Machine Translation in a Professional Translation Workflow: Post-editing or Computer Aided Translation

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I would like to thank Toni Badia for his patience and calm and for having guided me through all this process with wisdom, understanding and serenity.

Many thanks also to my mother and my girlfriend for their support, confidence and empathy on my wishes.

ABSTRACT

English

Localization is a fascinating field which has changed dramatically in the last years and it is still changing and adapting itself as society is. The use of machine translation has developed this field astonishingly. Many companies have started including machine translation in their workflows to meet their tight deadlines and be more competitive in terms of budget. The aim of this work is to analyze several significant issues that must be considered when it comes to implementing machine translation in a professional translation workflow. We have carried out an experiment in which real texts from a company have been translated using human translation, statistical machine translation and neural machine translation. After that, a mixed pool of 40 experienced and novice post-editors has post-edited these texts. We have analyzed quantitatively the speed and edit distance of the post-editing phase and at the same time we have reviewed the quality of the different translations. Finally, we have used a qualitative approach in the shape of a questionnaire of 6 questions that post-editors have answered. This experiment with 40 post-editors has shown that, in a practical setup, human translation (HT) and machine translation (MT) are not that far away each other. Our research confirms that HT and MT can be interrelated. In addition to that, our work has confirmed that some post-editors think HT is MT, and the other way around. This means that MT allows post-editors to work as naturally as if they were reviewing HT. The results of the experiment and the feedback from post-editors also confirm that Neural Machine Translation (NMT) has helped to close the gap between HT and MT.

Last but not least, results in our experiment also confirm that post-editing (PE) is more competitive than HT from an economic point of view.

Español

La localización es un campo fascinante que ha cambiado drásticamente en los últimos años y todavía está cambiando y adaptándose a medida que la sociedad lo hace. El uso de la traducción automática ha desarrollado este campo de manera asombrosa. Muchas empresas han comenzado a incluir la traducción automática en sus flujos de trabajo para cumplir con sus plazos ajustados y ser más competitivos en términos de presupuesto. El objetivo de este trabajo es analizar varias cuestiones importantes que deben tenerse en cuenta a la hora de implementar la traducción automática en un flujo de trabajo profesional. Hemos llevado a cabo un experimento en el que se han traducido textos reales de una empresa mediante traducción humana, traducción automática estadística y traducción automática neuronal. Después, un grupo mixto de 40 post-editores experimentados y noveles han post-editado estos textos. Hemos analizado cuantitativamente la velocidad y el número de cambios de la fase de post-edición y, al mismo tiempo, hemos revisado la calidad de las diferentes traducciones. Finalmente, hemos utilizado un enfoque cualitativo mediante un cuestionario de 6 preguntas que los post-editores han respondido. Este experimento con 40 post-editores demuestra que en un entorno funcional la traducción humana (HT) y la traducción automática (MT) no están muy lejos la una de la otra. Nuestra investigación confirma que la HT y la MT pueden interrelacionarse. Además, nuestro trabajo ha confirmado que algunos post-editores piensan que HT es MT y al revés. Esto pone de manifiesto que la MT permite a los post-editores trabajar con MT de la misma

manera que si estuvieran revisando HT. Los resultados del experimento y los comentarios de los post-editores demuestran también que la traducción automática neuronal (NMT) ha ayudado a acercar la HT y la MT. Por ultimo y no menos importante, nuestro experimento y sus resultados también confirman que la post-edición (PE) es más competitiva que la HT desde un punto de vista económico.

Català

La localització és un camp fascinant que ha canviat dràsticament en els últims anys, i encara està canviant i s'està adaptant en la mesura que ho fa la societat. L'ús de la traducció automàtica ha donat un impuls enorme a aquest camp. Moltes empreses han començat a incloure la traducció automàtica en els seus fluxos de treball per poder complir amb els terminis ajustats amb què treballen i ser més competitives en el pressupost. L'objectiu d'aquest treball és analitzar diverses qüestions importants que han de ser tingudes en compte a l'hora d'implantar la traducció automàtica en un flux de treball professional. Hem dissenyat un experiment en el qual textos reals d'una empresa han estat traduïts mitjançant traducció humana, traducció automàtica estadística i traducció automàtica neuronal. Després, un grup mixt de 40 posteditors experimentats i novells han posteditat aquests textos. Hem analitzat quantitativament la velocitat i el nombre de canvis de la fase de postedició i, a la vegada, hem revisat la qualitat de les tres traduccions. Finalment, hem fet servir un enfocament qualitatiu a partir d'un qüestionari de 6 preguntes que han contestat els posteditors. Aquest experiment amb 40 posteditors demostra que en un entorn funcional la traducció humana (HT) i la traducció automàtica (MT) no queden gaire lluny l'una de l'altra. La nostra investigació confirma que la HT i la MT es poden interrelacionar. A més, el nostre treball confirma que alguns posteditors pensen que HT és MT i al revés. Això

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posa de manifest que la MT permet als posteditors treballar amb MT exactament com si estiguessin revisant HT. Els resultats de l'experiment i els comentaris dels posteditors demostren també que la traducció automàtica neuronal (NMT) ha contribuït a acostar la HT i la MT. Finalment i no per això menys important, el nostre experiment i els seus resultats confirmen també que la postedició (PE) és més competitiva que la HT des d'un punt de vista econòmic.

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List of acronyms

CAT Computer-assisted/aided Translation

CE Confidence Estimation

ePE Experienced Post-editors

HT Human Translation

LSP Language Services Provider

MT Machine Translation

NMT Neural Machine Translation

nPE Novice Post-editors

PE Post-editing

RBMT Rule-based Machine Translation

SMT Statistical Machine Translation

SD Standard Deviation

TAUS Translation Automation User Society

TM Translation Memory

TMS Translation Management System

CHAPTER 0: INTRODUCTION

First of all, I would like to explain why I have devoted my efforts and time to write this work. I studied Translation and Interpreting at university and I have been working for many years as a translator, translation project manager, account manager, technical localization specialist and lately as university lecturer. I have been in contact with many computer-aided translation tools and processes. I have seen how the concept of translation has evolved and what consequences it has had. Translators have found it necessary to adapt their profiles in order to benefit from the advantages of new technologies. Some of them have seen these new technologies applied to translation processes as a threat. But it has become evident that it is necessary to implement technologies in translation processes in order to meet the globalized world's requirements: volume, deadlines, price, competitiveness, etc.

Localization is a fascinating field which has changed dramatically in the last years and it is still changing and adapting itself as society is. The first steps in machine translation (from now on it will be referred to as MT) were done by technical people with specific language skills coming from the computational and Information Technology area.

The concept of machine translation is not completely new, although it seems to be science fiction and something which has been developed only in recent years. In fact, many people have been working very hard since the late 1940's. The topic itself is very attractive even if there is no interest at all in linguistics, languages or translation as MT broaches the ancient topic of creating something similar to a human being. Albert Einstein said once: "I am convinced that He (God) does not play dice." (King-

Hele, D. G., 1971). Well, this quote seems to imply that everything is well structured and that there is no chaos or free will when it comes to the brain's performance. However, the problem lies in the fact that to puzzle out how human brains work is extremely difficult and something that maybe can never be reached. Research on MT is related to natural language processing as the process involves a lot of previous developments and improvements in this science.

From a linguist's or translator's point of view, MT means condensing the work of a whole lifetime (learning and mastering a language, obtaining the appropriate translation skills, etc…) in a few seconds. The mental process in the human brain while translating is very complex, and implies thousands of neuronal connections but MT can be a matter of one mouse click. It is fascinating how human beings have improved technology so much that a computer or a robot translating texts from one original language to another different language can now be imagined.

But unfortunately, one thing is what researchers on MT think the future of the matter is going to be and another is the cruel and limited reality.

Once translators are more or less used to working with computer-aided translation tools, they do not see these applications as a threat but as a valuable tool which supports and increases efficiency and they are even involved in some processes to improve computer-aided translation tools performance, I think it is time to analyze what the interaction between MT systems and translators looks like, what problems it has, what advantages, how it should be handled, etc.

The main reason why I have begun studying MT is the fact that there is a new interaction between translators and machines. However, there have been few practical studies focusing on the real day-to-day of a company. This work tries to fill in this gap of knowledge being as close as possible to real working life.

0.1 Motivation

As mentioned in the introduction, the first aim of this work is to analyze the MT usage in a translation company's professional workflow. I have tried to understand what MT means and how this domain is structured. I have always been looking for an approach which is easy to understand for a translator or a linguist. MT is a field in which computer engineers and mathematicians monopolize all research when it comes to developing algorithms so a translator who wants to be part of this field has to make the best of his or her experience in order to contribute to this field.

Something that I think is paramount about MT and that should be clear and understood for everyone who takes part in translation processes is that MT is a means and not an end. All fear should be banished without trace. Translators should not be afraid of MT. It is time to readapt their profile. Some criticism of MT from translators has no foundations. When it is said that MT does not produce high-quality outputs, somebody should highlight the fact that human translation (from now on HT) always needs a revision from a second translator depending on what this translation is going to be used for. A previous analysis should be carried out before using MT in order to know what the requirements are. This work tries to help to explain the difference between dissemination and assimilation. This difference is something which is very important when a company needs translation services.

MT will play an important role in the translation industry in a short-, mid-term. According to the information provided by De Palma (2021), in one of the latest reports of CSA Research [1], in 2020 24% of the projects of the top LSPs worldwide were done using MT. This information can be seen in Figure 0.1.
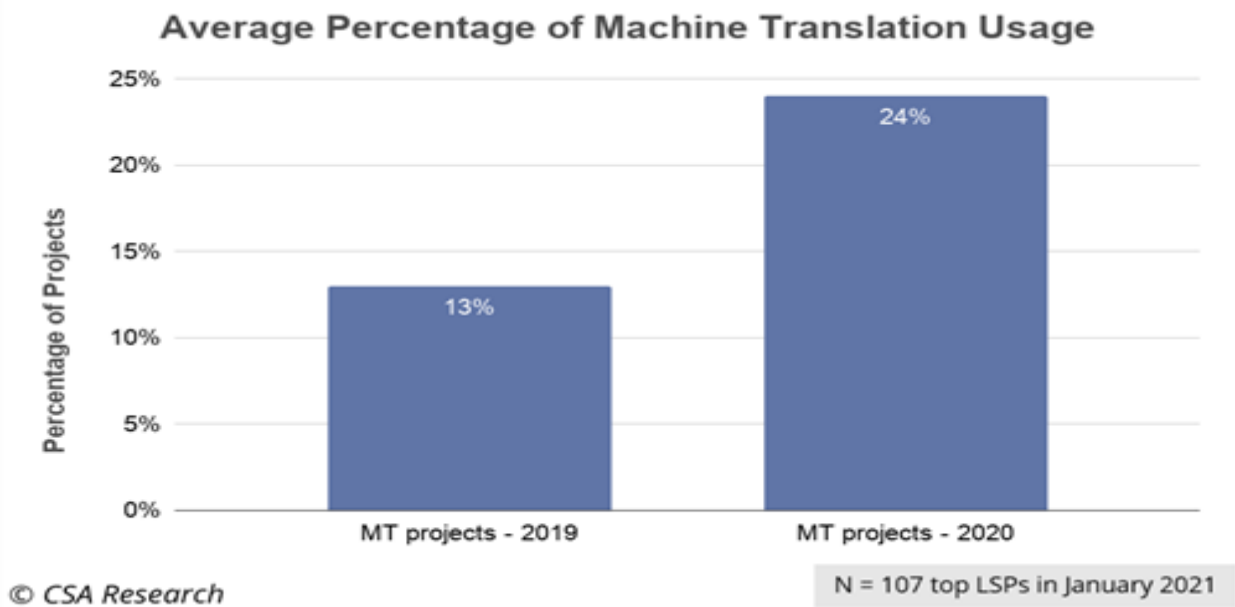
Figure 0.1: MT Usage

Nowadays, MT is already used in combination with post-editing (from now on PE). Computer-assisted Translation technology (from now on CAT) is the most popular way of getting things translated but this will change. Companies and translation agencies will begin using MT on a large scale in order to meet deadlines, reduce costs and to be more competitive. As I mentioned before, this does not mean that all translators are going to be fired. Translators and linguists will be used to post-edit, prepare dictionaries, terminology databases, controlled language, carry out Quality Assurance

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[1] From the 2021 article "The Language Sector in Eight Charts". https://insights.csa-research.com/reports/305013239?searchTerms=machine%20translation

processes, etc. MT will be used preferably in a technical domain in which terminology and languages are controlled. But there are other fields in which MT can be used and is being used (De Palma, 2021)[2]. Figure 0.2 shows the MT content types.
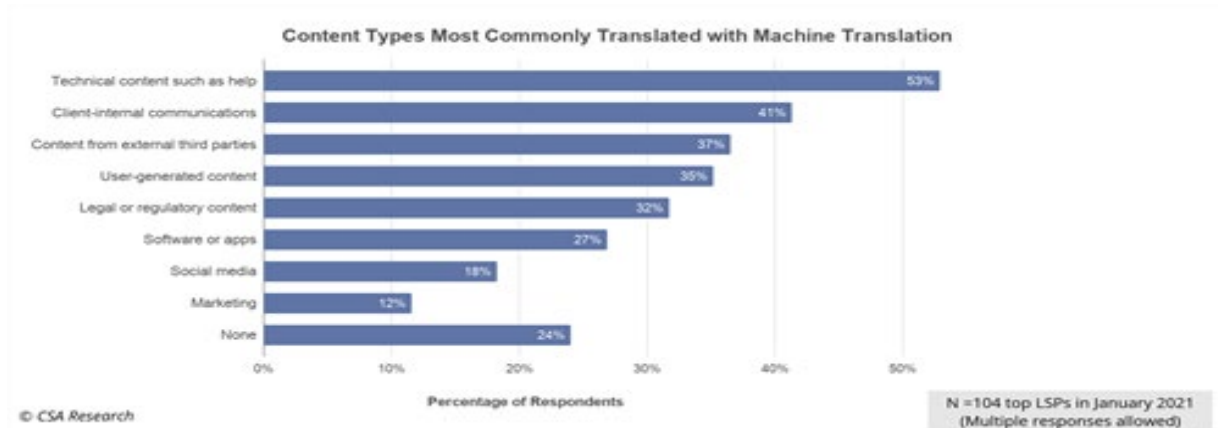
Figure 0.2: Most commonly MT content types

When the aim is to obtain high quality translation, the first phase of the translation process will be translating the text with the MT system and then a post-editor will take care of the PE (not revision) of the output.

In my opinion, if translators know how MT works, they will be able to be better prepared when they carry out PE (Arevalillo, 2012), (Rico and Torrejón, 2013), (Salah and Majid, 2021).

Another important point is the fact that translators working as post-editors should be aware of what MT implies. MT is a very complex field in which a lot of efforts are devoted. Thus, post-editors should be patient with MT outputs. An appropriate answer should not be: "I do not understand anything. This translation is awful." The correct

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[2] From the 2021 article "The Language Sector in Eight Charts". https://insights.csa-research.com/reports/305013239?searchTerms=machine%20translation

response would be trying to understand the whole previous process to be aware how much knowledge has been used in order to obtain that translation. Once this is crystal clear, translators will help, as they always did, to achieve a global communication between people of different countries and different languages.

I am sure this thesis contributes to get an insight into MT for people who did not know much about the topic. Nowadays, the most effective approaches are the data-driven and neural ones. It has been seen that reusing previous knowledge (translation memories) is the key to comprise as much human knowledge as possible in order to obtain translations which are similar to human ones.

0.2 Research Questions

Coming back to the professional environment, the localization world is really interested in knowing how beneficial a MT setup can be. There are still some gaps in assessing MT benefits when it comes to translating documentation in the daily work. This is the reason why we try to shed light on how much effort is needed to post-edit some particular MT output (RQ1) and whether it is worth post-editing it in comparison with using computer aided translation from an economic point of view (RQ2).

Last but not least, this study focuses on the MT workflow at a professional level in a real localization environment. We will study throughout the thesis the relevance of MT in the industrial field which at the same time is going to be relevant to the academic environment, because we try to shed light onto some of the relevant aspects (time spent, effort required, expertise capacity required and real cost for end user…) that are included in the process of MT itself (RQ3).

0.3 Structure of the Thesis

Chapter 1 presents the main MT models and approaches and provides a general overview of the translation memory (TM from now on) technology.

Chapter 2 presents a general literature review about the works related to our thesis. Note that it is not intended to provide a comprehensive review of MT works.

Chapter 3 explains the experimental setup. The texts are translated and then post-edited by a mixed group of 40 experienced and novice post-editors. In addition to that an independent reviewer reviews the translated texts for the error categorization. It also details how the different translations of the experiment (HT, SMT and NMT) have been obtained and how the PE experiment has been carried out.

Chapter 4 studies the productivity results of the experiment and analyses them comparing results from experienced and novice post-editors.

Chapter 5 studies the quality of the different types of translations used in the experiment (HT, SMT and NMT). An error analysis of the different types of translation which have been post-edited is presented.

Chapter 6 presents the main aspects of MT to be considered in an industrial localization environment from an economic point of view.

Chapter 7 studies how the different types of translations (HT, SMT and NMT) post-edited by the post-editors in the experiment are perceived by them.

Chapter 8 presents in detail the main conclusions and explains the possible future work to be carried out.

CHAPTER 1: OVERVIEW OF MT AND TM TECHNOLOGIES

In this chapter, we present the concepts of MT and TM and the reasons to use MT nowadays. We also provide the different MT and TM technologies currently used and the most popular methods of using MT depending on the final audience.

1.1 MT

The term MT refers to computerized systems responsible for production of translations with or without human assistance (Hutchins, 2003). Or in easier words: the use of computers to automate translation from one language to another (Jurafsky and Martin, 2009).

The first question that comes to our minds is why MT is needed since there are human translators. Well, the answer is clear:

First, there is too much to be translated and human translators cannot cope (Stevanović and Radičević, 2020). A second reason is that technical materials, the ones best suited to MT, and which can be processed easier than literature or law texts, are too boring and tedious for human translators (Guerberof, 2012). Furthermore, MT uses terminology consistently because computers are consistent whereas human translators try to use different terms in order to obtain variety and enrich texts. As the fourth reason, MT is faster and can increase the volume and speed of translation output. This is very important to companies, although dangerous to human translators, and a very controversial topic: MT reduces translation costs.

1.2 MT Technologies

According to Stevanović and Radičević (2020), there can be four kinds of MT: direct, rule-based, corpus-based and knowledge-based. Figure 1.1 shows the four MT kinds.
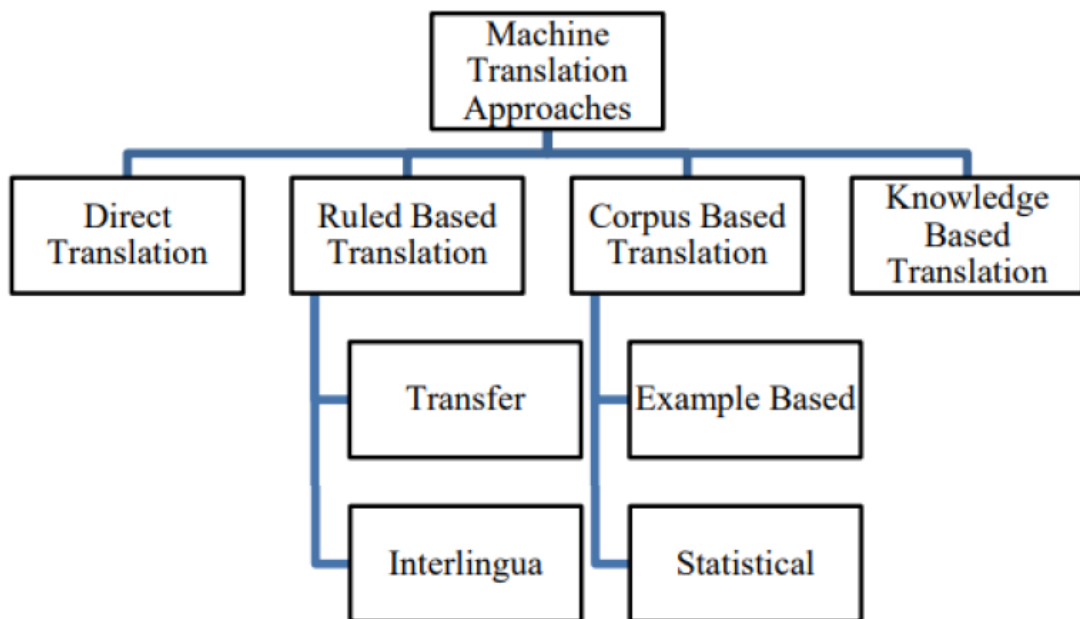
Figure 1.1: MT Technologies (Stevanović and Radičević, 2020)

The Direct translation method is only feasible for one language pair and it requires little analysis of text, which is usually reduced to morphological analysis, preposition handling, syntactic arrangement and morphological generation.

Rule-based MT (RBMT) is based on morphology, syntax, lexical selection rules and semantic analysis for each language which is used for translation and generation (Stevanović and Radičević, 2020).

Corpus-based MT (SMT) requires parallel-aligned text for each language pair, sentence by sentence. It can be further classified into statistical and example-based MT. Its translation accuracy is guaranteed thanks to the previous alignment, which is why SMT is one of the most widely used approaches (Stevanović and Radičević, 2020).

On the other hand, knowledge-based MT systems (Neural Machine Translation - NMT) are different as they incorporate the semantic-based approach to language analysis, introduced by Artificial Intelligence researchers. Therefore, it requires large knowledge bases that include both ontological and lexical data (Stevanović and Radičević, 2020).

1.3 Translation Memories

TM technology is based on fuzzy matching. Fuzzy matching can be explained as the proposals based on previous translations that the machine gives you to translate a sentence. These proposals are categorized by a similarity percentage depending on how similar they are with the current segment (100%, 99-95%, 95%-85%, 85%-75%, below 75%). The most popular CAT systems are based on this TM technology. The information comes from the previous translations that have been done (TM) or from the aligned material of parallel texts. The chance of the system returning an accurate proposal depends on this similarity percentage. By analogy with MT, CAT systems can be configured to always return a proposal, even if the similarity measure is very low.

Moreover, TM systems offer the translator concordance functions and terminology look-up features. These functions allow the translator to look for the translation of a single or multi-word term or phrase in the whole TM, and to paste the actual translation into the given segment (Guerberof, 2012).

All these above-mentioned features allow translators to increase their efficiency and productivity along with coherence and quality.

Let's take a closer look at the CAT approach in Figure 1.2:
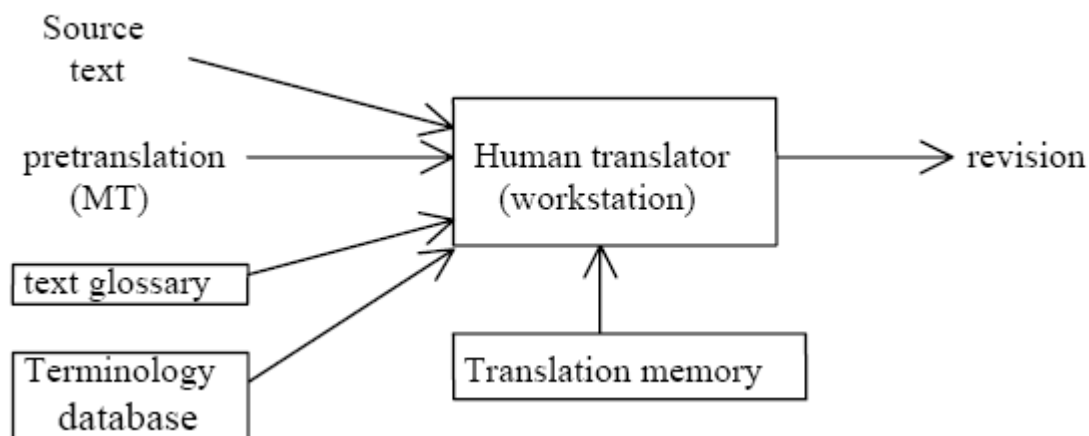
Figure 1.2: CAT (Hutchins, 2003)

In this image, the centre represents the human translator at a workstation (computer). Translators have several computer facilities such as a terminology database, a glossary, access to pre-translation, a TM and options to review texts after translation. Here the key feature is the TM. Once the pre-translation has taken place, the translator will jump from one segment to another obtaining proposals (fuzzy matches) from the

TM. As it was previously mentioned, the system can be configured so that every time the translator jumps to the next untranslated segment, the machine gives her or him a proposal, even if the chance of accuracy is very low.

1.4 MT Methods

When observing the use of MT in industrial environments, a distinction between types of procedure should be made according to (Specia, Forcada, Sánchez-Martínez, Esplà-Gomis, 2017). Accordingly, we are not interested in what types of MT there are from a technical point of view but on the combination quality-target group and level of human assistance and not so much on the process. MT is an unknown concept for people who are not involved in MT processes and even for translators and linguists it can sometimes be unclear. From my point of view, the popular view has to be changed; the one which pictures MT as some kind of technological miracle which translates from one language into another in a matter of seconds without any other effort and returns very high-quality results. A process that is doomed to failure if the final product is not excellent. However, this view should be modified. First of all, because there is not always the need to obtain high-quality results (Stevanović and Radičević, 2020) and another thing which has to be borne in mind: HT is not always excellent and it has to be reviewed by a second translator (known as a reviewer) in order to maximize quality. MT technology should be used as a means to improve translation processes and not as some sort of panacea which can solve all problems.

If we take (Hutchins, 2003) and (Specia, Forcada, Sánchez-Martínez, Esplà-Gomis, 2017) as reference, there can be four kinds of MT: dissemination, assimilation, interchange and database access.

Dissemination: the production of translations of publishable quality. Publishable quality means that there is a need of human assistance. Therefore, PE (revision) of the output text, pre-editing of the input, using a controlled language, or restricting the system to a specific subject domain is needed. In general, the more the subject domain of an application can be restricted the more successful the system is, in terms of quality.

Assimilation: the translation of texts for occasional users or specialists, where the "raw" output from the system does not need to be edited, in other words, where recipients can accept poor quality as long as they can get a rough idea of what the text conveys. For example, this MT type can be successfully used with texts for companies' internal use in meetings in which a general idea is enough.

Interchange: the communication between different languages by individuals, by correspondence, by email or by telephone. The quality of the translation is not so important as long as the message is understood. This one is the most popular nowadays thanks to social networks. Its users need an immediate communication and MT applications help here. There is no need to obtain a very high-quality translation as long as the message is understood. This communication has no terminological component; thus, MT is very successful.

Database access: the use of translation to assist in getting information from a database in a foreign language. These days this means mainly the use of translation aids for searching the Internet, for accessing web pages. Again, this type is a very good candidate for using MT.

Since the Dissemination method is the one in which PE is included after using MT and it is the approach followed in this work and in the experiment, we use this figure to show how the concept can be seen from a schematic point of view. Figure 1.3 shows the options available for the use of MT in a dissemination function (Hutchins, 2003).
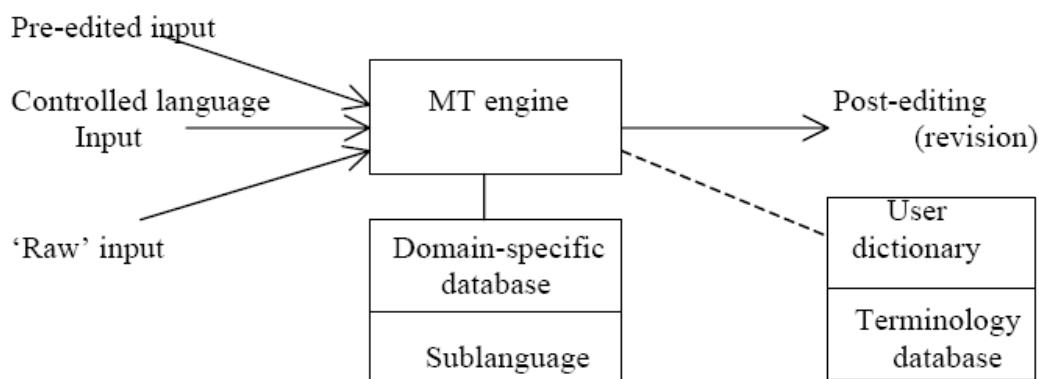
Figure 1.3: Human-aided MT (Hutchins, 2003)

In the image, the MT engine can be seen in the centre. It functions as a "black box" which receives an input and returns an output. The input can be pre-edited, that is, the text is prepared to be processed. What does this exactly mean? Well, first of all, the main goal of the pre-editing is to be as less ambiguous as possible and to try to overcome all typical problems which make MT systems' life difficult: according to Hutchins (2003), Guerberof (2012) and Haji Sismat (2016) the main errors arise, of course, from the difficulties computers have with many aspects of language (ellipsis,

pronouns, coordination, to mention just a few) and, in particular, with handling complex sentences – long sentences of more than one clause tend always to be translated less successfully than short single-clause sentences. If the original text includes a misspelling – which despite spell checkers and grammar checkers still happens – the word will not be recognized, and this may well affect the translation of the rest of the sentence. If the original contains a typographic mistake (although correctly spelled, e.g. the use of *from* instead of *form*), there is going to be a problem with the translation. Missing punctuation can also cause problems. For example, *The Commission vice president* might be incorrectly translated as *Le président du vice de la Commission* (the original should have a hyphen between *vice* and *president* in order to produce *le vice-président de la Commission*.) Some problems of interest to a Spanish audience are the following: prepositions are always problematic for MT systems; prepositional verb phrases are equally problematic. Inversions are another problem. Then there is the problem of the common Spanish constructions with reflexive verbs. English prefers a passive construction.

In some cases, it would be possible to correct theses regular errors semiautomatically by using macros in the word processor system, and this approach (Vasconcellos, 1986) is adopted increasingly in large translation services (Hutchins, 2003).

Raw input will also need to be prepared. As mentioned above, the more domain-specific a text is, the better. The language used in English literature or poetry is different from that of technical manuals. In addition to this, a sublanguage can also be used; i.e. a language which is compatible and well understood by the system.

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Once the text is already translated, a PE process is necessary. This is carried out by a human translator, supported by a dictionary and a terminology database that will be updated every time some text is translated in order to improve the system's performance.

At this point, the person in charge of doing the review has to have an appropriate preparation to handle this job; i.e. again depending on the target group, he or she will have to choose what options are the most suitable ones and what is not necessary to correct. This obviously creates a new profile, maybe even a new role for translators: the post-editor. There are real advantages of having translators as post-editors: people with some knowledge of translation who are prepared to learn the skills needed to specialize as good post-editors (Hutchins, 2003). In the beginning it was thought that there was no reason to employ people with some knowledge on the source language but now it is assumed that if the professional post-editor is a translator with some additional qualification in PE, all the problems are going to be handled in a much better way. Hence, as opposed to what traditional translators think, MT is not going to replace human translators but modify their roles in the process. Large companies and corporations are always looking for ways and methods of producing more in a cheaper way. MT gives them the opportunity to increase the speed and processed volumes. However, companies not only need a qualified and skilled staff of translators, linguists, reviewers and, localization engineers but also the appropriate resources such as texts corpora, the larger the better, whose aim will be to improve the system with each translation made. This will also contribute to maintaining terminological consistency.

On the other hand, another paramount point is language combination. According to Hutchins (2003), the dominance of English means that English appears in all systems, as source and/or target language, and other combinations are rare, e.g. French and German, Dutch and Italian, Spanish and Japanese. Many languages are not represented at all in enterprise systems, simply because there is not a large commercial demand for those languages or for translation to and from them.

CHAPTER 2: LITERATURE REVIEW

This chapter covers a literature review of previous research and knowledge which is related to the current study. The literature on MT, PE and the use of TM is very broad, and this work does not pretend to present it fully. We present the works that have a direct connection with the current research. It focuses on PE performance and MT. We have divided this section in three parts: PE, Quality in PE processes and PE in an industrial environment of a real company's workflow.

2.1 PE

2.1.1 Definition and types of PE

PE is related to MT. In (Allen, 2001), it was explained as the practice of correcting texts that have been pre-translated from a source language into a target language by a MT system. I think it is important to say that in CAT the term PE can also be used to define the way of correcting fuzzy matches from the TM since CAT tools offer the option to review MT and TM segments.

Depending on the effort and dedication devoted to the PE job, one of the first studies on PE typology is the work of (Laurian, 1984). In this work, two types of PE are suggested: rapid and conventional PE. The first one involves correcting texts but focusing only on accuracy, addition, omission, untranslated text, spelling, grammar and syntax. The conventional PE is focused on generating publishable translation following the same approach as HT. Allen (2003) suggested different terms for the two types of PE: minimal PE for the rapid and full PE for the conventional.

