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The Use Of Artificial Intelligence In Improving Machine Translation Post-Editing; Insights From Translation Editors

Dr. Yusra jadallah abed Khasawneh[1] ,
Dr. Mohamad Ahmad Saleem Khasawneh[2]

[1]Faculty of Educational Sciences., Department of Educational Administration, Faculty of Educational Sciences, Ajloun National University, Jordan.
Yusra.khasawneh@anu.edu.jo, yusrajadallahabedkhasawneh@gmail.com, https://orcid.org/0000-0002-7253-412x
Assistant Professor, Special Education Department, King Khalid University, Saudi Arabia,
mkhasawneh@kku.edu.sa. https://orcid.org/0000-0002-1390-3765

Abstract

The intricate nature of the human language has been a huge challenge to machine translation, and the human editors are constantly required to evaluate and access the quality and accuracy of machine translated contents. The post-editing processes have been manually conducted prior to the advancement of artificial intelligence. This study explores the roles of artificial intelligence in machine translation post-editing, focusing on gaining insights from professional translation editors on how AI models have facilitated their functions. The study is a survey quantitative analysis, and data was collected through the use of questionnaire that was distributed digitally. The survey community include 193 professional translation post editors drawn across different locations. Analysis was carried using relevant statistical measures, and the findings were presented in different statistical tables. The main AI tools employed in machine translation post editing include SDL Trados Studio, MemoQ, MateCat, KantanMT, Lilt, and MemSource. The data indicates that Lilt is the most frequently used AI tools by the study samples. The findings indicate that the integration of AI tools with the efforts of human translation editors yields excellent result in machine translation post editing. The study further indicated that majority of the participants rejected the position that machine translation post-editing tools can effectively produce high quality machine translation post-editing services without the input of human editors. There is also an indication that the human translation

editors are concerned about the security of their job as advancements in AI continues to threaten their profession. However, almost, 94% of the respondents accepted the fact that the best practice is the combination of the efforts of human editors and AI machine translation post-editing tools.

1. Introduction

The integration of machine translation systems to enhance communication has gained prominence in the domain of translation and language education. Machine translation systems have been developed to automatically translate texts from one language into another. Machine translation algorithms have always produced translated contents that require further amendments in other for the produced content to meet the expected quality and precision, following the internal complexities of the human language system (Chan, 2021; Camparin, 2017). The procedure to improve the translated contents from machine translation is technically referred to as Machine Translation Post Editing (MTPE). In the post editing process of machine translated texts, the focus is mainly to enhance the overall degree of precision, accuracy and to maintain linguistic fluency in connection to the message of the original text (Mantecon, 2023; Mellinger, 2017).

Machine translation post-editing has always been done manually by human editors prior to the advancement of artificial intelligence models. When translation editors began to integrate AI tools in machine translation post-editing, the main concern was to provide varieties of functionality and save time eve as they edit enormous MT produced translated texts (Moorkens, 2022). Generally, artificial intelligence tools for machine translation post editing offer valuable recommendations, automated rectifications, and linguistic evaluation of the machine translated contents.

In this research, the focus is to explore the keys roles of AI models in machine translation post-editing. The article focuses on obtaining valuable opinions and reliable data from professional translation editors. The primary goal is to explicate how the human translation editors have integrated the AI models to facilitate their wors, the areas the AI tools have enhanced their editing prowess, and their key challenges. The study also aims at unveiling the attitudes and perceptions of the translation editors towards the integration of AI models in machine translation post-editing.

2. Literature review

A. Machine Translation Post-Editing: Nature and Intricacies

Machine translation post-editing, in the words of Dorst et al. (2023) is a significant procedure that involves detailed assessment, evaluation and enhancement of texts translated automatically. Post editing is usually performed by professional translation editors or proficient language specialists who possess requisite understanding of both the source and target languages. The intricate and complex nature of the roles of translation post editors is marked by the integration of different skills and strategies for completing the relevant tasks (Chung, 2020; Cholewska, 2021a; Blagodarna, 2019). The major functions of translation post editors are to amend syntactic inaccuracies, improve the coherent structure of expressions, and change expressions with unclear and unrelated meanings, adjust the translated texts to align with the standards and meanings of the original texts, and to ensure that the derived meaning is not different from the meaning and style of the original text (Sanchez, 2022; Porro et al., 2014; Olohan, 2021; Zhao, 2021; Zou, 2022). Rossi and Carre (2022) asserted that post-editing in translation involves the engagement of professional editors to use their linguistic, technical, and cultural competencies to generate a conclusive translation that is both linguistically accurate and culturally suitable. Jia and Sun (2022, p.74) argued that "the complexities involved in the process of post-editing machine translation stem from a variety of factors."

