Master's thesis

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The new role of professional translators as post-editors and translation technology consultants

A qualitative systematic review considering the translator's role in a technology-driven industry

Master's thesis in Translational Studies
Supervisor: Annjo Klungervik
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Abstract

Since the increased automation of translation technology and its subsequent reduced level of human agency, professional non-literary translators and researchers alike have expressed concern regarding the role of professional non-literary translators in the industry. In this paper, a qualitative systematic review is presented with the purpose of providing an overview on what translation research from the last two decades has concluded about the evolving role of the professional translator as post-editor and in more recent times translation technology consultants. An attempt to shed light on the concerns researchers express regarding the challenges connected to this role was also made. Considering these challenges, the aim of the review was to investigate potential gaps in research that may answer questions regarding the future role of professional non-literary translators. A method of data synthesis was carried out to acquire relevant data for the study. By using databases of peer-reviewed journals, a set of search terms were used to limit the results while also providing relevant data. In acquiring the data, an analysis was performed, providing insight into the roles of professional translators since 2006 and up to present times. The findings of the study suggested the significant value of acceptance of the symbiotic human-computer interaction (HCI), technological adaptability and the collaborative relationship between professional translators and MT system developers. Additionally, the findings also suggested a potential for a new and more technologically involved role in the translation process where the translator is considered both a linguistic mediator and technology consultant/adviser (Massey, 2018).

Acknowledgements

I would like to take this opportunity to give thanks and show gratitude to my supervisor Annjo Klungervik Greenall for her valuable feedback and guidance in writing this thesis. She has been a great mentor providing me with insightful comments as well as having served as a great motivator in our digital meetings by being the understanding, positive and knowledgeable woman that she is. Also, Annjo deserves credit for her response time in our e-mail correspondence, which has been absolutely on point.

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1 Introduction

In the last two decades, technology has been at the forefront in revolutionizing trade and communication industries to become more efficient both in terms of consistency, cost, and speed. The field of translation is among these and has revolutionized the speed at which translation can be processed as machine translation (MT) is able to provide translations of large bodies of text from one language to another within seconds. Due to this development, many researchers have begun to raise questions regarding the roles of humans and machines as MT seems to have started a shift from the peripheries of the field of translation towards the center (Koponen, 2016, p. 131). With our technology's short, but meteoric history, the translation industry has seen some rapid changes in practice. In addition to MT, translation tools like computer-assisted translation, or CAT, have also received a central role in translation as it provides translators with simultaneous translation alternatives while translating. MT, on the other hand, handles translations of strings of text at incredible speeds and without human intervention and furthermore beyond a human's capacity, leaving translators to instead fix minor errors or a smaller percentage of an overall text. This is referred to as post-editing MT (PEMT) output, and its practice has seen an increase, which is reflected in a growing body of research, that has rapidly reached a critical mass especially in translation process research (O'Hagan, 2019). However, as reported by multiple researchers within the translation industry, speed is not everything, as translators need to edit the MT output to ensure the transfer, whether it is semantic, cultural or other elements of language for the translation to be publishable (Koponen, 2016; Taivalkoski-Shilov, 2018). This rapid transition into a more modernized industry creates a situation in which we do not know exactly how the process will unfold, leading to a sense of uncertainty among professional translators (O'Hagan, 2019).

Now with this growing mass of research into translators and machine translation, this qualitative systematic review will present and attempt to answer three research questions: (RQ1) With translators increasingly turning more into post-editors of MT, what does research within translation studies tell us about how MT is currently changing the role of the translator and how it might change even further in the future? (RQ2) What concerns do researchers have regarding the challenges connected to this role? (RQ3) Considering these challenges, what are the gaps in current research that will need to be filled? These research questions are important to ask as the answers may provide insight into and an understanding of how the future looks

for professional translators, the translation industry and the developing technologization of translation. In addition, it may provide some clarity to concerns and challenges and possibly supply researchers and professional translators on how to approach them. In the same vein, by shedding light on challenges that professional translators face in terms of user experience (UX), research may provide information as to how professional translators and developers of MT and CAT may collaborate to improve translation technology to create a more symbiotic relationship between the translator and the technology (Sun, 2021). Furthermore, these questions may impart knowledge of areas less known or prioritized within the industry that researchers need to bring more attention to.

To provide answers to the questions in this review, a method of data synthesis was carried out, using three different databases including *Sciencedirect*, *Google scholar* and *Oria*. These are databases that provide a vast number of peer-reviewed journal articles that can be found through searching its archives. By limiting the search with certain keywords or search terms, the databases provided search results extracted from individual research studies relevant to the research questions. In addition, by choosing specific search terms related to the research questions, the search results yielded more relevant articles for screening and analysis, thus avoiding both data irrelevant to the research questions as well as avoiding too broad and/or general search results. Finally, upon methodically sifting through the articles, the review was left with the 12 articles that represent the works considered and cited throughout this review. Furthermore, a thorough reading and analysis of each of the peer-reviewed articles was carried out to identify their theories and conclusions, and to ultimately observe and note their commonalities and connections.

Considering the uncertainty that automation of the translation industry poses to humans in the field, it raises questions and concerns as to what kind of roles professional translators have in the translation industry in the future. According to research on the roles of translators, technological developments made in the industry has forced some translators to resituate their practices as co-constructors of knowledge and co-communicators in more recent times (Raido, 2016). The post-editing role may therefore evolve into one that is more malleable and thus emerge into something new because of the equally evolving wave of automation in which the industry is undergoing. In the same vein, more varieties of translators will likely come as the need for technological know-how will be essential in adapting to the new role and a combination of a linguistic mediator and consultant of technology will be even more valuable (Taivalkoski-Shilov, 2018, p. 695; Massey, 2018). This may point to a future

of a more versatile translator role in terms of competence as it represents both linguistic and technological knowledge (Massey, 2018).

However, research on the challenges connected to these roles has illustrated far-reaching repercussions for the work and livelihood of the translators. Challenges such as the effort that goes into post-editing raw MT output and the working conditions that translators work under using technological tools of varying quality are among these (Koponen, 2016, p. 132). Researchers have observed some significant tendencies of translators to hesitate with or avoid implementing translational tools or technology into their work due to two of the most prevalent factors. One is unfamiliarity with the technology, causing translators to feel uncomfortable or encumbered by what they perceive as unnecessary and additional workloads, thereby neglecting it partly or altogether referred to as adoption or non-adoption of MT in this review (Cadwell, Castilho, O'Brien & Mitchell, 2016, p. 235; Taivalkoski-Shilov, 2018, p. 694; Koponen, 2016, p. 136; Beikian, Ketabi & Hesabi, 2019, p. 58; O'Brien, 2012, p. 108, 109). The other factor is regarding the user experience design (UXD) of the technology referring to how the technology is developed with the actual users of the service in mind, namely the translators in this context (Sun, 2021).

MT has for a while been a technology that requires little to no human intervention and is undergoing constant improvements as humans are becoming more adept at upgrading technology with new innovations. With the way that MT works today, these developments of MT will create an exponential gap between MT's translational ability and human agency (O'Hagan, 2019; Koponen, 2016, p. 135). Furthermore, as CAT tools are becoming increasingly more affected by MT, this too may further reduce the level of human agency in translation (O'Hagan, 2019). Additionally, many translators have been for a long time and still are living in a time of austerity as their conditions are affected by low rates, reduced agency in translation and ultimately experiencing a feeling of devaluation and demotion (Taivalkoski-Shilov, 2018, p. 695; O'Brien, 2012, p. 109). Likewise, as MT generates errors that a professional translator would rarely make, post-editing translators are left to complete tasks far below their level of competence, creating a feeling of being reduced to lesser repairs further generating negatively associated feelings toward both the technology and their own situation (O'Brien, 2012, p. 109).

These factors point both researchers and translators alike to prioritize implementation, familiarization, and normalization of translation technology into the profession as well as to create a collaborative environment between researchers, professional translators, and the

developers of the technology in question to make the technology fit the translator and not the other way around (Taivalkoski-Shilov, 2018, p. 694).

