading in more complex contexts (Alam, 2020; Mhlanga, 2022).



In situations where communication requires a deep understanding of cultural context or expertise in a specific domain, machine translation may be less effective compared to human translation. Human translators, with their sensitivity to context and nuances, can provide more accurate translations that are suitable for specific situations.

In conclusion, the speed and efficiency of machine translation provide significant added value in this rapidly moving world. However, users need to be aware of the limitations of machine translation in understanding context and nuances, requiring special attention in situations where precision and interpretational accuracy are crucial. As an evolving solution, the integration of the strengths of machine translation and the sensitivity of humans to cultural and linguistic contexts poses the next challenge in the development of more advanced translation technology.

Human translation brings critical elements into its process, such as flexibility and creativity, which provide a special and unique dimension to the translation results. One of the main advantages of human translation is its ability to capture the complex nuances of language and understand deeper contexts. The flexibility of human translators creates more dynamic translations, capable of adapting to various language styles, idioms, or distinctive expressions that might be challenging for machine translators to interpret. In this regard, human translation transfers words from one language to another and interprets the essence and meaning contained within (Indah Sari et al., 2020; Putri & Putri, 2020).

Creativity is an essential aspect of human translation. Translators have the freedom to adjust sentence structures, find more suitable synonyms, and even insert creative elements to maintain the authenticity of the communicated message. This becomes crucial in texts with literary elements, poetry, or even in the marketing industry, where creativity in delivering messages can have a greater impact.

However, these advantages come with challenges. Human factors directly impact the quality of translation, and several elements need consideration. The expertise of the translator is a key factor influencing the quality of the translation. Experience and in-depth knowledge of both the source and target languages, along with a good understanding of cultural context, form the foundation for accurate and

high-quality translations. Translators who not only master the language but also have profound knowledge in a specific field can provide more specific and accurate translations (Măță Liliana et al., 2023); (Tumminio Hansen, 2021).

Additionally, subjective factors play a role in the quality of human translation. The translation results can reflect the translator's personal knowledge and perspective, creating variations in interpretations. This can be an advantage in certain contexts, such as literature or philosophical texts, where personal interpretations can add an additional dimension to the text. However, on the flip side, this factor can also be a potential source of mismatch between the author's intentions and the translator's interpretation.

The ability to capture emotional nuances is also a key element in human translation. Human language focuses on the use of words and emotional expressions that can appeal to, touch, or even entertain. Human translators can capture and retain these elements, providing translation results that are more vibrant and aligned with everyday human experiences.

In conclusion, human translation introduces elements into its process that must be noticed in the effort to approach authenticity and accuracy in translation. Flexibility, creativity, and other human factors provide significant added value, especially in contexts where rich interpretations and human touch are required. While challenges such as subjectivity and variations in interpretation need to be carefully managed, recognition of the strengths of human translation forms the basis for a deeper and more accurate understanding of different cultures and language communities.

The comparison between machine and human translation involves evaluating various criteria, with accuracy, consistency, and flexibility being the primary aspects to consider. Accuracy, as the first criterion, becomes the main focus in assessing translation quality. With artificial intelligence and powerful algorithms, machine translation can provide quickly accurate translations, especially in the case of simple and common texts. However, this accuracy is often limited when facing complex or idiomatic contexts or those highly dependent on language nuances. On the other hand, human translation often excels in accuracy due to its ability to understand context deeply, capture language nuances, and produce translations aligned with the

author's original intent. The second criterion, consistency, is a crucial element in this comparison. Machine translation provides more consistent results overall, especially when dealing with large volumes of text. Machines are not affected by fatigue or performance fluctuations as humans are. This makes machine translation a strong choice in situations where consistency is required, such as in technical documentation or repetitive content translation. On the other hand, human translation consistency can be influenced by several factors, including fatigue levels, differences in experience, or even variations in the translator's style (Abdurahman et al., 2023; Waham et al., 2023). Nevertheless, human consistency brings a flexibility element that can address contextual or cultural variations.

The third criterion, flexibility, considers the method's ability to respond to changes, nuances, or variations in the text. Machine translation excels in flexibility, especially in contexts that require immediate translation without sacrificing speed. Machines can quickly adapt to changes in terminology or phraseology, making them an ideal choice for applications requiring instant responses. However, this flexibility is limited by the machine's ability to understand context deeply. On the other hand, human translation flexibility arises from their ability to accurately respond to changes in meaning or language nuances, adjusting translations according to specific needs or contexts.

Conditions and contexts also play a crucial role in determining the effectiveness of each translation method. Machine translation is often suitable for use in situations where speed and high volume are top priorities, such as website translation or instant communication. Meanwhile, human translation is more suitable for complex texts, such as literature, legal documents, or texts requiring a deep understanding of cultural or specific domain contexts. Context also includes whether the text has emotional or expressive elements, where human translation with sensitivity to language nuances can provide more profound and meaningful results (Li, 2022; Millner, 2021).

This research deepens the analysis of discussions related to technological trends in translation through a comparative approach between machine and human translation. In a comparative context, this research details the latest findings and traces them back to the results of previous research. While some previous studies may have identified advances in machine translation, this study presents a deeper layer of

analysis, considering recent evolutions in translation technology and their impact on translation outcomes. By juxtaposing the findings with previous research, this study was able to highlight significant shifts in the quality and accuracy of machine translations over time.

Previous research examining machine translation may have reached conclusions regarding the limitations and advantages of the technology. In a more in-depth discussion, this research details specific aspects of machine translation that have seen improvements or limitations that are still relevant (Asyafah, 2019); (Abas & Maburur, 2022). For example, in comparison with human translations, this research critically examines whether machines can capture linguistic nuances, cultural context, and emotional aspects that may be inherent in a particular text. Additionally, this discussion utilizes relevant theoretical concepts, such as linguistic theory and artificial intelligence, to support further analysis of the differences and similarities between machine and human translation.

By inserting new findings into the context of previous literature, this research creates a richer and more contextual narrative about the progress of translation technology. Through this approach, this research not only provides a deeper understanding of the comparison of machine and human translation but also provides richer insights regarding the evolution of technological trends in the context of modern translation.

In conclusion, the comparison between machine and human translation involves a careful assessment of each method's accuracy, consistency, and flexibility. While machine translation excels in speed and consistency, human translation provides an advantage in terms of deep accuracy and greater flexibility. The choice of the right method depends on the user's specific needs and the text's characteristics to be translated.

#### **4. CONCLUSION**

Overall, the comparison between machine and human translation reveals the strengths and limitations of each method. Machine translation excels in speed, consistency, and flexibility, making it ideal for situations that require instant responses and processing large volumes of text. However, the limitations of machines lie in the difficulty of understanding complex language contexts and nuances. On the other hand, human translation brings advantages in deep accuracy, contextual

flexibility, and nuanced language interpretation. However, the consistency and speed of human translation can be influenced by human factors such as fatigue or differences in translator styles. In conclusion, the choice of method depends on the user's specific needs and the text's characteristics, with the potential for integration between the strengths of both methods to achieve an optimal balance in effective and contextual translation. However, it needs to be acknowledged that this research has areas for improvement that need to be considered for future study development, namely that limited time is an obstacle in accessing and analyzing all the latest trends in translation technology. As technology develops rapidly, some innovations have yet to be fully documented or have yet to achieve widespread exposure. Therefore, future research could expand the scope to integrate newer and less widely exposed trends, thereby providing a more complete picture of recent developments in machine translation.

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