The existence of linguistic characteristics presents challenges, as different languages showcase unique grammatical systems, idiomatic phrases, and nuances of culture that may not align with the source content (Herbig et al., 2019; Chan, 2021; Do-carmo et al., 2021). To ensure the cohesiveness and style of the translated text, it is imperative that post-editors possess a deep understanding of the linguistic nuances at play. The intricacies of post-editing are frequently compounded by cultural complexities, given that translation often entails the adaptation of text to align with the social and cultural context of the target audience. In order to proficiently convey a message, it is imperative to possess not only a comprehensive command of the language, but also a discerning cognizance of cultural nuances to preclude any plausible misapprehensions (Kennedy and Doherty, 2014; Morken et al., 2018; Escarra and Guinazu, 2021; Wang, 2021). The temporal dimension assumes a notable significance in the context of post-editing, as practitioners of this craft are often compelled to operate within tight temporal constraints. Attaining a balance between the demand for superior output and the temporal restrictions necessitates the

utilisation of efficacious evaluation and assessment techniques to guarantee the prompt submission of a polished translation. In general, the act of post-editing machine-generated translations is a complex endeavour that necessitates a considerable level of linguistic acumen, cultural awareness, and efficient time management to produce translations of exceptional quality that effectively overcome linguistic barriers (Yang and Wang, 2023; Zigarishina et al., 2021; Pinnis et al., 2022).

B. Factors that Necessitate the Incorporation of AI IN Machine Translation Post-Editing

Significant progress has been made in using artificial intelligence (AI) in machine translation post-editing, and this has had a profound effect on the field of language translation. According to randy et al. (2019), rule-based systems, which use already established grammatical and syntactic principles to execute text translation, were the primary method used in the early days of machine translation. However, owing to their inability to properly handle the complexities of language, these algorithms usually produced inaccurate and unidiomatic translations. The limitations of the manual post-editing system necessitate the integration of AI tools to facilitate the process (Herbig, 2022; Huang and Wang, 2022).

Sharma et al. (2021) contends that workflows involving translation may benefit from the usage of artificial intelligence-powered translation systems due to their capacity to quickly handle vast quantities of content. The findings of the study conducted by Qing (2022) indicate that AI helps bring greater standardisation and accuracy to the area of language translations post-editing. By processing massive amounts of linguistic data, AI models may learn complex nuances of language and provide translations that are more suited to their context. In addition, the quality of translation is certain to improve gradually since AI-driven systems demonstrate continuous improvement over time using machine learning approaches (Cholewska et al., 2021b; Rossi and Carre, 2022; Zou, 2022; Dorst et al., 2023). In addition, AI makes it easier for translation models to be tailored to specific fields of study or application. Artificial intelligence models may learn to understand and use the specialised vocabulary and writing style of many domains via the process of fine-tuning and specialised training, allowing for the generation of more accurate translations.

The use of AI in machine translation post-editing has far-reaching implications in a variety of fields (Jia and Sun, 2022; Nitzke, 2021; O'Brien et al., 2018; Tavarres et al., 2023). At first, it improves the overall effectiveness and efficiency of translation methods, letting

specialists handle more content in less time. Industries like journalism, e-commerce, and customer service operate at a breakneck pace, making rapid translation procedures especially important for meeting their deadlines. Furthermore, Yang and Wang (2023) asserted that AI-driven translation systems help improve translation quality, reducing the need for time-consuming human post-editing. Although human experience is still essential, using AI technology may help reduce the likelihood of issues like inconsistencies and misinterpretations, leading to translations that are more accurate and reliable (Sanchez, 2022; Dorst et al., 2023; Herbig, 2022). There may be financial benefits to using AI into machine translation. By automating certain steps in the translation process, organisations may reduce their reliance on human translators, therefore lowering translation costs without sacrificing quality. As a result of its low cost, this method facilitates worldwide cross-cultural communication and makes language translation accessible to a larger range of organisations.