2 Method

2.1 Data Collection

In this qualitative systematic review, the method used was that of data synthesis, or in other words, results extracted from individual research studies that were relevant to this review's research questions (Munn, Tufanaru & Aromataris, 2014, p. 49). An electronic database search was made in three databases within multidisciplinary fields such as linguistics and digital technology with an emphasis on translation within these two. The three databases used to conduct the search were *Google Scholar*, *ScienceDirect*, and *Oria*. Before searching the archives of the databases, some considerations in terms of the research questions had to be made to acquire relevant data. As the research questions consider the role of translators, the challenges they face, and gaps in research, the search terms initially used were 'machine translation', 'translators', 'role of translators' and 'post-editing'. Upon getting familiar with the search results, and their respective titles and abstracts, more keywords were registered and thus added to the collection. Including the four first search terms, a set of eight keywords were used to acquire relevant data for the study. Keywords used in the search were: 'Machine translation', 'translators', 'role of translators', 'post-editing', 'Computer-assisted translation', 'professional translator', 'non-professional translator' and 'translation technology consultant'. The different search terms were used both separately and combined to both broaden the search but also to attempt to narrow it to explore relevant connections. Due to the difference between the databases, the search terms gave different results. Since *Sciencedirect* and *Google Scholar* provided the largest data result collection, these were the two databases mainly used. However, *Oria* was not excluded as it served a useful purpose in finding articles missing from the two other main databases.

Articles written in a different language than English were excluded from the results and although the review addresses digital technology and requires a degree of updated sources, eight sources published prior to 2018 were included in the results as they yielded relevant data regarding translators, post-editing, and their interrelationship. Another reason for the inclusion of older sources was to acquire insight into the change in the role of translators over the years. The remaining sources ranged between 2018 to 2021, to provide the review

with up-to-date sources on machine translation as well as present-day translators and their present and future role.

During the initial database search conducted, no record of the amount of search results was kept, and neither was there an exclusion or inclusion criteria for data collected. However, regardless of record, data for the different search terms varied between 10 000 to 200 000, and the factor for inclusion or exclusion was the relevance of the data in relation to the research questions. This connection through relevance was found by screening titles of articles for words that indicate a different topic than that of the research questions of this review. Data including search terms but not relevance to the research questions was thereby excluded from the collection. Relevant articles therefore included the search terms as well as other words connected to the topic of machine translation, translators, and post-editing. Upon collecting a satisfactory amount of 36 articles, a secondary rounding of filtering was needed, and a thorough reading of the articles' abstracts was carried out to further seek out relevance and relation to the research questions. In addition to the beforementioned databases, before arriving at the 36 articles, a screening process of the existing articles' reference lists was simultaneously carried out to access relevant data conveniently. Finally, 21 articles made it through for further research and actions were taken to acquire access to the different works for reading. Finally, an additional seven articles were excluded upon a full-text assessment as they lacked relevance to the research questions by discussing irrelevant topics or provided a similar but less informative role as another article, leaving the study with 14 articles.

2.2 Quality assessment

Each of the articles included in the research were peer-reviewed journal articles. Moreover, the quality of data chosen for the research was evaluated in multiple steps of the procedure. One of which was the inclusion of specific keywords or search terms to limit the search. However, combinations of said search terms were also implemented to acquire more data matching the criteria of relevance. This combination allowed for additional data results for screening and analysis. Although the combination provides more results, the chosen search terms still limit the search results both due to the number of search terms but also because of the choice of search terms themselves. One drawback from this could be that these choices may have excluded relevant search results from the research. Another drawback could be from the screening process of titles, where the title obscures or misleads the researcher into

excluding the article. However, because of this method of screening, the researcher is not encumbered by an overwhelming amount of search results and allows for a more comprehensive screening of abstracts.

On another note, careful consideration was taken in the inclusion of articles with respect to the year the articles were published. Articles regarding the translators' role, effort in post-editing and workload did not require as strict a criterion for updated publishing year as that of articles regarding machine translation. Thus, articles going back as far as 2006 were included as they offered relevant insight for the research questions.

3 Results

3.1 The new role of translators

Due to the nature of the roles of MT and translators, MT's shift to the center from the peripheries has created a subtle repositioning between the two, placing the translator in a now more peripheral role (Koponen, 2016, p. 131). Instead of providing the manual translation of an entire text, many, though not all translators process the raw translations produced by MT by editing it for errors and overall quality as the MT output is not always flawless. The increase of post-editing MT (PEMT) has quickly amassed a large body of translation process research interested in the effects that this will have on the translation industry, the profession, the process and the overall role of the translators themselves (O'Hagan, 2019). A study carried out by Raido (2016) argues that:

> […] despite the challenges of powerful automatic implementation, and the upsurge of volunteer crowdsourcers, professional translators will continue to adapt to evolving work conditions and emerging phenomena, moving the traditional boundaries of the practice and discipline of translation (Raido, 2016).

3.1.1 What roles are translators left with?

With the increase in the use of machine translation and the corresponding post-editing workflows, the role of translators in the field, whether professional or not, has already changed as a result and is expected to continue to do so (Koponen, 2016, p. 143). The ultimate concern and topic of contention regarding the role of human translators expressed in

translation research is that of the concerns of MT technology pushing humans out of the field (Koponen, 2016, p. 143). Although the role of the translator has shifted to the periphery, as stated before, translators are still essential in the translation process of the *human-computer interaction* (HCI) as referred to by O'Brien (2012). Paraphrasing O'Brien's (2012) formulation, HCI is a term that considers the symbiotic relationship between human and computer regarding translation, without dehumanizing translation or humanizing computers, but rather realizing the profession as already changed and that there are both benefits and challenges connected to this relationship (p. 103). For many years now, translators have had the role of post-editors working with computers, and as the industry is becoming further technologized, MT will continuously need technological moderators as well as linguistic professionals ensuring publishable target texts. With that said, newer research is recognizing new competence profiles of translators indicating a similar symbiosis as the one argued by O'Brien (2012) in what is referred to as intercultural linguistic mediators, trans- and co-creators, language quality and technology consultants/advisers (Massey, 2018). Looking forward, perhaps even beyond post-editors and the new translation technology consultants, research is pointing toward future translator roles that may be even more involved in the development of not only MT systems improving user experience design (UXD), but also research and implementation (Sun, 2021; O'Brien, 2012, p. 119).

3.1.2 Translators as post-editors

The increasing potential and benefits of MT coupled with the need for human translators creates a relationship ensuring the essential quality and integrity of the translation. According to O'Brien (2012), this HCI symbiosis presents a need for a shift in focus within the translation community as the interrelationship between the two can be studied to improve and enhance the output of PEMT (p. 103). A trope in translation research has been that of 'user experience design' (UXD) and the room for improvement for human translators' use of MT systems (Sun, 2021). User experience design (UXD) refers to the design of the technology and how it is made in accordance with the ones that use it (Sun, 2021), in this case being post-editors.

The concerns regarding humans being pushed out of the translation industry and into a more peripheral role of a post-editor is largely reflected in research (Koponen, 2016, p. 143). However, studies show that the translators' role has already changed and that although MT

may be effective in certain areas of translation, like text that is limited in its complexity or one that only needs its contents to be adequately translated, it is still quite dependent on human supervision (Koponen, 2016, p. 143). Furthermore, research also reflects and emphasizes human agency in translation as essential and that the cause for concern is rather a helpful tool if the translators can accept their new role as post-editors (O'Brien, 2012, p. 109). On the other hand, this has not been the case for all translators, as literary translators have had a more uncomplicated time in relation to translation technology, as their source text require more complex facets of translation and attention to detail (Taivalkoski-Shilov, 2018, p. 695).

3.1.3 Translators as collaborators with MT system developers

With these points in mind, the new role of translators does come with baggage, indeed, however, there is a silver lining to their role. Both O'Brien (2012) and O'Hagan (2019) provide support for the positive sides of post-editing MT output, since the corrections made by post-editing translators oftentimes are fed back to the MT systems in order for it to "learn from its mistakes" (O'Brien, 2012, p. 106). Additionally, O'Brien makes a valid argument in emphasizing the potential of including professional translators in the technological development process for the translation industry, thus shaping a new and more integrated role for translators:

> […] the more the professional translator is involved in the testing, implementation and execution of translation technology, the more ownership they feel over the technology, and the more likely it is to be seen as an aid rather than a dehumanizing threat. (2012, p. 109).