However, the most commonly used terms nowadays in the translation industry are the ones suggested by TAUS (2010) talking of light PE to achieve good enough quality to meet clients' requirements and full PE to achieve the same quality HT can offer.

2.1.2 PE and speed

2.1.2.1 Comparison of speed between PE and TM

In the PE field, Sharon O'Brien's work is one of the most important. She has been busy with this topic for several years and has covered different questions included in PE such as productivity and cognitive effort. She carried out a pilot study, (O'Brien, 2006) in which she applied an eye-tracking technique to assess the cognitive effort when post-editors face different types of fuzzy matches coming from TM. The experiment consisted of four professional translators (two native speakers of French and two native speakers of German). They were asked to translate from English into their language using Trados Translator's Workbench. TM were provided by Symantec. If there was no match coming from the TM, the translators had to post-edit MT outputs from Systran. The results showed that the cognitive effort increases as the fuzzy match decreases. However, the cognitive effort for MT matches is similar to that of 80-90% fuzzy matches.

In a similar eye-tracking study, O'Brien (2011) checked PE speed and cognitive effort and looked into the correlation between speed, cognitive effort and automatic MT metric scores. In this study, O'Brien grouped seven French native professional translators. General Text Matcher (GTM) (Cahill, 2009) and Translation Edit Rate (TER) (Snover et al., 2006) were chosen as assessment metrics. Final results

suggested that the time and cognitive effort required for post-editing segments with high GTM and TER scores are substantially lower when compared to segments with medium or low scores. The two studies mentioned before O'Brien (2006) and O'Brien (2011) used different types of methodology. In O'Brien (2011), it is assumed that segments with high fuzzy matches or automatic MT metric scores would need less cognitive effort and this means that speed increases.

Guerberof (2009) carried out a pilot study based on (O'Brien, 2006) to clarify if the time devoted to post-edit MT equals to post-editing the 80-90% matches. In Guerberof's work results could not be confirmed because the speed of post-editing MT seemed to be higher than the speed of post-editing fuzzy matches.

However, in her PhD, Guerberof (2012) increases the percentage threshold to 85-94% and this time results showed that the speed of post-editing MT equals the speed of correcting the 85-94% fuzzy matches. Following her findings, the current study tries to look into the effort needed to post-edit MT or to translate from scratch using CAT.

2.1.2.2 Comparison of speed between HT and PE

Zampieri and Vela's (2014) study covered the importance of MT outputs' quality on the translator's performance. The experiment consisted of 15 German-native beginner translators who translated from English. Each translator had to carry out three tasks: to translate without using TM, to translate using a TM containing post-edited MT output, and to translate using a TM containing raw MT output.

It was suggested that there is a difference between the tasks. In the second and third task, translators translated 28.87% and 52.82% faster respectively. There was also a productivity increase between task 2 and 3 with an average of 33.77%. In our study, post-editors review HT and MT outputs without knowing which one comes from MT and which one comes from HT. This way we aim to show that MT outputs can be as comfortable to review as HT ones. Moreover, we add two different MT methods (statistical and neural) to study the pros and cons of them.

2.1.2.3 PE speed and language pairs

Another study that can be interesting for our current research is the study done by Zhechev (2012) on productivity in post-editing MT.

It tested productivity on nine languages including English which was the source. These nine languages belonged to four different groups: Romance, Slavic, Germanic and Asian group. Four translators were working on each language. The study showed that productivity increase in PE varied depending on the language in the range of 37-92% when compared to translation from scratch.

We can infer thanks to this experiment that language combinations can have an impact on the productivity since quality of the data trained for each language combination can be different.

2.1.2.4 PE speed and sentence length

Another key factor in PE is sentence length. According to Popovic et al. (2014), Tatsumi (2009) and Tatsumi and Roturier (2010) sentence length can impact productivity rate.

Tatsumi (2009) investigated the correlation between automatic evaluation metric scores and PE speed on the segment level. The results proved that PE speed can be slower if sentences are too long or too short.

On the other hand, it is also suggested that source text structure and MT errors can have an effect on PE speed. There is a correlation between how the source text is structured and MT quality according to Lee (2021). The better the source text structure is, the less MT errors.

Popovic et al. (2014) in their study tried to find a relation between the different actions PE involved and the cognitive and time effort. The five different actions were edit operations, correcting word form, correcting word order, adding omission, deleting addition and correcting lexical choice. The results showed that correcting lexical errors is the most time-consuming action and indicated also that PE time effort depends on sentence length. This study also contributed to the confirmation that reordering and mistranslation are strongly related to the quality level of the translation output. Mistranslations are the main error found in the translation outputs.

Following with the importance of sentence length on PE, Koponen and Sami (2015) worked on the type of errors that can be identified and corrected without reference to

the source text. They found out that working on long sentences and sentences with many errors are more difficult to PE.

In our research, we also see interesting results on MT output and its PE depending on whether the sentences are very long or very short.

2.1.2.5 PE speed and post-editor's experience

One of the factors that we think are very important when post-editing is the post-editor's experience. In my professional working experience, I have noticed that experience plays an important role. Interestingly, we could think that the more experience the better, but experienced translators often get frustrated and bored when they post-edit.

Other studies such as De Almeida (2013) and Guerberof (2012) also related post-editors' performance to their experience. In her PhD., Guerberof (2012) tried to investigate whether the more experienced translators would display more productivity when they post-edit. The results indicated that the least experienced translators showed the highest productivity. De Almeida (2013) also showed that PE effort and PE performance is too complex to be explained only by analyzing productivity increase. The findings could also explain that the more experienced translators are the more critical they can be with the translation output. This can be problematic when measuring the PE effort because, depending on the PE strategy, maybe light PE is needed.

The present study has been carried out taking into account this characteristic of experience and we have tried to choose a mixed group of experienced and novice post-editors to see if we could confirm previous studies' results.

2.2. Quality in PE processes
2.2.1 Quality in PE

Quality is also a very important issue in PE studies. Different approaches are used by researchers to provide their results.

In our study quality is also investigated. This is the reason why different MT methods have been used (statistical and neural) and these along with HT have been reviewed to find out which typical errors show up depending on the type of translation.

I think this study will help researchers working on MT and PE thanks to its practical and professional approach because real data is used in a real company's workflow.

Koponen and Salmi (2015) carried out an experiment with a group of 48 translation students from different languages. The students post-edited English-Finnish MT outputs and they didn't check the source texts while doing so. The data showed that errors regarding word form are easier to identify and correct than omissions and mistranslations. Moreover, Koponen (2016) confirmed that word order is not particularly easy or difficult because Finnish has "relatively free word order".

In another experiment, Daems et al. (2014) tried to identify MT errors and investigated if they are still there after PE process. The results showed five types of grammatical

errors which are the ten most common errors in MT: superfluous or missing articles, incorrect verb forms, agreement issues, word order problems and missing constituents. However, according to Daems et al. (2014), the most complex error in PE are wrong collocations, word sense and misspelled compounds. All these errors are generated by MT.

Bowker and Ehgoetz (2007) worked on user satisfaction of MT output. As we do in our current research, they carried out an experiment where they presented three different target texts for the same source text. It was done from French into English. There were three different translation versions: HT, raw MT output and post-edited MT output. 121 professors at the Arts Faculty at the University of Ottawa were involved in the experiment. They assessed these texts regarding speed, quality and cost. It was tested whether these users would accept lower quality but lower cost as well. On the other hand, they were testing if faster turn-around times would be preferred instead of higher quality at a higher cost and slower turn-around time. The results showed that two thirds of the participants chose the PE option and one third the HT. The study is innovative because final consumers of the translated texts are involved. It is interesting because final users of the MT texts have a different perception than professional translators.

Fiederer and O'Brien (2009) examined the question of quality in MT texts. They hypothesized that professional translators would think that PE output has lower quality than HT. An experiment was carried out and it consisted of eleven raters who evaluated 30 source sentences, three human translated versions and three post-edited versions (180 sentences in total), based on the parameters of clarity, accuracy

and style. The raters applied a four-point scale to each sentence going from 1 to 4. Participants had to indicate their favorite translated option out of the six proposals for that given source, but they were not aware that they were rating PE texts as well. The results showed that raters gave equal scores for translated and post-edited sentences with regards to clarity, higher scores for post-edited sentences with regards to accuracy and finally they gave a higher score to translated sentences in terms of style.

In addition to that, raters chose primarily the translated sentences as their favorite sentences. A possible correlation between the use of controlled language rules and the quality of the post-edited product was also demonstrated.

This study is interesting because, as we try to do in our current research, they focused on the final perception of the final user of the translated text rather than in the productivity of the post-editors.

In their study, Carl et al. (2011) compared the PE experience in a group of translation students and professionals to measure time, keystroke and gaze data. They performed the experiment using three texts from English to Danish with an average of 850 characters each to translate manually. The same texts were machine translated using Google Translate. The quality of the translations was reviewed by seven native Danish speakers and four of them were professional translators. The results indicated that the post-edited texts were judged to have higher quality than the manual translation.

García (2010) explored the use of MT and PE in a non-professional context. The experiment was done involving fourteen bilinguals with an interest in translation. The language combination was English into Chinese and the tool used was Google Translator Toolkit (GTT). They wanted to determine if quality and speed were higher or lower using the MT option. The participants translated four 250-word extracts from general texts with legal and medical topics. Two texts were translated using MT and the other two directly translated from the source text without MT. The results showed that translating with MT was faster in 15 cases out of 28. Regarding quality, the MT solution was preferred in 59 percent of the cases. It is relevant to see that PE was rated higher than raw MT, although this experiment was not done by professional linguists, the engine was not trained with specific data and time spent was not mentioned.

De Sutter and Depraetere (2012) performed a study with 15 translation trainees, two of which were non-native speakers, who post-edited and translated 3045 words from English into French (half of the text was post-edited and the other half was translated from scratch). The post-edited text was evaluated by a professional translator using a five-point scale. The results showed that the average productivity of translators is higher when they post-edit. Regarding quality, the study suggests that manual translation has better quality than PE.

The current study also tries to shed light on the different errors that can be caused by MT and how these errors are handled by post-editors. We also test HT and MT outputs and how quality and speed look after reviewing them. This information is very helpful

not only for researchers but also for professionals working with MT in the translation industry.

2.2.2 Comparison of quality between post-editing MT and TM

In her PhD., Guerberof (2012) suggested that the quality of post-edited MT is higher than the edited fuzzy match segments. These results also showed that language, terminology and style errors are more common in no-match segments while accuracy errors are more common in fuzzy match segments, and mistranslations are more commonly found in MT matches.

In our study we also think it is important to see how quality differs in HT and MT.

2.2.3 Comparison of quality between HT and PE

There have been studies that investigated correlation between HT and PE.

In our study, we review HT and MT quality. Daems et al. (2014) and Daems and Macken (2013) contributed with their studies to investigate translations issues by comparing HT and post-edited MT.

In (Daems et al., 2014), the errors are classified into two categories: adequacy and acceptability errors and each category are divided into sub-categories. Sixteen Master's students participated in the study and they didn't have any experience with PE. The results indicated that the post-editors found the major problems with

grammar, syntax and lexical problems while style and register issues were more common in the HT.

Regarding adequacy errors, addition and omission errors are more common in the HT while word sense and misplaced words are more common in PE (Daems et al., 2014). Overall, meaning shift is the most common problem in HT while wrong word sense disambiguation and wrong collocation appear to be the most problematic errors in PE. The origin of these errors is not clear (Daems et al., 2014).

2.2.4. PE and automatic metric scores

De Sutter (2012) investigated the correlation between edit distance and fluency scores. In her experiment they used 2,300 words from an English leaflet. The output of two engines (one RBMT and one SMT) was chosen to generate the evaluation sets for the post-editors. Eleven students from a Masters in Translation Studies were involved to review the MT outputs. Fluency and accuracy were reviewed. The results showed that the RBMT system generates the best results. De Sutter also tested the edit distance between the MT output and the PE text. From these results, De Sutter suggested an edit distance mapping with human evaluation. The score of 100 corresponds to an Excellent Fluency score (5), the 95-99 to Good (4), the 80-94 to Average (3), the 50-79 to Poor (2), the <50 to Very poor (1).

This study points out the need to have a correlation between automatic scores and the PE effort. This is something that we think is very important to assess MT quality and whether it is worth post-editing it. This is one of the main goals of our present work.

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2.2.5. PE and confidence scores

Regarding confidence scores, we need to refer to the work carried out in the field of computational linguistics. There are studies exploring the idea of getting confidence scores in the MT output that can present to the post-editors which segments require a higher degree of editing when they are reviewing translations. Specia et al. (2009a) and Specia et al. (2009b) explore the idea of predicting the MT output quality when there is no human reference available. She applied regression estimation models to obtain scores in various MT systems and language pairs at the sentence level. The goal of these works is to ease the effort of the post-editors when they are evaluating the MT output. This way they do not have to spend much time thinking whether the quality of the segment is good enough to be edited. These studies showed that this method can help to control expected precision and recall. Thus, a set of translations with a better quality can be chosen for the post-editors.

Specia (2011) worked with different estimation models using three parameters (PE time, distance and effort scores) to improve how different MT segments were marked. According to Specia's thoughts, translators tend to complain about the fact that the "PE of certain segments with low quality can be frustrating and can require more effort than translating those segments from scratch, without the aid of an MT system". This fact can have a bad influence over the other segments that have better quality and makes translators' work slower. Specia carried out an experiment with post-editors so they could assess the quality of the machine translated segments from 1 to 4: 1 being a complete retranslation from scratch and 4 a perfect translation. At the same time, they had the task of post-editing in order to calculate the edit distance of each segment

thanks to an on-line tool that also calculates the time they needed to complete the PE of each segment. Finally, Specia analyzed, at the end of the task, the data in terms of setting the quality of the raw output in relation to translators' opinions on effort, the edit distance and the time spent. The results showed that "CE [Confidence Estimation] models that learnt from objective annotations of translation quality produce rankings of translations that reliably reflect their PE effort". Although this is a highly technical and complex paper from a computational linguistic field, we think that it addresses the question of having scores per segment very similar to the ones attributed to fuzzy matches in TM, and it involves post-editors as human annotators. From our point of view, this is very interesting, because if a MT engine is used, the work carried out by post-editors can help to generate confidence scores for future segments and give information about the quality of the MT output. On the other hand, He et al., (2010a) suggested a framework that combines MT with TM for translators. The framework suggests MT outputs to a TM user when the machine finds the MT suggestions more appropriate than the TM one. To measure it, they used an automatic MT metric (TER) and obtained a precision of 0.85 and a recall of 0.89.

He et al. (2010b) explored the option of combining SMT systems and TM, to investigate how this combination can help translators to choose the best option during the translation process through a suggestion (recommendation) model. In this case, rather than having an automatic metric, they carry out a human review on TM and MT integration with the help of a team of five post-editors from English to French using a web application. Post-editors select the best segment for post-editing from a group of three segments on screen, the original text, and two target texts (TM or MT segments randomly placed on the screen) without knowing where the given text is coming from

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(the two target texts are marked as Candidate 1 and 2). The time they need to make the decision of selecting one segment or another is measured. Then translators receive a questionnaire to provide more details about their experience while post-editing and their opinions of MT quality. The results showed that all five post-editors selected more MT suggestions to post-edit than the TM options. This supports the conclusions obtained in the previous study where automatic evaluation metrics were deployed. It was also found out that there was consistency in their behavior according to inter- and intra-annotator agreement. During the questionnaire, one post-editor confirmed that the quality of the TM suggestions was more appropriate for post-editing but he chose more MT outputs in the experiment. It can be seen here that as the quality of SMT engines is improved, the more difficult it is for post-editors to distinguish between the quality generated from the MT engine and from TM suggestions. Moreover, if high quality MT segments are suggested, post-editors would even prefer to use MT output. However, in this experiment post-editors do not carry out the PE of the suggestions from the MT engine to confirm whether they would have been faster when post-editing these segments than when translating them from scratch or editing suggestions from the TM. We think this would have required a completely different setup since the same post-editors cannot evaluate and edit the same source sentence since this would modify the final results.

2.3. PE in an industrial environment of a real company's workflow

Flournoy and Duran (2009) explored the question of whether post-editing MT output is faster than translating from scratch using MT integrated into the Adobe production

workflow. They carried out two tests, a small one of around 800-2,000 words and a second, larger project of around 200,000 words using two different MT engines: PROMT for Russian and Language Weaver for Spanish and French. The original language was English. They were trained with Adobe data and lexicons. The results concluded that there was a higher speed while post-editing in both tests. In the small test the results showed that the translators could do their job of a day in less than two hours if they post-edited. As the researchers indicated, these figures did not consider any additional workload. The standard daily translator's output of around 2,500 words was used and not the actual productivity of these translators. Regarding the second experiment, it was reported that the speed was higher by a range of 40-45 percent in comparison with HT. It is always difficult to know how these figures were calculated in the context of a live project. Although in the second phase of the experiment real figures were measured (PE versus HT) the files were different and this introduces doubt over whether the increase in speed was related to MT or to the nature of those specific files. There are too many variables when data is measured in a live context and this must be considered in the analysis. But, on the other hand, there are interesting points in this paper, such as the claim that MT quality and editing speed are significantly different between files and that MT quality was related to the quality of the source text. According to this paper, it is also important to take into consideration that PE requires experienced translators because novice translators trusted MT output more than experienced ones. This can lead to a lower final quality.

Groves and Schmidtke (2009) were involved in the study of post-editing patterns in MT projects at Microsoft. The MT engine used was the Microsoft Treelet system that Quirk et al. (2005) adapted and trained with their own data. Microsoft based their time

measures on the information obtained from their language service providers. They considered three "representative" translators (one of average productivity, one new to the project and one expert translator). The results obtained are then averaged to know the productivity increase per translator. In addition to this, Microsoft collected unstructured feedback from their translators (through the LSPs). Microsoft reported improvements in the quality of the MT and the productivity increases from 5-10 percent to 10 to 20 percent for certain languages, although they confirmed that the PE productivity depends on the language, project, product, and translators. Translators shared feedback on issues like terminology, grammar, and incorrect use of formatting elements like tags and other mark-up signs. In the experiment, two data sets were used: English into German and English into French. The source text, the raw MT output and the post-edited text were used for the analysis. Both languages had the same segment length and most of the segments had around 20 words or less. They used their own edit distance methods and they found that in French the edit distance was 5.60 versus the German one which was 8.81. This indicated that the effort was greater when post-editing German. The most common types of edits were deletion and insertion of function words like the determiners. There were also edits in punctuation such as adding or deleting commas. From our point of view, the way the time is measured in this study and the productivity increase that is reported could have been more accurate. Translators measured their own time when they were working on a regular project. We cannot confirm whether the difference in translators' productivity or between languages were because of how the data was collected or because of the impact of the MT.

Plitt and Masselot (2010) from Autodesk worked on a very interesting job on a productivity test of statistical PE. It is important and related to our work because they carried out the experiment in a commercial environment. This is relevant because it showed a change in how experiments in the localization environment on PE and MT were carried out. The study focused on the productivity of the PE task and we think this is something normal because companies would be interested in reducing costs and increasing benefits. Nevertheless, the improvement of this type of studies was that they were using similar texts and a similar environment to that of professional translators. Plitt and Masselot (2010) prepared an experiment with twelve participants. They translated from English into French, German, Italian and Spanish. They created a Moses (Koehn et al., 2014) based engine which was trained with Autodesk data (a total of 144,648 words of source words processed). The translators worked in a PE environment created for the experiment and this environment only contained the source and target fields. Then after the translators finished their job the Quality Assurance team of Autodesk verified the quality produced by them. The Quality Assurance team did not know where the segments came from. The results showed that using MT helped translators to work faster but the percentages varied from 20 to 131 percent. Regarding the edit distance, the fastest translators edited the text more than the slower ones. It is interesting to see that there was no correlation between the productivity and the number of edits. When it comes to talking about segment length, they confirmed that the optimum length should be between 20 and 25 words. They didn't mention anything about smaller or longer segments in terms of productivity. According to the Quality Assurance team, there were more errors from translation jobs than from post-edited jobs in all the languages tested.

All these findings are relevant for our study since we have tested the number of edits and the time spent on each of the translation types (HT, SMT and NMT) by our group of 20 experienced translators and 20 novice translators. It is worth mentioning regarding quality that Autodesk has a large corpus of parallel text in all the languages of the experiment and an extensive pool of TMs and terminological databases which increased the quality of the MT outputs. Furthermore, Autodesk had enough budget to carry out this experiment with translators but, in our experiment the added value is that we used 40 post-editors. Autodesk's experiment is one of the most relevant ones carried out in an industrial environment but maybe the number of subjects working on the experiment was not enough to get a more extensive picture and more accurate results.

There was an analysis carried out by Beinborn (2010) in which she used the data collected in the Autodesk experiment. She performed a cross-linguistic analysis of the temporal, technical and cognitive effort in the post-edited text (German, French, Italian and Spanish) as part of her Master's thesis. Her aim was to cast light on the PE processes. The segments that required more time in the previous experiment were identified and technical annotations were applied to verify the type of edits made in the MT output. Beinborn also analyzed the translators' feedback to better understand their experience. She also analyzed the pause indicators (measured by the absence of keystrokes) to measure cognitive effort. The results showed that the times depended on the language and on the amount of context the segment had. In terms of edit distance, the higher the edit distance was the higher the processing time. This is something that does not match with the findings of Plitt and Masselot (2010) that we have previously discussed. The edit distance was similar in each of the four languages

and there was an increase in the effort due to long segments, tags, technical instructions and complex descriptions. She also found that the target language plays an important role with regard to cognitive effort. From our point of view, her experiment is of special interest because she studied the PE and translation process using a novel system of annotation in the target languages and it remains an interesting model to follow if PE is to be analyzed in a detailed manner at a target sentence level.

Tatsumi (2010) studied, in her doctoral thesis, the speed of nine professional English to Japanese post-editors and analyzed the edit distance during this process as well as the influence of the source text on speed and type of edits. She used a 5,000 word-corpus from a user manual from Symantec Corporation. The post-editors used SDL Trados Translator's Workbench with a specific macro designed to help to measure time. She used a small sample (906 words) of TM segments with a range of fuzzies from 75 to 99. She used Systran version 6 and 3 with pre-processing and post-processing scripts. There was a questionnaire in order to better understand the different factors that could impact the process and also to collect some opinions about PE and MT in general and about that specific project. In this case, this experiment showed that there is a moderate correlation between the edit distance and the PE speed. This correlation is confirmed for simple and complex sentences but it does not have a great impact for incomplete sentences. The results also showed that simple sentences were post-edited in the fastest way, followed by complex ones and finally by incomplete sentences. Another finding was that the more complex the sentence, the slower the PE speed. The PE operations that had an impact on speed are: supplementation, rewriting, and punctuation edits. It is interesting to see that the post-editors reviewed the texts again, not to make any further changes but to review a

previous decision or change. However, the post-editors that have a higher number of revisits are not necessarily slower.

The results from the questionnaire showed that the post-editors saw it as an important action to standardize terminology in the MT output. But they also confirmed positively that the quality of the MT was good enough. All in all, this study focused on important questions in PE such as the nature of changes, and the behavior of post-editors in a commercial environment. However, the number of participants seems to be too low to achieve accurate results.

After the experiment done by Plitt and Masselot (2010), Autodesk (2011) published on their website the results of a two-day translation and PE test carried out with 37 participants from English into Chinese, Japanese, Polish, Portuguese, German, Italian, Korean, Spanish and French. They used a Moses-based engine trained with Autodesk data. In addition to that, a translation interface was used to register the time spent on each segment. The corpus was composed of user interface as well as documentation segments. The conclusions of this test showed that the productivity was higher using MT than translation. However, the productivity increase depended on the language: Chinese was the lowest (with 42 percent) and French was the highest (with 131 percent). Spanish had a 117-percent increase. According to this test, experience, specifically in PE, was considered to be the most relevant factor in productivity. The translators' perception of speed did not match the real speed they experienced during the test. Some of the participants believed they were faster in translation. No correlation is found between the translation methods preferred by post-editors and productivity. However, interestingly, those translators that preferred using

fuzzy matches were the least productive. In the experiment, when they compared fuzzy matches of all categories including below 50 percent matches with MT in those languages with best MT output (Chinese, Polish, German, Spanish, French and Italian), MT is more productive in general and as productive as the matches in the 85-94 range. Just as in the previous studies we have seen, the ideal segment length that increased the productivity was around 25 words for PE and 21 words for translation. Another interesting part of the experiment was that they carried out a final translation review in which the reviewers did not know where the reviewed text came from (translation or PE). Surprisingly, reviewers could not distinguish the difference between post-edited text and HT. It seemed there was no loss of quality.

In this section we have covered some important studies carried out in a commercial environment: Adobe, Autodesk, Microsoft, or Symantec. But there are others experiments which are also quite significant and that have added great value to this research field. These include IBM (Roukos et al, 2011), Sybase (Bier and Herran, 2011), PayPal (Beregovaya and Yanishevsky, 2010), PayPal and Caterpillar (Dove et al., 2011), and CA (Paladini, 2011). As we mentioned previously, the main problem while testing in a real environment is that there are too many variables that can impact the final results. These variables can be fuzzy matches from TMs, translators' speed in direct translation, terminology, type and order of files, number of participants in tests or weak time measurements. These commercial experiments are increasing and we think that our work will help to increase the number of these experiments not only because it is beneficial for the companies from an economic point of view, but because this will help them to set clear and sophisticated workflows which improve the productivity, knowledge and quality of their localization processes and workflows.

There will be more MT processes which will have PE included. Maybe there are some language combinations that are more difficult to machine translate and post-edit like Chinese, Japanese or Russian, but there are other language combinations for which MT and PE are being used such as German, Italian, French and Spanish. Regarding the MT engines in use, we can mention Moses, Lucy LT, Systran, Globalese or the company's own engine. Nowadays, it is common for a company to hire the services that a MT provider to train their engines.

The main conclusions from the commercial use of MT and PE are that the MT helps to increase productivity and this does not mean that the quality decreases thanks to the PE steps among other reasons to which we can include: proper training of the engines, proper training of the post-editors and fair payment of the post-editors and reviewers involved in the process.

These studies are helping to acquire quantitative data to support business decisions made in the localization industry. TAUS (Translation Automation User Society) is a good example of a community of users and language service providers of translation technologies and services. They are focused on good practices, quality assessment, identifying processes and exchanging experiences in MT and new translation technologies in general (TAUS, 2012). Common Sense Advisory is a research and consultancy company with the aim of offering best practices and valuable views about the localization process. They very often publish valuable reports about MT processes, implementation, usage, PE and pricing systems (De Palma, 2011), (De Palma and Kelly, 2009). There are MT users that collect data from all sources and distributing this

area in the localization field. Among them we can mention Asia Online (Asia Online, 2012) and through blogs and knowledge-based sharing (Vashee, 2012).

CHAPTER 3: METHODOLOGICAL CONSIDERATIONS

This thesis is presented as an inductive applied research work with an important pragmatic character, and a functional and constructivist approach. In the course of its elaboration, phases of quantitative and qualitative analysis have been combined to reach the systematization and knowledge of the object of study from the proven experience through professional practice.

As mentioned in the previous sections, there is a lack of knowledge and research in the way MT is used in translation companies. The PE effort is not assessed when MT is applied (Álvarez, 2021).

On the other hand, another issue that may affect the efficiency of the translation process is the fact that there is no measurement of post-editors' performance based on their experience.

Our work tries to fill these two gaps by measuring the effort needed for post-editing different translation outputs (HT, SMT and NMT) and studying the post-editors' performance depending on their experience (experienced and novice post-editors).

In this section, we present the background of the research project, the hypotheses formulated and how they have been applied to their operationalization, the methodology used for the project, how the methodology was tested, and a description of the project development.

3.1 Hypotheses

It is commonly believed that if MT is used, quality is impacted and there is always fear of not meeting the audience's expectation (Lin et al., 2022). Moreover, in order to keep quality, a PE phase is added. However, there are many cases in which PE is deployed without analyzing whether MT output is good enough and projects are delayed, and costs increase.

It is worth investigating the impact of using PE in professional workflows especially from the economic point of view. Therefore, the present study hypothesizes as follows, dividing the hypotheses regarding productivity and quality:

Productivity:

- H1: Experienced post-editors spend more time on reviewing than novice post-editors.

- H2: Post-editing HT is slower than post-editing MT.

- H3: Slower post-editors carry out less edits than faster post-editors.

Quality:

- H4: There are more errors in the SMT and NMT output than in the HT output, but post-editors spend more time on HT.

- H5: SMT and NMT have more syntactic, semantic and pragmatic errors than HT but SMT and NMT have better performance in translation-specific errors like consistency than HT.

3.2 Methodology

3.2.1 Mixed Methods Approach

In the present work, we focus on a quantitative analysis (Productivity and Quality) to test our hypotheses. However, qualitative data (Questionnaire) has also helped to explain some phenomena observed when examining the quantitative results. Human post-editors' working styles and their opinions about the different translations (HT, SMT, NMT) they have post-edited have been very useful for our research.

For the above-mentioned, we decided to use a mixed methods approach in this project consisting of two phases: quantitative followed by qualitative. The first phase of this research has gathered quantitative data, and this has been analyzed to confirm H1, H2 and H3.

The second part, which has occurred immediately after we finished collecting the quantitative data, has gathered qualitative results thanks to a questionnaire which has helped to explain the results obtained in the quantitative analysis.

3.2.2 Experimental Project

In this section, we describe the methodology adopted in this study and the processes involved in the research project.

As mentioned in the previous sections, one of the main contributions of this work is that the experiment happens in a real professional environment of a company. Real data has been used to perform translations and to train the Moses-based MT system. The usual LSP used in the translation workflow of the company has been the one performing the HT. Financial data, such as the budget the company spent on translation and the rates used by the LSP for the English into Spanish language combination, have been used in this research work.

The texts that we have used for the experiment belong to the real texts that were translated in the daily work of the company. The content type is marketing, and the field is e-commerce travel industry. 300 texts (Appendix A) were chosen to be translated by three different methods: HT, SMT and NMT.

The 300 texts were grouped in 3 versions (100 different texts in each version). The texts in version 1 were translated by HT, the texts in version 2 were translated by SMT and the texts in version 3 were translated by NMT.

The HT was performed by the company's usual Language Service Provider (LSP). The LSP translated 100 texts out of the total of 300 texts from English into Spanish. The text had 3,328 words and the LSP used its TMS to translate the texts. Translation memories from previous projects were used along with glossaries and terminology

databases as they always use in their daily work. It is important to mention that these were new texts that have never been translated before by the LSP.

The SMT was performed by a Moses-based SMT system built by me from scratch. As was done in the HT, 100 texts from English into Spanish were machine translated by the SMT. These 100 texts were different from the 100 texts translated by HT and the 100 texts translated by NMT.

The NMT was carried out by Google Translate [3]. As was done in the HT, 100 texts from English into Spanish were machine translated by the NMT. These 100 texts were different from the 100 texts translated by HT and the 100 texts translated by NMT. The content type was marketing and the field was e-commerce travel industry as mentioned before.

Once all translations were done, a pool of 40 post-editors reviewed the same 300 translations without knowing if they were HT, SMT or NMT. This is very important to avoid bias from the post-editors. In the Excel file, they received the 300 translations divided in version 1, version 2 and version 3.

Finally, to analyze the different types of translations (HT, SMT and NMT) from a quality point of view and carry out the error analysis, an independent reviewer reviewed all the texts according to the error categorization that is presented in chapter 5 of this thesis.

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[3] The NMT was obtained thanks to Google Translate website interface on the 6th September 2021.

3.2.3 Data for Quantitive and Qualitive Analysis

This section includes the data used for the quantitative and qualitive analysis. As mentioned in the previous section, a corpus of 300 texts of 3,328 words was chosen as source text. Between the different language combinations that the company usually needs translations for, we selected English into Spanish because this combination yields better MT results and the corpus of previous translations to train the Moses-based MT system was the biggest in the English into Spanish combination. The selection of post-editors was also easier for this combination.

3.2.4 Sample
3.2.4.1 Criteria for selecting post-editors

For this project we had a group of 40 linguists for the PE task. We thought it was very important to have a mix between experienced and novice linguists because experienced linguists can add all their experience and knowledge but, on the other hand, they usually get frustrated reviewing MT outputs (Salah and Majid, 2021). However, novice linguists can add a fresh view and are not as biased as experienced linguists with a long working experience using CAT.