C. AI-Powered Machine Translation Post-Editing Tools

Post-editing of machine translation is a pivotal stage in the translation workflow, wherein human translators scrutinize and enhance machine-generated content to guarantee precision and coherence (Aziz et al., 2013; Pinni et al., 2014; Jia and Sun, 2022; Bentivogli et al., 2018). Several artificial intelligence (AI) tools have been created to assist translators in their work. Quality assessment tools are specifically developed to evaluate the quality of machine translation output, thereby indicating potential errors or areas that necessitate improvement. According to Chung (2020), error detection tools are designed to detect and indicate errors within translated text, including issues related to grammar, syntax, and consistency. Automated tools for quality checking integrate quality evaluation and error checking capabilities, providing a thorough assessment and response to the content that has been translated by an automated system. The result of the researches conducted by Mantecon (2023), Moorkens (2022), and Yand and Wang (2023) indicate that Artificial intelligence (AI) tools aid translators by optimizing the post-editing procedure, diminishing the duration and exertion needed for manual assessment, and augmenting the overall quality of translation.

A number of distinct artificial intelligence (AI) tools are frequently utilized in the process of post-editing machine translation. These tools include "SDL Trados Studio, MemoQ, MateCat, Kantan MT, Lilt, and MemSource" (Dorst et al., 2023, p.49). According to Sharma et al. (2021, p.61), SDL Trados Studio is a prevalent translation environment tool that incorporates machine translation and post-editing

capabilities, enabling translators to work proficiently "with pre-translated segments and access real-time suggestions and terminology databases". Chan (2021) noted that MemoQ provides comparable functionalities that empower translators to utilize machine translation results and tailor post-editing configurations to align with their individual preferences. MateCat is a translation environment that operates on cloud-based technology and integrates "a collaborative platform, translation memories, and machine translation" (Tavarres et al. 2023, p.63). This results in a more efficient workflow for post-editing tasks. The primary objective of Kantan MT is to offer personalized machine translation engines and post-editing guidelines that can effectively improve translation efficiency. Lilt employs "adaptive neural machine translation" technology and provides an interactive interface that supports translators in the post-editing phase (O'Brien, et al., p.20). The MemSource translation management system is a cloud-based solution that incorporates machine translation and post-editing capabilities, facilitating streamlined collaboration and centralized project administration. The aforementioned tools have the ability to enhance the capabilities of translators by granting them expedient entry to machine-generated translations, simplifying the process of post-editing, and promoting uniformity and precision in translations.

D. Statement of Problem

Notwithstanding the accessibility and progressions in artificial intelligence (AI) tools for post-editing of machine translation, there exists a conspicuous dearth of research that delves into the perspectives and experiences of human editors who employ these tools. Comprehending the viewpoints of translators and editors is imperative in assessing the efficacy and applicability of artificial intelligence tools in practical situations. Through the implementation of a research study aimed at soliciting opinions from editors, we can effectively address the gap in current literature and acquire significant knowledge regarding the pragmatic implications associated with the utilization of such tools. The proposed study would establish a justification for investigating the advantages, difficulties, and constraints encountered by editors while employing artificial intelligence (AI) tools in the process of post-editing machine translation. The results of this study have the potential to enhance the efficacy of the design and execution of these tools, customize them to align with the preferences of editors, and pinpoint domains that necessitate supplementary assistance or improvements. Furthermore, collecting observations from editors would enhance comprehension of the dynamics of interactions between humans and machines in translation assignments and facilitate the creation of

more efficient and user-friendly artificial intelligence (AI) resources for post-editing machine translation.

E. Study Questions

The following study questions are posed to guide this study:

i. What are the main artificial intelligence tools used in machine translation post-editing?
ii. To what extent does the combination of the efforts of human editors and artificial intelligence yield high quality machine translation post editing?
iii. What are the perceptions and attitudes of professional editors towards the integration of artificial intelligence models in machine translation post-editing?

F. Research Objectives.

The primary goal of this study is to expound the views of professional translation editors on the roles of the incorporation of artificial intelligence in machine translation post-editing. Specifically, the study will interrogate the main artificial intelligence tools used in machine translation post-editing, and the extent the combination of the efforts of human editors and artificial intelligence yield high quality machine translation post-editing. The study also examines the perceptions and attitudes of professional editors towards the integration of artificial intelligence models in machine translation post-editing.

3. Study Methodology

A. Study Community

Professional translation editors were engaged in this study. The choice of only professional translation editors is to engage who are directly involved in machine translation post-editing. However, there are certain considerations in the choice of selecting the study community, as listed below:

i. The participant must be an active translation editor, with a minimum of five years' work experience.
ii. The participant must conversant with different artificial intelligence tools for machine translation post-editing
iii. The participant must be necessarily bilingual, and actively engaged in machine translation post-editing specifically.

Using the above criteria, the study participants were carefully selected to ensure that the analysis is anchored on data from the right study respondents.