O'Brien (2012) argues for a need for a paradigm shift, as technologization provides an opportunity for translators to improve their skills and take on new roles rather than see the technology as a threat (p. 119). In her article, she argues a possibility for translators in a role where in addition to being post-editors, they are also collaborators with MT system developers, researchers, and implementers (p. 119). This new role may be key in developing a translation technology design which is suited for professional translators as it would be based on the perspective of its intended users.

3.2 Challenges

The translation industry along with its translators and machine technology has had a change in their ecology and the roles of translators is thus changing due to the growing and developing nature of technology. As a result of this change, despite the many perks and advantages of MT, many translators are faced with several challenges in their profession working as post-editors of which five will be addressed here. First, research done on the attitudes of translators toward MT has, according to researchers Beikian, Ketabi & Hesabi (2019) a strong connection to the working conditions of post-editing translators (p. 58). Second, another challenge facing translators is the effort put into post-editing machine translation considers the varying repercussions of the technological changes in the industry such as the livelihood and textual ownership of translations (Taivalkoski-Shilov, 2018, p. 691). Third, facing translators is the challenge of the reduced amount of human agency in translation technology. With CAT being a means of assisting translators in their process, and MT being more of an independent or automatic translation (although often dependent on humans to post-edit), this may prove a significant challenge to the role of translators, not only as post-editors but as translators as a whole, as CAT is becoming increasingly more influenced by the automation of MT, thereby placing human agency even further to the peripheries (Koponen, 2016, p. 131). Fourth, translators have for a long time been and still are finding themselves in a place of austerity even though the translation industry has been growing (Taivalkoski-Shilov, 2018, p. 695). With MT making certain elements of translation more effective, many translators have been left with the feeling of fixing the lesser mistakes of the machine and feel a sense of devaluation from all their years of training and education only to be replaced by a machine (O'Brien, 2012, p. 109). With that said, there are more than just one type of translator, and literary translators for example, have had less issues with MT as their source text require a more complex translation (Taivalkoski-Shilov, 2018, p. 695). However, literary translators, as with non-literary translators face financial challenges like low wages (Taivalkoski-Shilov, 2018, p. 695). These are challenges translators have had to come to terms with due to the nature of automation and its developments, and further research into these issues may provide information as to how working conditions can be improved for professional translators.

3.2.1 Translators' attitudes toward MT

Research shows that non-adoption of technological tools such as translation memory (TM) and MT by some translators originate from their unfamiliarity with the technology and that this may cause professional translators to have more negative attitudes toward MT (Beikian, Ketabi & Hesabi, 2019, p. 60). In the same vein, with ongoing advancements of machine technology, CAT is becoming increasingly affected by MT, causing further "automation anxiety" among translators as Akst (2013) coined it (O'Hagan, 2019). Following this notion, Lange & Bennett (2000) observed that translators' productivity may be increased by implementing technological tolls into their practice through accepting their role as post-editors of machine-controlled translations and that if negatively disposed toward MT, the resulting process of post-editing may prolong the human translation (Beikian, Ketabi & Hesabi, 2019, p. 60). This acceptance of translators' new role is according to them considered potentially beneficial to translators as familiarity and skills in using technological tools in translation may affect their attitudes for the better. Furthermore, along with Dillon & Fraser (2006), they assert that professional translators proficient in information technology seem to have more positive attitudes toward MT (Beikian, Ketabi & Hesabi, 2019, p. 60).

Translators with technological know-how share a connection with what O'Brien (2012) refers to as the human-computer interaction (HCI) and the technological implementation into the profession (Beikian, Ketabi & Hesabi, 2019, p. 60). This may imply the common notion that the more familiar you get with a process, the more confident and capable you become. This creates a dilemma for translators who cannot adapt to their new role and may therefore struggle to compete compared to those who do acquire skills and sees technology as a helpful tool for greater throughput (Koponen, 2016, p. 136). Translators' hesitancy due to unfamiliarity may cause them to refrain from using translation technology, thereby creating a sort of paradox in which their own hesitancy or unwillingness only exacerbates their potential for learning and inhibits their ability to adapt (Beikian, Ketabi & Hesabi, 2019, p. 60).

For instance, studies like Beikian, Ketabi & Hesabi (2019) cover one of the challenges of translators' attitudes toward MT technology and notes how translators who are negatively disposed to MT, may experience a more drawn-out post-editing process which may be even slower than human translation (p. 60). Their study further indicates that translators who share more positive attitudes toward MT will experience increased productivity given that they feel comfortable in their role as a post-editor of translation controlled by machines (p. 60).

Another study by Cadwell, Castilho, O'Brien & Mitchell (2016) carried out an experiment on 70 translators of the European Commission's Directorate-General for Translation (DGT) to better understand the factors involved in the adoption or non-adoption of MT systems in translation and found at the same time interesting results regarding the participants' shared thoughts about positive and negative aspects of post-editing MT (p. 235). A table was presented to illustrate the reasons provided by the DGT participants:

Reasons to use MT	**Reasons NOT to use MT**
For speed or productivity gains	Because of perceived poor quality of MT output
Because of the perceived good quality of the MT output	Because of MT's negative influence on a translator's abilities
For inspiration, to kick-start the translation process or for new ideas	Because of fear (of the unknown, being replaced)
To reduce typing or clicking	Induces translator to make particular errors
Because of personal interest in technology	Extra attention required for PEMT
Because MT output is easily enabled or disabled	Personal lack of interest in MT
Out of habit or custom	Devalues a translator's work
For weaker source languages	Following direction from a senior or colleague
With the goal of improving the MT systems	Because they're not required to
Following direction from a senior or colleague	MT cannot be trusted
To get a gist understanding	MT Diminishes creativity
Because of MT's positive influence on a translator's abilities	MT output is not always accessible
To not waste resources	Security/confidentiality reasons
Because a target text will be revised anyway	
To miss fewer elements of source content	
For texts which can easily be processed by a machine	

Table 1. (Cadwell, Castilho, O'Brien & Mitchell, 2016, p. 236)

Although their study decided to focus on the aspect of participants expressed that they were using MT as a "kick-starter" for their writing, this study will instead draw upon the more central issues displayed here, such as quality, unfamiliarity with tools and technological know-how (Cadwell, Castilho, O'Brien & Mitchell, 2016, p. 236). Although these are not all the issues covered in this table, topics such as effort, devaluation of translators and human agency will be covered in the following sections of this discussion.

3.2.2 The effort of post-editing MT

Research into post-editing and its productivity has found conflicting results, as studies have reported significant productivity gains in comparing post-editing to manual translation, while other studies have not been able to report significant differences (Koponen, 2016, p. 136). Productivity in this context refers to the speed of translation with good quality ensured. Machine translation provides speed without a doubt; however, it does not guarantee a result of publishable quality. Furthermore, studies such as Koponen (2016) report how translators are paying the price of poor MT quality, as post-editing could in some cases require more effort than manual translation as translators need to go back and forth between the source text and the MT output to identify discrepancies and ensure the quality of the work of the MT output (p. 132). With that said, Koponen (2016) addresses specific conditions that the productivity depends on, namely high-quality MT, which is according to the study achievable for certain language pairs, and with the right systems of MT designed for the specific type of text being translated (p. 136). Additionally, as we will get into later, the post-editors' familiarity with translational tools and processes involved in post-editing play an important role on the effort of post-editing (Koponen, 2016, p. 136). On that note, a study observing translators' productivity have found that the inclusion of MT may increase their productivity (throughput - words translated per hour) given that they are comfortable in their role as post-editors (Beikian, Ketabi & Hesabi, 2019, p. 60). In addition, the study found that translators negatively inclined to implement MT into their post-editing process may as a result cause it to take longer than human translation would (Beikian, Ketabi & Hesabi, 2019, p. 60).