To find the suitable novice participants, master's and bachelor's students from the Universitat Oberta de Catalunya were approached and selected.

For the experienced linguists, a group of working colleagues from previous companies in which I had worked was selected. They were chosen due to their interest in translation technology and had between five and ten years of experience in the

translation industry. Being familiar with CAT tools (such as Transit, SDL Trados, XTM or MemoQ) was a signal of close relation with translation memories and postediting. Linguists needed to be close to the translation environment to be able to understand the goal of the task.

English into Spanish had to be their working language combination. In addition, they had to be willing to participate throughout the whole research project.

The reviewer who took care of the analysis of all the texts to create the error categorization has more than 20 years of experience in the localization field as a reviewer, working in different companies.

At the end of the review, the participants received a questionnaire (Appendix B) designed to find out their impressions while reviewing the translations. They had to answer 6 concrete questions and were free to add any other comment they found suitable.

3.2.5 SMT engine

A statistical MT engine was trained based on Moses technology (Koehn and Hoang 2017).

The Moses MT system was installed in a Linux operating system (Ubuntu distribution). Moses was chosen because it is an Open Source engine that has been used by LSPs as opposed to private engines that would have needed a specific budget for their build.

According to Plitt and Masselot (2010), who chose Moses for their experiment, Moses can be installed, configured and used by a person with some technical knowledge but this person does not have to be an experienced developer.

Moses is a SMT system that allows automatic training of translation models for any language pair. All that is required is a collection of translated texts (parallel corpus). Then, a search algorithm quickly looks for the highest probability translation among an exponential number of choices (Koehn and Hoang 2017).

3.2.5.1 Components

According to Koehn and Hoang (2017), the two main components in Moses are the training pipeline and the decoder. There are also a variety of contributed tools and utilities. The training pipeline is really a collection of tools (mainly written in Perl, with some in C++) which take the raw data (parallel and monolingual) and turn it into a MT model. The decoder is a single C++ application which, given a trained MT model and a source sentence, will translate the source sentence into the target language.

3.2.5.2 The Training Pipeline

As explained by Koehn and Hoang (2017), there are several phases in generating a translation system from training data. These are implemented as a pipeline, which can be controlled by the Moses experiment management system, and Moses in general makes it easy to insert different types of external tools into the training pipeline.

The data typically needs to be prepared before it is used in training, tokenizing the text and converting tokens to a standard case. Heuristics are used to remove sentence pairs which are misaligned, and long sentences are removed. The parallel sentences are then word-aligned, typically using GIZA++, which implements a set of statistical models developed at IBM in the 80s. These word alignments are used to extract phrase to phrase translations, or hierarchical rules as required, and corpus-wide statistics on these rules are used to estimate probabilities.

An important part of the translation system is the language model, a statistical model built using monolingual data in the target language and used by the decoder to try to ensure the fluency of the output. Moses relies on external tools for language model building.

The final step in the creation of the MT system is tuning, where the different statistical models are weighed against each other to produce the best possible translations. Moses contains implementations of the most popular tuning algorithms.

3.2.5.3 The Decoder

Following the explanation by Koehn and Hoang (2017), the job of the Moses decoder is to find the highest scoring sentence in the target language (according to the translation model) corresponding to a given source sentence. It is also possible for the decoder to output a ranked list of the translation candidates, and also to supply various types of information about how it came to its decision (for instance the phrase to phrase correspondences that it used).

The decoder is written in a modular fashion and allows the user to vary the decoding process in various ways, such as:

- Input: This can be a plain sentence, or it can be annotated with xml-like elements to guide the translation process, or it can be a more complex structure like a lattice or confusion network (say, from the output of speech recognition)

- Translation model: This can use phrase to phrase rules, or hierarchical (perhaps syntactic) rules. It can be compiled into a binarized form for faster loading. It can be supplemented with features to add extra information to the translation process, for instance features which indicate the sources of the phrase pairs in order to weigh up their reliability.

- Decoding algorithm: Decoding is a huge search problem, generally too big for exact search, and Moses implements several different strategies for this search, such as stack-based, cube-pruning, chart parsing, etc.
- Language model: Moses supports several different language model toolkits (SRILM, KenLM, IRSTLM, RandLM) each of which has its own strengths and weaknesses, and adding a new LM toolkit is straightforward.

The Moses decoder also supports multi-threaded decoding (since translation is embarrassingly parallelizable), and also has scripts to enable multi-process decoding if you have access to a cluster.

3.2.6 Corpus for training the Moses-based MT system

Ideally the corpus of parallel texts to train the system has to be as big as possible due to the fact that statistical MT Systems yield better results when they have been trained with big corpora (Koehn et al., 2014).

Knowing that, we started working with a corpus of 1,800,000 lines. However, due to technical limitations with the computer, the size of the corpus which could be handled to train the system was 40,000 lines which equals to 649,102 words. Every time we tried to train the system with a corpus of 1,000,000, 500,000, 250,000, 148,000, or 80,000 lines, the training crashed.

On the other hand, one of the important characteristics of this research is that the Moses-based system was trained with a domain-specific corpus coming from previous translations performed in the company. That is, parallel texts from marketing and travel industry were included in it. These previous parallel texts were also included in the TM used in the HT.

3.2.7 Training the engine

In order to train the engine, we extracted all the information provided by Koehn and Hoang (2017). Although, as we mentioned earlier, it is not necessary to be an experienced developer to work with this system, the process requires a relatively important technical effort. The following steps are needed to train the system.

3.2.7.1 Installation

- Moses was installed.

- GIZA++ was installed for word-aligning the parallel corpus.

- IRSTLM was installed for language model estimation.

- All the tools and data were installed in my home directory (i.e. ~/), and Moses was downloaded and compiled into ~/mosesdecoder. Moses has already been run from there.

- Binaries were created in ~/giza-pp/GIZA++-v2/GIZA++, ~/giza-pp/GIZA++-v2/snt2cooc.out and ~/giza-pp/mkcls-v2/mkcls.

- When I ran the training, I needed to tell the training script where GIZA++ was installed using the -external-bin-dir argument.

3.2.7.2 Corpus Preparation

To be able to train a translation system, parallel data is needed as previously mentioned. It had to be aligned at the sentence level.

To prepare the data for training the translation system, we performed the following steps:

- Tokenisation: This means that spaces have to be inserted between words and punctuation.

- Truecasing: The initial words in each sentence are converted to their most probable casing. This helps reduce data sparsity.

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- Cleaning: Long sentences and empty sentences are removed as they can cause problems with the training pipeline, and obviously mis-aligned sentences are removed.

- Sentence length was limited to 50 words due to technical limitations of the computer used. Training crashed with more than 50 words per sentence.

3.2.7.3 Language Model Training

According to Koehn and Hoang (2017) the language model is used to ensure fluent output, so it is built with the target language (i.e, Spanish, in this case). The texts used come from the different Spanish translations the company has done over the last few years. The content type was marketing and the field was e-commerce travel industry as mentioned before.

3.2.7.4 Training the Translation System

At the end of the process, we trained the translation model. We ran word-alignment (using GIZA++), phrase extraction and scoring, created lexicalized reordering tables and generated the Moses configuration file, all with a single command.

Once it is finished, we get a moses.ini file in the working directory. The model specified by this .ini file is used to decode (i.e. translate), but this file loads very slow and the weights used by Moses to weigh the different models against each other are not optimized. To find better weights we needed to tune the translation system, which led us on to the next step.

3.2.7.5 Tuning

This is the slowest part of the process. As Koehn and Hoang (2017) explain, "Tuning requires a small amount of parallel data, separate from the training data". I used some parallel data prepared for this purpose and the end result of the tuning is an .ini file with trained weights. This set of parallel data was different from the corpus used to train the engine. The content type was marketing and the field was e-commerce travel industry as mentioned before.

3.2.7.6 Testing

The decoder was tested and BLEU was used to check how good the system was.

BLEU is an automatic evaluation method created to help researchers to evaluate the quality of a translation quicker than using human evaluation. The method is based on the idea that "the closer a MT is to a professional HT, the better it is" (Papineni et al. 2002). The final score is calculated assessing the distance between the evaluated segment and the human references. The higher the BLEU score is, the better the translation can be considered. However, we have to bear in mind that BLEU just compares the MT output to the HT one. It does not consider synonyms or accepted word order changes for instance, so its score needs to be considered carefully.

The BLEU score for our Moses project was 10.55 whereas the score of the Google NMT was 22.00. This was calculated by using as reference more than 1,000 sentences coming from data of the company and Wikipedia general content. As we have mentioned above, the higher the MT output the better.

BLEU scores generate a number, but it is not a percentage of accuracy. It just represents how close the MT output is to a HT.

We need to bear in mind that HT can be evaluated as not perfect by Moses if there have been different words used and in a different order. According to Vashee (2012), "even two competent HT of the exact same material may only score in the 0.6 or 0.7 if they use different vocabulary and phrasing".

3.2.7.7 Perform the translations with the Moses MT system

Once the Moses-based statistical MT system was installed and correctly configured, the translation was performed without problems. Results can be seen in Appendix A.

3.2.8 NMT phase

Neural translation was performed using Google Translate [4]. Results can be seen in Appendix A.

3.2.9 HT phase

HT was performed by the usual LSP of the company. We used their data exchange platform to send the request and they did it in two working days.

They translated using native professional translators of the target language (Spanish) and the process happened in their Translation Management System (a TMS created

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[4] The NMT was obtained thanks to Google Translate website interface on the 6th September 2021.

by the company in which all translation memories are centralized in the server). There was no review step by a second professional translator.

Quality assurance checks for spelling, terminology and consistency were carried out by the Quality Controllers of the LSP.

The final translations were delivered via the same data exchange platform used for the request.

3.2.10 PE phase

Once the HT, SMT and NMT were ready, the PE round started.

All the post-editors involved in the process received a message with basic instructions to perform the task. They were requested to review the Spanish translation in column C and post-edit it (if necessary). The post-edited version should be added in column D. In column E post-editors needed to add the time they spent on each row of the Excel which comprised 1 translated text. It is worth mentioning here that the time post-editors spend on post-editing texts is not measured in the professional localization field. They usually receive the total amount of hours they need to spend, and they carry out the task according to it.

Finally, post-editors needed to answer questions in column F, which were questions related to the three different types of translations (Appendix B). In column A, the 300 rows of translations were divided into version 1, version 2, and version 3. Answers

should be added in column G. Post-editors didn't receive too much information, in order to avoid bias.

Post-editors didn't know which of the three translated versions came from HT, SMT or NMT. This was done because professional translators tend to think MT is more difficult to review than HT. It was interesting to see their reactions when dealing with the translated texts (Stevanović and Radičević, 2020).

In addition to the review of the translated texts, post-editors registered how much time they spent on each translation and answered 6 questions on the translation's quality.

3.2.11 Quality review phase

In order to review, from a quality point of view, the 100 texts translated by HT, the 100 texts translated by SMT and the 100 texts translated by NMT, an independent reviewer was employed. The reviewer was an experienced linguist with more than 20 years of experience in the localization field as a reviewer. As was done with the post-editors, the reviewer reviewed the same 300 translations without knowing if they were HT, SMT or NMT. This was very important to avoid any bias from the reviewer and to categorize the errors in the most objective way.

The reviewer received the same Excel file the post-editors did. The 300 translated texts were divided in version 1 (100 texts), version 2 (100 texts) and version 3 (100 texts). The instructions were to categorize the errors according to the error categorization in chapter 5 of this thesis.

CHAPTER 4: PRODUCTIVITY RESULTS

In this chapter, we present the results of the analysis of the data obtained from the work done by the post-editors reviewing HT, SMT and NMT. This chapter begins by covering different aspects of productivity: speed and the number of edits involved in the review of each translation.

4.1 Productivity

In this section we indicate the processing speed and the number of edits carried out by the post-editors while reviewing the different translations. This section is also aimed at confirming whether there is any correlation between PE speed and number of edits. The analyzed hypotheses in this section are the following:

- H1: Experienced post-editors spend more time on reviewing than novice post-editors.

- H2: Post-editing HT is slower than post-editing MT.

- H3: Slower post-editors carry out less edits than faster post-editors.

4.1.1 Processing speed

This section covers the processing time the post-editors spent on reviewing HT, SMT and NMT. We have used two different parameters to assess the time post-editors spent on the review: total time of the review in minutes and number of words per minute in the review. The time the post-editors spent on each version of the translations was calculated by them manually. The number of words per minute was calculated dividing the total number of words (3,328 words) by the total time they spent.

4.1.1.2 Time spent by experienced post-editors

Table 4.1 and Figure 4.1 show the time in minutes that experienced post-editors spent on each translation version (HT, SMT or NMT). Table 4.1 shows that the mean processing speeds of the experienced post-editors were 145.85 minutes on HT, 133.95 minutes on SMT and 93.15 on NMT.

On the other hand, we think it is relevant to observe the standard deviation of these figures, because there are significant differences in the time spent between experienced post-editors on the different translation types. HT has a SD of 115.83, SMT of 113.06 and NMT of 67.32. This difference of time spent by some post-editors can come down to different factors, such as whether the changes are really needed or not (Koponen, Salmi, 2015) and therefore some post-editors have spent more time than others.

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Moreover, the highest SD is on HT which can be a sign that post-editing HT is not as direct and easy as SMT and NMT.

ePE	HT	SMT	NMT
1	47	45	23
2	286	208	147
3	201	114	89
4	90	240	120
5	52	49	54
6	32	32	28
7	180	90	80
8	140	114	91
9	184	110	136
10	47	51	38
11	43	58	27
12	46	44	19
13	489	503	255
14	54	82	13
15	143	140	120
16	103	48	24
17	150	250	200
18	172	131	121
19	334	261	173
20	124	109	105
Mean	145.85	133.95	93.15
SD	115.83	113.06	67.32
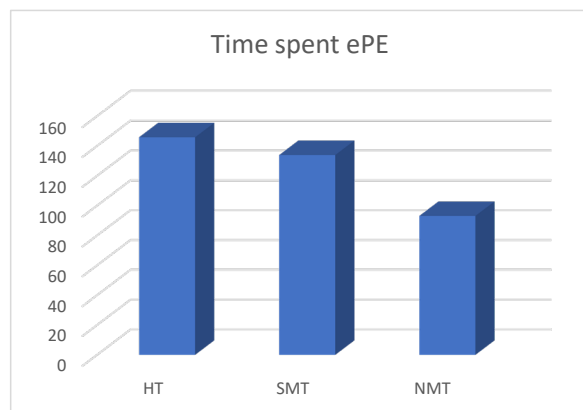
Figure 4.1: Time spent ePE

Table 4.1: Time spent ePE

4.1.1.3 Time spent by novice post-editors

Table 4.2 and Figure 4.2 show the time in minutes that novice post-editors spent on each translation version (HT, SMT or NMT). Table 4.2 shows that the mean processing speeds of the novice post-editors were 124.01 minutes on HT, 109.5 minutes on SMT and 97.825 on NMT.

It is relevant here also to observe the standard deviation of these figures, because there are significant differences in the time spent between post-editors on the different translation types. HT has a SD of 53.40, SMT of 56.99 and NMT of 56.99. This difference in time spent by some post-editors can come down to different factors, such as whether the changes are really needed or not (Koponen and Salmi, 2015) and therefore some post-editors have spent more time than others.

It is relevant to mention that novice post-editors don't show a SD as high as experienced post-editors.

nPE	HT	SMT	NMT
1	124	109	105
2	150	170	160
3	72	68	51
4	125	129	111
5	140	160	120
6	135	109	113
7	15	37.25	21.5
8	66.2	50.75	41
9	147	140	141
10	55	50	45
11	191	75	53
12	95	77	74
13	55	85	70
14	148	139	110
15	193	127	155
16	97	83	95
17	108	64	43
18	209	104	99
19	194	292	230
20	161	121	119
Mean	124.01	109.5	97.825
SD	53.40	56.99	50.48

Table 4.2: Time spent nPE
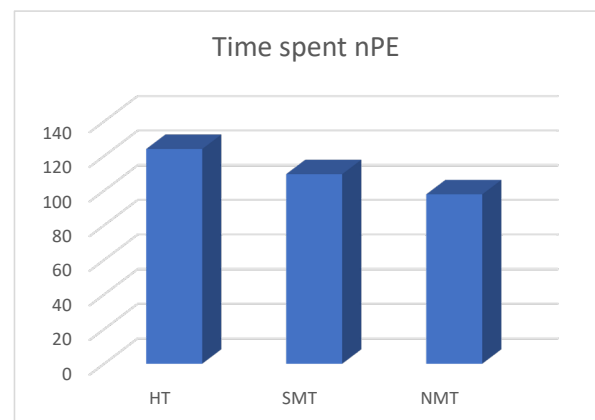
Figure 4.2: Time spent nPE

4.1.1.4 Time spent (WPM) by experienced post-editors

The processing speed or the time that experienced post-editors devoted for the review was also measured by words per minute (WPM) (Plitt and Masselot, 2010) with the goal to have a better picture of the results and to compare them in a better and a clearer way. The number of words per minute was calculated dividing the total number of words (3,328 words) by the total time they spent. The results in the Table 4.3 and Figure 4.3 show the differences in speed depending on the translation output. Experienced post-editors post-edited 38.55 words per minute on HT, 42.75 words per minute on SMT and 83.25 words per minute on NMT.

ePE	HT	SMT	NMT
1	70	73	144
2	11	16	22
3	16	29	37
4	36	13	27
5	64	67	61
6	104	104	118
7	18	36	41
8	23	29	36
9	18	30	24
10	70	65	87
11	77	57	123
12	73	75	175
13	6	6	256
14	54	83	256
15	23	23	27
16	32	69	138
17	22	13	16
18	19	25	27
19	9	12	19
20	26	30	31
Mean	38.55	42.7	83.2
SD	28.29	28.6	76.9

Table 4.3: Time spent ePE (WPM)
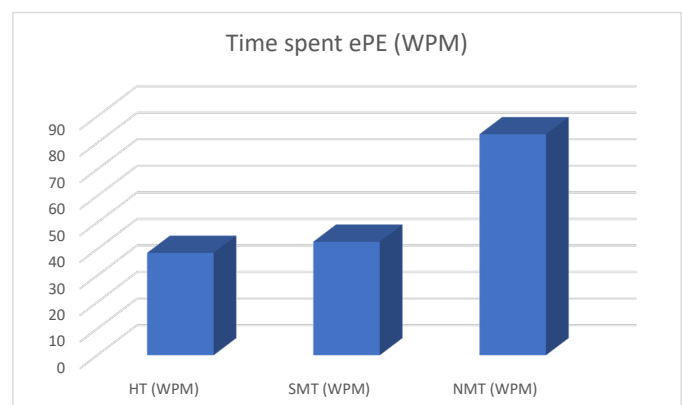
Figure 4.3: Time spent ePE (WPM)

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4.1.1.5 Time spent (WPM) by novice post-editors

The processing speed or the time that novice post-editors devoted for the review was also measured in words per minute (WPM) (Plitt and Masselot, 2010) with the goal to have a better picture of the results and to compare them in a better and a clearer way. As we did with the experienced post-editors, for the novice post-editors the number of words per minute was calculated dividing the total number of words (3,328 words) by the total time they spent. The results in Table 4.4 and Figure 4.4 show the differences in speed depending on the translation output. Novice post-editors post-edited 39.9 words per minute on HT, 38.15 words per minute on SMT and 46.7 words per minute on NMT.

nPE	HT	SMT	NMT
1	27	31	32
2	22	20	21
3	46	49	65
4	27	26	30
5	24	21	28
6	25	31	29
7	222	89	155
8	50	66	81
9	23	24	24
10	61	67	74
11	17	44	63
12	35	43	45
13	61	39	48
14	22	24	30
15	17	26	21
16	34	40	35
17	31	52	77
18	16	32	34
19	17	11	14
20	21	28	28
Mean	39.9	38.15	46.7
SD	45.05	19.01	32.58

Table 4.4: Time spent nPE (WPM)
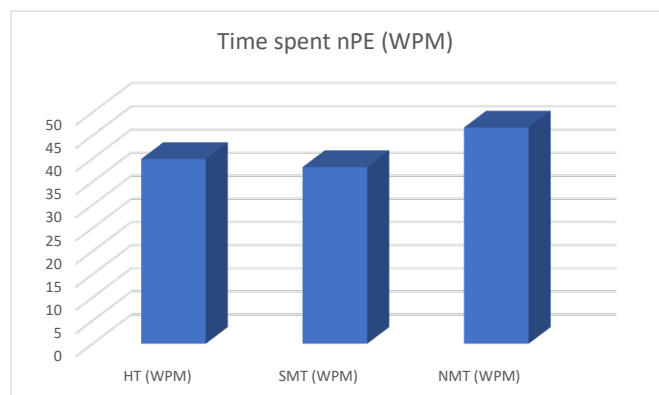
Figure 4.4: Time spent nPE (WPM)

4.1.1.6 Conclusions on processing speed

It is interesting to observe from the results that experienced post-editors devoted more time to HT and SMT than novice post-editors. This contradicts the findings of De Almeida and O'Brien (2010) where they found that more experienced post-editors were faster than novice post-editors. On the other hand, novice post-editors spent more time on NMT. Maybe this is caused by the fact that 2-3 post-editors spent much more time on the NMT than the other novice post-editors.

In addition to this, it is also remarkable that both experienced and novice post-editors spent more time on HT outputs than on SMT and NMT. The average processing speed of the experienced post-editors on HT was 145.85 minutes, 133.95 minutes on SMT and 93.15 on NMT. The average processing speed of the novice post-editors on HT was 124.01 minutes, 109.5 minutes on SMT and 97.825 on NMT. The average speed on HT output is slower than on the SMT and NMT ones.

At the same time, it is interesting to confirm that the processing speed of the post-editors on SMT output is slightly slower than on NMT. Similar results are shown in (Toral et al., 2018) in which "PE also leads to reductions in the number of keystrokes: by 9% with PBMT, and by 23% with NMT. Finally, regarding cognitive effort, PE results in fewer (29 and 42% less with PBMT and NMT, respectively) but longer pauses (14 and 25%). Although the statistical MT seems to have more basic errors such as untranslated words, grammar or syntax, post-editors spend more time (longer pauses) on neural translation."

H1 and H2 have been confirmed. H1: Experienced post-editors spend more time on reviewing than novice post-editors. H2: Post-editing HT can be slower than post-editing SMT and NMT. This could lead us to think that MT can be included in localization processes without losing productivity and efficiency in the process.

4.1.2 Edit distance

According to Yu Jiang et al. (2020), edit distance can be defined as "an important way to quantify how dissimilar two strings are to one another by counting the minimum number of operations required to transform one string into the other". Much natural language processing is based on measuring how similar two strings are.

In our experiment, number of edits have been registered while post-editors were reviewing the translations to identify the effort of reviewing each of the translations. The method used has been a comparison between the original translation and the one post-edited by the post-editors in a compared Word file. Once we have had the compared Word file, we have run a macro which shows the number of insertions, the number of deletions and the total numbers of changes that the file has.

4.1.2.1 Numbers of edits by experienced post-editors

Table 4.5 and Figure 4.5 show the number of edits the experienced post-editors have carried out on each translation version (HT, SMT or NMT). Table 4.5 shows that the mean edit distance of the experienced post-editors on HT was 541 edits, 1103.9 edits on SMT and 468.25 on NMT.

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The standard deviation of these figures is remarkable, because there are significant differences in the edit distance between post-editors on the different translation types. HT has a SD of 468.40, SMT of 72.40 and NMT of 235.77. This difference in the edit distance of some post-editors can be explained by the fact that some post-editors take their time to make their final choice and others prefer to carry out some overcorrections on their review.

In addition to that, it is also interesting to observe that the HT has the highest SD. This shows us that experienced post-editors not only need to carry out more edits on HT but also that post-editing HT is not as straightforward as post-editing SMT or NMT, although the quality is better than in SMT and NMT as we will study in the Quality chapter.

HT implies a more complex structure (Munková et al., 2021) that needs more time to be reviewed versus the MT text structure which tends to be less complex and therefore easier to review.

ePE	HT	SMT	NMT
1	778	1179	429
2	925	1179	601
3	1340	1173	674
4	80	1071	212
5	119	943	450
6	1022	1166	17
7	1682	1093	876
8	847	1116	710
9	122	1126	517
10	95	1037	222
11	185	1062	571
12	469	1072	452
13	995	1106	351
14	634	1009	62

15	158	1146	553
16	410	1126	565
17	424	1267	870
18	140	1023	534
19	280	1095	213
20	115	1089	486
Mean	541	1103.9	468.25
SD	468.40	72.40	235.77

Table 4.5: Edits ePE
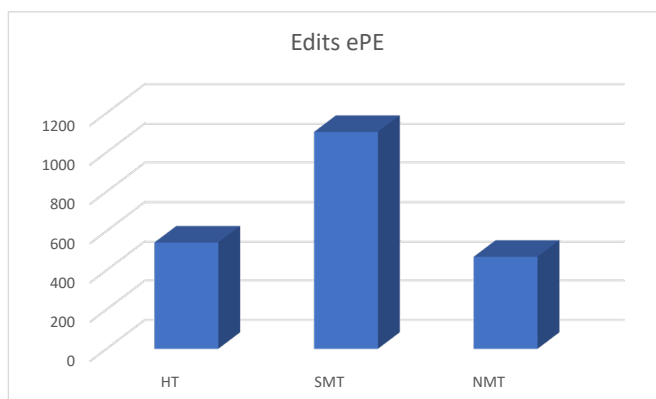
Figure 4.5: Edits ePE

4.1.2.2. Numbers of edits by novice post-editors

Table 4.6 and Figure 4.6 show the number of edits the novice post-editors have carried out on each translation version (HT, SMT or NMT). Table 4.6 shows that the mean edit distance of the novice post-editors on HT was 735 edits, 1109.85 edits on SMT and 544.4 on NMT.

It is relevant here also to observe the standard deviation of these figures, because there are significant differences in the edit distance between post-editors on the different translation types. HT has a SD of 634.13, SMT of 64.56 and NMT of 175.63. This difference of edit distance of some post-editors can be explained by the fact that some post-editors take their time to make their final choice and others prefer to carry out some overcorrections on their review.

In addition to that, it is also interesting to observe that the HT has the highest SD as we have seen was also the case with experienced post-editors. This shows us that novice post-editors not only need to carry out more edits on HT but also that post-

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editing HT is not as straightforward as post-editing SMT or NMT, although the quality is better than in SMT and NMT as we will study in the Quality chapter.

HT implies a more complex structure (Munková et al., 2021) that needs more time to be reviewed versus the MT text structure which tends to be less complex and therefore easier to review.

nPE	HT	SMT	NMT
1	213	1089	486
2	554	1094	388
3	3120	1024	422
4	802	1135	952
5	802	1208	377
6	702	1043	604
7	1193	1123	617
8	408	1051	477
9	1011	1201	638
10	459	1133	160
11	528	1216	684
12	441	991	615
13	395	1186	331
14	1098	1051	366
15	399	1147	675
16	766	1163	658
17	698	1095	690
18	800	1105	465
19	150	1041	619
20	161	1101	664
Mean	735	1109.85	544.4
SD	634.13	64.56	175.63

Table 4.6: Edits nPE
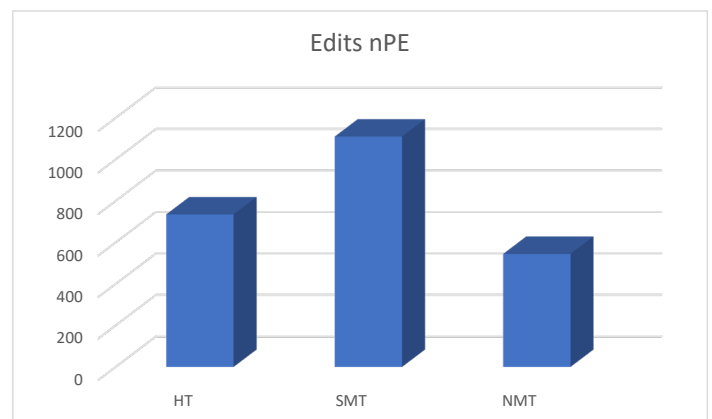
Figure 4.6: Edits nPE

4.1.2.3 Conclusions on edit distance

Regarding edit distance, we have confirmed in our experiment that novice post-editors carried out more edits than experienced ones. The edit distance of experienced post-editors was 541 in HT, 1103.9 in SMT and 468.25 in NMT. However, the edit distance of novice post-editors was 735 in HT, 1109.85 in SMT and 544.4 in NMT. This can be explained and put in perspective with the fact that they needed more time for the PE. Novice post-editors try to post-edit quickly and they didn't spend the time to think carefully about the change they would carry out.

It is also interesting to notice from the results that experienced and novice post-editors carried out more edits on HT than on NMT. This can be explained by the fact that HT has longer sentences than NMT (Toral et al., 2018). This is also reflected in the questionnaire post-editors completed after the task in which they confirmed that NMT had shorter sentences, and that this was easier to post-edit than HT, which had longer and more complex sentences.

On the other hand, when post-editing SMT post-editors needed less time than when post-editing HT, but they carried out more changes in SMT than in HT. Experienced post-editors spent 145.85 minutes on HT and 133.95 minutes on SMT. And they carried out 541 edits in HT and 1103.9 edits in SMT. This shows us that experienced post-editors carried out more edits in SMT than in HT in less time. This could explain to us that working from SMT can be quicker than working with HT since SMT has more errors and these errors are easier to identify than the fewer errors that HT has. To identify them you have to read the whole text carefully.

When it comes to analyzing the speed and edit distance of HT versus SMT, novice post-editors spent 124.01 minutes on HT and 109.5 minutes on SMT. The edit distance of novice post-editors was 735 in HT and 1109.85 on SMT. Here again they spent more time on HT than on SMT but they carried out more edits on SMT than on HT. This helps us to confirm our H2: Post-editing HT is slower than post-editing MT and H3: Slower post-editors carry out less edits than faster post-editors (Hotate et al., 2019).

4.1.3 Edit rate

Edit rate can be defined as the number of insertions and deletions and the total number of all keystrokes needed to correct the MT errors (Huang and Carl, 2021). We have included edit rate in our analysis with the aim to have more quantitative data for the analysis.

4.1.3.1 Edit rate by experienced post-editors

To determine whether the experienced post-editors are fast or slow by checking how many edits they make, we have calculated the edit rate by dividing the number of edits that experienced post-editor have carried out by the total number of words.

Table 4.7 and Figure 4.7 show the mean edit rate for HT is 0.16, for SMT 0.33 and for NMT 0.14.

ePE	HT	SMT	NMT
	Edit rate	Edit rate	Edit rate
1	0.23	0.35	0.13
2	0.28	0.35	0.18
3	0.40	0.35	0.20
4	0.02	0.32	0.06
5	0.04	0.28	0.14
6	0.31	0.35	0.01
7	0.51	0.33	0.26
8	0.25	0.34	0.21
9	0.04	0.34	0.16
10	0.03	0.31	0.07
11	0.06	0.32	0.17
12	0.14	0.32	0.14
13	0.30	0.33	0.11
14	0.19	0.30	0.02
15	0.05	0.34	0.17
16	0.12	0.34	0.17
17	0.13	0.38	0.26
18	0.04	0.31	0.16
19	0.08	0.33	0.06
20	0.03	0.33	0.15
Mean	0.16	0.33	0.14
SD	0.14	0.02	0.07

Table 4.7: Edit rate ePE
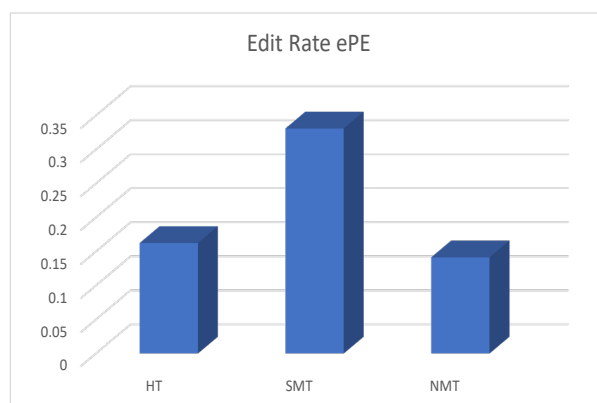
Figure 4.7: Edit rate ePE

4.1.3.2 Edit rate by novice post-editors

As we studied with experienced post-editors, to determine also whether the novice post-editors are fast or slow by checking how many edits they make, we have calculated the edit rate by dividing the number of edits that novice post-editors have carried out by the total number of words.