B. Study Approach

This study is a quantitative analysis of the views of the professional translation editors on the fundamental roles of artificial intelligence in machine translation post-editing. The choice of quantitative analysis is to enable the collection of statistical data in providing answers to the research questions.

C. Sample Size

The sample size for this study is 193 professional translation editors drawn across various sectors. Using purposeful sample technique, we selected the respondents that are considered to be qualified to participate in the study base on the aforementioned criteria. The relevant demographic variables are summarized in table 1 below:

Table 1: The Demographic Variables of the Study Sample

Groups	Categories	Frequency	Percentage
	Male	**119**	**61.66%**
Gender	**Female**	**74**	**38.34%**
	Total	**193**	**100%**
Educational qualifications	**Bachelors**	**87**	**45.08%**
	Masters	**106**	**54.92%**
	Total	**193**	**100%**
	1-5 years	**35**	**18.13%**
Years of experience	**6 years and more**	**158**	**81.87%**
	Total	**193**	**100%**

From the table above, the following demographic information are evident:

i. From the 193 participants, 119 (61.66%) are the male respondents, while the rest (38.34%) are the female participants, indicating that more male translation editors participated in the study.

ii. About 87 (45.08%) of the participants hold bachelor's degree in language related courses or translation studies, whereas 106 (54.92%) hold master's degree in translation studies. The space for doctorate degree was not filled by any of the

respondents, wherein we presume that none of the study respondents are doctorate degree holders.

iii. About 35 (18.13%) of the respondents have been practicing translation editing between one to five years, wherein the focus was on those at five years of more. As such, a total of 158 (81.87%) of the respondents have been working as translation editors for six years and above, indicating that almost all the participants have been translation editors for over five years. This gives them the requisite experience to discuss the role of AI in their machine translation post-editing.

D. Tools for Data Collection

As a survey, questionnaire was used to collect the required data for the study. The questionnaire was segmented into various parts to be able to elicit the right and accurate data for the analysis. The questionnaire contains the following information:

i. Section one provides question inputs on the demographic variables of the study participants, including their gender, educational background and years of experience as professional translation editors.

ii. Section two of the questionnaire contains questions on their frequency of usage of different artificial intelligence tools in machine translation post-editing.

iii. Section three contain questionnaire items on the nature of the combination of human translation editors and artificial intelligence tools in machine translation post editing.

iv. Section four contains questions on the perception and attitude of the professional translation editors on the roles and usage of AI models in facilitating machine translation post-editing.

v. Questions in sections three and four were designed with five-points Likert Scale.

E. Analysis Procedure

The following processes were adhered to in the analysis of the data:

i. The responses of the study participants were calculated and presented in descriptive statistics tables.

ii. The descriptive statistics tables contain the values of the Liker scare, ranging from strongly agree (SA), to Agree, (A), neutral (N), disagree (D), to strongly disagree (SD). The descriptive statistics tables also contain the mean and standard deviation of values.

iii. The tables also include an acceptability status of each question item which form the basis for discussing the research questions.

iv. The data, as collected from the respondents, were inputted into Jamovi statistical software to generate the relevant statistical analysis

4. Results and Discussion

4.1. Results

The results gathered from the questionnaires are presented in three sections. The first section provides data in response to the first research question. The second section provides data for the second research question, while the third section provides data for the third research question.