Also, a study carried out by Beikian, Ketabi & Hesabi (2010) supports the notion of encumbering translators with the workload that follows the use of translation technology (p. 58). They, along with other researchers (Ehrensberger-Dow, 2017; LeBlanc, 2017) argue that the use of computer-assisted technology (CAT) for post-editing translators, may have both negative effects on translation quality but also thrust unnecessary mental loads on translators (p. 58). Although CAT is meant to provide users (translators) with assistance in translation by offering multiple alternatives to a translation, for example, it might concomitantly make the process more complex or laborious for the translator.

3.2.3 The reduced level of human agency in PEMT

Translation, according to Gómez (2020) is not solely about being able to write in the target language, but rather knowledge of how a language is used, like knowing your audience, theme, relation to reader/recipient, or in other words, metalinguistic knowledge (p. 205, 206). This knowledge is something that is considered more of an innate personal understanding acquired from experience, rather than something that can be refined and developed (Gómez, 2020, p. 205, 206). Human agency is therefore a significant element in translation, although to a larger degree in some places more than others, like with literary translation where *voice* is something that the author provides and is inferred by the reader by means of recognizable features known to a collective consciousness (Taivalkoski-Shilov, 2018, p. 695). According to research carried out by Taivalkoski-Shilov (2018), the human translator can be contrasted with the more stereotypical voice of MT, which has a more non-linear and unpredictable voice as well as with a lack of common sense (p. 698). This distinguishes it from the human translator who can create a vocal multilayeredness and deliberate ambiguity making it possible to have plural interpretations, which may most often be too complex a process for MT systems (Taivalkoski-Shilov, 2018, p. 698).

Another significant challenge regarding human agency is CAT being increasingly affected by MT (O'Hagan, 2019). The reason for why this is significant is due to CAT functioning as a technological tool designed for human intervention, offering translators simultaneous vocabulary alternatives while writing based on human-produced translation memory (TM) matches (O'Hagan, 2019). MT on the other hand is considered automatic computer translation without human intervention and it is this concept of translation without human intervention which has caused concern regarding quality for the translation industry, which seem to be of utmost importance according to the SDL Translation Technology Insight Survey (SDL 2016) (O'Hagan, 2019).

Additionally, research into CAT and MT developers and their co-operation with translators may prove fruitful in the future as a lot of uncertainty originates from unfamiliarity with the technology as well as the technological design may not be optimal for its intended users such as professional translators. These two factors are inter-related and may affect translators' opportunity to achieve a fully beneficial and symbiotic relationship between the translator and translation technology.

3.2.4 The austere conditions of translators in a technology-driven future

Recent research within the translation industry related to MT demonstrates the austere conditions of the translators' profession in an environment where the language industry thrives (Moorkens, 2017, p. 464, in Taivalkoski-Shilov, 2018). This perspective can be argued to portray the profession as one rolling with the punches, so to speak, as translators have been put in a position where the technology sits in the front seat. However, according to Taivalkoski-Shilov (2018), this austere role does not include all translators, as some literary translators seem to have been put in a more favorable position with regards to translation technology. Nevertheless, a withstanding challenge she presents is that of poor fees for these translators as their fees do not secure a proper living, so much so, that it does not equate to a stable means of living, compelling them to seek out side-jobs or likewise become dependent on grants (Taivalkoski-Shilov, 2018). In the same research, some non-literary translators have also been able to get ahead of this *losing* side of translation technology as technological know-how appears to be paramount in the new role of translators (Taivalkoski-Shilov, 2018). According to Beikian, Ketabi & Hesabi (2019), translators' productivity has been observed to increase with the combination of translation memory (TM) and machine translation (MT) given that these feel comfortable in their roles as post-editors of machine-controlled translations (p. 60). Additionally, should the translators feel negatively disposed to MT, the process of post-editing may take longer than human translation (Beikian, Ketabi & Hesabi, 2019, p. 60).

Taivalkoski-Shilov (2018) reports on the repercussions of the changes that professional translation is undergoing and how the nature of translators' methods, livelihood and textual ownership is being affected the increased focus on productivity (Drugan, 2013, p. 187; Ehrensberger-Dow, 2017, p. 343; Koskinen & Ruokonen, 2017, p. 8; Moorkens, 2017, p. 464–466; O'Brien, 2012, p. 103, in Taivalkoski-Shilov, p. 691). This increased focus and inclination to outsource services of translation both in the private and public sector is pushing more translators to work on a freelance basis, posing new ethical challenges for translators, like questions of copyright as well as more professional repercussions for professional translators such as job security and stable income (Taivalkoski-Shilov, 2018, p. 2018).

In addition, O'Brien (2012) discusses how the use of translation tools creates an expectation of increased productivity while at the same time decreasing the translator's pay (p. 110). Furthermore, since the introduction of translation memory tools (TM), rates per word from translation have undergone a steady decrease, and due to the exponential use of MT, the

decrease, or as she calls it, “downward pressure”, is felt even further (O’Brien, 2012, p. 110). In addition to this financial challenge to their role as post-editors, O’Brien also addresses translators’ feelings of devaluation of their profession due to their years of training, acquiring competence which require time, effort, and expenses, only to see it mirrored within hours because of stored databases and terminology management tools (2012, p. 109).

4 Discussion

4.1 Overview

The 14 articles chosen for this review involve research on the translator’s role, the translation process, and the profession itself. More specifically, the articles address these factors in relation to translation technology, and how the evolving post-editing and translation technology consultant role of translators is changing even further due to MT technology. The literature points to how the increasingly technologized translation industry can be seen as propelling the role of professional translators as they need to adapt to the changes, suggesting a need for a paradigm shift in their profession.

The following topics will discuss the findings of the studies addressed in the results section of this review firstly with regards to the first research question (covered in 4.2 & 4.3) on the roles of professional translators as post-editors and translation technology consultants. After having discussed the answers of RQ1 in 4.2 and 4.3, an evaluation of the research and the researchers’ methods will be addressed at the end of 4.3. Secondly, the second research question (covered in 4.4) will be answered in the discussion about the concerns researchers have regarding the challenges that are associated with the role of the translator (RQ2). After having addressed the answers of RQ2 in 4.4, a similar evaluation of the researchers and their methods will be addressed at the end. Lastly, the discussion will address the third research question, namely what researchers argue should be the scope of future research related to the translation profession as well as my own reflections on future research.

4.2 Translators as post-editors

In attempting to answer the first research question regarding how MT is currently changing the role of translators, and even further in the future, it will be important to look at the larger picture from a temporal perspective, as the role has changed over time due to the

technologization of the industry. Because of this, the results section of this study included articles going back to 2006 to include research covering topics involved with the post-editing role then and up to more recent times. The research in this study points to how translators in the translation industry have, due to MT technology, taken a role as post-editors and more recently a role of translation technology consultants. Furthermore, as technology has developed, machine translation has become advanced enough to be able to translate large bodies of text almost instantaneously. This increasing practice of PEMT has brought interest into the translator's profession and role and is therefore largely reflected in translation research (O'Hagan, 2019; Koponen, 2016, p. 143; Beikian, Ketabi & Hesabi, 2019, p. 58; Taivalkoski-Shilov, 2018, p. 694; O'Brien, 2012, p. 106). Professional translators have because of this technology adapted into the role of editing the raw MT output generated to ensure the required quality of a given target text, as MT output is not without occasional errors of syntactic or semantic nature (O'Brien, 2012, p. 108, 109). There are multiple elements involved affecting this relationship between translator and machine that research emphasizes. O'Brien notes that even though MT comes with flaws, post-editing MT output can increase the translator's average production of words per day significantly and according to Koponen (2016) as much as 2,500 to 3,500 words per day and in some cases depending on the individual as much as 5,000 words per day (Koponen, 2016, p. 134; O'Brien, 2012, p. 107). Quality of MT output is therefore a very central element in discussing translators as post-editors, because it provides the base from which human translators can optimize their translation process, and for the MT to serve its potential. This notion is supported by O'Brien's (2012) article on human-computer interaction in which she discusses how human translators and post-editors more specifically play an essential role in producing high quality MT output. By repairing and improving the output produced, the feedback received helps optimize the MT systems which continuously generate a mass of training data that will develop and improve the quality of MT (O'Brien, 2012, p. 118). Thus, seen from the perspective of MT technology, the translator role thereby provides updated linguistic information with which the system can learn from – a role we will get into in 4.3.