Table 4.8 and Figure 4.8 show the mean edit rate for HT is 0.22, for SMT 0.33 and for NMT 0.33.

nPE	HT Edit rate	SMT Edit rate	NMT Edit rate
1	0.06	0.33	0.33
2	0.17	0.33	0.33
3	0.94	0.31	0.31
4	0.24	0.34	0.34
5	0.24	0.36	0.36
6	0.21	0.31	0.31
7	0.36	0.34	0.34
8	0.12	0.32	0.32
9	0.30	0.36	0.36
10	0.14	0.34	0.34
11	0.16	0.37	0.37
12	0.13	0.30	0.30
13	0.12	0.36	0.36
14	0.33	0.32	0.32
15	0.12	0.34	0.34
16	0.23	0.35	0.35
17	0.21	0.33	0.33
18	0.24	0.33	0.33
19	0.05	0.31	0.31
20	0.05	0.33	0.33
Mean	0.22	0.33	0.33
SD	0.19	0.02	0.02

Table 4.8: Edit rate nPE
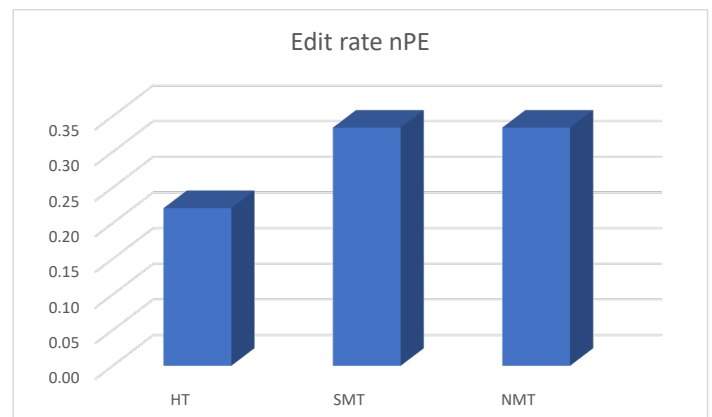
Figure 4.8: Edit rate nPE

4.1.3.3 Conclusions on edit rate

The overall results indicate between the experienced post-editors and the novice post-editors that the slower novice post-editors tend to make less edits than the fast

post-editors which confirms our H3: Slower post-editors carry out less edits than faster post-editors (Hotate et al., 2019).

4.1.4 Conclusions on productivity

We have tested our hypotheses regarding productivity and found that the results showed that experienced and novice post-editors spent more time on HT than on MT outputs.

This outcome is really interesting because it confirms that MT output can be used in a localization workflow to improve efficiency and speed up the processes.

On the other hand, experienced post-editors spend more time than novice post-editors on post-editing. However, novice post-editors carry out more edits, according to the results.

Regarding edit distance, we have also confirmed that post-editors in general needed to carry out more edits on HT than on NMT. However, they needed to edit more on SMT than on NMT and HT, although they spent less time than on HT.

Moreover, novice post-editors needed to carry out more edits than experienced post-editors. This means that experienced post-editors need more time to think about the edit they are going to make, but, once they have edited the translation, they don't come back again to that edit. On the contrary, novice post-editors make much more edits than experienced post-editors, which can be understood as a way of PE in which they

don't spend too much time on thinking beforehand what the change is going to be, and they prefer to carry out many edits and to spend as little time as possible on the task.

All these findings help us to understand that, although the quality of MT is not as good as HT (Ahrenberg, 2017), in terms of productivity, using PE in a localization workflow can help to speed up processes and reduce timelines needed for delivering projects.

Furthermore, we have confirmed that HT implies a more complex structure (Munková et al., 2021) that needs more time to be reviewed versus the MT text structure which tends to be less complex and is therefore more easily reviewed.

Another important finding of this study is the fact that experience is something to be considered when setting up a MT localization workflow, in terms of quality and efficiency. As mentioned before, experienced post-editors needed more time to post-edit, but, less edits than novice post-editors. From our point of view, this implies that the MT output post-edited by experienced post-editors is of a higher quality. On the contrary, novice post-editors make much more edits than experienced post-editors, which can be understood as a way of PE in which they don't spend too much time beforehand on thinking what the change is going to be, and they prefer to carry out many edits and to spend as little time as possible on the task. We understand this behavior as a way of post-editing in a faster way, but it implies less quality of the final post-edited output. This can be understood as follows: if the company that is going to set up the MT workflow is more focused on time and fast deadlines, our recommendation would be to use novice post-editors who are going to spend less time on PE the MT outputs. However, if the company is more focused on quality than on

fast deadlines, our suggestion would be to select experienced post-editors who will need more time to carry out the task but once they have post-edited the MT output, the quality would be higher.

This part of the study can help future work setting up MT localization workflows in which time is the most important factor and therefore the use of PE can be relevant to add value to the process. We don't mean that quality is not as important as efficiency and time needed in a process, but nowadays more and more processes are focused on time efficiency rather than on quality.

CHAPTER 5: QUALITY RESULTS

This chapter tests the quality hypotheses (H4 and H5) and discusses the quality of the different types of translations (HT, SMT and NMT). An error categorization for each type of translation is provided. The quality of the translations is measured by two parameters. The first one is the number of errors found in the translations. This number is obtained by calculating the number of edits (insertions and deletions) that post-editors have made in the PE phase. The second parameter is the results of the actual quality of the translations confirmed by the reviewer in the error categorization.

The errors are analyzed and classified in the different types of translations (Zhou and Bollegala, 2019), (Popovic, 2018), (Dastjerdi and Abdolmaleki, 2012). As the number of errors increases, the quality decreases. However, two translations, may have a similar number of errors but one translation may have more major errors while the other may have a higher number of minor errors. Therefore, it is important to consider the severity levels of the errors (major and minor errors) in the analysis. The foci of the error analysis are as follows:

- to examine the number of errors commonly found when a translation is post-edited by measuring the number of errors the post-editors managed to correct.
- to investigate the source of the errors depending on whether it is HT, SMT or NMT, and on the type of error.

5.1 Revision time (speed) and edit distance (changes) by post-editors

To examine the number of errors commonly found when the different types of translations were post-edited, it is interesting to confirm again whether there was agreement in terms of corrections and time among the 40 post-editors. As previously mentioned in chapter 3 of this thesis, each post-editor had 3,328 words to post-edit distributed between HT, SMT and NMT. The post-editors confirmed in the questionnaire that they usually reviewed in order, from the first translation until the end, although on occasions they went back to change some corrections in previous translations.

Revision time varies from one post-editor to another as can be shown in chapter 4 of this work. It is interesting to confirm that the more experienced the post-editors were, the longer they took to complete the whole task when it came to post-editing HT and SMT. However, novice post-editors need more time to post-edit NMT than experienced post-editors.

All this data helps us to test our H4: There are more errors in the SMT and NMT outputs than in the HT output, but post-editors spend more time on HT.

5.1.1 Experienced post-editors

Table 5.1 and Figure 5.1 show the time and the number of edits the experienced post-editors have carried out on each translation version (HT, SMT or NMT). Table 5.1 shows that the mean of the time spent by the experienced post-editors on HT was

145.85 minutes, 133.95 minutes on SMT and 93.15 minutes on NMT. On the other hand, the mean number of edits was 541 on HT, 1103.9 on SMT and 468.25 on NMT.

ePE	HT		SMT		NMT	
	Speed	Changes	Speed	Changes	Speed	Changes
1	47	778	45	1179	23	429
2	286	925	208	1179	147	601
3	201	1340	114	1173	89	674
4	90	80	240	1071	120	212
5	52	119	49	943	54	450
6	32	1022	32	1166	28	17
7	180	1682	90	1093	80	876
8	140	847	114	1116	91	710
9	184	122	110	1126	136	517
10	47	95	51	1037	38	222
11	43	185	58	1062	27	571
12	46	469	44	1072	19	452
13	489	995	503	1106	255	351
14	54	634	82	1009	13	62
15	143	158	140	1146	120	553
16	103	410	48	1126	24	565
17	150	424	250	1267	200	870
18	172	140	131	1023	121	534
19	334	280	261	1095	173	213
20	124	115	109	1089	105	486

Mean	145.85	541	133.95	1103.9	93.15	468.25
SD	115.83	468.40	113.06	72.40	67.32	235.77

Table 5.1: ePE Speed vs. Changes
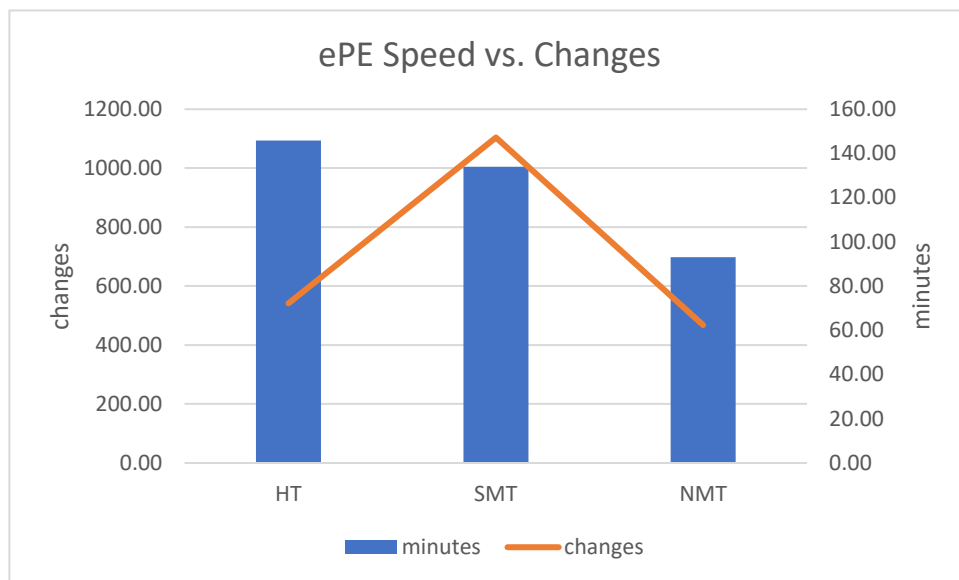
Figure 5.1: ePE Speed vs. Changes

5.1.2 Novice post-editors

Table 5.2 and Figure 5.2 show the time and the number of edits the experienced post-editors have carried out on each translation version (HT, SMT or NMT). Table 5.2 shows that the mean of the time spent by the experienced post-editors on HT was 124.01 minutes, 109.05 minutes on SMT and 97.825 minutes on NMT. On the other hand, the mean number of edits was 735 on HT, 1109.85 on SMT and 544.4 on NMT.

nPE	HT		SMT		NMT	
	Speed	Changes	Speed	Changes	Speed	Changes
1	124	213	109	1089	105	486
2	150	554	170	1094	160	388
3	72	3120	68	1024	51	422
4	125	802	129	1135	111	952
5	140	802	160	1208	120	377
6	135	702	109	1043	113	604
7	15	1193	37.25	1123	21.5	617
8	66.2	408	50.75	1051	41	477
9	147	1011	140	1201	141	638
10	55	459	50	1133	45	160
11	191	528	75	1216	53	684
12	95	441	77	991	74	615
13	55	395	85	1186	70	331
14	148	1098	139	1051	110	366
15	193	399	127	1147	155	675
16	97	766	83	1163	95	658
17	108	698	64	1095	43	690
18	209	800	104	1105	99	465
19	194	150	292	1041	230	619
20	161	161	121	1101	119	664
Mean	124.01	735	109.5	1109.85	97.825	544.4
SD	53.40	634.13	56.99	64.56	50.48	175.63

Table 5.2: nPE Speed vs. Changes
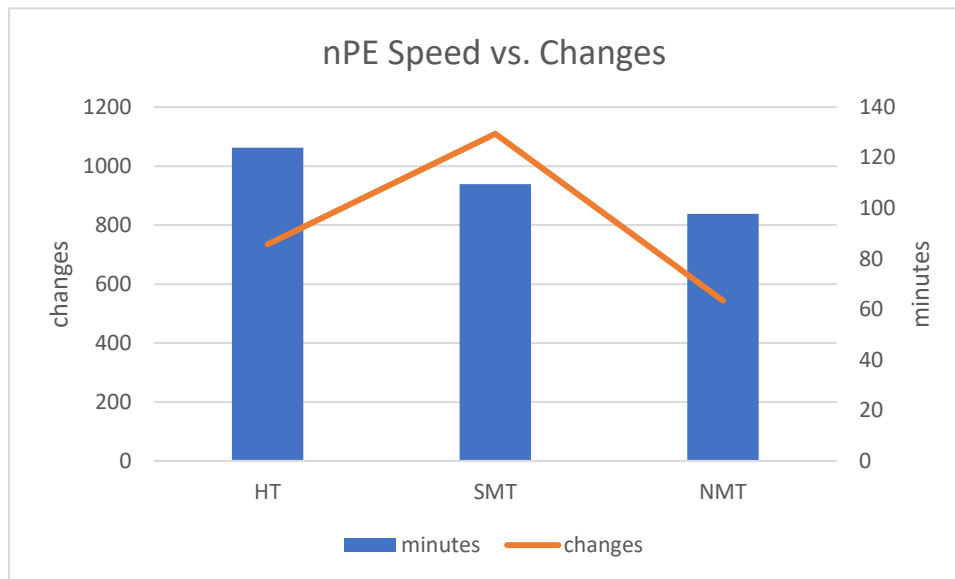
Figure 5.2: nPE Speed vs. Changes

With this data we have tested speed in PE and quality. We have assumed (as mentioned in the beginning of this section) that the more words have been changed (insertions and deletions), the worse the quality. Thus, H4: "There are more errors in the SMT output than in HT and NMT, but post-editors spend more time on HT" is confirmed because SMT output has lower quality (more insertions and deletions) than NMT and HT, but post-editors spent more time on HT.

As mentioned many times in our study, experience is something to be considered when setting up a MT localization workflow in terms of quality and efficiency. According to our study, experienced post-editors are more focused on delivering high quality or at least they are more concerned about it. On the contrary, novice post-editors make many more edits than experienced post-editors and they prefer to carry out many edits and to spend as little time as possible on the task. We understand this behavior as a way of post-editing in a faster way, but it implies less quality of the final post-edited output. According to our findings this can be understood as follows: if the company

that is going to set up the MT workflow is more focused on time and fast deadlines, our recommendation would be to use novice post-editors who are going to spend less time on post-editing the MT outputs. However, if the company is more focused on quality than on fast deadlines, our suggestion would be to select experienced post-editors who will require more time to carry out the task but once they have post-edited the MT output, the quality would be higher.

5.2 Quality review

As already introduced in chapter 3 of this thesis, in order to review from a quality point of view the 100 texts translated by HT, the 100 texts translated by SMT and the 100 texts translated by NMT, an independent reviewer was employed. The reviewer was an experienced linguist with more than 20 years of experience in the localization field as a reviewer. As was done with the post-editors, the reviewer reviewed the same 300 translations without knowing whether they were HT, SMT or NMT. This is very important to avoid bias from the reviewer and to categorize the errors in the most objective way.

The reviewer received the same Excel file the post-editors did. The 300 translated texts were divided into version 1 (100 texts), version 2 (100 texts) and version 3 (100 texts). The instructions were to categorize the errors according to the error categorization in the following section of this thesis.

5.3 Error classification

In this section we will analyze the types of errors and determine which types of errors are more common in the different types of translation that we have in the thesis: HT, SMT and NMT (Lommel, A. et al., 2014). The error categorization is extracted from Dastjerdi and Abdolmaleki (2012).

Figure 5.3 shows the error types proposed by Dastjerdi and Abdolmaleki (2012). This is a hybrid model designed by Dastjerdi and Abdolmaleki (2012) which is a combination of ATA's (2010) categorization of error types and Keshavarz's (1993) linguistic taxonomy of errors. For the specific definition of each type of errors, please see Appendix C.

1	Syntactic Errors	1.	Grammar
		2.	Syntax
		3.	Punctuation
		4.	Usage
2	Semantic Errors	1.	Addition or omission
		2.	Terminology, word choice
		3.	Too freely translated
		4.	Too literal, word-for-word translation
		5.	False cognate
		6.	Ambiguity
		7.	Accents and other diacritical marks
		8.	Case (upper case/lower case)
		9.	Word form
		10.	Spelling
3	Pragmatic Errors	1.	Misunderstanding of the original text
		2.	Mistranslation into target language
		3.	Register
		4.	Style
4	Translation-Specific Errors	1.	Incomplete passage
		2.	Inconsistency

Figure 5.3: Error classification

According to Dastjerdi and Abdolmaleki (2012), there are not any models to classify translation errors in a unified way. In their study, they argue that there are two models which are relevant. One model was proposed by ATA (2010) and this model includes 22 types of errors which can be used to classify and grade the errors: they are 1. Incomplete passage, 2. Illegible handwriting, 3. Misunderstanding of the original text, 4. Mistranslation into target language, 5. Addition or omission, 6. Terminology, word choice, 7. Register, 8. Too freely translated, 9. Too literal, word-for-word translation, 10. False cognate, 11. Indecision in word choice, 12. Inconsistent, 13. Ambiguity, 14. Grammar, 15. Syntax, 16. Punctuation, 17. Spelling, 18. Accents and other diacritical marks, 19. Case (upper case/lower case), 20. Word form, 21. Usage and 22. Style.

However, this list of errors needs to be improved to be a sufficient model in error classification, not only at the level of words but also at the levels of sentences and discourse (Dastjerdi and Abdolmaleki, 2012). Baer and Koby (2003) have suggested some ways to improve it.

There is another categorization model for translation errors used by the National Accreditation Authority for Translators and Interpreters in Australia (NAATI). The NAATI model is based on the following eight criteria 1. Mistranslation, 2. Inappropriate vocabulary, 3. Incorrect punctuation, 4. Incorrect grammar, 5. Incorrect spelling, 6. Distortion of meaning, 7. Unidiomatic usage, 8. Stylistic infelicities (Dastjerdi and Abdolmaleki, 2012). These criteria are believed to be vague, and the specific meanings of the sentences are often left to the interpretation of individual evaluators (Gentile, 1997).

We think the classification of translation errors proposed by Dastjerdi and Abdolmaleki (2012) is an accurate and easy to follow classification and can help us in our purpose. Moreover, most of these errors are the most common errors that appear in the daily work of the professional localization environment.

The work of Koponen, Salmi, Nikulin (2019) helps us to identify which are the most common errors in HT, SMT and NMT. According to them, the postedited texts show statistically significant differences in the distribution of edit types between MT systems. Moreover, according to these authors, insertions are the most common edit type for the SMT and word form changes as well as word substitutions for the NMT system. Their findings also show significant differences in the correctness and necessity of the edits. In the NMT and SMT there are also problems related to certain verb forms and ambiguity.

On the other hand, when it comes to determining the errors found in HT, Lin et al. (2022) suggests that there have been many studies on improving translations with automatic PE due to the quality problems of MT outputs. However, there have not been that many studies focused on automatically correcting HT. According to Lin et al. (2022), HT usually has errors not only in the form of typos and inconsistencies but a more diverse range. Although HT shows fewer translation errors in terms of fluency, there are still errors. And this is one of the reasons that in the translation and localization industry, the four-eyes principle is used. There is always one human translator translating the text and then, after that, there is another human reviewer reviewing the translated text if the translation quality needs to keep the highest standards.

We will now analyze the errors that were found in the three different types of translations we have used in the study: HT, SMT and NMT.

5.3.1 Error classification for the HT

In this section we focus on analyzing the HT errors found in the quality review. The HT translations were formed of 100 texts. A text is defined here as the text contained in one cell in the Excel file.

	Translated Texts	Erroneous Texts	Recognized Errors	
Number	100	44	20	
Frequency		44%	20%	
	Pragmatic Errors	Translation-Specific Errors	Syntactic Errors	Semantic Errors
Number	4	5	8	3
Frequency	20%	25%	40%	15%

Table 5.3: HT number and types of errors

As Table 5.3 and Figures 5.4, 5.5, 5.6, 5.7, 5.8 indicate, out of 100 texts under study, 44 texts were recognized as erroneous, which comprises 44% of the total. 20 errors were discovered in the erroneous texts. Out of these erroneous items, 40% percent (8 cases) were syntactic, 15% percent (3 cases) were semantic, 20% percent (4 cases)

were pragmatic, and 25% percent (5 cases) were categorized as translation-specific errors.

In the chart below, the frequency of the HT errors can be seen more clearly:
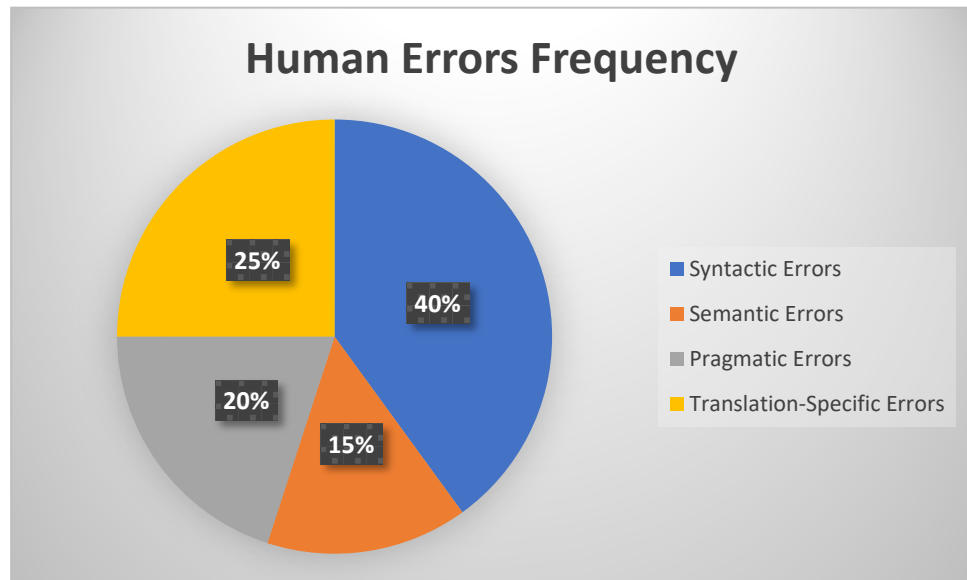
Figure 5.4: HT errors frequency

Once we have defined the 4 error categories: syntactic, semantic, pragmatic and translation-specific, we can go deeper into each category and show the different types of errors within each category:

Figure 5.5: HT syntactic errors

Regarding syntactic errors, there were 4 usage errors, 2 grammar errors, 1 punctuation error and 1 syntax error. This shows us that human translators tend to have fewer errors in terms of syntactic structures when they translate.
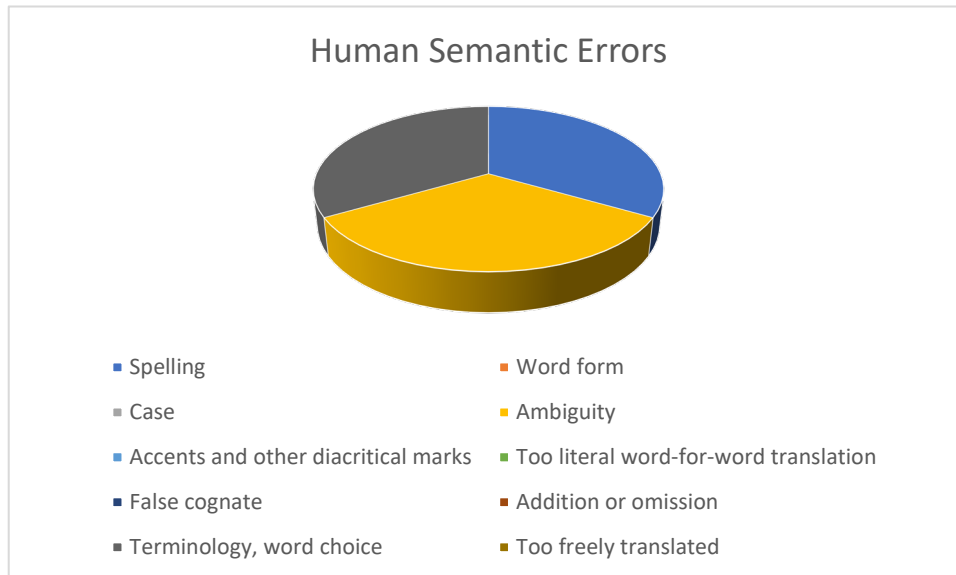
Figure 5.6: HT semantic errors

When it comes to analyzing the semantic errors, there were 1 spelling error, 1 ambiguity error and 1 terminology, word choice error. HT is known as being more accurate than MT. The fact that there was only 1 ambiguity error confirmed that HT is better to take into account subtle linguistic variants, context, and capricious meaning associated with the language and culture of different groups (Brazill et al., 2016).
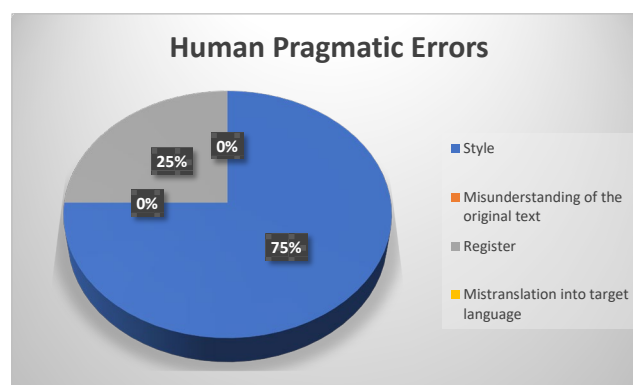
Figure 5.7: HT pragmatic errors

The analysis of the human pragmatic errors showed us that humans make fewer mistakes in terms of style or register in comparison with MT outputs (Zhao et al., 2021). There were 3 style errors identified and 1 register error.
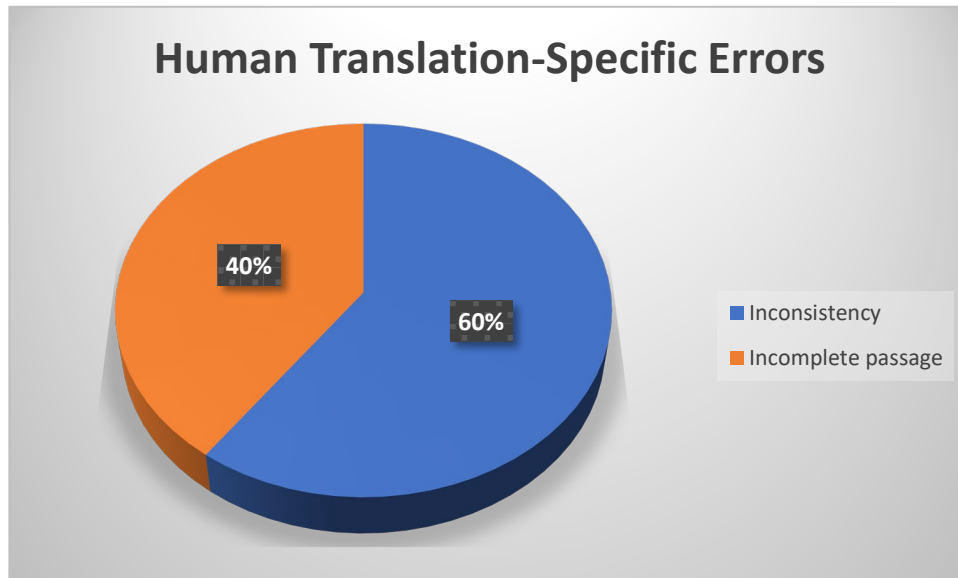
Figure 5.8: HT translation-specific errors

The translation-specific errors could lead us to believe that HT is of a lower quality in terms of consistency compared to MT outputs. The results of the translation-specific errors showed us that there were 3 inconsistency errors and 2 incomplete passage errors. In HT, inconsistency of the same terminology is inevitable. Most are translations with the same meaning but different indications, which impacts the readability of the whole translated text.

5.3.2 Error classification for the SMT

In this section we focus on analyzing the SMT errors found in the quality review (Vilar, D. et al., 2006), (Farrús, M. et al., 2010). The SMT translations were formed of 100 texts. A text is defined here as the text contained in one cell in the Excel file.

	Translated Texts	Erroneous Texts	Recognized Errors	
Number	100	86	104	
Frequency		86%	104%	
	Pragmatic Errors	Translation -Specific Errors	Syntactic Errors	Semantic Errors
Number	38	8	10	48
Frequency	36.5%	7.6%	9.5%	46%

Table 5.4: SMT number and types of errors

As Table 5.4 and Figures 5.9, 5.10, 5.11, 5.12, 5.13 indicate, out of 100 texts under study, 86 texts were recognized as erroneous, which comprises 86% of the corpus. 104 errors were discovered in the erroneous texts. Out of these erroneous items, 9.5% percent (10 cases) were syntactic, 46% percent (48 cases) were semantic, 36.5% percent (38 cases) were pragmatic, and 7.6% percent (8 cases) were categorized as translation-specific errors.

In the chart below, the frequency of the SMT errors can be seen more clearly:

Figure 5.9: SMT errors frequency

Once we have defined the 4 error categories: syntactic, semantic, pragmatic and translation-specific, we can go deeper into each category and show the different types of errors within each category:

Figure 5.10: SMT syntactic errors

Regarding syntactic errors, there were 6 usage errors, 3 grammar errors, 0 punctuation errors and 1 syntax error. This showed us that SMT tends to have more errors than human translators in terms of syntactic structures and the way MT engines handle the usage when they translate (Lin et al., 2022).

Figure 5.11: SMT semantic errors

When it comes to analyzing the semantic errors, there were 2 spelling errors, 2 word form errors, 24 ambiguity errors, 20 too literal word-for-word translation errors and 1 terminology, word choice error. SMT engines are not as accurate as human translators (Brazill et al., 2016). In spite of the fact that we trained this Moses-based SMT engine with specific texts from the tourism sector, the SMT had problems distinguishing which was the best option when there are semantic details to take into account (Lin et al., 2022). There were also some words in the SMT that were not translated at all and left in English. For future work, to have a better SMT-trained engine, we would need to create specific glossaries and tune the engine more extensively in order to obtain better results.

We would like to mention that in terms of case, MT output has not been able to recognize any capital letter in the text. However, we have not included it as an error, since it could have been fixed by using different capitalization models (Knight et al., 2006). This would be taken into account for future work, so that the trained engine can be trained accordingly to identify the case changes needed in the translation.
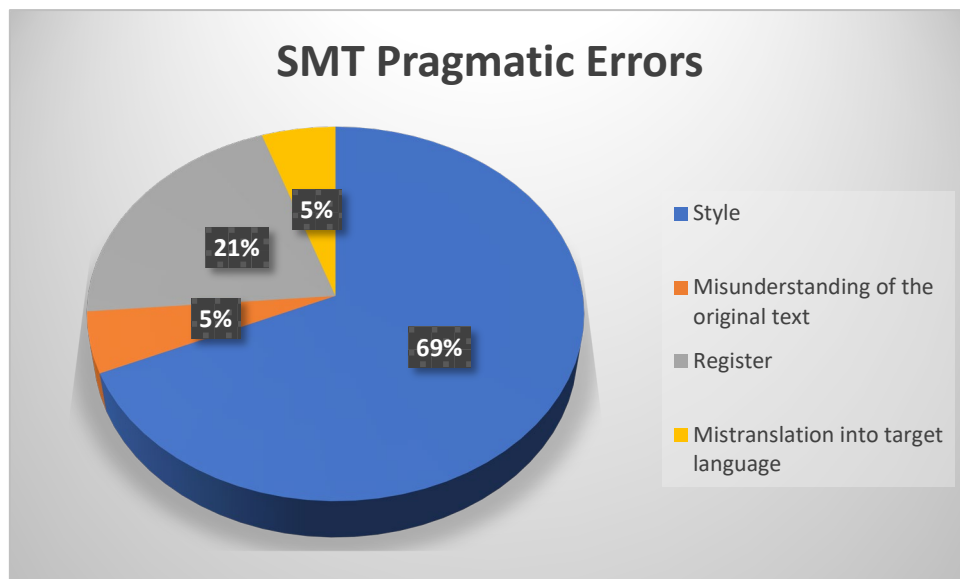
Figure 5.12: SMT pragmatic errors

The analysis of the SMT pragmatic errors showed us that humans make fewer mistakes in terms of style or register in comparison with MT outputs (Zhao et al., 2021). There were 26 style errors identified, 2 misunderstandings of the original text, 8 register errors and 2 mistranslation into target language errors.