A. Usage of Different AI Tools

Figure: Result of the Usage of Different AI Tools

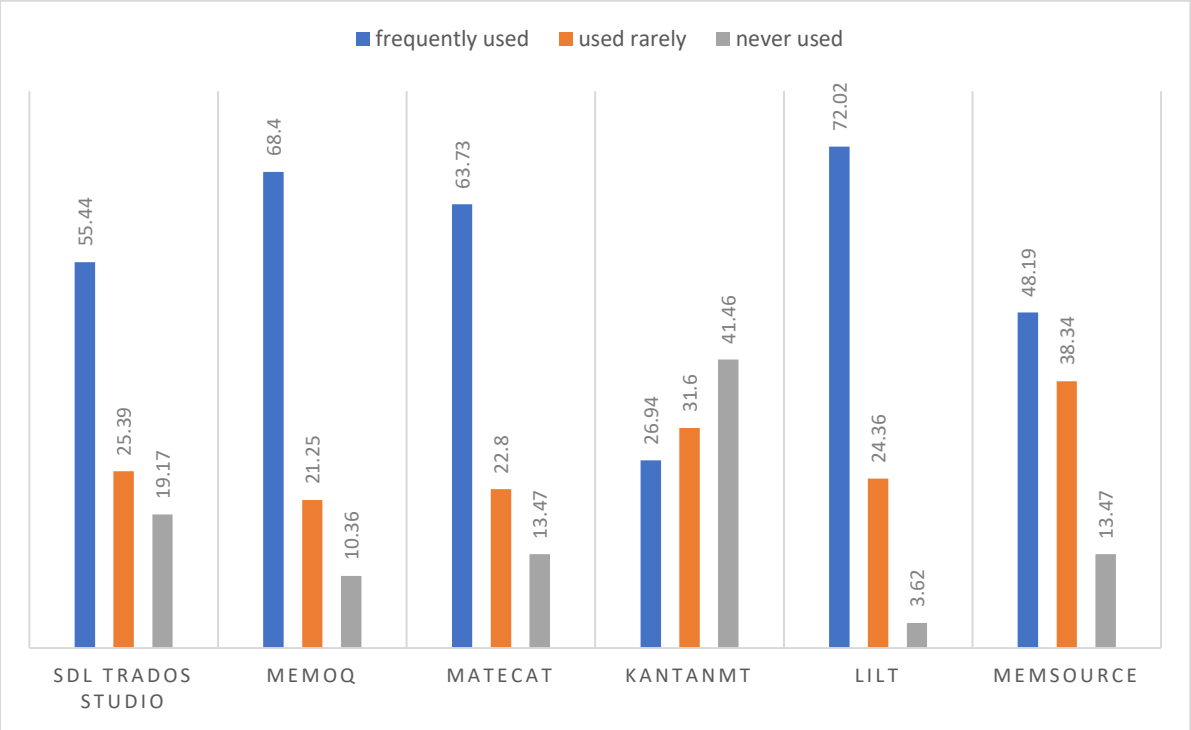

Figure 1 provides information on the usage of different artificial intelligence tools in machine translation post-editing. The summary of the findings of the data in figure 1 is presented below:

i. Over 55% of the respondents affirm that they use SDL Trados Studio frequently for machine translation post-editing. This figure is far higher than the 25.29% that use the tool rarely, and the 19.17% that rarely use this tool.

ii. A total of 68.40% of the respondents use MemoQ AI tool in their machine translation post-editing, which is higher than the 21.24% that rarely use the tool and the 10.36% that never used the tool.
iii. More than 63% of the respondents affirm that they are frequently using MateCat AI tool for machine translation post editing. The finding further indicates that more than 22% use the tool once in a while, but 13.47% have never used this particular tool.
iv. Over 40% of the study population have never used KantanMT in their MT post-editing. This figure is higher than the 31.60% that rarely use it, and the 26.94% that use the tool frequently.
v. Among all the tools, Lilt seems to be the most frequently used AI tool for machine translation post-editing. This claim is supported by over 72% that of the respondents that use it frequently, 24.36% that se it once in a while, and merely 3.62% that have never used the tool.
vi. There are 48.19% of the respondents that frequently use MemSource for machine translation post-editing, which is higher than the 38.34% that use it once in a while, and the 13.47% that have never used this particular tool.
vii. In general, all the study respondents have used one of the tool AI tools in figure 1 for machine translation post-editing. Some are more frequently used than the other.

B. Effects of the Combination of Human Translation Editors and AI tolls in MT Post-Editing.

The second research question is predicated on evaluating the effects of the combination of artificial intelligence and human translation editors in machine translation post-editing. The aim is to gain insights into the crucial nature of the AI tools in combination with human translation editors. The following questions were used to elicit data, and are contain in the table"

1. The use of artificial intelligence tools by human translation editors have enhanced the quality of machine translation post editing.
2. AI tools for machine translation post-editing does not necessarily require human editors to produce quality contents
3. Although using AI tools for machine translation post editing has enhanced translation quality, human editors are still needed for final translation results.
4. The combination of the editing skills of human translation editors and the systems of AI tools remains the best in machine translation post-editing

5. Human translation editors may not be able to produce exceptional translation content without the integration of Artificial Intelligence tools in machine translation post-editing.