What we can take from this with consideration to the first research question is that the translator and the machine share a symbiotic relationship as O'Brien expresses in his article (2012). More than that, the concerns regarding humans being pushed out of the translation field can be comforted by the conclusions of these aforementioned findings as translators are more efficient as post-editors with the aid of high quality MT, and MT systems are dependent

on the competence and quality control of post-editors not only for publishable quality but as a source of training data to improve its quality, thus creating the symbiotic relationship in which both parts benefit from each other (O'Brien, 2012).

4.3 Translators as collaborators with MT system developers

Research from more recent times suggests a different role for translators, namely translation technology consultant (Massey, 2018) – one that is more involved in the technological translation process. This also provides us with an answer to the first research question regarding what research tells us about the changes in the translator's role, and which direction it is taking looking forward. Although one might think that the improved MT systems may eventually push out humans, research shows that translators have instead adapted in a way of collaboration with MT system developers to maintain quality and to improve working conditions by getting involved with areas such as UXD for technological translation tools of CAT for example (O'Brien, 2012, p. 119; Sun, 2021). This suggests one of the ways in which the role of translators is changing even further as technology has established a more central role in translation, and opportunities for professional development for translators have emerged. The reason for the inclusion of studies dating back as far as 2006 is that they illustrate how and why the role of translators change in parallel to the growing technologization. Although newer studies provide updated data on the current technologies in use, the role is one that needs to be considered based on its developments over time. Koponen (2016) mentions how research on post-editing already begun in the late 1950s and 1960s and displays how long this change has taken place due to the automation of the industry (p. 133).

Nonetheless, as technology has grown, so has translators' possibilities to adapt, and as a result, many translators have been forced to resituate their practices, thereby broadening the potential of their competence in accordance with technology (Raido, 2016). More recent research has also found that the more recent translator competence profiles that have been developed at the European Parliament's DGT (The Directorate-General for Translation) are acknowledging the potential of T&I (translation and interpretation) professionals as intercultural linguistic mediators and language quality and technology consultants (Massey, 2018). These findings can be recognized and supported by doing a quick search on the internet illustrating several webpages where translator profiles such as *translation technology*

consultants are offering their services through lesser-known freelancers (proZ.com), larger non-profit social enterprises (slator.com) and even on widely recognized business platforms such as LinkedIn. Although some webpages are markedly more recognized and credible than others, it does however demonstrate how the role of translators has reached quite a different potential, advising on not only linguistic issues, but on technological tools such as CAT, technical communication, and MT. The services that this new role offers can provide competence to a larger audience than just the translation industry and gives a different perspective to the translator's position looking back.

Another suggestion from research is how the resulting data and experience from post-editors' functions as key components to improving MT systems, creating a basis for the collaboration with MT system developers (O'Brien, 2012, p. 119). This research illustrates not only the value of human intervention of translators, but also their necessary place in the technologized industry. In addition, it also illustrates how their role will continue to change by necessity alongside MT and because of this, translators collaborating with MT system developers will ultimately create the shift in paradigm which O'Brien (2016) addresses (p. 119). This will, instead of being seen as a threat, be seen as an opportunity to expand skillsets and new roles that will, according to Massey (2018), provide a type of hybrid role where linguistic and technological competence are at the forefront. Similarly, research also expects this involvement of translators in the technological aspect of translation such as the testing, implementation, and general production of translation technology (O'Brien, 2012, p. 109). This will further provide translators with a feeling of more ownership over the technology and similarly, instead of being received as a dehumanizing threat, translation technology will be seen as what it was originally meant to be - an aid (O'Brien, 2012, p. 109).

Taking a more critical look at this research from the outside, most of the sources used in this study range from ten to seven years old, which one could argue is outdated material to support one's theories regarding technology in the translation industry of today. However, when aiming to find answers regarding the change in the role of translators, the perspective of the past is significant in observing how things were as opposed to how things are. With that said, most of the research carried out by Koponen (2016), O'Brien (2012), and Taivalkoski-Shilov (2018) is theoretical, making their theoretical claims less credible as opposed to empirical evidence. Also, details regarding translators' average words produced per day mentioned by Koponen (2016) are elements of the bibliography that are important to keep in mind, as these details might not be consistent with present day word production of post-

editors. With regards to technology and the productivity of translators, a lot can happen in seven years and so the measurements of these translators' average word production per day are also relative, seen from a critical point of view. Although the theoretical research used in this review is not recent and may also refer to even older sources within them, it does however provide a strong account for repeated patterns throughout the years of research on the different aspects that make up the role of the translator. Studying the tasks and responsibilities of translators provides an understanding of what changes a role, and as change is something that happens gradually, the inclusion of these is not only for relevance, but also for the significance they provide from a temporal aspect.

In terms of more recent roles of translators, more recent sources are needed as well. Since the role as a translation technology consultant is a relatively new one, research on the matter was scarce. However, Raido (2016) and Massey (2018) discuss in their articles the emergence of these roles and the factors of technological integration involving translators. Recent studies regarding the present-day roles of some translators such as these contribute by creating a sketch of what this evolving role presently looks like. Additionally, the identification of the titles of such profiles also contributes to not only indicate the responsibilities of the role, but also which direction or directions the role is taking. Titles like 'translation technology consultants' allow translators to identify and offer their services, and as explained, these titles can be seen on a plethora of platforms on the internet, supporting the findings of Raido (2016) and Massey (2018). Although there are many webpages of varying credibility, a quick search will also show recognizable and acknowledged webpages of larger organizations or sites such as LinkedIn, which is widely known within the business world.

Lastly, although theoretical research might not provide as detailed and thorough evidence as what empirical research may, the theories and conclusions from these articles supply researchers and translators with interesting contributions to the role of the translator. Learning about the working conditions, responsibilities and tasks of translators of the past may provide us with an understanding of how things have come to be, and further, what things might become. Koponen (2016), O'Brien (2012) and Taivalkoski-Shilov (2018) address several relevant aspects of the translator - which elements of computer advancements affect them, by which means things can be done to improve their working conditions, and how things were compared to how things are. One could argue that more empirical research would be beneficial, but theoretical research still provides the translation community with significant findings regarding the role of the translator and the challenges that face them.

4.4 Challenges

The research utilized in this study has as we have seen provided information on the role of the translator as a post-editor and collaborator with MT system developers (O'Brien, 2012, p. 119). In this section of the discussion however, we will address the second research question about which concerns researchers have regarding the challenges connected to the new role of the translator. We will do so by addressing four challenges specifically: the effect of translators' attitudes toward MT systems, the effort of post-editing MT, reduced human agency in MT and the austere conditions of translators in a technology-driven industry.

Firstly, in addressing the effect of attitudes of translators toward MT, it is important to emphasize the significance of one of the more prominent issues regarding post-editing MT, which is the quality of the MT output. MT quality is a hot topic within the post-editing community, as research suggests a correlation between low-quality MT and increased post-editing effort for translators (Koponen, 2016, p.132; Taivalkoski-Shilov, 2018, p. 694). Although post-editor attitude is the overarching topic here, our main focus is to understand how these attitudes are connected to the role of the translator, and since low-quality MT can make the post-editor's job more strenuous in some cases, it is therefore a central factor affecting the attitudes toward the technology. Just as with any process of production, the raw materials need to be of good quality to produce a good product, and the same goes for raw output from an MT system. Attitudes, because of low-quality MT, therefore, influences the post-editing role as it can affect the working conditions of the translator negatively when MT is not optimized.

Similarly, Koponen (2016) also notes how unfamiliarity with technological tools in translation plays a part in the attitudes leading to non-adoption of MT systems by translators (p. 136). Considering what we have covered so far regarding the potential for increased productivity using MT systems, non-adoption could imply significant challenges to post-editors since the inclusion of MT in more recent times can seem almost mandatory. Nonetheless, increased productivity is relative due to the conditions in which MT systems are dependent on, namely what kind of source text is being processed (Koponen, 2016, p. 136). Ultimately, it seems however that research is pointing to a 'if you can't beat them, join them'-narrative, as the technologization of the industry is not changing its course. Thus, suggesting that the integration of technological competence is paramount in the education and training of translators (Taivalkoski-Shilov, 2018, p. 695). Acceptance seems therefore to be a significant keyword associated with translators' attitudes and MT systems, and for non-literary

translators Taivalkoski-Shilov (2018) emphasizes technological know-how will be "the key to survival" (p. 695). This argument is also supported by Beikian, Ketabi & Hesabi (2019), who assert that professional translators who possess skills in information technology seem to be more positively inclined toward the use of MT (p. 60). Unfamiliarity and non-adoption are then additional keywords one can associate with factors influencing the post-editing role as the human and the computer both (can) benefit from each other but are also dependent on each other.