According to the study of Danylov et al. (2021), "MT is not yet capable of fully translating phraseological units and slang. The computer does not take into account the peculiarities of the context, the specifics of the construction of sentences, irony and humor. Only a person can convey all the nuances of the language, play on words,

the author's style. In some areas, even the most accurate and correct translation of a computer is subject to multiple human checks. This applies to the translation of medical topics, legal documents and texts, where the cost of an error can be very high, up to a human life. The same sad situation develops in the translation of works of art, in which, in addition to meaning, it is necessary to convey emotions, expression, imagery. In addition, the style of the work, culture, era, wordplay, humor should be preserved."

It is true that human translators cannot carry out a translation in which all the above-mentioned details are covered, but the HT output does not need as many human reviews as MT outputs need, no matter how good in terms of quality the MT output is.

It is also worth mentioning the register in the MT engines. Machines have problems to distinguish between formal and informal register. In our research, the SMT engine was not trained to identify formal or informal register issues. For future work, it would be interesting to apply some methods like the ones in (Niu et al. 2017) in which the authors "mainly address the question of how much leverage they can derive by collecting a large amount of informal-formal sentence pairs and build models that learn to transfer style directly."
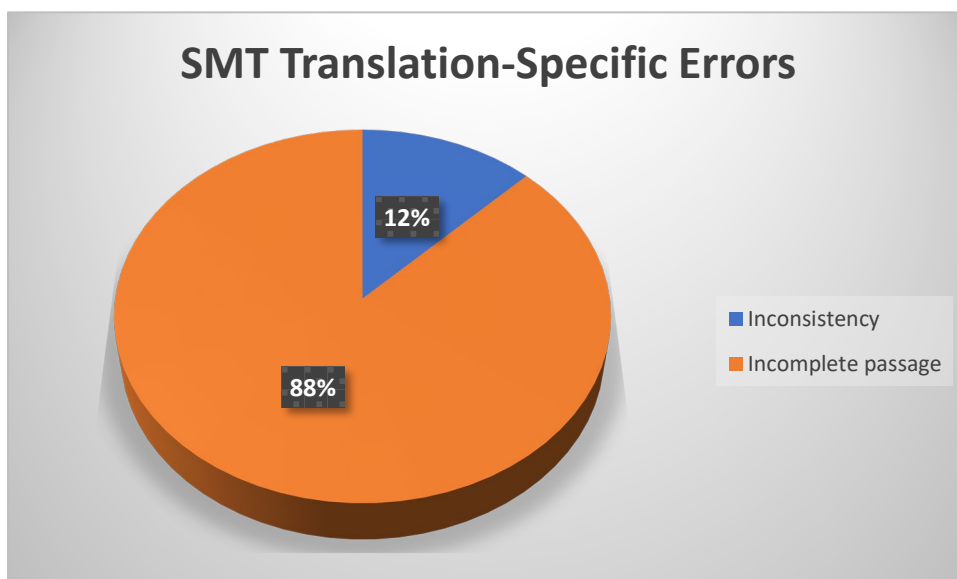
Figure 5.13: SMT translation-specific errors

At this point, we can see some advantages of using MT engines in terms of quality. MT outputs are consistent (Alam et al., 2021). This can be an issue that human translators are not able to solve alone, and some consistency checks are needed. The results of the translation-specific errors showed us that there were 1 inconsistency error and 7 incomplete passage errors.

5.3.3 Error classification for the NMT

In this section we focus on analyzing the NMT errors found in the quality review. The NMT translations were formed of 100 texts. A text is defined here as the text contained in one cell in the Excel file.

	Translated Texts	Erroneous Texts	Recognized Errors	
Number	100	58	62	
Frequency		58%	62%	
	Pragmatic Errors	Translation-Specific Errors	Syntactic Errors	Semantic Errors
Number	13	14	20	15
Frequency	20.9%	22.5%	32.3%	24.2%

Table 5.5: NMT number and types of errors

As Table 5.5 and Figures 5.14, 5.15, 5.16, 5.17, 5.18 indicate, out of 100 texts under study, 58 texts were recognized as erroneous, which comprises 58% of the corpus. 62 errors were discovered in the erroneous texts. Out of these erroneous items, 32.3% percent (20 cases) were syntactic, 24.2% percent (15 cases) were semantic, 20.9% percent (13 cases) were pragmatic, and 22.5% percent (14 cases) were categorized as translation-specific errors.

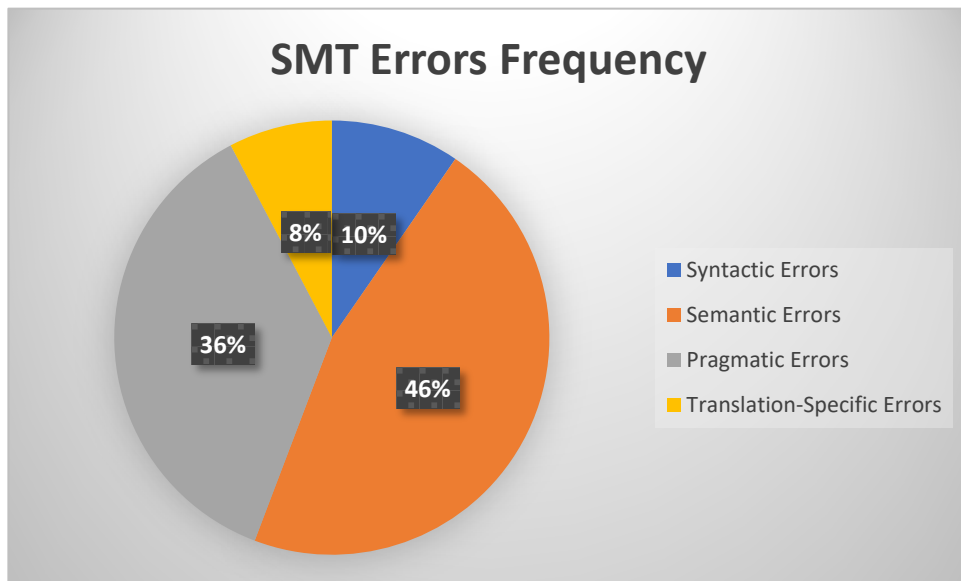In the chart below, the frequency of the NMT errors can be seen more clearly:
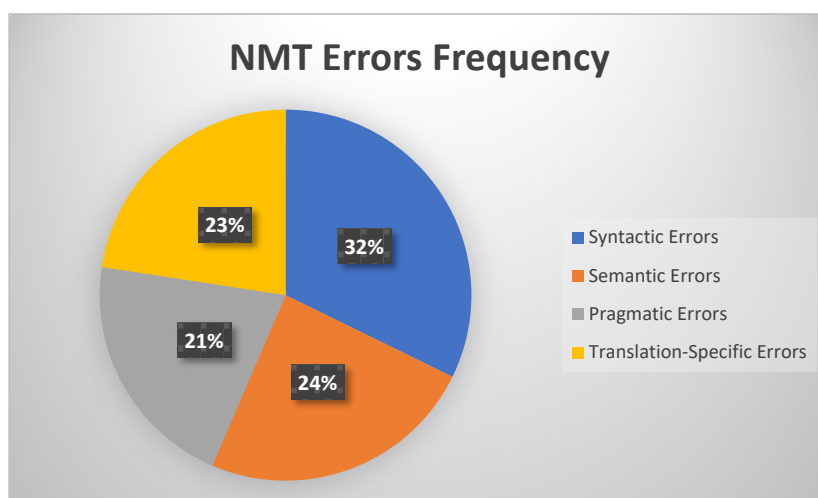
Figure 5.14: NMT errors frequency

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Once we have defined the 4 error categories: syntactic, semantic, pragmatic and translation-specific, we can go deeper into each category and show the different types of errors within each category:
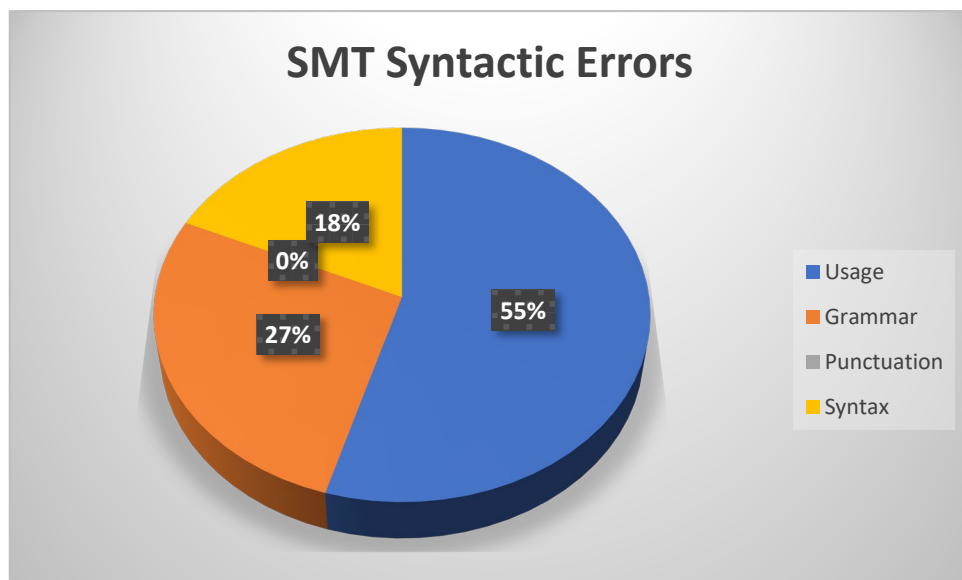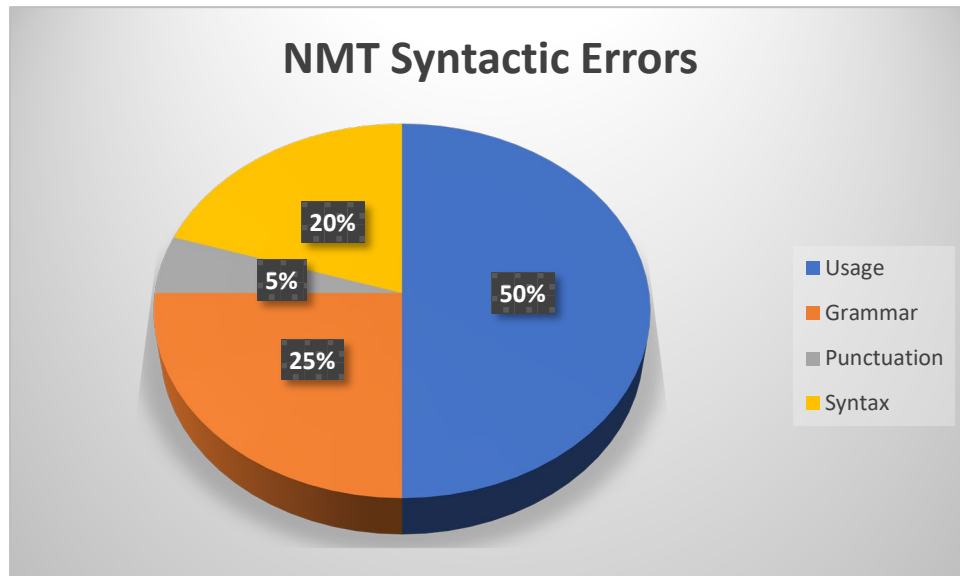

Figure 5.15: NMT syntactic errors

Regarding syntactic errors, there were 10 usage errors, 5 grammar errors, 1 punctuation error and 4 syntax errors. This shows us that human translators tend to have fewer errors in terms of syntactic structures when they translate and MT engines, no matter if they are SMT or NMT, tend to have problems with usage and grammar (Danylov et al., 2021).
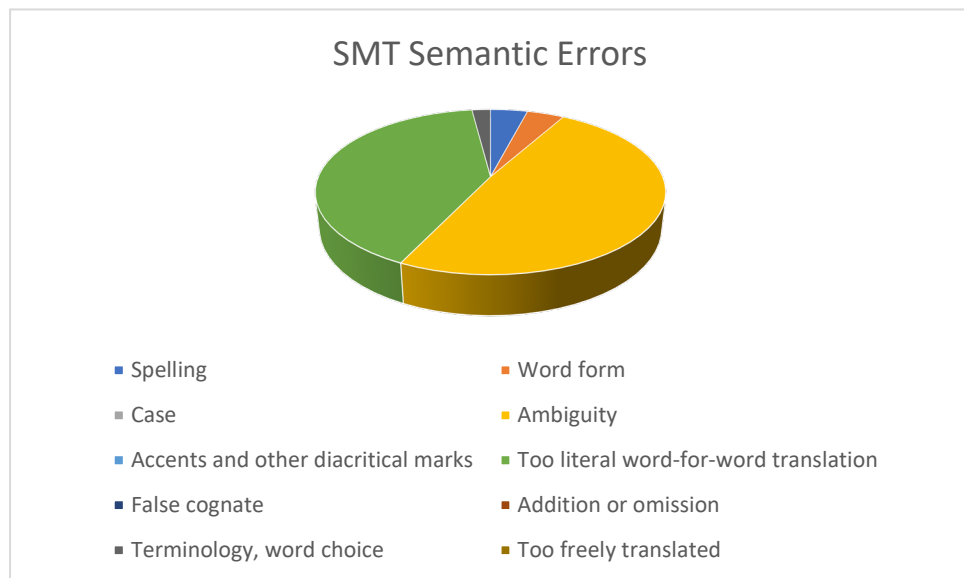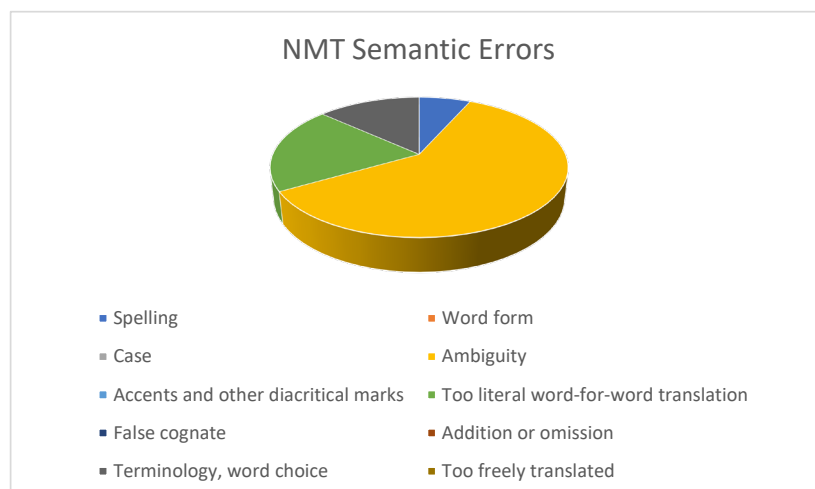

Figure 5.16: NMT semantic errors

When it comes to analyzing the semantic errors, there were 1 spelling error, 9 ambiguity errors, 3 too literal word-for-word translation errors and 2 terminology, word choice errors. MT engines in general are not as accurate as human translators (Brazill et al., 2016). However, NMT has improved systematically the quality of MT outputs (Cheng et al., 2019). Our results have shown that quality in NMT output is higher than in SMT output. But there are still semantic problems that need to be solved through human intervention (Brazill et al., 2016).
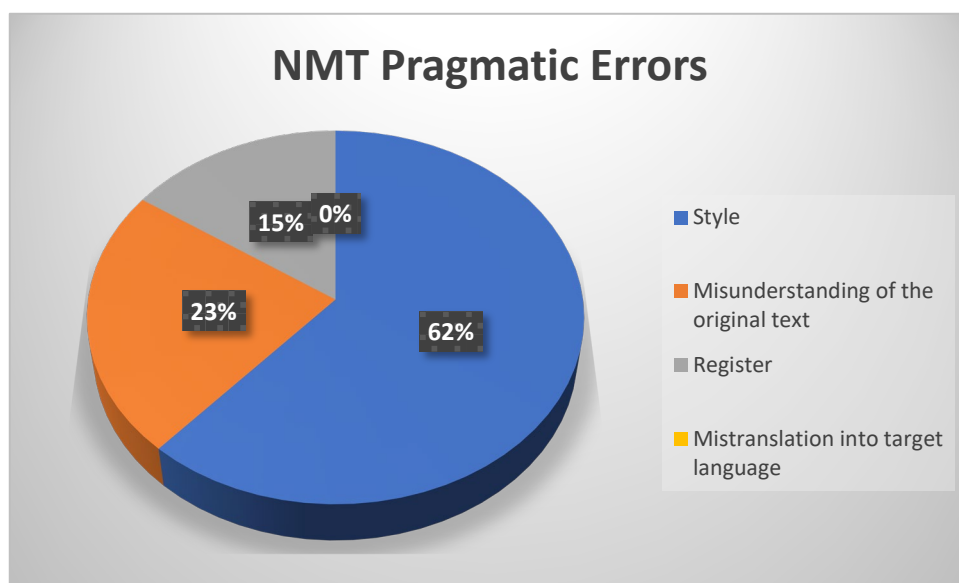
Figure 5.17: NMT pragmatic errors

The analysis of the NMT pragmatic errors showed us that NMT engines make fewer mistakes in terms of style or register in comparison with SMT outputs. There were 8 style errors, 3 misunderstandings of the original text and 2 register errors. According to López-Pereira (2019), NMT systems tend to have less errors in style and this leads the post-editors to have the perception that it is easier to post-edit NMT than SMT.
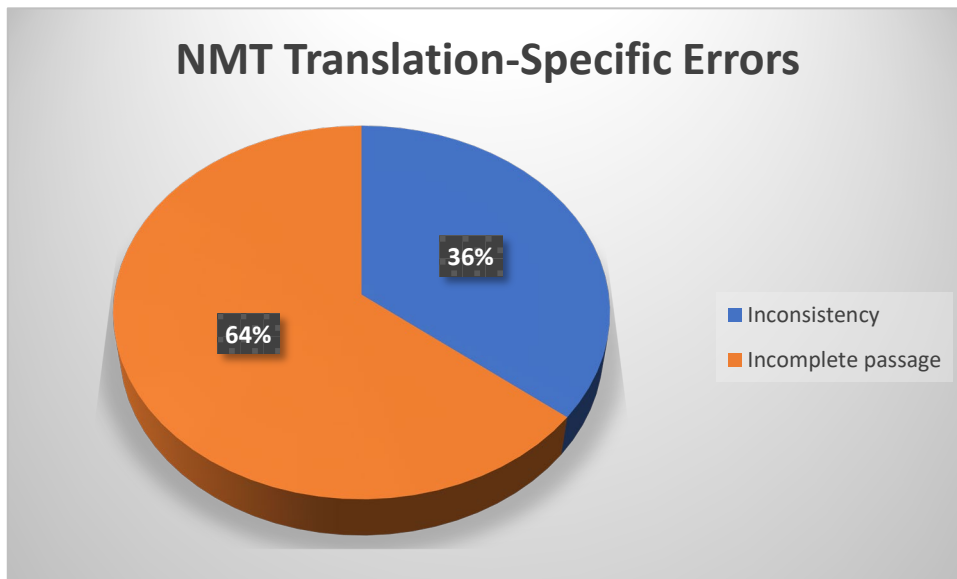
Figure 5.18: NMT translation-specific errors

At this point, we can see some advantages of using NMT engines in terms of quality. NMT outputs, as with SMT, are consistent (Alam et al., 2021). This can be an issue that human translators are not able to solve alone, and some consistency checks are needed. The results of the translation-specific errors showed us that there were 5 inconsistency errors and 9 incomplete passage errors.

5.6. Conclusions on quality

With the data from our PE experiment, we have tested speed in PE and quality assuming that the more words that have been changed (insertions and deletions), the worse the quality. SMT has more insertions and deletions than NMT and HT. In addition to that, we have also been able to confirm that SMT and NMT have more "real" errors than HT from our error analysis and categorization.

Thanks to these results, we have been able to validate our H4: "There are more errors in the SMT output than in the HT and NMT outputs, but post-editors spend more time on HT" because we have confirmed with data that SMT output has lower quality (more insertions and deletions and more "real" errors from our error analysis and categorization) than neural MT and HT, but post-editors spent more time on HT.

In our study, we have also analyzed the different errors and their categories in the three different translation types which were the focus of the study: HT, SMT and NMT.

In the HT error analysis and categorization, out of 100 texts under study, 44 texts were recognized as erroneous, which comprises 44% of the corpus. 20 errors were discovered in the erroneous texts. Out of these erroneous items, 40% percent (8 cases) were syntactic, 15% percent (3 cases) were semantic, 20% percent (4 cases) were pragmatic, and 25% percent (5 cases) were categorized as translation-specific errors.

Moreover, in the SMT error analysis and categorization, out of 100 texts under study, 86 texts were recognized as erroneous, which comprises 86% of the corpus. 104 errors were discovered in the erroneous texts. Out of these erroneous items, 9.5% percent (10 cases) were syntactic, 46% percent (48 cases) were semantic, 36.5% percent (38) were pragmatic, and 7.6% percent (8 cases) were categorized as translation-specific errors.

Finally, in the NMT error analysis and categorization, out of 100 texts under study, 58 texts were recognized as erroneous, which comprises 58% of the corpus. 62 errors

were discovered in the erroneous texts. Out of these erroneous items, 32.3% percent (20 cases) were syntactic, 24.2% percent (15 cases) were semantic, 20.9% percent (13 cases) were pragmatic, and 22.5% percent (14 cases) were categorized as translation-specific errors.

All these results based on data from our experiment allow us to validate H5: SMT and NMT have more syntactic, semantic and pragmatic errors than HT but SMT and NMT have better performance in translation-specific errors like consistency than HT.

All these findings are relevant and lead us to think that an industrial MT workflow can be set up in a real company due to the fact that post-editing MT outputs is quicker than HT. Not only that, but also the fact that from an economic point of view a MT workflow can be more competitive as we will discover in the following section.

CHAPTER 6: ECONOMIC CONSIDERATIONS

In this chapter we explore a very important topic nowadays in the localization industry: budget. One of the goals of this study is to determine whether a PE workflow can be set up in a company and whether it is more competitive than HT (CAT). There are not many works which have spent time on this topic (Ahuja et al., 2022), and we think our study contributes to add more knowledge to the field.

Thanks to our experiment in a real work environment, with real translators and real data, we have added value to the localization research field and collaborated with other works done in an industrial setup as we described in section *2.3. PE in an industrial environment of a real company's workflow.*

Companies are more interested in efficiency than ever. Efficiency can also be understood from an economic point of view. Processes need to be quicker than ever, while maintaining quality and staying within budget.

According to the information provided by De Palma (2021), companies need to change their message [5]. "Enter a new requirement that sees translation as integral to meeting the customer satisfaction (CSAT), engagement, retention, and upselling goals as companies globalize digital experience initiatives. Given that many DX (Digital Experience), UX (User Experience), CX (Customer Experience) projects grew organically, that means localization teams, LSPs, and TMS vendors have to roll up

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[5] From the 2021 article "Leverage Your Localization Budget as a Strategic Tool". https://insights.csa-research.com/reportaction/305013340/Toc?SearchTerms=translation%20costs

their sleeves, identify, and potentially help application owners fix shaky customer journeys."

Now, it is time to come back to the RQ2 of our study to confirm whether it is validated: whether it is worth it from an economic point of view to post-edit in comparison with using computer aided translation. We have analyzed the costs of carrying out localization processes in a real company's translation workflow considering two options: HT or MT output plus PE.

6.1 HT costs

As we mentioned before in section *3.2.9 HT phase*: HT was performed by the usual LSP of the company. We used their data exchange platform to send the request and they did it in two working days.

If we take a look to the costs involved, the rate per word for the English into Spanish combination was €0.107. There was a Project Management fee of 5% of the total cost of the translation so that a dedicated project manager can handle the translation request with the translator. Among the project manager's duties were to receive the request from the client (us), to prepare the request in their Translation Management System, to send the request to the translator, to provide and set the corresponding translation memories and terminological database and to support the translator with the query management.

Considering that there were 3,328 words. The total cost for the company of this translation request was **€373.9** including the Project Manager fee. And in terms of productivity the job was done in **2 working days** upon approval of the request.

It is also relevant to show the costs of having translated on the four eyes basis and having used one translator and one reviewer reviewing the translation since this is a typical way to ensure quality. Thus, considering that there were 3,328 words and the translation, plus review rates per word, for the combination English into Spanish was €0.139. The total cost for the company of this translation request would have been **€485.73** including the Project Manager fee. And in terms of productivity the job would have been done in **3 working days** upon approval of the request.

6.2 MT costs

Now let's check the MT translation costs. As we indicate in the section *3.2.10 PE phase*, once the HT was ready in our experiment, the PE round started.

According to the costs involved, the rates per PE (we have assumed that the costs of SMT and NMT are the same) in the combination English into Spanish was €0.083. There was a Project Management fee of 5% of the total cost of the translation as with the HT, so that a dedicated project manager can handle the translation request with the MT engine. Among the project manager's duties were to receive the request from the client (us), to prepare the request in their Translation Management System, to send the request to the MT engine, to receive the MT output and share it with the post-editor and to support the post-editor with the query management.

Considering that there were 3,328 words. The total cost for the company of this translation request was **€290** including the Project Manager fee. And in terms of productivity the job was done in **1 working day** upon approval of the request.

6.3 Conclusion on costs

We have analyzed the economic costs of HT and MT plus PE in our experiment.

The cost of the HT was **€373.9** including the Project Manager fee. And in terms of productivity the job was done in **2 working days** upon approval of the request.

In case the HT is reviewed by a second linguist, the total cost for the company of this translation request would have been **€485.73** including the Project Manager fee. And in terms of productivity the job would have been done in **3 working days** upon approval of the request.

The total cost of PE for the company of this translation request was **€290** including the Project Manager fee. And in terms of productivity the job was done in **1 working day** upon approval of the request.

We have answered the RQ2 of our study: whether it is worth it from an economic point of view to post-edit in comparison with using computer aided translation. The economic costs are lower in the PE option as well as the working days, which are reduced from 2 to 1.

But of course, there are some remarks to be considered and that have been shown during our study:

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1. The total cost and working days that we have concluded are standard and depend on several factors, as we have seen in our experiment: quality of the MT output and experience of the post-editors.

2. Nevertheless, we have confirmed that, although the quality of the translation output is important to boost productivity and therefore reduce the delivery time in working days, it is also true, as confirmed in our experiment thanks to the edit rate and the time spent on the PE phase by the post-editors, that in some cases a translation output is more quickly post-edited, although post-editors need to carry out more edits, since it is clearer for them what they have to change. We have demonstrated this with the HT and MT translations PE phase and the edit rate and revision times.

CHAPTER 7: QUESTIONAIRE RESULTS

This chapter presents the feedback the post-editors gave after completion of the questionnaire (Appendix B). We have used this information to test our hypotheses on productivity and quality. It has also been interesting to see how the post-editors' feedback does not match with what can be expected when MT is used. As mentioned in chapter 3 of this thesis, post-editors did not know which version was HT, SMT or NMT.

There were 6 questions. We have organized each question into a table containing the responses from the 40 post-editors. All comments directly from the translators are in English and Spanish.

7.1 Experienced Post-editors

7.1.1 Which version(s) was the best quality?

With this question of the questionnaire, we wanted to confirm the perception the post-editors had when carrying out their review task. Data in Table 7.1 and Figure 7.1 confirms that the perception of the post-editors is that HT has the best quality and it relates to our hypotheses H2: Post-editing HT is slower than post-editing MT, and H4: There are more errors in the SMT and NMT output than in the HT output, but post-editors spend more time on HT.

13 out of 20 (65%) consider that the best quality is HT. 7 out of 20 post-editors (35%) consider that the best quality is NMT. This is an interesting conclusion, since not all of the post-editors consider HT to be the best translation in terms of quality. No post-editor considers SMT to be the best quality translation.

If we compare the results of the questionnaire regarding which translation had the best quality with the quantitative data from chapter 4, we notice that, although experienced post-editors spent more time on HT (145.85 minutes in comparison with the 133.95 minutes they spent on SMT and the 93.15 minutes they spent on NMT), their perception is that HT has the best quality. However, if we compare the edit distance results from chapter 4 with this perception, we see that experienced post-editors carried out 541 edits on HT, 1103.9 on SMT and 468.25 on NMT. The fact that they carried out less edits on HT than on SMT and few more than on NMT can help to perceive that HT has the best quality.

It is worth commenting that experienced post-editors spent the least time on NMT (93.15 minutes) and carried out the smallest number of edits on NMT (468.25 edits), but they still think HT has the best quality.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of the experienced post-editors that HT has the best quality. In HT, 44 erroneous texts were found, in comparison with the 86 erroneous texts found in SMT and the 58 erroneous texts found in NMT.

ePE	HT	SMT	NMT
1	x		
2	x		
3	x		
4	x		
5	x		
6			x
7	x		
8			x
9	x		
10			x
11			x
12	x		
13			x
14			x
15	x		
16	x		
17	x		
18	x		
19			x
20	x		

Table 7.1: ePE best quality version
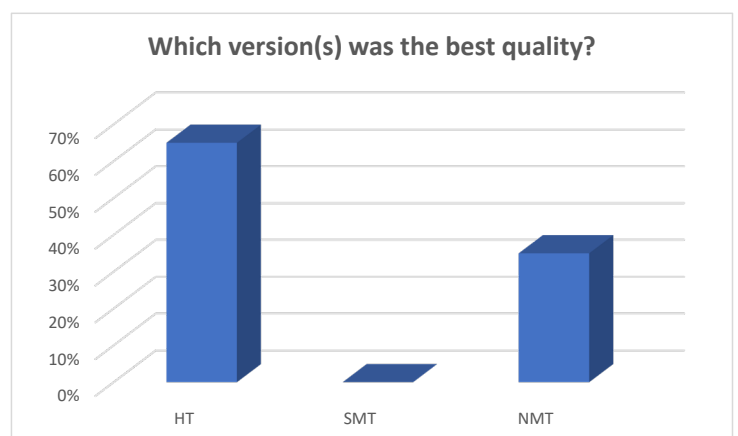
Figure 7.1: ePE best quality version

7.1.2 Which version(s) was the worst quality?

This question of the questionnaire confirms that all post-editors consider SMT as the worst quality of the three versions.

Table 7.2 and Figure 7.2 show that 18 out of 20 (90%) consider that the worst quality is SMT. 2 out of 20 post-editors (10%) don't give any answer.

As we did in the previous question, if we compare the results of the questionnaire regarding which translation had the worst quality with the quantitative data from chapter 4, we also notice that, although experienced post-editors spent more time on HT (145.85 minutes in comparison with the 133.95 minutes they spent on SMT and the 93.15 minutes they spent on NMT), their perception is that SMT has the worst quality. However, if we compare the edit distance results from chapter 4 with this perception, we see that experienced post-editors carried out 541 edits on HT, 1103.9 on SMT and 468.25 on NMT. The fact that they carried out more edits on SMT can help support the conclusion that SMT has the worst quality.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of the experienced post-editors that SMT has the worst quality. In SMT, 86 erroneous texts were found, in comparison with the 44 erroneous texts found in HT and the 58 erroneous texts found in NMT.

ePE	HT	SMT	NMT
1		x	
2		x	
3		x	
4		x	
5		x	
6	N/A	N/A	N/A
7		x	
8		x	
9	N/A	N/A	N/A
10		x	
11		x	
12		x	
13		x	
14		x	
15		x	
16		x	
17		x	
18		x	
19		x	
20		x	

Table 7.2: ePE worst quality version
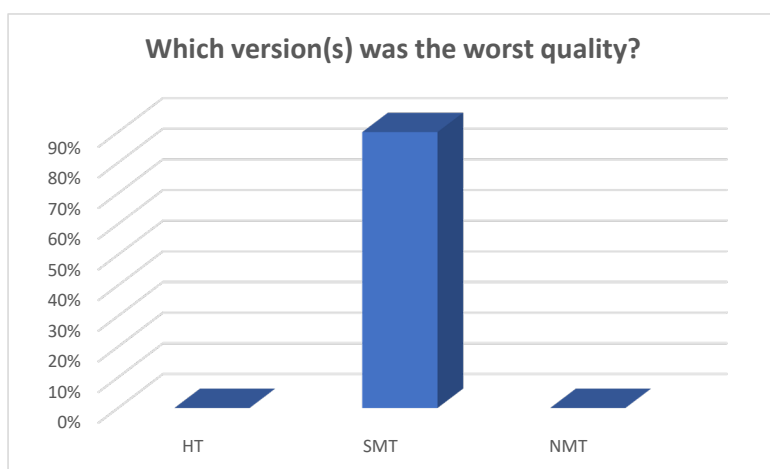
Figure 7.2: ePE worst quality version

7.1.3 Which version(s) was MT?

This question of the questionnaire is also interesting because there are some post-editors that consider HT version as MT. But most of the experienced post-editors think SMT and NMT are MT.