Table 2: Result of the data from Research Question 2:

Question Items	SA	A	N	D	SD	Mean	Std. Dev.	Acceptability status
Question 1	**27.46**	**52.85**	**8.80**	**7.78**	**3.11**	**4.18**	**1.03**	**Accepted**
Question 2	**7.78**	**12.56**	**5.69**	**46.11**	**27.46**	**2.29**	**1.89**	**Rejected**
Question 3	**36.79**	**52.33**	**4.66**	**5.19**	**1.03**	**4.85**	**0.98**	**Accepted**
Question 4	**42.49**	**44.09**	**5.69**	**6.75**	**1.03**	**4.91**	**0.87**	**Accepted**
Question 5	**20.20**	**21.77**	**19.18**	**27.46**	**11.39**	**2.38**	**1.47**	**Undecided**

Table 2 provides insights into the nature of the important roles of AI tools in machine translation post-editing. From the results presented in the table, it could be seen that:

i. Over 80% of the study sample affirm that the use of AI tools by human translation editors have improved the quality of machine translation post-editing. This submission was rejected by only less than 12% of the study population, while 8.80% remained neutral. Considering the fact that a greater percentage of respondents agreed with this proposition, the statement was accepted.

ii. More than 73% of the respondent refute the claim that AI tools for machine translation post-editing does not necessarily require human efforts to produce quality contents. Just about 20.74% accepted the statement, while 5.69% remained neutral. following the observation that a greater percentage of population refuted this claim, the statement was rejected.

iii. More than 88% of the study population agreed and strongly agreed that despite the fact that using artificial intelligence tools in machine translation post editing has improved translation quality, human editors are still required for final translation result. This statement was rejected by only 6.22%, while 4.66% remained neutral. As such, the statement was accepted because a greater percentage of the study population affirmed the claim.

iv. About 42.49% strongly agreed and 44.04% agreed that the combination of the editing skills of human translation editors and the systems of AI tools remains the best in machine translation post-editing. Since it was only 7.78% rejected the claim and 5.69% remained neutral, the statement was accepted.

v. There is an undecided situation in question five wherein the combination of those rejected the claim with those that remained neutral is deemed higher than those that accepted the claim that "human translation editors may not be able to produce exceptional translation content without the integration of Artificial Intelligence tools in machine translation post-editing." In other words, 41.97% affirmed the claim, but 38.85% of the respondents rejected the claim, while 19.18% remained neutral. Since the value of the respondents that affirm the statement does not constitute overall majority that is higher than the combination of those that rejected with those that remained neutral, and people that rejected the claim does not also enjoy overall majority, it is deemed undecided.

C. Results of the Perception and Attitude of Translation Editors Towards the Usage and Role of AI Tools I Machine Translation Post-Editing.

A part of the questionnaire was developed to attend to the perception and attitudes of the huma translators towards the use of artificial intelligence models in machine translation post-editing. This is also another way to explore how these AI tolls are important to the human translation editors, and how they view the incorporation of the tools into their work. Five questionnaire items were developed in this regard, in order to answer the third research question. The questions are listed below and the results are contained in table 3:

1. Using artificial intelligence tools in machine translation post-editing makes the work to be easier and saves time.
2. I prefer to edit machine translated contents without any AI tools as the tools can create more errors.
3. In editing machine translated contents, AI tools may change the meaning of the original text if human translators do not make necessary inputs.
4. The continuous sophistication of AI tools in machine translation post-editing places my job at risk.
5. I became more proficient as a machine translation editor since I integrated AI tools in my work.

table 3: Result of the Attitude and Perception of AI tools in machine translation post-editing

Question items	SA	A	N	D	SD	Mean	Std. Deviation	Acceptability status
Question 1	**30.57**	**54.40**	**9.34**	**5.69**	**-**	**4.17**	**1.04**	**Accepted**
Question 2	**9.34**	**12.43**	**5.69**	**53.37**	**19.17**	**2.08**	**1.74**	**Rejected**
Question 3	**34.72**	**50.78**	**11.91**	**2.59**	**-**	**4.19**	**1.02**	**Accepted**
Question 4	**20.20**	**60.63**	**10.89**	**5.18**	**3.10**	**3.98**	**1.13**	**Accepted**
Question 5	**28.49**	**66.84**	**4.67**	**-**	**-**	**5.08**	**0.39**	**Accepted**

Table 3 provides details of the result of the data generated from question 3. The study helps to understand the perception and attitude of human translation editors towards the integration of AI tools I machine translation post-editing. The findings provide many insights into the nature of the roles AI models play in machine translation post-editing. As such, table 3 indicates that:

i. More than 84% of the study population, at a mean of 4.17, affirmed that using artificial intelligence tools in machine translation post-editing makes the work to be easier and saves time. Less than 6% disagreed but no one strongly disagreed with this claim, and 9.34% remained neutral. As such, the statement was accepted on the basis of the majority that affirmed the statement.

ii. More than 72% of the study population refuted the claim that they prefer to edit machine translated contents without any AI tools as the tools can create more errors. This claim was accepted by only 21.77%, and 5.69% remained neutral. following the fact that a greater number of the respondents refuted this claim, the statement was rejected.