The second topic in relation to challenges of the translator's post-editing role regards the effort of translators and technological translation tools. Research on the effort spent by post-editing translators using technological tools and MT systems in this study considers factors that are related to attitudes and quality of translation as they are interconnected. Although MT is quite advanced and capable of translating large texts at incredible speeds, MT may sometimes produce unexpected new meanings via unpredictable paths of syntactic and semantic errors (Lee, 2011, p. 93, 94). These errors are most prevalent in cases where the source text is too complex for the MT system to process, as in literary translation for example, where elements of metaphor and ambiguity can be found more often (Lee, 2011, p. 93, 94). Should a translator receive low quality MT output to post-edit, this may overtax the translator's work as the individual would have to cross-reference the source text with the MT's output, spending more time to ensure acceptable transfer to the target text, when manual translation could have been more effective (Taivalkoski-Shilov, 2018, p. 694). Additionally, such workflow, because of low-quality MT, could lead to cognitive and emotional stress which may cause an encumbering effect on the translator (Cadwell, Castilho, O'Brien & Mitchell, 2016, p. 235; Taivalkoski-Shilov, 2018, p. 694; Koponen, 2016, p. 136; Beikian, Ketabi & Hesabi, 2019, p. 58; O'Brien, 2012, p. 108, 109). According to a study consisting of almost 2,800 respondents to the SDL (Specification and Description Language) Translation Technology Insight Survey (SDL 2016), quality is most prioritized for the translation industry (O'Hagan, 2019). These surveys illustrate the importance of researching quality of MT as it has a direct effect on the post-editing process (Koponen, 2016, p. 132; Taivalkoski-Shilov, 2018, p. 692).

Effects like these on the translator's working conditions may contribute to negative feelings or attitudes toward the technology in general which may further lead to hesitancy toward using the technology, and in some cases lead to non-adoption of MT (Koponen, 2016). Research that illustrates the increased effort of low-quality MT is not easy, as every translator

is different and may have different working methods. However, research methods such as key-stroke logging can indicate the time intervals between keystrokes during post-editing to measure cognitive effort (Koponen, 2016, p. 141). Comparing different post-editors' pauses during difficult source text processing may provide information as to which kinds of data require the most effort (Koponen, 2016, p. 141). Another method of measuring effort is through a process known as eye tracking, where gaze fixation for a longer period or repeated gaze fixations on certain words indicate increased effort (Koponen, 2016, p. 142). Nonetheless, seen from a different perspective, researchers have concluded that with higher quality MT output, an increase in productivity is possible, as there are less errors to fix and repair for the post-editor and the types of errors that do occur require less cognitive effort (Beikian, Ketabi & Hesabi, 2019, p. 60; Koponen, 2016, p. 132). Koponen (2016) summarizes in her study how post-editing time, technical effort of correcting and the perceived effort of humans are the means with which effort can be investigated (p. 142). Toral & Way (2015) suggest interactive MT as a solution instead of MT, in which translators are provided with simultaneous translation alternatives based on translation memory, or in other words CAT tools (p. 264). However, Taivalkoski-Shilov (2018) stresses the importance of how developers of such systems, in that case, should consider UXD to better facilitate the application for human utilization (Taivalkoski-Shilov, 2018, p. 694).

The third topic addressing the challenges portrayed by research in relation to the translator's role (RQ2) is human agency in MT (Taivalkoski-Shilov, 2018, p. 696; Lee, 2011, p. 93, 94). Human agency represents the intervention of the human aspect of translation, where certain choices are made to maintain elements of the text to be translated, such as the voice of the author, fixing semantic errors generated by MT and in general cases where the human translator intervenes to avoid inconsistencies or inappropriateness (Lee, 2011, p. 94; Taivalkoski-Shilov, 2018, p. 695). Although this study considers mainly professional non-literary translators, it may be better to consider the perspective of literary translations when attempting to explain 'voice of author' as it requires more human agency as multilayered aspect to writing oftentimes can prove too complex for MT systems to process (Taivalkoski-Shilov, 2018, p. 695). Literary texts are often characterized by deliberate ambiguity, opening multiple ways of interpretating content for the reader, where words and strings of words can have more than one meaning (Taivalkoski-Shilov, 2018, p. 695). Words alone can therefore be complex in the context of translation, and 'maintaining the voice of the author' then means that the translator's responsibility is to make choices in creating the best possible transfer into

the target text by: (1) considering connotations of words, (2) maintaining the author's style of writing, (3) acknowledging the theme of the context as well as the relations of either author and reader or characters within the text (Taivalkoski-Shilov, 2018, p. 695). A quote from the ALPAC report (Automatic Language Processing Advisory Committee) delivers it eloquently: "understanding human language relies on information which is not present in the words which make up the message" (Taivalkoski-Shilov, 2018, p. 696).

Although the voice of author is more relevant to literary translation, it does however provide information regarding the importance of the human aspect in translation, as humans are more adept at reading between the lines than machines are. Human agency is one of the more central aspects of the contention around MT as machine translation requires no human intervention in its processing, albeit dependent on post-editing (O'Hagan, 2019). Take CAT for example, which is a technological tool where it is the human who translates and the technology offers vocabulary alternatives as options for the human to consider (O'Hagan, 2019). With MT however, it is an automatic computer translation that processes text without human intervention and delivers its finished product of the target language (O'Hagan, 2019). Now, with MT becoming more integrated with CAT, the division between the two technologies is becoming more blurred in terms of human agency (O'Hagan, 2019). Considering these findings, it seems that with the uptake of MT, the need for human agency in non-literary translation seems to have become reduced and this might come at the cost of the benefits of human agency discussed here. Even though machines can be programmed to almost anything, metalinguistic knowledge is more than learning a language, it considers experience, associations, and at times even personal traits rather than a skill that can be refined and developed (Gómez, 2020, p. 205, 206).

The fourth and final topic to be addressed regarding the challenges connected to the role of the translator (RQ2) is the austere conditions in which translators work under. This refers to the circumstance translators find themselves in because of MT technology. Research from the last two decades describe austere times for the translators as this technology's speed and word production renders earlier practice (manual translation) as unnecessary and inefficient in comparison and is thus one of the unfavorable repercussions of this technological advancement of the industry (O'Brien, 2012, p. 107). Another element of the unfortunate conditions is how the automation of the industry has enabled clients of translators to replace professionals by cheaper alternatives and faster turnarounds through PEMT (Beikian, Ketabi & Hesabi, 2019, p. 58). This, in turn leads to the post-editor's livelihood

being threatened as manual translation is less favorable due to PEMT providing a more efficient service, and in addition, with the machine translating most of the text, the cost for employers is reduced further at the post-editor's expense (O'Brien, 2012, p. 107). Translation technology essentially speeds up the operation by skipping the retranslation process which a translator would otherwise offer (O'Brien, 2012, p. 107). According to O'Brien (2012), this improves quality through consistency and reduces the cost of translation since the retranslation 'step' of the process has been removed, causing translators an unfortunate decrease in income consequently (p. 106). Taivalkoski-Shilov (2018) notes how some translators' income has been affected in such a way that some must search for additional jobs on the side or for grants to make ends meet (p. 695). These working conditions are a serious challenge to the post-editors as MT is directly affecting the financial aspect of the role, which essentially is the translator's livelihood.