Table 7.3 and Figure 7.3 show us that 3 out of 20 (15%) consider that the HT is MT. 11 out of 20 post-editors (55%) think SMT is MT and 4 out of 20 (20%) answer that NMT is MT. 1 of the post-editors does not give any answer.

This data correlates with the number of experienced post-editors (18) who think that SMT has the worst quality.

According to the quantitative data from chapter 4, the fact that experienced post-editors spent more time on HT (145.85 minutes in comparison with the 133.95 minutes they spent on SMT and the 93.15 minutes they spent on NMT) can help us to understand the 3 experienced post-editors who think that HT is MT. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by experienced post-editors (541 edits on HT, 1103.9 on SMT and 468.25 on NMT) matches the perception that most of the experienced post-editors perceive that SMT is MT.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the experienced post-editors that SMT is MT. In SMT, 86 erroneous texts were found, in comparison with the 44 erroneous texts found in HT and the 58 erroneous texts found in NMT. These numbers also help us to understand the 3 experienced post-editors who think that HT is MT and the 4 experienced post-editors who think that NMT is MT, since there are less errors in HT and NMT in comparison with SMT.

ePE	HT	SMT	NMT
1	x		
2	x		
3		x	x
4			x
5		x	
6		x	
7		x	x
8		x	

9	N/A	N/A	N/A
10	x		
11		x	
12		x	
13		x	
14		x	
15		x	x
16		x	
17	x	x	X
18		x	x
19		x	
20		x	x

Table 7.3: ePE MT version
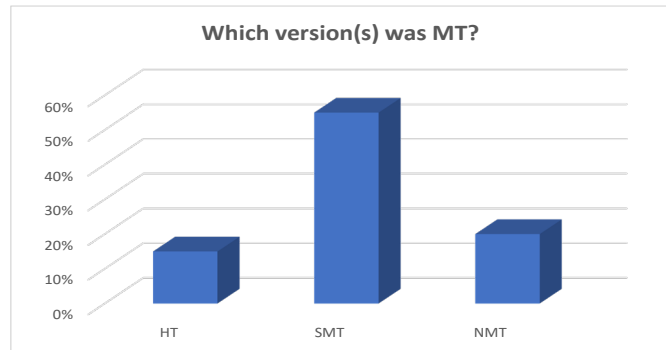
Figure 7.3: ePE MT version

7.1.4 Which version(s) was HT?

This question of the questionnaire is also interesting because there are some post-editors that consider the NMT version as HT.

Table 7.4 and Figure 7.4 show us that 14 out of 20 (70%) consider that HT is HT. No post-editor considers SMT as HT and 10 out of 20 (50%) perceive NMT as HT.

This data correlates with the number of experienced post-editors (13) who think that HT has the best quality.

According to the quantitative data from chapter 4, the fact that experienced post-editors spent more time on HT (145.85 minutes in comparison with the 133.95 minutes they spent on SMT and the 93.15 minutes they spent on NMT) could lead us to think that this perception is not right. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by experienced post-editors (541 edits on

HT, 1103.9 on SMT and 468.25 on NMT) matches the perception that most of the experienced post-editors perceive that HT is HT.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the experienced post-editors that HT is HT. In HT, only 44 erroneous texts were found, in comparison with the 86 erroneous texts found in SMT and the 58 erroneous texts found in NMT. In this question there are some experienced post-editors that think that both HT and NMT are HT (4 post-editors).

ePE	HT	SMT	NMT
1			x
2			x
3	x		
4	x		
5	x		
6	x		x
7	x		
8	x		x
9	x		
10			x
11	x		
12	x		x
13			x
14			x
15	x		
16	x		
17	x		x
18	x		
19			x
20	x		

Table 7.4: ePE HT version
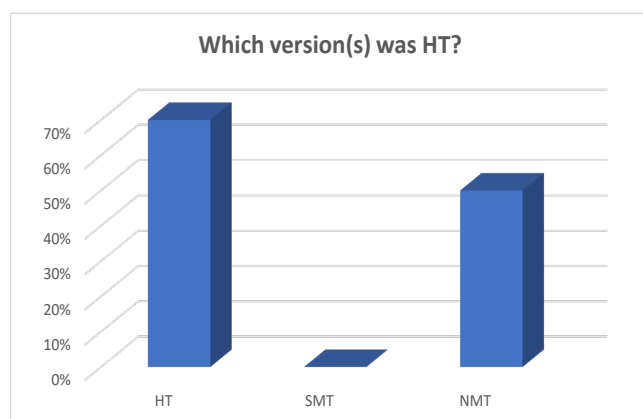
Figure 7.4: ePE HT version

7.1.5 Which version(s) was the easiest to review?

This question of the questionnaire is also relevant because there are some post-editors that consider SMT and NMT versions as the easiest to review in comparison with HT.

Table 7.5 and Figure 7.5 show us that 10 out of 20 (50%) consider that HT is the easiest version to review. 2 out of 20 (10%) consider SMT as the easiest version to review and 8 out of 20 (40%) perceive NMT as the easiest version to review (López-Pereira, 2019).

According to the quantitative data from chapter 4, the fact that experienced post-editors spent more time on HT (145.85 minutes in comparison with the 133.95 minutes they spent on SMT and the 93.15 minutes they spent on NMT) could lead us to think that this perception is not right. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by experienced post-editors (541 edits on HT, 1103.9 on SMT and 468.25 on NMT) matches the perception that most of the experienced post-editors perceive that HT is the easiest translation to review.

On the other hand, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the experienced post-editors that HT is the easiest translation to review. In HT only 44 erroneous texts were found in comparison with the 86 erroneous texts found in SMT and the 58 erroneous texts found in NMT.

It is also worth remarking that the results of this question (10 experienced post-editors) correlate with the results of the questions "which translation has the best quality" (13 experienced post-editors) and "which translation is HT" (14 experienced post-editors).

ePE	HT	SMT	NMT
1			x
2	x		
3	x		
4	x		
5	x		
6			x
7		x	
8			x
9	x		
10			x
11		x	
12			x
13			x
14			x
15	x		
16	x		
17	x		
18	x		
19			x
20	x		

Table 7.5: ePE easiest version to review
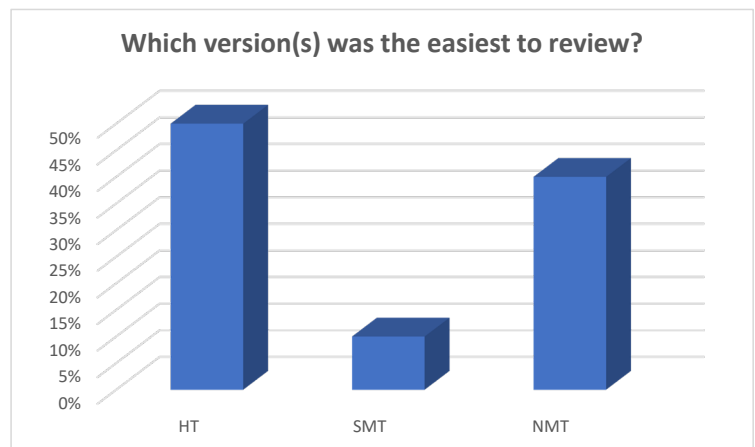
Figure 7.5: ePE easiest version review

7.1.6 Which version(s) was the most difficult to review?

This question of the questionnaire is also relevant because there are some post-editors that consider the HT version to be the most difficult one to review.

Table 7.6 and Figure 7.6 show that 2 out of 20 (10%) consider HT to be the most difficult version to review. 15 out of 20 (75%) consider SMT the most difficult version to review and 4 out of 20 (20%) perceive NMT as the most difficult version to review.

According to the quantitative data from chapter 4, the fact that experienced post-editors spent more time on HT (145.85 minutes in comparison with the 133.95 minutes they spent on SMT and the 93.15 minutes they spent on NMT) could make us think that this perception is not right. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by experienced post-editors (541 edits on HT, 1103.9 on SMT and 468.25 on NMT) matches the perception that most of the experienced post-editors perceive SMT to be the most difficult translation to review.

On the other hand, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the experienced post-editors that SMT is the most difficult translation to review. In SMT, 86 erroneous texts were found in comparison with the HT, in which only 44 erroneous texts were found, and SMT, in which 58 erroneous texts were found.

It is also worth noting that the results of this question (15 experienced post-editors) correlate with the results of the questions "which translation has the worst quality" (18 experienced post-editors) and "which translation is MT" (11 experienced post-editors).

ePE	HT	SMT	NMT
1		x	
2			x
3			x
4		x	
5		x	
6		x	
7	x		
8		x	
9		x	
10		x	
11	x		x
12		x	
13		x	
14		x	
15		x	
16		x	
17			x
18		x	
19		x	
20		x	

Table 7.6: ePE most difficult version to review
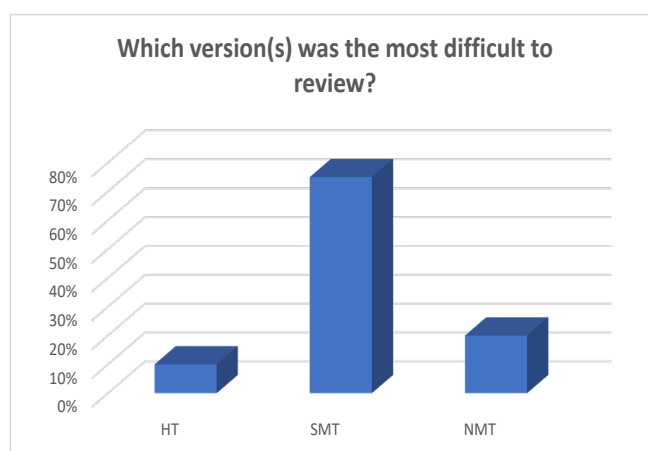
Figure 7.6: ePE most difficult version to review

7.1.7 Additional remarks by experienced post-editors

Table 7.7 shows the comments experienced post-editors added after finishing the PE phase and the questionnaire. They are direct quotations. We can see the comments regarding the quality of the translation and how easy or difficult they found the task. These comments correlate with the data of the questionnaire.

It is interesting to see how experienced post-editors have reacted. For example, experienced post-editor 7 claims that the second version is the easiest to review

because it is so full of errors that she could start from zero and make the translation in her own words. She confirms that probably the first version would be the easiest to review, but for her, it is harder when the translation is almost perfect.

Experienced post-editor 3 find this task of comparing quality between different translations very interesting.

Experienced post-editor 10 claims that in the SMT, the review is extensive. In most of the segments, she had to rewrite all the translation. However, the time taken to review SMT (51 minutes) is similar to that taken to review the HT (47 minutes), due to the shortness of the segments.

ePE	
1	Many verbs and pronouns were changed in a formal way in Spanish in order to give a more formal (worth repeating it) and professional treat to the customer.
2	I do prefer a more formal translation, so I have changed the informal version of the second person of the singular "tu" and used "usted" that is more formal.
3	I would like to say that it has been quite interesting being able to compare different translations and thus different qualities between them, as well as different equivalents for the same items or structures. As refers to the solutions taken, I would like to say that for most problems I found equivalents in dictionaries and corpora and tried to avoid interference from English. For some other problems, I searched for similar documents in Spanish to try to be as accurate as possible. Having revised the three versions, I can now say that

	sometimes revising can be harder work than translating (depending on the quality of the translation provided).
4	N/A
5	N/A
6	Punctuation was not always used in the sentences.
7	For me, the second version was the easiest because it was so full of errors that I could start from zero and make the translation in my own words. I know that probably the first version would be the easiest to review, but for me, it is harder when the translation is almost perfect.
8	The task shows three different kind of translations. While some segments could provide interesting information, others were completely misleading and may confuse the translator. They also prove how machine translation and non-professional translation can be so different from a professional work: whole sentences do not work at all when they are not contextualized or mixed up. In general terms, many words must be put in context in order to get an optimal translation that works in a real website and read by native people. The tone of the translation also needed to be considered; who is the target of the text? Who will be the potential customers?
9	N/A
10	In the first version, the review of certain segments were done based on the standardized language, due to some expressions from Spain found in the text. This expression could be confussing for readers from Latin America.

In the second version, the review, as I stated above, was extensive. In most of the segments, I had to rewrite all the translation. However, the time taken |

	in this translation was less than the previous one, due to the shortened of the segments. In this version, I noted down specificly how much time did I take to translate each segment, together with the time of reading of each one of them. The time was less also in the case of repeated segments, in which excel helped me to write quickly the sentence in the chart again, which gave me some more time for further segments. In the third translation, the time taken was minor.
11	N/A
12	Version 1 was the version that had the best quality. As I was correcting it, I thought that probably it was human post-edited. I changed some expressions that weren't too natural and that seemed semantic calques. In addition, I decided to keep tu in instead of usted in the translation. Also, I preferred check-in to registro, salida o facturación, as we didn't have enough context to pick on option, and check-in is a common concept in this subject (although as it is an English word, we must write it in italics; the word app is another example of the same situation). Version 2 was the one with the worst quality. I had to rewrite all the segments, as almost all of them had errors or were incomprehensible. Some segments were untranslated, and the great majority were poorly and badly translated. It was plenty of punctuation problems and problems with the use of capital letters. Because of the tone of the segments in this version, I also decided to keep tu in instead of usted.

	Version 3 had good quality, but I had to correct many segments because it had issues with the use of capital letters and exclamation marks at the beginning of the sentences. I also changed boleto for billete and monto for coste (more common in this context). It was the easiest version to correct because there were a lot of repeated segments.
13	N/A
14	Version 1: Informal registration, addresses you (informal) instead of you (formal). Taking into account the concept of the message, being a claim, it is better to establish a distance with the affected user. Version 2: syntax errors, addresses the user as you (informal) instead of you (formal) (bad registration), automatic translation as there are segments translated literally. Bad translations of some words. Text required more corrections, in the translation the use of words in the source language was maintained, such as form (form) website (web page), there were errors of concordance Version 3: Correct translations, made by a human translator, there are errors in the use of capital letters but they do not alter the meaning of the text.
15	I decided that I would use, after surfing the Net, the informal register (tu, insteaad of su, etc.) in the three translations. The second and speacially the third one had no capital letters after full stop (.), so I have to correct them all. And I decided to translate ticket for billete and voucher for vale.
16	I found quite strange that version 3 has multiple equal segments. I translated the second person of the singular as 'tu' and its derivatives, as I followed the first version which has used this informal second person.
17	N/A
18	N/A

19	All three texts comprised a different level of difficulty in complying with the revision. It is clear that in the case of versions 1 and 3, the intervention of the human factor means that both texts have fewer errors compared to version 2 made by computer. At specific moments, the doubts that have arisen have had to do with the recipient of the text since in version 3, some of the words referred to a Latin American and non-Spanish audience, as is the case of the translation of the word tickets for tickets and not tickets. Another question also arose as to how the addressee of the message should be referred to, i.e. the level of formality of the text. In different sections there is a mixture of you and you that have made it difficult to opt for one profile or another. I would also like to emphasise that by calculating the hours spent on this task, I believe that this revision has required a greater number of hours on my part since some of the doubts mentioned above have meant that I have had to revise the texts on more than one occasion.
20	The first version was the easiest to review, but version number two was the worst version of all. Especially because I had to change every sentence with capital letters and also rewrite most of the sentences because they contained errors.

Table 7.7: ePE remarks

7.2 Novice Post-editors

7.2.1 Which version(s) was the best quality?

With this question of the questionnaire, we wanted to confirm the perception the novice post-editors had when doing their review task. The data confirms that the perception of the novice post-editors is that HT has the best quality, and it relates to our H4: There are more errors in the SMT and NMT output than in the HT output, but post-editors spend more time on HT.

Table 7.8 and Figure 7.7 show that 15 out of 20 (75%) consider that the best quality is HT. 1 out of 20 (5%) consider SMT as the best quality version. 4 out of 20 post-editors (20%) consider that the best quality is NMT. This is an interesting conclusion, since not all of the post-editors consider HT to be the best translation in terms of quality. But in comparison with experienced post-editors, there are more novice post-editors who perceive HT to be the best one.

If we compare the results of the questionnaire regarding which translation had the best quality with the quantitative data from chapter 4, we notice that, although novice post-editors spent more time on HT (124.01 minutes in comparison with the 109.05 minutes they spent on SMT and the 97.825 minutes they spent on NMT), their perception is that HT has the best quality. However, if we compare the edit distance results from chapter 4 with this perception, we see that novice post-editors carried out 735 edits on HT, 1109.85 on SMT and 544.4 on NMT. The fact that they carried out less edits on HT can help support the perception that HT has the best quality, but in this case novice post-editors carried out less edits on NMT (544.4) than on HT (735).

It is remarkable to comment that novice post-editors spent less time on NMT (97.825 minutes) than on HT and carried out less edits on NMT (544.4 edits) than on HT, but they still think HT has the best quality.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of the novice post-editors that HT has the best quality. In HT, 44 erroneous texts were found, in comparison with the 86 erroneous texts found in SMT and the 58 erroneous texts found in NMT.

nPE	HT	SMT	NMT
1	x		
2	x		
3			x
4	x		
5			x
6	x		
7	x		
8	x		
9	x		
10			x
11	x		
12	x		
13	x		
14			x
15	x		
16		x	
17	x		
18	x		
19	x		
20	x		

Table 7.8: nPE best quality version
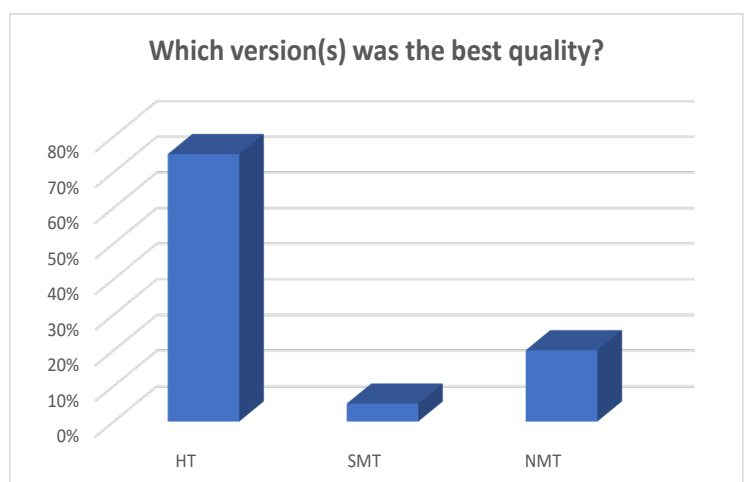
Figure 7.7: nPE best quality version

7.2.2 Which version(s) was the worst quality?

This question of the questionnaire confirms that almost all novice post-editors consider SMT to have the worst quality of the three versions.

Table 7.9 and Figure 7.8 show that 19 out of 20 (95%) consider that the worst quality is SMT. 1 out of 20 post-editors (5%) consider NMT to be the worst quality version.

As we did in the previous question, if we compare the results of the questionnaire regarding which translation had the worst quality with the quantitative data from chapter 4, we also notice that, although novice post-editors spent more time on HT (124.01 minutes in comparison with the 109.05 minutes they spent on SMT and the 97.825 minutes they spent on NMT), their perception is that SMT has the worst quality. However, if we compare the edit distance results from chapter 4 with this perception, we see that novice post-editors carried out 735 edits on HT, 1109.85 on SMT and 544.4 on NMT. The fact that they carried out more edits on SMT can be seen to support the perception that SMT has the worst quality.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of the novice post-editors that SMT has the worst quality. In SMT, 86 erroneous texts were found, in comparison with the 44 erroneous texts found in HT and the 58 erroneous texts found in NMT.

nPE	HT	SMT	NMT
1		x	
2		x	
3		x	
4		x	

5		x	
6		x	
7		x	
8		x	
9		x	
10		x	
11		x	
12		x	
13		x	
14		x	
15		x	
16			x
17		x	
18		x	
19		x	
20		x	

Table 7.9: nPE worst quality version
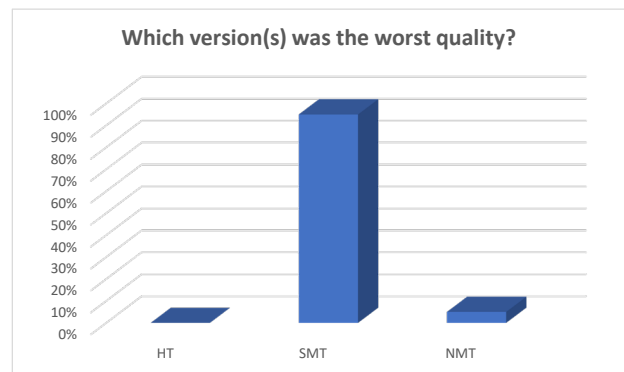
Figure 7.8: nPE worst quality version

7.2.3 Which version(s) was MT?

This question of the questionnaire is also interesting because there are some post-editors that consider HT version to be MT.

Table 7.10 and Figure 7.9 show that 3 out of 20 (15%) consider that the HT is MT. 17 out of 20 post-editors (85%) think the SMT is MT and 11 out of 20 (55%) answer that the NMT is MT.

This data correlates with the number of novice post-editors (19) who think that SMT has the worst quality.

According to the quantitative data from chapter 4, the fact that novice post-editors spent more time on HT (124.01 minutes in comparison with the 109.05 minutes they spent on SMT and the 97.825 minutes they spent on NMT) can help us to understand the 3 novice post-editors who think that the HT is MT. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by novice post-editors (735 edits on HT, 1109.85 on SMT and 544.4 on NMT) matches the fact that most of the novice post-editors perceive that SMT is MT.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the novice post-editors that SMT is MT. In SMT, 86 erroneous texts were found, in comparison with the 44 erroneous texts found in HT and the 58 erroneous texts found in NMT. These numbers also help us to understand the 3 novice post-editors who think that the HT is MT and the 11 novice post-editors who think that NMT is MT, since there are less errors in the HT and NMT in comparison to SMT.

nPE	HT	SMT	NMT
1		x	x
2		x	
3		x	
4		x	x
5	x		x
6		x	
7		x	
8		x	
9	x	x	x
10		x	
11		x	x
12		x	x
13		x	x
14		x	
15		x	
16			x
17			x

18	x	x	x
19		x	
20		x	x

Table 7.10: nPE MT version
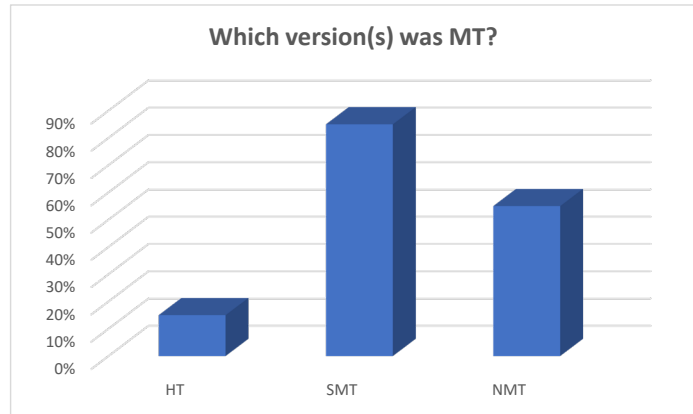
Figure 7.9: nPE MT version

7.2.4 Which version(s) was HT?

This question of the questionnaire is relevant because there are some post-editors that consider NMT version to be HT.

Table 7.11 and Figure 7.10 show that 16 out of 20 (80%) consider that HT is HT. 1 out of 20 (5%) have the perception that SMT is HT and 10 out of 20 (50%) perceive NMT as HT. 1 post-editor does not give any answer to this question.

This data correlates with the number of novice post-editors (15) who think that HT has the best quality.

According to the quantitative data from chapter 4, the fact that novice post-editors spent more time on HT (124.01 minutes in comparison with the 109.05 minutes they spent on SMT and the 97.825 minutes they spent on NMT) could lead us to think that this perception is not right. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by novice post-editors (735 edits on HT, 1109.85 on

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SMT and 544.4 on NMT) matches the perception that most of the novice post-editors perceive that HT is HT.

Finally, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the novice post-editors that HT is HT. In HT, only 44 erroneous texts were found, in comparison with the 86 erroneous texts found in SMT and the 58 erroneous texts found in NMT. In this question there are some experienced post-editors who think that both HT and NMT are HT (4 post-editors).

nPE	HT	SMT	NMT
1	x		
2			x
3	x		x
4	x		
5			x
6	x		
7	x		x
8	x		x
9	x		x
10	x		x
11	x		x
12	x		
13	x		
14			x
15	x		x
16	x	x	
17	x		
18	N/A	N/A	N/A
19	x		
20	x		

Table 7.11: nPE HT version
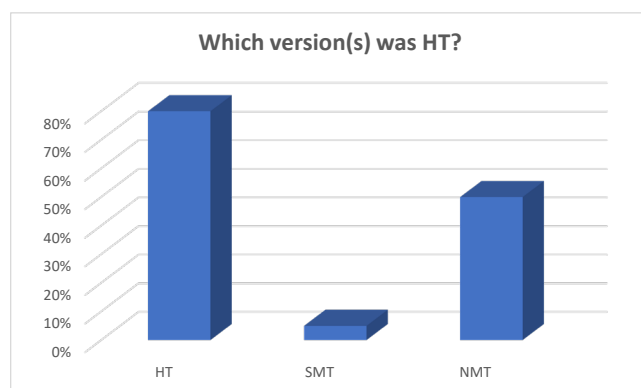
Figure 7.10: nPE HT version

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7.2.5 Which version(s) was the easiest to review?

This question of the questionnaire is also relevant because there are some post-editors who consider the SMT and NMT versions the easiest to review, as opposed to HT.

Table 7.12 and Figure 7.11 show that 9 out of 20 (45%) consider that HT is the easiest version to review. 1 out of 20 (5%) considers SMT the easiest version to review and 12 out of 20 (60%) perceive NMT to be the easiest version to review (López-Pereira, 2019).

According to the quantitative data from chapter 4, the fact that novice post-editors spent more time on HT (124.01 minutes in comparison with the 109.05 minutes they spent on SMT and the 97.825 minutes they spent on NMT) could lead us to think that this perception is not right. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by novice post-editors (735 edits on HT, 1109.85 on SMT and 544.4 on NMT) matches the perception that most of the novice post-editors perceive that HT is the easiest translation to review.

On the other hand, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the novice post-editors that HT is the easiest translation to review. In HT, only 44 erroneous texts were found, in comparison with the 86 erroneous texts found in SMT and the 58 erroneous texts found in NMT.

It is also worth noting that the results of this question (9 novice post-editors) correlate with the results of the questions "which translation has the best quality" (15 novice post-editors) and "which translation is HT" (16 novice post-editors).

nPE	HT	SMT	NMT
1	x		x
2			x
3			x
4			x
5			x
6	x		
7	x		
8	x		
9			x
10			x
11	x		x
12			x
13	x		
14			x
15	x		
16			x
17	x		
18	N/A	N/A	N/A
19	x		
20		x	x

Table 7.12: nPE easiest version to review
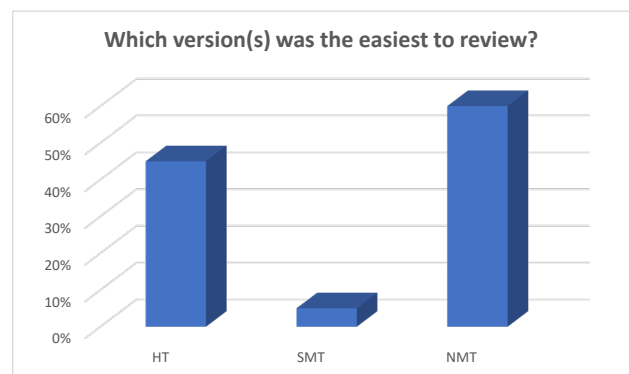
Figure 7.11: nPE easiest version to review

7.2.6 Which version(s) was the most difficult to review?

This question of the questionnaire is also interesting because there are some post-editors who consider HT and NMT versions to be the most difficult ones to review.

Table 7.13 and Figure 7.12 show that 2 out of 20 (10%) consider that HT is the most difficult version to review. 16 out of 20 (80%) consider SMT as the most difficult version to review and 2 out of 20 (10%) perceive NMT as the most difficult version to review. 1 post-editor does not give any answer to this question.

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According to the quantitative data from chapter 4, the fact that novice post-editors spent more time on HT (124.01 minutes in comparison with the 109.05 minutes they spent on SMT and the 97.825 minutes they spent on NMT) could lead us to believe that this perception is not right. Nevertheless, regarding edit distance results from chapter 4, the number of edits carried out by novice post-editors (735 edits on HT, 1109.85 on SMT and 544.4 on NMT) matches the perception that most of the novice post-editors perceive that SMT is the most difficult translation to review.

On the other hand, according to the quality data in chapter 5 of this thesis, we confirm that the quality data matches the perception of most of the novice post-editors that SMT is the most difficult translation to review. In SMT, 86 erroneous texts were found, in comparison with the HT, in which only 44 erroneous texts were found, and NMT, in which 58 erroneous texts were found.

It is also worth stating here that the results of this question (16 novice post-editors) correlate with the results of the questions "which translation has the worst quality" (19 novice post-editors) and "which translation is MT" (17 novice post-editors).

nPE	HT	SMT	NMT
1		x	
2		x	
3		x	
4		x	
5		x	
6			x
7		x	
8		x	
9		x	
10		x	
11		x	
12		x	

13		x	
14		x	
15		x	
16	x		X
17		x	
18	N/A	N/A	N/A
19		x	
20	x		

Table 7.13: nPE most difficult version to review
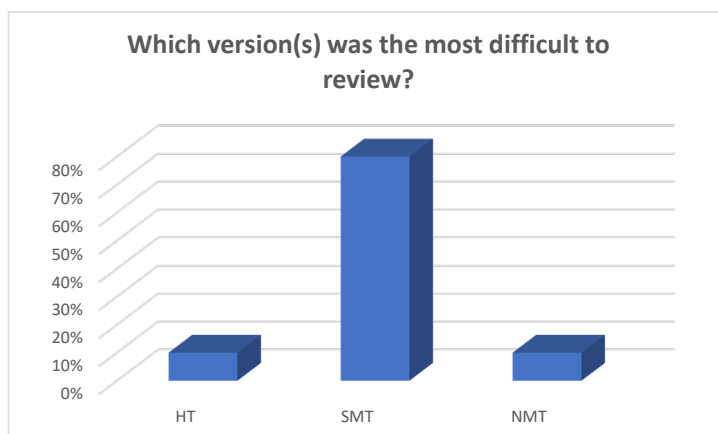
Figure 7.12: nPE most difficult version to review

7.2.7 Additional remarks by novice post-editors

Table 7.14 shows the comments novice post-editors added after finishing the PE phase and the questionnaire. They are direct quotations. We can see the comments regarding the quality of the translation and how easy or difficult they found the task. These comments correlate with the data of the questionnaire.

Here there are also some interesting comments:

Novice post-editor 1 confirms that HT was the easiest to review and where he spent less time. Novice post-editor 12 claims that she spent more time reviewing HT than SMT and NMT because she used her learnings from the HT review in SMT and NMT. If the review had been done separately, she would have needed to spend more time on SMT and NMT.

nPE	
1	As for the first version of the text, it didn't take me long to correct, but the second one made me much slower and heavier to do.

2	In the versions, the second person is used interchangeably: you and you (formal). In the first and third versions I opted for the formal form, and in the second version for the informal one. I think both forms can be used in this type of text. Some terms are variations of American Spanish, and I have hesitated whether to leave them or change them for the peninsular variant. Finally, I have changed them. Perhaps if I had had the reference of the specific purpose of this translation and the place of publication, or the audience something, it would have helped me to decide as to the variations of Spanish. Another difficulty I have had is differentiating between correct Spanish and some forms of English that we domesticate in Spanish, recognize and use, but perhaps they are not accepted academically. I think that depending on the audience to whom the text is addressed, some terms and expressions would have to be negotiated.
3	Most of the segments in all three versions didn't include a capital letter when starting a segment. I also found a critical issue regarding the way in which the translation of "You" has been addressed: mostly it has been translated with an informal tone "Tú"; only in Version 3 both formal and informal treatments are alternated. However, I believe in this kind of text the proper way to address the addresee is with a formal tone "Usted", and that's why I have edited most of the segment.
4	N/A
5	The second version was so bad that more than a correction it ended up being a translation.
6	N/A

7	If it hadn't been for the time I've had to spend changing the deal from "you" to "you" (formal), I don't think it would have taken me that long to complete this task. The only revision that has been heavy and painful for the eyes has been version 2. In addition, many of the segments, for example in version 3, were constantly repeated so they autocomplete directly but, in turn, it has made it a rather boring and monotonous task.
8	The task has been especially complicated for me because of the monotonous and mechanical nature of it. Many segments were repeated to the point of exhaustion; Besides, the fact of having to calculate the time spent on each segment has added monotony to the activity.
9	When I found that the proposed original translation was good enough I did not write anything in column D (there are a few cases). Difficulties found were all described in detail in the answers above, but more in particular, it was diffcult to me to tell between using the singular second person or the third personal tonic pronoun when addressing the recipient in the translation into Spanish. Eventually, I opted for the latter, leaving the former just for those sentences that I guessed were advertisements.
10	I have hesitated to translate "you" by you or by "you" (formal), but I think that in this context, I would be more inclined to use "you".
11	In the first version I underlined the words that I changed from the original translation. In the second version I didn´t underline anything because almost everything I wrote was my translation work. In the third version I didn´t underline anything because I just found mistakes with capital letters and a few other mistakes.