iii. Over 85% of the respondents affirm that in editing machine translated contents, AI tools may change the meaning of the original text if human translators do not make necessary inputs. Only 2.59% disagreed with this position, none strongly disagreed, and 11.91% remained neutral. To that extent, the statement was accepted.

iv. More than 80% of the study population accepted the statement that the continuous sophistication of AI tools in machine translation post-editing places their job at risk. This position indicates that AI tools have become increasingly indispensable in machine translation post-editing. Since it was only 8.28% rejected this claim and 10.89 remained neutral, the statement as accepted.

v. Finally, over 95% of the respondents generally affirmed that they became more proficient as a machine translation editor since they integrated AI tools in my work. Only 4.67% was neutral in the claim, and none of the respondents disagreed or strongly disagreed with the claim. The findings inform the decision to accept the statement, indicating the AI tools have enhanced not just translation, but improved machine translation post-editing.

4.2. Discussions and Implications

The integration of different artificial intelligence tools has enhanced the post-editing of machine translation, as evidenced in the data presented. Various findings were made from the data presentation, and they are discussed here with the implications of the analysis and various studies that supported the findings in this research.

Research question one focused on the frequency of the usage of different AI tools in machine translation post-editing. The survey findings indicate that a significant proportion of respondents, exceeding 55%, reported frequent utilization of SDL Trados Studio for post-editing of machine translations. The data indicates that there is a significant disparity between the frequency of use of this tool among individuals. A considerable proportion of the population frequently uses this tool, while only a small percentage of the sample uses it infrequently, which was at 25.29%. Specifically, only 19.17% reported that they never used the SDL Trados Studio for machine translation post-editing. According to the survey findings, a considerable percentage of the participants, precisely 68.40%, frequently employ the MemoQ AI software in their machine translation post-editing. The aforementioned percentage is significantly greater than the corresponding proportions of individuals who utilize the tool infrequently, which is recorded at 21.24%, and those who have never utilized it, which is documented at 10.36%. These findings are similar to the conclusions reached in the study carried out by Dorst et al. (2023), Moorkens (2022), and Yang and Wang (2023).

In accordance with the findings of the survey, 63% of the respondents stated that they employ the MateCat artificial intelligence (AI) tool on a frequent basis to carry out post-editing of machine-generated translations. The study findings indicate that a noteworthy percentage of the respondents, specifically exceeding 22%, reported employing the aforementioned instrument periodically. It is worth mentioning that only 13.47% indicated that they had never employed this specific instrument. The study's results further indicate that a considerable percentage, exceeding 40%, of the surveyed individuals have never employed KantanMT in their post-editing of machine translated contet. The proportion of individuals who infrequently employ the tool is comparatively lesser than the proportion of those who utilize it consistently. The data reveals that 31.60% of individuals rarely use the tool, whereas 26.94% of respondents frequently use the tool.

The result further indicate that Lilt is the most frequently used artificial intelligence (AI) instrument for post-editing machine translation. The claim is supported by a considerable percentage of the sample, as over 72% of the participants indicated frequent utilization of the instrument. Furthermore, 24.36% of the participants reported that they rarely use the tool, whereas only 3.62% of the respondents disclosed that they have never employed the tool. The survey findings reveal that 48.19% reported frequent usage of MemSource for post-editing machine translation. This percentage is significantly greater than the participants who reported that they rarely use the tool, which was 38.34%, and the 13.47% who affirmed that they have never used MemSource machine translation post-editing. In general, it is evident that all study participants employed one of the artificial intelligence tools illustrated in Figure 1 to engage in post-editing of machine translation.

The second research question was aimed at understanding the extent to which the combination of the efforts of human editors and artificial intelligence can yield high quality machine translation post editing. The results of the study indicate that a significant majority, specifically over 80% of the respondents, have attested to the enhancement of machine translation post-editing quality through the utilization of AI tools by human translation editors. Less than 12% of the study population rejected this submission, while 8.80% maintained a neutral stance. The statement was accepted based on the higher percentage of respondents who agreed with it. Also, more than 73% of the participants rejected the assertion that making use of AI tools for post-editing of machine translation completely eliminates the need for human intervention in generating high-quality content. Just about 20.74% accepted the statement, while 5.69%

remained neutral. After noting that a higher proportion of the population denied this assertion, the statement was dismissed. The rejection of this statement is an indication that human translation editors are still needed to work together with the AI tools for effective machine translation post-editing.