Another unfavorable element related to the conditions of the translator's profession that has been marked upon in research is translators' feelings of devaluation due to the automation of the industry (O'Brien, 2012, p. 109). O'Brien emphasizes that although the sentiment might to a degree be based on emotion, translators experience that their time, effort, and expenses over several years of training to achieve recognizable competence feels undervalued and underappreciated as machines can perform the same task at an appropriate level by having access to translation memory data, stored terms, or translations with terminology management tools (2012, p. 109). In addition, translators are also experiencing feelings of being reduced to smaller and less significant tasks that seem beneath their level of competence as made explicit here by O'Brien (2012):

> *In the context of MT, not only can translators feel replaced by the machine, but the machine generates fundamental linguistic errors that a trained human translator would rarely generate. The professional translator is then demoted to the status of a fixer of seemingly unintelligent errors. That they are paid lower rates to fix such errors than to create their own translation adds to the feelings of negativity (p. 108, 109).*

It seems then, according to these findings, that in some of these cases the odds are stacked against translators and that they find themselves between a rock and a hard place. However, creating awareness of such sentiments held by translators can contribute to starting a dialogue that takes matters of the translators and their profession more seriously in the consideration of their role in translation. Nonetheless, although it might seem like the system

is designed to push out humans from the field, recent research is instead pointing towards the future where new roles can provide a larger range of tasks, creating opportunities for new competence and a more stable income which could change the negative feelings some translators harbor towards technology in translation.

Having discussed these four challenges and their connection to the post-editing role, it is also important to discuss the research behind these theories. For example, most of the theories used in this study have been theoretical and based on other theoretical studies. Although empirical research can provide evidence of claims to greater detail, this study's aim was to establish what research within translation studies can tell us about how MT is changing the role of the translator, and this can be done in many ways, as both empirical and theoretical research is represented in translation studies. Additionally, both illicit different qualities depending on the context in which it is used. For instance, in looking at a central topic that has been an issue for a long time, such as attitudes formed from low-quality MT, both empirical and theoretical research can provide insight into how low-quality MT might affect translators' attitudes on MT in the past, present and future. On the other hand, in the case of looking at post-editing effort, which is a difficult element to concretize, empirical research will provide evidence that is more solid as there are standardized methods that more accurately measure cognitive effort. In Koponen's (2016) study, she mentions keyboard logging and eye-tracking methods that could have provided concrete evidence for her research, but her study does not provide actual use of these methods, which is a criticism to consider (p. 142). In Cadwell, Castilho, O'Brien and Mitchell's (2019) research, a focus group study consisting of 70 translators was carried out to better understand why some translators choose to adopt or not adopt MT during their translation tasks (p. 222). A study of 70 participants is arguably a large study as it provides the research with many opinions on a matter. This serves as a strong and credible source of information as their claims are supported not only because of their many participants, but also because their participants are experienced professionals that are directly involved in the topic they are researching.

O'Hagan's (2019) study on post-editing effort, although a theoretical review of existing research, includes data of nearly 2,800 respondents from the SDL (2016) Translation Technology Insight survey. Their surveys are a widely acknowledged and credible source of information regarding statistics on the challenges of the growth within the translation industry, thereby strengthening the claims made in her study (Ryce, 2016, SDL). With data like this included in her study, the arguments made have a stronger foundation in addressing

topics like MT quality, human agency and the need for integration of translators in the MT development process.

In making the parallel between literary translators and non-literary translators (which this study is mainly focused on), Lee's (2010) article "The death of the translator", although theoretical, provides the review with both a temporal perspective of research from a different time, but also with a comprehensive account regarding the importance of human agency and 'voice'. Human agency is one of the main factors involved in the discussion of the human-computer interaction, and Lee's (2010) article, although relatively old in some respects, supplies this study with significant arguments that still hold relevance with regards to the role of post-editor in the context of MT. In a similar vein, O'Brien's (2012) research can also be considered old to some degree, as this thesis considers technology which is under continuous development. Nonetheless, the study does address an interesting finding regarding translators' feelings of devaluation and demotion, which she herself notes as something abstract and more based on emotion rather than scientific evidence. However, even though emotions can be an abstract factor to include in one's research, it is a relevant point to make in describing how the use of MT can seem inconsiderate of the investment of time, training, and expenses of human translators in their professional education.

Although much can be said about the challenges that the post-editing role faces, several of the studies published seven to ten years ago have made some relevant speculations regarding the role of translation technology consultants of today. Due to the scarcity of existing research on this new role there has not been too much of it included in this study. However, it goes to show how an amalgamation of research such as the ones considered here both empirical and theoretical aid in creating awareness of how the working conditions are for translators and potentially improve this interdependent and mutually beneficial relationship between translators and MT technologies.

Lastly, the evaluation of both the empirical and theoretical studies used in this review has illustrated both weaknesses and strengths in terms of their claims regarding the new roles of translators as post-editors and translation technology consultants. The theoretical studies, which cover a considerate portion of the research included, have shown how knowledge of past research can provide information about how the evolving role of post-editors changes as technology advances. Similarly, with the inclusion of empirical research that supports and share commonalities with said theoretical studies, they can together shed light on existing topics that further our knowledge of the current and future roles of the translator. In addition,

this research may also serve as an opportunity that furthers our knowledge of the challenges of these roles, and potentially their solutions. Ultimately, supplying researchers, translators, and MT system developers with the means to identify gaps in research which need to be filled.

4.5 Research gaps

So far in this discussion we have considered the first two research questions regarding the role of translators as post-editors and translation technology consultants, how it is changing, and how it might change even further in the future (RQ1). Additionally, this paper has discussed the concerns researchers have regarding the challenges connected to this role (RQ2). However, considering the research covering the different topics discussed, there are some gaps in the research that will need to be filled (RQ3). One of which is presented by O'Brien (2012) who foresees translators as collaborators with MT system developers, researchers, and implementers (p. 119). Considering the year of publication of O'Brien's (2012), Raido's (2016) and Massey's (2018) articles on new translator profiles, O'Brien's (2012) foresight matches the description of linguistic mediators and translation technology consultants as these profiles serve as a hybrid profession combining both language and technology competence. By having translators involved in the development, research and implementation of MT systems, translators can participate in changing some of the issues they have experienced as users of the technology, while at the same time evolve into a different role which sees technology tools within the translation industry as an aid rather than a threat (O'Brien, 2012, p. 119). Additionally, being involved in the implementation of MT systems may offer translators a greater feeling of confidence and ownership of the technology, which might, as we have discussed have a positive effect on translators' attitudes and subsequently their working conditions regarding the technology (O'Brien, 2012, 109).

With regards to human agency, O'Hagan (2019) notes the need for further research in relation to post-editing activities and wider cat environments to better integrate post-editing into the professional translation process, where post-editing is no longer a discrete task. Essentially, by shedding more light on the role of post-editing and the tasks that go into it, researchers can create more awareness around the gap between human agency and increasing MT technology. Similarly, Beikian, Ketabi & Hesabi (2019) suggest further research into stakeholders including sustainable development in their views on translation quality, of which

human agency is a factor (p. 61). A valid point though, made by Gómez (2020) is that a consequence from the point of view of the sustainability of language strategies from a corporate and national perspective concerns differing views on competence needs and expectations (p. 209). Furthermore, she argues that businesses will frame their demands according to how they understand their needs, suggesting that the market is driven by what businesses see as most profitable and efficient, and if technological tools can provide similar services at a much cheaper price, the quality of human agency may not be as prioritized (Gómez, 2020, p. 209).

Lastly, in my own attempt at answering RQ3, I would add that further research should focus on the responsibilities of the future hybrid role of translation technology consultants and similar profiles to try and understand how the role is changing, along with its respective tasks. Additionally, research on what an individual with this background can do with their competence in terms of employability in other areas may detect potential for what direction the role of the translator is moving in. Research is already shedding light on professional translators' ability to adapt to their evolving role and industry and how it will allow them to push the traditional boundaries of the practice and gain potential for new ventures both within and outside of the translation industry (Raido, 2016). Further research on translator profiles that have resituated their practice as "Co-communicators", as Raido (2016) calls it, could essentially mean that translators could utilize their competence in other fields requiring these different skills that this evolving role has amassed. Information regarding employment in other fields by translators might supply researchers with new perspectives of the aspects affecting working conditions of the profession. Another point for further research that this data synthesis has brought attention to is the value of professional translators' input regarding their place in all this, and qualitative research methods such as interviews with translators could provide insight into other areas that deserve attention regarding both working conditions and potential opportunities for improvement of the role of translators and its challenges.