12	I have spent more time in the first text because I had to make decisions on wether translating or not words like app o check-in, or change the translation of voucher to vale instead of cupón because I think it's more used in this industry, or decide wether to change the translation of airline to compañía aérea throughout the text, etc. So this time spent should be considered in the other two reviews as well if they had been done separately.
13	N/A
14	N/A
15	I have replaced the formal treatment with an informal one in the last translation, mainly because this is the most common usage in this type of text/context. In addition, apart from correcting purely grammatical and spelling mistakes, I have made some other changes in the three translations to improve the style, for instance, to avoid repetition of words – which in Spanish could denote poor vocabulary – excessive use of the passive voice, and literal translations. I have also given priority to the Spanish variants of words when making changes because these are the alternatives recommended by the RAE and Fundeu. i.e.: although check-in is not strictly incorrect, I have changed it to facturación, the same goes for e-mail, which I have corrected as correo or correo electrónico. In a real working environment, these changes would only be a suggestion and I would adjust them according to the vision and expectations of the client (same criteria applies to whether usted or tú should be used). Overall, I find revisions a very challenging task because it is still difficult for me not to incur in overcorrection.
16	The greatest difficulty I have found was not being able to copy / paste normally in the excel cells since the entire format was changed and it was quite

15	uncomfortable. I should add, too, that it has been somewhat laborious to modify all the verb forms to fit the form "you", since I found that tweeting the client was too informal. Sometimes I have only had to correct the lack of capital letters.
17	Throughout this experiment I have encountered some difficulties on how to translate this text that seems to be taken from the website of an airline company. At first I hesitated about the treatment and finally I left it with a close treatment, as the customer feels more comfortable and that also generates more confidence when communicating. However, I have differentiated the part when it comes to the text related to the signing of the conditions of the services rendered, which in this case, to give more seriousness, it is better to make the translation formally addressing the client. From this point on, I have had few doubts, as it is a text that may be familiar to us because most of us have had to buy airline tickets or have had a problem with a flight or an airline company that we are familiar with.
18	N/A
19	When I started the review, I decided to do some research and looked for parallel texts on the Ryanair and Vueling websites. I have also analysed the types of errors that appear in each version. I have made a review of the whole task: translation review, comments and answers to the questions.

20	The longest sections of text were hard to review because of the limited space. Maybe it was due to the software version I'm running, but I had to scroll up and down, and it made the task annoyingly difficult to do smoothly. No problems with short sections, though. It was a very interesing activity and the only chance I've had during the degree to work with a Spanish translation. This has caused me to take longer in some sections due to not being used to working from English to Spanish (I've worked the whole four years from English to Catalan). The fact that the three versions are so distinct made me hesitate in some parts, but I found version 2 to be the easiest to review. I started by changing the "tu" to "usted", but ultimately went back on my decision and returned them to the more casual "tu". In conclusion: very interesting task and I'm thankful to have been able to work with a different target language.

Table 7.14: nPE remarks

7.3 Conclusions on the questionnaire

In this chapter we have reviewed the answers provided by the post-editors after having post-edited the translations. As mentioned previously in chapter 3 of this thesis, where we presented the methodological considerations, once all translations were done, a pool of 40 post-editors (experienced and novice) reviewed the same 300 translations without knowing whether they were HT, SMT or NMT. This requirement was essential to avoid post-editors being biased.

From the 6 questions of the questionnaire, we have received interesting feedback which allows us to conclude that it is not always clear whether using HT in the workflow helps to speed up the process compared to using MT (SMT or NMT). Some post-editors claim that, although SMT was the worst quality translation, they spent less time post-editing it than post-editing HT since HT requires a more detailed review to identify the errors.

If we compare the results from the experienced post-editors with the results from the novice post-editors, we have the following:

Regarding the question "Which version(s) was the best quality?", there is not much difference between experienced and novice post-editors. Results show us that they consider that HT has the best quality.

Regarding the question "Which version(s) was the worst quality?", both experienced and novice post-editors also agree on the fact that the SMT has the worst quality.

For the question "Which version(s) was MT?", both experienced and novice post-editors agree on the fact that SMT and NMT are MT. However, more novice post-editors than experienced post-editors identify SMT as MT (85% versus 55%). And more novice post-editors than experienced post-editor identify NMT as MT (55% versus 20%).

The question "Which version(s) was HT?" shows us that both experienced and novice post-editors agree on the fact that HT is HT.

Regarding the question "Which version(s) was the easiest to review?", both experienced and novice post-editors agree on the fact that HT is the easiest one to review.

Finally, the results of the question "Which version(s) was the most difficult to review?", show us that experienced post-editors and novice post-editors find SMT the most difficult translation to review.

These findings are aligned with our H1, H2 and H4:

- H1: Experienced post-editors spend more time on reviewing than novice post-editors.

- H2: Post-editing HT is slower than post-editing MT.

- H4: There are more errors in the SMT and NMT output than in the HT output, but post-editors spend more time on HT.

Coming back to our research questions (how much effort is needed to post-edit MT output (RQ1) and whether, from an economic point of view, it is worth post-editing it in comparison with using computer aided translation (RQ2)), the findings from the questionnaire have helped us to analyze them from a qualitative point of view. The main conclusion might be that including PE in a professional workflow would impact positively in terms of productivity, while maintaining a good level of quality.

CHAPTER 8: FINAL CONCLUSIONS AND FUTURE WORK

In this chapter, we conclude our research by presenting some general conclusions and thoughts about the work done. We also comment on potential improvements for future work.

8.1 Final conclusions

Nowadays, companies are more and more interested in including MT technologies in their localization workflows. This is motivated by the demanding timelines that many projects have. On the other hand, another key factor is budget. Companies are investing more on localization processes (Figure 0.1: MT Usage), because localization has become a key element in many companies' strategy. However, there are still some doubts related to the use of MT technology and whether it is efficient in terms of time and costs.

In this thesis, we have studied the different MT approaches and calculated the PE effort post-editors need to post-edit different translated outputs (HT, SMT and NMT).

We have also tested our research questions RQ1 (how much effort is needed to post-edit some particular MT output), RQ2 (whether it is worth post-editing it in comparison with using computer aided translation from an economic point of view) and RQ3 (try to shed light onto some of the relevant aspects that are included in the process of MT itself).

In chapter 1 we have presented the main MT models and approaches and provided a general overview of the TM technology.

In chapter 2 we have presented a general literature review about the works related to our thesis without intending to provide a comprehensive review of MT works.

In chapter 3 we have explained the experimental setup. We have detailed how the Moses-based MT engine has been configured and trained, how the different translations of the experiment (HT, SMT and NMT) have been obtained and how the PE experiment has been carried out. We have referred to the review carried out by an independent reviewer to categorize the errors of the different translations which were then used for the PE phase.

Chapter 4 has covered the productivity results of the experiment from experienced and novice post-editors. Results have shown that post-editing MT outputs can be faster than post-editing HT, although MT outputs have more errors than HT, which suggests that including PE in an industrial workflow could be advisable to speed up the process.

In chapter 5 we have studied the quality of the different types of translations used in the experiment (HT, SMT and NMT) aiming to determine whether quality impacts the PE process. Thanks to the error analysis of the different types of translation we have confirmed that HT is better than SMT and NMT from a semantic point of view but SMT and NMT can work well in terms of consistency. In terms of the impact the quality of the different translations (HT, SMT and NMT) has had on the PE phase, we have confirmed that HT has less errors than SMT and NMT, but not only experienced but also novice post-editors spent more time on HT than on SMT and NMT. In addition to

that, SMT has more errors than NMT and this is reflected in the greater amount of time that both experienced and novice post-editors spent on SMT.

In chapter 6 we have presented the main aspects of MT to be considered in an industrial localization environment from an economic point of view. We have been able to conclude that PE can be more competitive economically than HT. Thus, we have validated our RQ2: whether it is worth post-editing from an economic point of view, in comparison with using computer aided translation, and the figures suggest that PE is more competitive than HT from an economic point of view.

In order to support our thesis with some qualitative value, in chapter 7 we have studied the feedback from the post-editors involved in the experiment. The findings show that post-editing HT is not always easier and faster than post-editing SMT and NMT.

As a general conclusion, we are not going to argue that HT and MT processes are not different, because they are indeed. The traditional view has always been that the difference is significant. However, our experiment with 40 post-editors has shown that, in a practical setup, HT and MT are not that far away each other. Our research confirms that HT and MT can be interrelated.

Our work has confirmed that some post-editors think HT is MT, and the other way around. Moreover, a significant group of post-editors think that post-editing HT is as difficult as post-editing MT. This means that MT allows post-editors to work as naturally as if they were reviewing HT. The results of the experiment and the feedback from post-editors also confirm that NMT has helped to close the gap between HT and MT.

MT quality is higher with NMT than with SMT. Data has shown that NMT is easier to review than HT for a significant group of post-editors. Post-editors' perception has changed, and now post-editing MT is not as tedious as before.

8.2 Future work

We think there are some points of our research that could be further covered by future work.

First of all, if the SMT system is configured, trained and tuned more comprehensively, the quality gap between SMT and NMT would be not that big.

In addition to that, a more sophisticated PE environment for the PE phase could help post-editors to carry out their job in the experiment in an easier way. Furthermore, data could be collected more efficiently.

Another important improvement that could be added to this work would be working on a specific quality and productivity score. This score could be used to confirm how much time and which costs there would be in the PE workflow in a more automated way.

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Appendix A

English source text and Spanish translations:

Source	HT	SMT	NMT
Booking 555: Refund request consent	Reserva 555: Consentimiento de solicitud de reembolso	reserva 555: reembolso petición consentimiento	reserva 555: consentimiento de solicitud de reembolso
Dear Ricardo, First and foremost, we hope this message finds you and your loved ones safe and well in these uncertain times. We've received your refund request relating to your cancelled booking. Given the growing numbers of passengers requesting repayment for their bookings, most airlines have stopped offering cash refunds, giving the option of vouchers and free rebooking to affected passengers instead. In the event that your airline is no longer offering cash payments, **we need your consent to allow us act on your behalf to obtain your voucher.**	Estimado Ricardo: Primero que todo, esperamos que tú y tus seres queridos se encuentren bien en estos tiempos de incertidumbre. Hemos recibido tu solicitud de reembolso relacionada con tu reserva cancelada. Dada la creciente cantidad de pasajeros que están solicitando la devolución del dinero de sus reservas, gran parte de las aerolíneas dejó de ofrecer reembolsos en efectivo y comenzó a dar opciones de recibos y nuevas reservas gratuitas. En caso de que tu aerolínea deje de ofrecer pagos en	estimado ricardo. en primer lugar , y foremost, esperamos este mensaje que usted y el seguro loved ; y bien en estos incierto times. we've recibido el reembolso petición sobre tu reserva. anulada la creciente número de pasajeros solicitar la recuperación de su bookings, más aerolíneas fin brindar dinero refunds, dar a la opción de descuentos usados y rebooking a afectadas pasajeros instead gratis. en el caso de que tu compañía aérea ya no es brindar dinero payments, necesitamos su consentimiento para que nosotros actuar en tu nombre obtener	Querido Ricardo. En primer lugar, esperamos que este mensaje lo encuentre a usted y a sus seres queridos sanos y salvos en estos tiempos inciertos. Hemos recibido su solicitud de reembolso relacionada con su reserva cancelada. Dado el creciente número de pasajeros que solicitan el reembolso de sus reservas, la mayoría de las aerolíneas han dejado de ofrecer reembolsos en efectivo, dando la opción de cupones y reservas gratuitas a los pasajeros afectados.

To give your consent to this complimentary service, simply click I AGREE below. As soon as we have details, we'll be in touch. Rest assured we are here to help you with frequent status updates on your refund and in any way we can. We want to make sure you get the most out of your voucher before it expires. **I AGREE** Please note that our teams are monitoring your booking to act on any updates from the airline, so **you do not need to contact us at this stage**. We will reach out to you directly as soon as we know more. You will receive an important email update during next week - please make sure you read it to get important information about your booking status. **I AGREE** Kind regards, Customer Service	efectivo, necesitamos una autorización para actuar en tu nombre y obtener el recibo por ti. Para darnos tu consentimiento y tener acceso a este servicio gratuito, simplemente haz clic en ACEPTO, a continuación. Nos pondremos en contacto contigo apenas tengamos detalles. Quédate tranquilo, estamos aquí para ayudarte con actualizaciones frecuentes del estado de tu reembolso y de cualquier forma posible. Queremos asegurarnos de que aproveches al máximo tu recibo antes de que caduque. ACEPTO Recuerda que nuestros equipos supervisan tu reserva para tomar medidas en caso de que la aerolínea realice actualizaciones, por lo que no es necesario que te pongas en contacto con nosotros en esta etapa. Apenas tengamos más información nos	tu voucher. para dar su consentimiento a este bonitas service, simplemente haz clic acepto tu tan pronto como hemos details, we'll de touch. seguro de que estamos aquí para ayudarte a con el número de estatuto real de reembolso y en modo alguno que can. queremos asegúrate de aprovechar al máximo tu cupón antes expires. acepto ten en cuenta que nuestros grupos son control de tu reserva en cualquier real de la airline, para que no debemos ponte en contacto con nosotros en esta stage. podamos llegar a usted directamente tan pronto como sabemos mucho más recibirás un e @-@ mail actualizar durante la semana próxima . asegúrate de leer esto para disfrutar de información importante sobre tu reserva status. acepto tipo regards, atención al cliente	en caso de que su aerolínea ya no ofrezca pagos en efectivo, necesitamos su consentimiento para permitirnos actuar en su nombre para obtener su cupón. para dar su consentimiento a este servicio complementario, simplemente haga clic en Acepto a continuación. Tan pronto como tengamos detalles, estaremos en contacto. Tenga la seguridad de que estamos aquí para ayudarlo con las actualizaciones frecuentes de estado de su reembolso y de cualquier manera que podamos. queremos asegurarnos de que aproveche al máximo su cupón antes de que caduque. estoy de acuerdo tenga en cuenta que nuestros equipos están monitoreando su reserva para actuar sobre cualquier actualización de la aerolínea, por lo que no necesita contactarnos en esta etapa. nos

181	pondremos en contacto directamente contigo. Recibirás un e-mail con una actualización importante durante la próxima semana, no olvides leerlo, ya que contendrá información importante sobre el estado de tu reserva.

ACEPTO

Saludos cordiales, Atención al cliente | | comunicaremos con usted directamente tan pronto como sepamos más. recibirá una importante actualización por correo electrónico durante la próxima semana; asegúrese de leerla para obtener información importante sobre el estado de su reserva. estoy de acuerdo Saludos cordiales, Servicio al Cliente |
| Booking 555: Important update on your refund request | Reserva 555: Actualización importante con relación a tu solicitud de reembolso | reserva 555: noticia importante en el reembolso petición | reserva 555: actualización importante en su solicitud de reembolso |

Dear Juan,	Estimado Juan:	estimado juan,	querido Juan,
Thank you for giving us your consent to liaise with the airline on your behalf. We are now working to **ensure your refund claim is resolved** as quickly as possible, and will be in touch as soon as we have updates.	Gracias por darnos tu consentimiento para comunicarnos con la aerolínea en tu nombre. Estamos trabajando para garantizar que tu solicitud de reembolso se resuelva lo más rápido posible. Nos pondremos en contacto tan pronto como tengamos actualizaciones	gracias por habernos su consentimiento a liaise con la compañía aérea para tu behalf. ahora estamos trabajando para el reembolso pretender es resueltas tan rápidamente como possible, y será en contacto tan pronto como hemos updates.	Gracias por darnos su consentimiento para establecer un enlace con la aerolínea en su nombre. ahora estamos trabajando para asegurarnos de que su reclamo de reembolso se resuelva lo más rápido posible y nos comunicaremos tan pronto como tengamos actualizaciones.
Please bear in mind that this process could take several weeks as airlines deal with an unprecedented number of customer queries, but your request has now been submitted. We will be closely monitoring your case until we reach a satisfactory solution for you.	Ten en cuenta que este proceso podría tardar varias semanas, ya que las aerolíneas están lidiando con una cantidad de solicitudes sin precedentes, sin embargo, tu solicitud ya ha sido enviada. Supervisaremos atentamente tu caso hasta que tengamos una solución que sea satisfactoria para ti.	ten en cuenta que este proceso pueda tomar algunas semanas como compañías aéreas con un sin precedentes número de atención al cliente queries, pero tu solicitud ha sido submitted. vamos a estrechamente controlar el caso mientras no alcanzar una solución satisfactoria para más información	tenga en cuenta que este proceso puede llevar varias semanas, ya que las aerolíneas se ocupan de un número sin precedentes de consultas de clientes, pero su solicitud ya se ha enviado. estaremos monitoreando de cerca su caso hasta que lleguemos a una solución satisfactoria para usted.
There is no need to contact us in the meantime - you'll be the first to hear how it's going, at every stage of the process. You will receive an important email update during next week - please make sure you read it to get important information about your booking status.	No es necesario que te pongas en contacto con nosotros por el momento, te informaremos el estado de tu solicitud en cada etapa del proceso. Recibirás un e-mail con una actualización importante durante	no hay necesidad de ponte en contacto con nosotros entretanto , you'll es la primera saber cómo it's going, en cada etapa de la process. recibirás un e @-@ mail actualizar durante la semana próxima . asegúrate de leer esto para disfrutar de información importante sobre tu reserva status.	mientras tanto, no es necesario que se comunique con nosotros: usted será el primero en saber cómo va todo en cada etapa del proceso. recibirá una importante actualización por correo electrónico durante la próxima
Kind regards, Customer Service			

	la próxima semana, no olvides leerlo, ya que contendrá información importante sobre el estado de tu reserva. Saludos cordiales, Atención al cliente	tipo regards, atención al cliente	semana; asegúrese de leerla para obtener información importante sobre el estado de su reserva. Saludos cordiales, Servicio al Cliente
Check-in is not ready yet	El check-in aún no está listo	check-in aún no está en condiciones	el registro aún no está listo
Try again in a few minutes, after you receive your confirmation email	Inténtalo de nuevo en unos minutos después de recibir el e-mail de confirmación.	inténtalo de nuevo en unos minutes, después de recibas el e @-@ mail de confirmación	intente nuevamente en unos minutos, luego de recibir su correo electrónico de confirmación
Juan, our special gift to you	Juan, nuestro regalo especial para ti	juan, nuestra dádiva especial .	juan, nuestro regalo especial para ti

Dear Juan,	Estimado Juan:	estimado juan,	querido Juan,
First and foremost, we hope this message finds you and your loved ones safe and well in these uncertain times.

We are reaching out to you about your trip booked with us, reference 555 which given the circumstances you were not able to enjoy. | Antes que nada, esperamos que tus seres queridos y tú estéis bien en estos tiempos de incertidumbre.

Nos ponemos en contacto contigo en relación con tu reserva de viaje con nosotros, con referencia 555, que dadas las circunstancias no has podido disfrutar. | en primer lugar , y foremost, esperamos este mensaje que usted y el seguro loved ; y bien en estos incierto times.

llegamos a usted de tu viaje reservado con us, referencia 555 que teniendo en cuenta las circunstancias no pudiera usted enjoy. | En primer lugar, esperamos que este mensaje lo encuentre a usted y a sus seres queridos sanos y salvos en estos tiempos inciertos.

nos comunicamos con usted acerca de su viaje reservado con nosotros, referencia 555, que dadas las circunstancias que no pudo disfrutar. |
| On top of the refund request which we already contacted you about, we would like to help you by giving you a discount of €50 on your next Flight + Hotel booking. We look forward to helping you plan future trips whenever you are ready to travel again. | Además de la solicitud de reembolso, para la que ya nos hemos puesto en contacto contigo, nos gustaría ayudarte ofreciéndote un descuento de 50 EUR en tu próxima reserva de Vuelo + Hotel. Esperamos poder ayudarte a planificar tus próximos viajes cuando estés listo para viajar de nuevo. | en primer lugar de la solicitud reembolso que ya se about, quisiéramos para ayudarte a por proporcionan un descuento de €50 en tu próximo vuelo + hotel reserva. esperamos a que plan viajes , siempre que están dispuestos a again. de viaje. | Además de la solicitud de reembolso sobre la que ya nos pusimos en contacto con usted, nos gustaría ayudarlo ofreciéndole un descuento de 50 € en su próximo vuelo + reserva de hotel. Esperamos poder ayudarlo a planificar futuros viajes cuando esté listo para viajar nuevamente. |
| Kind regards | Atentamente, | cordialmente | Saludos cordiales |

Your Customer Service Team	El equipo de Atención al Cliente	tu servicio de atención al cliente	su equipo de servicio al cliente
Flight + hotel	Vuelo + hotel	vuelo + hotel	vuelo + hotel
£50 off	50 EUR de descuento	£50 de descuento	£ 50 de descuento
Use this code: 555	Utiliza este código: 555	esta code: 555	usa este código: 555
Valid until 31.12.2020	Válido hasta el 31/12/2020	hasta 31.12.2020 válido	válido hasta el 31.12.2020
CLICK ON THIS EMAIL Then enter the code when paying to enjoy your discount!	HAZ CLIC EN ESTE E-MAIL. Después introduce el código durante el pago para disfrutar del descuento.	haz clic en este e @-@ mail entonces introduce el código al pagar con tu discount!	Haga clic en este correo electrónico y luego ingrese el código al pagar para disfrutar de su descuento.
Book now	Reserva ya	reservar ahora	reservar ahora
*Conditions of use of the promotion code 555. The promo code 555 allows you to benefit from a discount of €50 on your Flight + Hotel booking with a minimum booking value of €500. Voucher applicable only by clicking on this email. Code must be used by 31.12.2020. No discount will be applied retroactively to existing reservations and the discount can not be combined with other promotions. To apply the discount code, the flight and hotel must be booked together and hotel stay must cover the entire duration of the trip. This discount is not applicable in the App.	*Condiciones de uso del código de promoción 555. El código promocional 555 te permite disfrutar de un descuento de 50 EUR en tu reserva de Vuelo + Hotel con un valor mínimo de reserva de 500 EUR. Cupón aplicable únicamente haciendo clic en este e-mail. El código debe utilizarse antes del 31/12/2020. No se aplicarán descuentos de forma retroactiva a las reservas existentes y el descuento no puede utilizarse junto a otras promociones. Para aplicar el código de	*conditions de uso de la promoción código 555. el código promocional 555 permite que beneficiarse de un descuento de €50 sobre tu vuelo + hotel reserva con un mínimo reserva valor de €500. cupón aplicable sólo por hacer clic en este e @-@ mail código debe ser utilizado por 31.12.2020. sin descuento se aplicarán propietarios a actual reservas y el descuento no se puede junto con otros promotions. aplicar el descuento code, el vuelo y hotel debe ser reservado juntos y hotel estancia que toda la duración del viaje.	* condiciones de uso del código de promoción 555. el código de promoción 555 le permite beneficiarse de un descuento de 50 € en su vuelo + reserva de hotel con un valor mínimo de reserva de 500 €. cupón aplicable solo haciendo clic en este correo electrónico. el código debe usarse antes del 31.12.2020. no se aplicará ningún descuento retroactivamente a las reservas existentes y el descuento no se puede combinar con otras promociones. Para aplicar el código de

	descuento, el vuelo y el hotel deben reservarse a la vez y la estancia en el hotel debe cubrir toda la duración del viaje. Este descuento no se aplica en la app.	este descuento no es aplicables en la app	descuento, el vuelo y el hotel deben reservarse juntos y la estadía en el hotel debe cubrir toda la duración del viaje. Este descuento no es aplicable en la aplicación.
Please note: we are currently experiencing a very high volume of calls. Rest assured, we try to help our Prime members first.	Atención: en estos momentos estamos experimentando un gran volumen de llamadas. Puedes estar tranquilo: intentamos ayudar a nuestros miembros Prime primero.	por favor note: estamos asistiendo muy elevado volumen de calls. resto assured, es intentar ayudar a nuestras miembros prime first.	tenga en cuenta: actualmente estamos experimentando un volumen muy alto de llamadas. Tenga la seguridad de que primero intentamos ayudar a nuestros miembros principales.
Local rates may apply if calling from abroad	Es posible que se apliquen tarifas locales en las llamadas desde el extranjero.	locales que podrían aplicarse tarifas si del extranjero	pueden aplicarse tarifas locales si llama desde el extranjero
Protection Against Airline Insolvency	Protección frente a insolvencia de la compañía aérea	protección contra la compañía aérea insolvencias	protección contra la insolvencia de la aerolínea
Travel with confidence - Protecting your money against airline bankruptcy	Viaja con confianza, protegiendo tu dinero en caso de quiebra de la compañía aérea	viajar con la confianza - proteger tu dinero contra la compañía aérea insolvencia	viaje con confianza: proteja su dinero contra la quiebra de una aerolínea

per person and segment	por persona y trayecto	por persona y trayecto	por persona y segmento
Add	Añadir	añadir	añadir
Added	Añadida	añadido	adicional
Full refund on your flight if your airline files for bankruptcy	Reembolso íntegro de tu vuelo en caso de quiebra de la compañía aérea	el reembolso sobre tu vuelo si la aerolínea dictámenes de insolvencia	reembolso completo de su vuelo si su aerolínea se declara en quiebra
Immediate payment so you can book a new flight	Pago inmediato para que puedas reservar un nuevo vuelo	pago inmediata , podrás reservar un nuevo vuelo	pago inmediato para que pueda reservar un nuevo vuelo
We'll contact you to arrange everything	Te llamamos para organizar todo	we'll en contacto contigo propongo volver todo	nos pondremos en contacto con usted para organizar todo
Summary of conditions	Resumen de condiciones	resumen de las condiciones	resumen de condiciones
Protect your flight!	¡Protege tu vuelo!	protege tu flight!	protege tu vuelo!
Last year 18 airlines filed for bankruptcy, don't get caught out!	El año pasado 18 compañías aéreas declararon la quiebra. ¡Que no te pille!	el año pasado 18 compañías aéreas nombrado por bankruptcy, don't consigue pescaban out!	el año pasado 18 aerolíneas se declararon en bancarrota, ¡no las atrapen!
Protect my flight	Proteger mi vuelo	protege mi vuelo	protege mi vuelo
No thanks	No, gracias	no , gracias	no, gracias
Security	Seguridad	la seguridad	seguridad
Free rebooking and protection	Cambio de fechas gratuito y protección	gratis rebooking y protección	reserva gratuita y protección
Cover your flight against airline issues, and rebook for free!	Protege tu vuelo frente a problemas de la compañía aérea y realiza cambios de fecha gratuitos.	cobertura tu vuelo contra la compañía aérea issues, y nuevamente de free!	¡cubra su vuelo contra problemas de la aerolínea y vuelva a reservar gratis!
Book now	Reserva ya	reservar ahora	reservar ahora
Past trips	Viajes anteriores	viajes pasados	viajes pasados
Check-in access failed	Error de acceso al check-in	no check-in acceso	acceso de registro fallido
Please try again later, we are working to fix this soon	Vuelve a intentarlo más tarde. Estamos trabajando para resolver pronto el problema.	inténtalo de nuevo later, estamos trabajando a este pronto fix	intente nuevamente más tarde, estamos trabajando para solucionarlo pronto
Try again later	Intentar más tarde	inténtalo más tarde	intente nuevamente más tarde

Questions about COVID-19?	¿Tienes preguntas sobre el COVID-19?	preguntas sobre covid-19?	preguntas sobre covid-19?
You'll find all the information you need here	Encontrarás toda la información que necesitas aquí	you'll encuentra toda la información que necesitas aquí	encontrarás toda la información que necesitas aquí
Please contact us as soon as possible on the number below to discuss the best available option for you.	Ponte en contacto con nosotros lo antes posible llamando al número que aparece en más abajo para encontrar la mejor opción disponible para ti.	contáctanos lo antes posible en el número sobre la que mejor se adapten para más información	contáctenos lo antes posible en el número a continuación para analizar la mejor opción disponible para usted.
Regular price	Precio normal	regularmente precio	precio regular
Price	Precio	precio	precio
Price with discount	Precio con descuento	precio con descuento	precio con descuento
Oops! This version of the app isn't supported anymore. To make sure your app keeps working properly, tap here to update to a newer version.	Vaya... Esta versión de la app ya no se admite. Para garantizar que la app sigue funcionando correctamente, pulsa aquí para actualizarla a una nueva versión.	esta versión oops! de la app isn't apoyado anymore. a asegúrate de la app vigile trabajando properly, toca aquí para actualizar a un newer version.	¡Uy! Esta versión de la aplicación ya no es compatible. Para asegurarse de que su aplicación siga funcionando correctamente, toque aquí para actualizar a una versión más nueva.
Your baggage is not protected	Tu equipaje no está protegido	tu equipaje no está protegida	su equipaje no está protegido
Add protection	Añadir protección	añadir protección	agregar protección
Recommended	Recomendado	recomendado	recomendado
Baggage assistance	Asistencia para el equipaje	equipaje asistencia	asistencia de equipaje
Protect your belongings against loss, delay or theft!	Protege tus pertenencias frente a pérdidas, retrasos o robos.	protege tu belongings contra loss, retraso o theft!	¡Proteja sus pertenencias contra pérdida, demora o robo!
Add baggage assistance and if we can't find your baggage and return it to you within 96 hours, we will pay you €1000!	Añade asistencia para el equipaje y si no podemos encontrar tu equipaje y entregártelo en 96 horas, te abonaremos 1000 €.	añadir equipaje y asistencia si can't encuentra tu equipaje y volver a en 96 hours, vamos a pagar usted €1000!	agregue asistencia para el equipaje y si no podemos encontrar su equipaje y devolvérselo dentro de las 96 horas, ¡le pagaremos 1000 €!