More than 88% of the study population agreed and strongly agreed that despite the fact that using artificial intelligence tools in machine translation post editing has improved translation quality, human editors are still required for final translation result. This statement was rejected by only 6.22%, while 4.66% remained neutral. As such, the statement was accepted because a greater percentage of the study population affirmed the claim. Approximately 42.49% of the participants expressed a strong agreement, while 44.04% agreed that the optimal approach for machine translation post-editing involves a combination of human translation editors' editing expertise and AI tools' performance. The statement was deemed acceptable as only 7.78% of individuals rejected the claim and 5.69% maintained a neutral stance.

There was an undecided situation, in which the combination of those who rejected that claim with those who remained neutral is deemed higher than those who accepted the claim that "human translation editors may not be able to produce exceptional translation content without the integration of artificial intelligence tools in machine translation post-editing." In other words, 41.97% of respondents agreed with the assertion, while 38.85% of respondents did not agree with the claim, and 19.18% of respondents were indifferent. It is considered indecisive because the number of respondents who agreed with the statement does not represent an overwhelming majority that is bigger than the sum of those who rejected the claim and those who stayed neutral. Similarly, the number of respondents who disagreed with the claim does not likewise constitute a vast majority. The implication of this findings is that human translation editors are not sure if they can perform better without the integration of AI, which invariably unveils the importance of AI tools in machine translation post-editing.

The third research question focused on unveiling the nature of the attitude and perception of translation editors towards the use of AI tools in machine translation post-editing. According to the findings, a significant majority of the study group totaling over 84%, reported a mean score of 4.17, indicating that making use of artificial intelligence tools in machine translation post-editing offers a notable advantage in terms of increased efficiency and time-saving benefits. The assertion in question garnered dissent from a mere fraction of 6%,

with nobody expressing strong disagreement. Meanwhile, a notable 9.34% of respondents opted to remain impartial on the matter. Therefore, the assertion was deemed valid by virtue of the consensus of the majority who affirmed it. In a similar study, Huang and Wang (2022) summarized that AI tools have helped machine translation editors to improve their performance and do more works.

According to the findings, a significant majority of the study population, specifically over 72%, rejected the assertion that they support revising machine-generated translations without the aid of artificial intelligence tools, pointing to the tools' potential to introduce further inaccuracies. Merely 21.77% of those surveyed consented to this assertion, while 5.69% maintained a neutral stance. In light of the larger proportion of respondents who contested the assertion, it was ultimately disregarded.

According to the survey results, a significant majority of the participants, over 85%, acknowledge that making use of artificial intelligence (AI) tools in the process of editing machine-translated content may result in alterations to the intended meaning of the source text, unless adequate inputs are provided by human translators. Merely 2.59% differed from this stance, with no instances of strong disagreement, while 11.91% maintained a neutral disposition. To that extent, the statement was deemed valid.

More than 80% of the study population accepted the statement that the continuous advancement of artificial intelligence tools in machine translation post-editing places their job at risk. The current stance posits that artificial intelligence (AI) tools have attained an elevated level of indispensability in the realm of post-editing for machine translation. Given that the proportion of rejections was a mere 8.28%, and an average of 10.89% remained neutral, it can be inferred that the statement was deemed acceptable. Ultimately, a significant majority of the participants indicated that they experienced an improvement in their proficiency as machine translation editors following the integration of artificial intelligence tools in their work, with a reported percentage exceeding 95%. Merely 4.67% of the respondents expressed neutrality towards the claim, while none of them exhibited disagreement or strong disagreement towards it. The results of the study provide insight into the decision to confirm the proposition, suggesting that the utilization of AI tools has not only advanced the process of translation, but also enhanced the quality of machine translation post-editing.

5. Conclusion

Generally, artificial intelligence has been found to be very important to translation editors in machine translation post-editing. The study respondents who are professional translation editors, affirm that the artificial intelligence tools have become increasingly indispensable in machine translation post editing. With a sample size of 193 participants, and the deployment of relevant statistical tools to attend to the three research, we have been able to provide insights into the nature of the combination of the efforts of human translators and the improved performance of AI tools in machine translation post-editing. The findings indicate that the integration of AI tools with the efforts of human translation editors yields excellent result in machine translation post editing. The study further indicated that majority of the participants rejected the position that machine translation post-editing tools can effectively produce high quality machine translation post-editing services without the input of human editors. There is also an indication that the human translation editors are concerned about the security of their job as advancements in AI continues to threaten their profession. However, almost, 94% of the respondents accepted the fact that the best practice is the combination of the efforts of human editors and AI machine translation post-editing tools.

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