5 Conclusions

In this study the aim was to answer three research questions regarding (1) what research within translation studies tell us about how MT is currently changing the role of the translator and how it might change even further in the future, (2) what concerns researchers

have regarding the challenges connected to this role, and (3) considering these challenges, what the gaps are in current research that will need to be filled. To answer these questions a method of data synthesis was employed, involving screening, and analyzing relevant literature and to ultimately draw conclusions based on the studies' findings. The results from the study found that the translator's role as post-editor has changed into one that has adapted more into the technological side of the industry. Further, in more recent times, some translator profiles have been registered as translation technology consultants, showing signs of translators adapting technologically in the industry. However, there are challenges associated to the role of post-editor, which consist of negative attitudes towards translation technology from translators; low-quality MT output requiring more post-editing time and effort; technological unfamiliarity among translators and austere conditions regarding translator salary and reductive post-editing tasks due to MT (Taivalkoski-Shilov, 2018, p. 693; Beikian, Ketabi & Hesabi, 2019, p. 60; O'Brien, 2012, p. 107). Nonetheless, researchers emphasize how high-quality MT can improve post-editing productivity compared to manual translation (Koponen, 2016, p. 132). One of the ways in which research suggests how to increase the quality of MT is through the training data that post-editing provides by repairing and fixing errors from MT output (O'Brien, 2012, p. 118). Thus, the research suggested that technological know-how would be key for non-literary translators in the future as it can improve post-editing productivity and one's chances of adapting into a more technology-driven industry (Beikian, Ketabi, Hesabi, p. 2019, 60).

Studies looking into effort in post-editing are emphasizing the importance of further research into MT quality as it seems to influence the cognitive effort and emotional stress of translators (Koponen, 2016, p. 132; Taivalkoski-Shilov, 2018, p. 694). Research also suggests further studies into translators' collaboration with MT system developers for more insight into the potential of translators' involvement with technology for more ownership and confidence in the technology (O'Brien, 2012, p. 119). One study promotes further research on the major publishing houses' incorporation of sustainable development in their views on translation quality (Taivalkoski-Shilov, 2018, p. 698). Lastly, further research into the practice of translation and interpretation (T&I) profiles, such as translation technology consultants, can supply us with information regarding how the translator roles have adapted, and in the same vein, what the responsibilities of these roles are.

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Relevance of thesis to teaching profession

The relevance for my master's thesis in relation to the teaching profession comes in two parts. Firstly, there are multiple elements to my master's thesis that have made me realize the relevance to teaching English as my master covers both the various values associated with human agency in English writing and the use of technological tools to facilitate this process. With technology being increasingly more used in school and especially with the emergence of CHATGPT, the importance of educating students on the values associated with human voice in writing, should be a prioritized focus for English teachers. One of the competence aims of the school curriculum in 11th grade is to be able to read, discuss and reflect over content and literary tools in different types of texts, including texts chosen by themselves (Utdanningsdirektoratet, 2020, p. 10). In terms of reading, teaching students how to identify, recognize and understand the literary devices used in texts may help them improve their metalinguistic knowledge for their own writing. Also, in relation to technological tools, a similar competence aim from the curriculum seeks to have students be able to discuss and reflect on the form, content and literary tools in English speaking cultural forms of expression from different media, including music, films and games (Utdanningsdirektoratet, 2020, p. 10). Considering this aim, this thesis has also made me realize the potential for teaching students about using technological tools for language use and at the same time educate them on the pitfalls of MT. CHATGPT has received a lot of recognition in recent times and especially among students in school seeing it as a way of making their tasks easier. I believe, with my experience from this thesis, that with the right guidance, students may use their metalinguistic knowledge to use technological tools as an aid, and not as a replacement for their homework.

The second part of my thesis' relevance is more related to my field of study as a teacher rather than the teaching profession, as this thesis has opened my mind to the possibilities that this degree offers. In the same way that translators have evolved into linguistic mediators and translation technology consultants, this master's degree, although much directed at teaching, can be very versatile in that it is an integrated degree with both English, pedagogy as well as with individual specializations. This provides students like me with several alternatives when searching for employment. Including education, this degree offers competence within language, communication, technology, and pedagogy which may be of interest to several employers of different disciplines.

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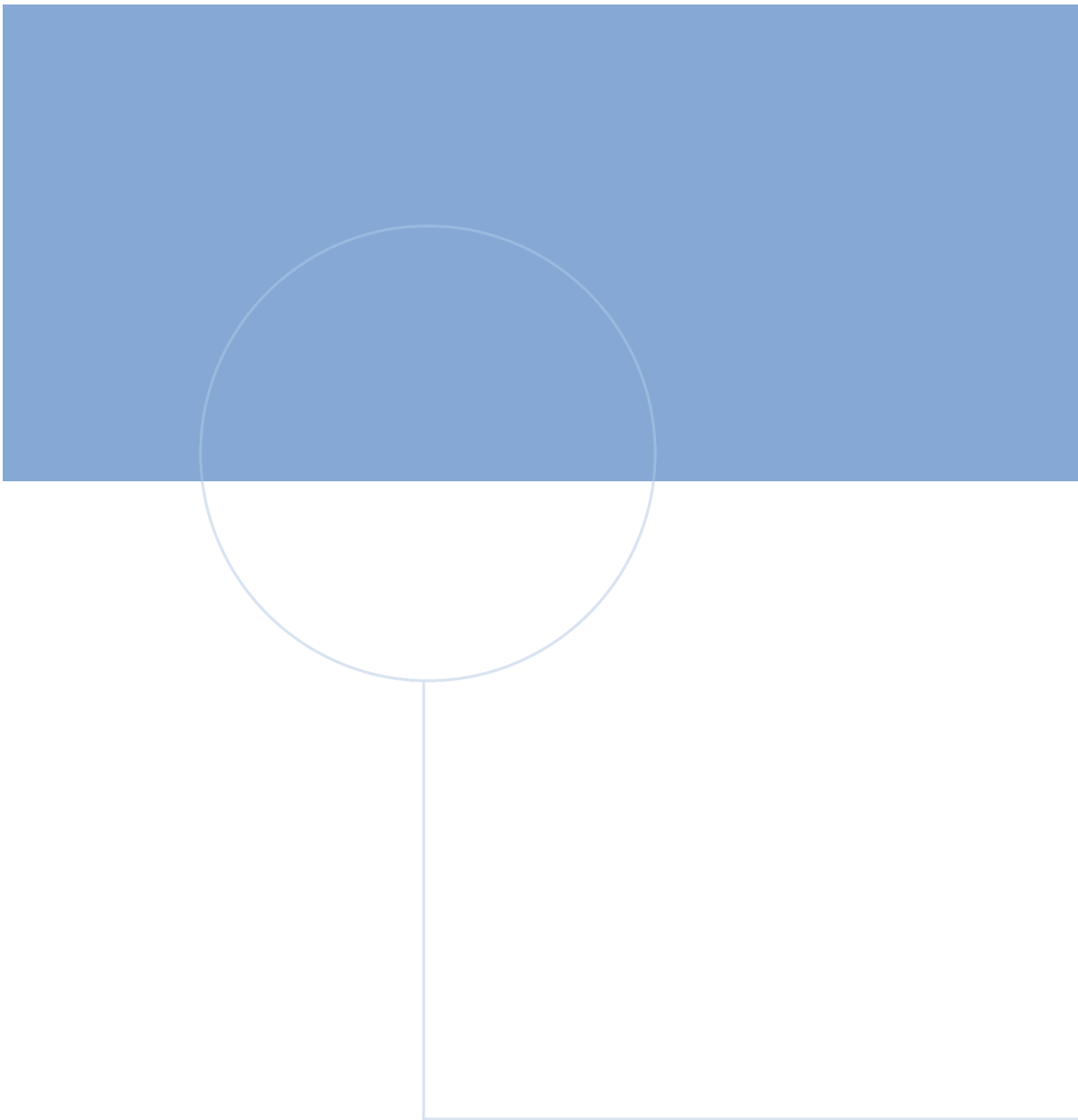

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