Add for €9 per passenger	Añade este seguro por 9 € por pasajero	añadir para €9 por pasajero	agregar por € 9 por pasajero
By selecting, I accept the Terms and Conditions.	Selecciona "Acepto los Términos y condiciones".	por selecting, acepto los términos y conditions.	Al seleccionar, acepto los términos y condiciones.
Your baggage is protected	Tu equipaje está protegido	tu equipaje está protegida	su equipaje está protegido
Good choice!	¡Buena elección!	buena choice!	¡buena elección!
per passenger	por pasajero	por pasajero	por pasajero
Are you sure you want to remove your protection?	¿Estás seguro de que deseas eliminar la protección?	¿ estás seguro de que deseas eliminar tu protection?	¿estás seguro de que deseas eliminar tu protección?
With assistance is always better, we will find your baggage and return it to you within 96 hours or we will refund €1000.	Con asistencia siempre es mejor: encontraremos tu equipaje y te lo entregaremos en 96 horas o te reembolsaremos 1000 €.	con la ayuda es siempre better, nos tu equipaje y volver a en 96 horas o vamos a reembolso €1000.	con asistencia siempre es mejor, encontraremos su equipaje y se lo devolveremos dentro de las 96 horas o le reembolsaremos 1000 €.
Remove	Eliminar	quitar	eliminar
Remove protection for all passengers	Eliminar la protección para todos los pasajeros	quitar protección para todos los pasajeros	eliminar la protección para todos los pasajeros
Discover	Descubre	descubre	descubrir
Save money	Ahorra dinero	ahorro	ahorrar dinero
Save	Ahorra	ahorra	salvar
I'm interested	¡Me interesa!	i'm interesadas	Estoy interesado
Pack your bags!	¡Haz ya las maletas!	pack tu bags!	¡Haz las maletas!
l'll take it!	¡Me lo llevo!	l'll tomar it!	¡Lo tomaré!
Relax	Relájate	relájate	relajarse
Take a break	Tómate un descanso	un cambio	tomar un descanso
Refresh offers	Actualizar ofertas	actualizar ofertas	actualizar ofertas
Be seduced!	¡Déjate seducir!	se seduced!	¡ser seducida!
Modify this booking	Modificar esta reserva	cambiar esta reserva	modificar esta reserva
We are processing your refund	Estamos procesando tu reembolso	estamos procesando tu reembolso	estamos procesando su reembolso
You can check its status on our website.	Puedes comprobar el estado en nuestro sitio web.	puedes consultar el estado en nuestro website.	Puede consultar su estado en nuestro sitio web.
Showing only flights with free rebooking	Solo vuelos con cambio de fechas gratuito	mostrando solo vuelos con rebooking gratis	mostrando solo vuelos con cambio de reserva gratuito

Passengers, seats, and baggage	Pasajeros, asientos y equipaje	passengers, seats, y de equipaje	pasajeros, asientos y equipaje
You cancelled this booking	Has cancelado esta reserva	usted anulada esta reserva	cancelaste esta reserva
Your refund is being processed. You can check its status on our website.	El reembolso se está procesando. Puedes comprobar el estado en nuestro sitio web.	el reembolso se processed. puedes consultar el estado en nuestro website.	Su reembolso está siendo procesado. Puede consultar su estado en nuestro sitio web.
Give yourself something to look forward to! Book your next trip now & get FREE rebooking on most flights	¡Regálate algo con lo que mirar al futuro! Reserva ya tu próximo viaje y obtén un cambio de fechas GRATUITO en la mayoría de vuelos	dar usted algo a deseoso to! reservar tu próximo viaje ahora & información gratis rebooking en la mayoría de vuelos	¡Date algo que esperar! Reserve su próximo viaje ahora y obtenga una nueva reserva gratuita en la mayoría de los vuelos
Why not give yourself that trip to [DESTINATION] to look forward to? Book now & get FREE rebooking on most flights!	¿Por qué no regalarte ese viaje a [DESTINATION] con el que mirar al futuro? Reserva ya y obtén un cambio de fechas GRATUITO en la mayoría de vuelos	¿ Por qué no usted que viaje a destino a deseoso to? reserva ahora & información gratis rebooking en más flights!	¿por qué no te das ese viaje al destino que anhelas? ¡Reserve ahora y obtenga una reserva gratis en la mayoría de los vuelos!
Why not give yourself a trip to look forward to? Book now & get FREE rebooking on most flights!	¿Por qué no regalarte un viaje con el que mirar al futuro? Reserva ya y obtén un cambio de fechas GRATUITO en la mayoría de vuelos	¿ Por qué no usted un viaje a deseoso to? reserva ahora & información gratis rebooking en más flights!	¿Por qué no te das un viaje que esperar? ¡Reserve ahora y obtenga una reserva gratis en la mayoría de los vuelos!
Free, preferential customer service	Servicio al cliente preferencial, sin costo	free, atención al cliente prioritaria	servicio al cliente gratuito y preferencial
Choose our Premium Support Option for total support before and during your trip.	Elige nuestra Opción de asistencia premium para recibir asistencia total antes y durante tu viaje.	elige la opción de soporte premium para total apoyo antes y durante tu viaje.	elija nuestra opción de soporte premium para obtener un soporte total antes y durante su viaje.

Free, preferential customer service Choose our Premium Support Option for total support before and during your trip.	Servicio al cliente preferencial, sin costo Elige nuestra Opción de asistencia premium para recibir asistencia total antes y durante tu viaje.	free, atención al cliente prioritaria elige la opción de soporte premium para total apoyo antes y durante tu viaje.	servicio al cliente gratuito y preferencial elija nuestra opción de soporte premium para obtener un soporte total antes y durante su viaje.
Push Notification Flight Tracker	Notificación automática del rastreador de vuelo	la frontera de la notificación tracker vuelo	seguimiento de vuelo de notificaciones push
Not sure what's happening with your flight? Keep track of any flight, world-wide, in your app	¿No estás seguro del estado de tu vuelo? Rastrea cualquier vuelo, en cualquier parte del mundo, en tu app	no sé what's ocurre con tu flight? mantener habituales de cualquier flight, world-wide, en la app	¿No estás seguro de lo que está pasando con tu vuelo? realizar un seguimiento de cualquier vuelo, en todo el mundo, en su aplicación
Push Notification Flight Status	Notificación automática del estado del vuelo	el estado de la frontera de la notificación vuelo	estado de vuelo de notificación push
Unsure if your flight to Madrid is still going ahead? Get real-time updates for your flight in your app.	¿No estás seguro de si tu vuelo a Madrid sigue adelante? Recibe actualizaciones en tiempo real de tu vuelo en la app.	unsure si tu vuelo a madrid continúan produciéndose real-time ahead? recibe alertas sobre tu vuelo en la app	¿no estás seguro si tu vuelo a madrid sigue adelante? Obtenga actualizaciones en tiempo real para su vuelo en su aplicación.
Additional products	Productos adicionales	más productos	productos adicionales
Automatic check-in	Facturación automática	automática check-in	check-in automático
We'll sort out your check-in and get your boarding pass for you.	Realizaremos tu facturación y obtendremos tu tarjeta de embarque.	we'll tipo en tu check-in y consigue tu tarjeta de embarque para más información	resolveremos su check-in y le conseguiremos su pase de abordar.

Dear Customer,	Estimado cliente:	estimado customer,	estimado cliente,
Has your flight been cancelled? Here's what to do (If your travel dates have passed and your flights operated normally, please disregard this email).	¿Tu vuelo ha sido cancelado? Esto es lo que tienes que hacer: (Si tus fechas de viaje han pasado y los vuelos operaron con normalidad, no tengas en cuenta este mensaje).	ha tu vuelo se cancelled? here's qué hacer (if las fechas de tu viaje han transcurrido y de tus vuelos operado normally, por favor descuidan este email).	¿Se ha cancelado su vuelo? esto es lo que hay que hacer (si sus fechas de viaje ya pasaron y sus vuelos funcionaron normalmente, ignore este correo electrónico).
Travel is being affected around the globe and as a result, many flights are being cancelled by airlines. Given the growing numbers of passengers requesting repayment for their bookings, most airlines have stopped offering cash refunds, giving the option of vouchers and free rebooking to affected passengers instead.	La posibilidad de viajar se está viendo afectada en todo el mundo y, como resultado, las compañías aéreas están cancelando muchos vuelos. Debido al número creciente de pasajeros que solicitan la devolución de sus reservas, la mayoría de las compañías aéreas han dejado de ofrecer el reembolso del dinero, dando la opción de conseguir cupones y cambios de fechas gratuitos a los pasajeros afectados, en su lugar.	viajar se afectada del mundo y como result, muchos vuelos baratos se aerolíneas anulada por la creciente número de pasajeros solicitar la recuperación de su bookings, más aerolíneas fin brindar dinero refunds, dar a la opción de descuentos usados y rebooking a afectadas pasajeros instead. gratis	los viajes se ven afectados en todo el mundo y, como resultado, las aerolíneas cancelan muchos vuelos. Dado el creciente número de pasajeros que solicitan el reembolso de sus reservas, la mayoría de las aerolíneas han dejado de ofrecer reembolsos en efectivo, dando la opción de cupones y reservas gratuitas a los pasajeros afectados.
We'll request your refund voucher for you	Solicitaremos el cupón de reembolso por ti:	we'll pide tus reembolso bono para ti	le solicitaremos su comprobante de reembolso
Should your airline be offering refund vouchers, as your travel agent we are here to act on your behalf to obtain your voucher for you, as soon as it becomes available. To give your consent to this complimentary service, simply click I AGREE below. As soon as we have details, we'll be in touch. We're on hand to help you rebook when you're ready to make new travel plans.	Si la compañía aérea te ofrece cupones de reembolso, como tu agente de viaje,	tu compañía aérea debería ser brindar reembolso vouchers, como tu viaje agente estamos aquí para actuar sobre tu nombre obtener tu bono para you, tan pronto como sea available. a dar su consentimiento a este bonitas service, simplemente haz clic acepto tu tan pronto como hemos details,	En caso de que su aerolínea ofrezca cupones de reembolso, como su agente de viajes, estamos aquí para actuar en su nombre para obtener su cupón en cuanto esté disponible. para dar su consentimiento a

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We've already helped more than 555 customers recover the cost of their bookings. Please note that our teams are monitoring your booking to act on any updates from the airline, so you do not need to contact us at this stage. We will reach out to you directly as soon as we know more. I AGREE Kind regards, Customer Service	estamos aquí para actuar en tu nombre y obtener tu cupón tan pronto como esté disponible. Para dar tu consentimiento a este servicio adicional, solo tienes que hacer clic en ESTOY DE ACUERDO, a continuación. En cuanto tengamos información, nos pondremos en contacto contigo. Estamos a tu disposición para ayudarte a cambiar las fechas cuando estés listo para hacer nuevos planes de viaje. Ya hemos ayudado a más de 555 clientes a recuperar el coste de sus reservas. Ten en cuenta que nuestro equipo está supervisando tu reserva para actuar ante cualquier actualización por parte de la compañía aérea, por lo que no es necesario que te pongas en contacto con nosotros en este momento. Nos pondremos en contacto contigo directamente en cuanto tengamos más información. ESTOY DE	we'll de touch. we're en parte para ayudarte a nuevamente cuando you're dispuestos a hacer nuevas viajar plans. we've ya han contribuido a más de 555 clientes recuperar los costes de sus reservas. ten en cuenta que nuestros grupos son control de tu reserva en cualquier real de la airline, para que no debemos ponte en contacto con nosotros en esta stage. podamos llegar a usted directamente tan pronto como sabemos mucho más . acepto tipo regards, de atención al cliente	este servicio complementario, simplemente haga clic en Acepto a continuación. Tan pronto como tengamos detalles, estaremos en contacto. estamos a su disposición para ayudarlo a volver a reservar cuando esté listo para hacer nuevos planes de viaje. Ya hemos ayudado a más de 555 clientes a recuperar el costo de sus reservas. tenga en cuenta que nuestros equipos están monitoreando su reserva para actuar sobre cualquier actualización de la aerolínea, por lo que no necesita contactarnos en esta etapa. nos comunicaremos con usted directamente tan pronto como sepamos más. estoy de acuerdo saludos cordiales, servicio al cliente

	ACUERDO Atentamente, Atención al cliente		
Booking 555: Important update regarding refund policies	Reserva 555: Actualización importante de la política de reembolso	reserva 555: noticia importante sobre reembolso políticas	reserva 555: actualización importante sobre las políticas de reembolso

Dear Customer,	Estimado cliente:	estimado customer,	estimado cliente,
First and foremost, we hope this message finds you and your loved ones safe and well in these uncertain times. We are reaching out to you about your trip booked with us, reference 555.	Antes que nada, esperamos que tus seres queridos y tú estéis bien en estos tiempos de incertidumbre. Nos ponemos en contacto contigo en relación con tu reserva de viaje con nosotros, referencia 555.	en primer lugar , y foremost, esperamos este mensaje que usted y el seguro loved ; y bien en estos incierto times. llegamos a usted de tu viaje reservado con us, referencia 555.	En primer lugar, esperamos que este mensaje lo encuentre a usted y a sus seres queridos sanos y salvos en estos tiempos inciertos. nos comunicamos con usted acerca de su viaje reservado con nosotros, referencia 555.
If your travel dates have passed and your flights operated normally, please disregard this email.	Si tus fechas de viaje han pasado y dichos vuelos operaron con normalidad, no tengas en cuenta este mensaje.	si las fechas de tu viaje han transcurrido y de tus vuelos operado normally, por favor descuidan este e @-@ mail	Si sus fechas de viaje ya pasaron y sus vuelos funcionaron normalmente, ignore este correo electrónico.
As you are aware, travel and transportation have been severely affected around the globe, with airlines cancelling or changing many flights due to travel restrictions and lockdowns. While these measures are essential to help combat the spread of the COVID-19 virus, we appreciate that they also have a significant impact on your travel plans. As your travel agent, our main priority is to provide you with the highest possible level of service to help you make new plans or recover the cost of your booking.	Como sabes, los viajes y los transportes se están viendo severamente afectados en todo el mundo; las compañías aéreas están cancelando y cambiando muchos vuelos debido a las restricciones para viajar y a los confinamientos. Si bien estas medidas son fundamentales para combatir la propagación del virus COVID-19, vemos que también tienen un impacto significativo en tus planes de viaje. Como tu agente de viaje, nuestra principal prioridad es proporcionarte el nivel de servicio	como usted aware, viajar y transporte han sido gravemente afectados por la globe, con compañías aéreas cancelación o cambio muchos vuelos debido a viajar limitaciones y lockdowns. a estas medidas son esenciales para ayudar a combatir el aumento de la covid-19 virus, consideramos que también una importante en tu viaje plans. como tu viaje agent, nuestra principal prioridad es proporcionar con el nivel del servicio para ayudarte a hacer nuevas planes o recuperar los costes de tu reserva.	Como usted sabe, los viajes y el transporte se han visto gravemente afectados en todo el mundo, y las aerolíneas cancelan o cambian muchos vuelos debido a restricciones de viaje y bloqueos. Si bien estas medidas son esenciales para ayudar a combatir la propagación del virus covid-19, apreciamos que también tengan un impacto significativo en sus planes de viaje. Como su agente de viajes, nuestra principal prioridad es brindarle el mayor nivel de
What to do in case your flight is cancelled by the airline	Como tu agente de viaje, nuestra principal prioridad es proporcionarte el nivel de servicio		
Most airlines have			

stopped offering cash refunds to customers for cancelled flights. Instead, they are offering alternatives such as vouchers or the ability to rebook.

If the airline you were due to fly with is offering a refund voucher and you would like us to obtain this on your behalf from the airline as soon as it becomes available, please CLICK YES.
We will start the process immediately and contact you with the full details of your voucher and/or any additional instructions on how to obtain or redeem it for your next trip. We will be available to help you rebook the flight of your choice when you make new travel plans.

Rest assured that we are working hard to provide you with the best possible alternatives, and once we have more information about your specific case we will contact you. Please note that our teams are monitoring your booking to act on any updates from the airline, so you do not need to contact us at this stage.

We hope this | más elevado para que puedas hacer nuevos planes o recuperar el coste de tu reserva.

¿Qué hacer si la compañía aérea ha cancelado tu vuelo?

La mayoría de las compañías aéreas han dejado de ofrecer el reembolso del dinero a los clientes por los vuelos cancelados. En su lugar están ofreciendo alternativas como cupones o la posibilidad de cambiar de fecha.

Si la compañía aérea con la que tenías que volar ofrece un cupón de reembolso y quieres que lo consigamos en tu nombre ante la compañía aérea tan pronto como esté disponible, HAZ CLIC EN SÍ. Comenzaremos a procesarlo inmediatamente y nos pondremos en contacto contigo con la información completa de tu cupón y/o cualquier instrucción adicional sobre cómo conseguirlo o canjearlo para tu próximo viaje. | lo que hacer en caso de cancelación por parte de la compañía aérea

más aerolíneas fin brindar dinero refunds a clientes para anulada vuelos instead, son prestados alternativas como descuentos usados o la capacidad de rebook.

si la aerolínea se te debido a vuela con es brindar a un reembolso cupón y nos gustaría obtener en tu nombre de la compañía aérea tan pronto como sea available, haz clic yes.
Comenzamos el proceso de inmediato y en contacto contigo con la todos los detalles de tu cupón and/or alguna instrucciones sobre cómo obtener o redeem se para tu próximo viaje. que estará disponible para ayudarte a nuevamente el vuelo de tu selección si una nueva plans. de viaje

seguro de que estamos trabajando intensamente para proporcionar con los mejores posibles alternatives, y una vez tenemos más información sobre | servicio posible para ayudarlo a hacer nuevos planes o recuperar el costo de su reserva.

qué hacer en caso de que la aerolínea cancele su vuelo

La mayoría de las aerolíneas han dejado de ofrecer reembolsos en efectivo a los clientes por vuelos cancelados. en cambio, están ofreciendo alternativas como cupones o la posibilidad de volver a reservar.

Si la aerolínea con la que debía volar ofrece un comprobante de reembolso y desea que lo obtengamos en su nombre de la aerolínea tan pronto como esté disponible, haga clic en Sí. comenzaremos el proceso de inmediato y nos pondremos en contacto con usted con los detalles completos de su cupón y / o cualquier instrucción adicional sobre cómo obtenerlo o canjearlo para su próximo viaje. estaremos |

information is useful and look forward to helping you book your next trip. Kind regards, Customer Service	Podemos ayudarte a cambiar las fechas por el vuelo que elijas cuando hagas nuevos planes de viaje. Te garantizamos que estamos haciendo todo lo posible para proporcionarte las mejores alternativas disponibles. En cuanto tengamos más información sobre tu caso específico nos pondremos en contacto contigo. Ten en cuenta que nuestro equipo está supervisando tu reserva para actuar ante cualquier actualización por parte de la compañía aérea, por lo que no es necesario que te pongas en contacto con nosotros en este momento. Esperamos que esta información sea útil y poder ayudarte con la reserva de tu próximo viaje. Atentamente, Atención al cliente	tus caso concreto , en contacto con más información ten en cuenta que nuestros grupos son control de tu reserva en cualquier real de la airline, para que no debemos ponte en contacto con nosotros en esta stage. esperamos esta información es útil y a ayudar a reservas tu próximo viaje. tipo regards, atención al cliente	disponibles para ayudarlo a volver a reservar el vuelo de su elección cuando haga nuevos planes de viaje. Tenga la seguridad de que estamos trabajando arduamente para brindarle las mejores alternativas posibles, y una vez que tengamos más información sobre su caso específico, nos comunicaremos con usted. tenga en cuenta que nuestros equipos están monitoreando su reserva para actuar sobre cualquier actualización de la aerolínea, por lo que no necesita contactarnos en esta etapa. Esperamos que esta información sea útil y esperamos poder ayudarle a reservar su próximo viaje. Saludos cordiales, Servicio al Cliente
ATTENTION - Your booking has been changed	ATENCIÓN - Se ha cambiado tu reserva	atención - tu reserva se ha cambiado	atención - su reserva ha sido modificada
Your flight has been cancelled	Tu vuelo ha sido cancelado	tu vuelo ha sido anulada	su vuelo ha sido cancelado
Flight Reservation	Reserva de vuelo	vuelo reserva	reserva de vuelo

Unfortunately the airline cancelled your flight.	Lamentablemente, la aerolínea canceló tu vuelo.	lamentablemente , la compañía aérea anulada tu vuelo.	Lamentablemente, la aerolínea canceló su vuelo.
We will guide you on how to request a refund, cancellation or to make changes with the airline.	Te guiaremos con relación a cómo solicitar un reembolso o una cancelación, o a hacer cambios con la aerolínea.	vamos a mantener usted sobre cómo pide una refund, cancelación o hacer cambios con el servicio	Le guiaremos sobre cómo solicitar un reembolso, cancelación o hacer cambios con la aerolínea.
Contact airline	Contacta a la aerolínea	en contacto con la compañía	aerolínea de contacto
In this case, your airline may offer you a travel voucher. Click the button to request your voucher.	En este caso, la aerolínea puede ofrecerte un recibo de viaje. Haz clic en el botón para solicitar tu recibo.	en este case, tu compañía aérea puede ofrecer un viaje voucher. haz clic en el botón a pide tus voucher.	En este caso, su aerolínea puede ofrecerle un bono de viaje. Haga clic en el botón para solicitar su cupón.
Request voucher	Solicita un recibo	solicitud de cupón	solicitud de cupón
or change dates.	o cambia las fechas.	o cambio fechas.	o cambiar fechas.
In this case, your airline may refund the cost of your flight. Click the button to request your refund.	En este caso, la aerolínea puede reembolsarte el costo de tu vuelo. Haz clic en el botón para solicitar tu reembolso.	en este case, tu compañía aérea puede reembolso de los costes de tu vuelo. haz clic en el botón a pide tus refund.	en este caso, su aerolínea puede reembolsar el costo de su vuelo. haga clic en el botón para solicitar su reembolso.
Request refund	Solicitar reembolso	pide reembolso	solicitud de reembolso
or change dates.	o cambia las fechas.	o cambio fechas.	o cambiar fechas.
Please check our Help Centre for more information.	Para obtener más información, consulta nuestro Centro de Ayuda.	consulta nuestro centro de ayuda para consultar más información.	consulte nuestro centro de ayuda para obtener más información.
Go to Help Centre	Ir al Centro de Ayuda	ir al centro de ayuda	ir al centro de ayuda
Unfortunately the airline has ceased operations.	Lamentablemente, la aerolínea ha cesado sus operaciones.	lamentablemente , la aerolínea ha ceased operations.	desafortunadamente la aerolínea ha cesado sus operaciones.

We are waiting for further instructions from the airline or its administrator. You do not need to contact us as we will inform you of any updates by email.	Estamos esperando instrucciones adicionales de la aerolínea o su administrador. No es necesario que te pongas en contacto con nosotros, te informaremos de cualquier actualización por e-mail.	estamos esperando más instrucciones de la compañía aérea o sus administrator. no deben ponte en contacto con nosotros lo podamos informarles de las notificaciones por e @-@ mail	Estamos esperando más instrucciones de la aerolínea o su administrador. no necesita ponerse en contacto con nosotros, ya que le informaremos de cualquier actualización por correo electrónico.
Your flight reservation has been cancelled.	La reserva de tu vuelo ha sido cancelada.	tu reserva se ha cancelled. Vuelo	su reserva de vuelo ha sido cancelada.
Flight reservation number:	Número de reserva del vuelo:	reserva number: vuelo	número de reserva de vuelo:
Email:	E-mail:	email:	correo electrónico:
How to contact Ryanair	Cómo ponerse en contacto con Ryanair	¿ Cómo en contacto con ryanair	Cómo contactar a Ryanair
To contact Ryanair, simply follow the instructions below.	Para ponerte en contacto con Ryanair, simplemente sigue las instrucciones a continuación.	en contacto con ryanair, simplemente sigue las instrucciones tu vuelo	Para contactar a Ryanair, simplemente siga las instrucciones a continuación.
Click this link to go to Ryanair's website.	Haz clic en este vínculo para ir al sitio web de Ryanair.	haz clic en el enlace para acceder a ryanair's website.	Haga clic en este enlace para ir al sitio web de Ryanair.
Enter your details in the form.	Escribe tus detalles en el formulario.	introduce tus detalles en la form.	ingrese sus datos en el formulario.
Follow the instructions to cancel your booking on Ryanair's website. Please note that refunds are processed onto the same payment method used at the time of booking.	Sigue las instrucciones para cancelar tu reserva en el sitio web de Ryanair. Recuerda que los reembolsos se procesan en la misma forma de pago que utilizaste en el momento de hacer la reserva.	sigue las instrucciones a cancelar tu reserva en ryanair's website. ten en cuenta que refunds son procesado en la misma forma de pago utilizado en el momento de reserva.	siga las instrucciones para cancelar su reserva en el sitio web de ryanair. tenga en cuenta que los reembolsos se procesan en el mismo método de pago utilizado en el momento de la reserva.

If you receive a refund confirmation email from Ryanair, please forward it to us by email to the following address	Si recibes un e-mail de confirmación de reembolso por parte de Ryanair, reenvíanos el e-mail a la siguiente dirección	si recibirás un reembolso e @-@ mail de confirmación de ryanair, vuelve a seguir que nosotros por e @-@ mail a la dirección	Si recibe un correo electrónico de confirmación de reembolso de Ryanair, envíenoslo por correo electrónico a la siguiente dirección
Contact Ryanair	Ponerse en contacto con Ryanair	en contacto con ryanair	contacto ryanair
How to contact Vueling	Cómo ponerse en contacto con Vueling	¿ Cómo en contacto con vueling	cómo contactar vueling
To contact Vueling, simply follow the instructions below.	Para ponerte en contacto con Vueling, simplemente sigue las instrucciones a continuación.	en contacto con vueling, simplemente sigue las instrucciones tu vuelo	Para ponerse en contacto con vueling, simplemente siga las instrucciones a continuación.
Click this link to go to Vueling's website.	Haz clic en este vínculo para ir al sitio web de Vueling.	haz clic en el enlace para acceder a vueling's website.	haga clic en este enlace para ir al sitio web de vueling.
Enter your details in the form.	Escribe tus detalles en el formulario.	introduce tus detalles en la form.	ingrese sus datos en el formulario.
Follow the instructions to cancel your booking on Vueling's website. Please note that refunds are processed onto the same payment method used at the time of booking.	Sigue las instrucciones para cancelar tu reserva en el sitio web de Vueling. Recuerda que los reembolsos se procesan en la misma forma de pago que utilizaste en el momento de hacer la reserva.	sigue las instrucciones a cancelar tu reserva en vueling's website. ten en cuenta que refunds son procesado en la misma forma de pago utilizado en el momento de reserva.	siga las instrucciones para cancelar su reserva en el sitio web de vueling. tenga en cuenta que los reembolsos se procesan en el mismo método de pago utilizado en el momento de la reserva.
If you receive a refund confirmation email from Vueling, please forward it to us by email to the following address	Si recibes un e-mail de confirmación de reembolso por parte de Vueling, reenvíanos el e-mail a la siguiente dirección	si recibirás un reembolso e @-@ mail de confirmación de vueling, vuelve a seguir que nosotros por e @-@ mail a la dirección	si recibe un correo electrónico de confirmación de reembolso de vueling, envíenoslo por correo electrónico a la siguiente dirección
Contact Vueling	Ponerse en contacto con Vueling	contacto vueling	contacto vueling

How to request your travel voucher	Cómo solicitar tu recibo de viaje	¿ Cómo a petición de cupón de tu viaje	cómo solicitar su bono de viaje
Request your travel voucher by clicking on the button below.	Solicita tu recibo de viaje haciendo clic en el siguiente botón.	pide tu viaje cupón por hacer clic en el botón tu vuelo	solicite su bono de viaje haciendo clic en el botón a continuación.
We will process your request and get back to you by email.	Procesaremos tu solicitud y nos contactaremos contigo vía e-mail.	vamos a procesar tu solicitud y consigue volver a usted por e @-@ mail	procesaremos su solicitud y le responderemos por correo electrónico.
You will receive a response by email as soon as possible.	Pronto recibirás un e-mail con nuestra respuesta.	recibirás una respuesta por e @-@ mail tan pronto como possible.	Recibirá una respuesta por correo electrónico lo antes posible.
Request voucher	Solicita un recibo	solicitud de cupón	solicitud de cupón
Conditions	Condiciones	condiciones	condiciones
Please note that travel vouchers are subject to specific terms and conditions defined by the airline. For more information	Recuerda que los recibos de viaje están sujetos a los términos y condiciones específicos definidos por la aerolínea. Para obtener más información	ten en cuenta que viajar descuentos usados están sujetos a términos y condiciones por el servicio de para más información	tenga en cuenta que los cupones de viaje están sujetos a términos y condiciones específicos definidos por la aerolínea. para más información
click here.	haz clic aquí.	haz clic here.	haga clic aquí.
We are processing your request	Estamos procesando tu solicitud	estamos procesando tu petición	Estamos procesando su petición
We will update you by email	Te enviaremos las actualizaciones por e-mail	vamos a actualizar usted por e @-@ mail	te actualizaremos por correo electrónico
How to request your refund	Cómo solicitar tu reembolso	¿ Cómo a petición el reembolso	cómo solicitar su reembolso
Request your refund by clicking on the button below.	Solicita tu reembolso haciendo clic en el siguiente botón.	pide tus reembolso por hacer clic en el botón tu vuelo	solicite su reembolso haciendo clic en el botón a continuación.
We will process your request and get back to you by email.	Procesaremos tu solicitud y nos contactaremos contigo vía e-mail.	vamos a procesar tu solicitud y consigue volver a usted por e @-@ mail	procesaremos su solicitud y le responderemos por correo electrónico.
We will keep you informed on a regular basis on the status of your request. For further information	Constantemente te mantendremos informado acerca del estado de tu solicitud. Para más información, visita	vamos a mantener informados usted de forma regular sobre el estado de tu request. para más	Le mantendremos informado periódicamente sobre el estado de su solicitud. Para obtener más

please visit Manage My Booking.	Administrar mi reserva.	información visita gestionar mi reserva.	información, visite gestionar mi reserva.
Request refund	Solicitar reembolso	pide reembolso	solicitud de reembolso
Conditions	Condiciones	condiciones	condiciones
For more information	Para obtener más información	más información	para más información
click here.	haz clic aquí.	haz clic here.	haga clic aquí.
We are processing your request	Estamos procesando tu solicitud	estamos procesando tu petición	Estamos procesando su petición
We will update you by email	Te enviaremos las actualizaciones por e-mail	vamos a actualizar usted por e @-@ mail	te actualizaremos por correo electrónico
Flight confirmed	Vuelo confirmado	vuelo confirmada	vuelo confirmado
Flight cancelled by the airline	Vuelo cancelado por la aerolínea	vuelo anulada por parte de la compañía aérea	vuelo cancelado por la aerolínea
More info	Más información	más información	más información
Your voucher request is being processed. We will update you by email.	La solicitud de recibo se está procesando. Te enviaremos las actualizaciones por e-mail.	el bono solicitud se processed. vamos a actualizar usted por e @-@ mail	Su solicitud de cupón se está procesando. Le actualizaremos por correo electrónico.
Your refund request is being processed. We will update you by email.	La solicitud de reembolso se está procesando. Te enviaremos las actualizaciones por e-mail.	el reembolso solicitud se processed. vamos a actualizar usted por e @-@ mail	Su solicitud de reembolso se está procesando. Le actualizaremos por correo electrónico.
Your flight change request is being processed. We will update you by email.	La solicitud de cambio de vuelo se está procesando. Te enviaremos las actualizaciones por e-mail.	tu vuelo cambiar solicitud se processed. vamos a actualizar usted por e @-@ mail	su solicitud de cambio de vuelo se está procesando. Le actualizaremos por correo electrónico.
Your request is being processed. We will update you by email.	La solicitud se está procesando. Te enviaremos las actualizaciones por e-mail.	tu solicitud se processed. vamos a actualizar usted por e @-@ mail	Se está procesando su petición. Le actualizaremos por correo electrónico.
I love it. Tell me more!	¡Me encanta! Cuéntame más.	esta gusta todo. Díganme more!	me encanta. ¡Dime más!
Tell me more!	Cuéntame más.	Díganme more!	¡Dime más!

Discover this destination	Descubrir este destino	descubre el destino	descubre este destino
Let's go!	¡Vámonos!	let's go!	¡vamonos!
Let's book!	¡Quiero reservar!	let's book!	vamos a reservar!
Take me there!	¡Llévame allí!	me there! tomar	¡Llévame allí!
I want it!	¡Lo quiero!	esta queremos it!	¡lo quiero!
Fly me out!	¡Llévame volando!	vuela me out!	volarme!
Experience this	Vivir esta experiencia	la experiencia esta	experimentar esto
Let's fly	¡A volar!	let's más barato	volemos
Start my trip	Empezar mi viaje	mi viaje	comenzar mi viaje
Plan my trip	Planificar mi viaje	plan mi viaje	planear mi viaje
Fly away	Volar	vuela en	alejarse
Check it out	No te lo pierdas	comprueba que se	Echale un vistazo
Book and save!	¡Reserva y ahorra!	vuelos baratos y save!	reserva y ahorra!
Let's do this!	¡Quiero hacerlo!	¿ this! let's	¡hagámoslo!
The price has dropped for your Santiago de Compostela trip. Book now before the deal disappears!	El precio para tu viaje a Santiago de Compostela ha disminuido. ¡Reserva antes de que la oferta desaparezca!	el precio ha debilitado para tu santiago de compostela viaje. reserva ahora , antes de que la oferta disappears!	el precio ha bajado para tu viaje a santiago de compostela. ¡Reserve ahora antes de que desaparezca el trato!
The price has increased for your Santiago de Compostela trip. Book now before it goes up again!	El precio para tu viaje a Santiago de Compostela ha aumentado. ¡Reserva antes de que vuelvan a subir los precios!	el precio ha subido para tu santiago de compostela viaje. reserva ahora , antes de que es hasta again!	el precio ha aumentado para su viaje a santiago de compostela. ¡Reserve ahora antes de que vuelva a subir!
The airline has changed the fare	La compañía aérea ha cambiado la tarifa	la aerolínea ha subido la tarifa	la aerolínea ha cambiado la tarifa
This usually means availability is running out due to high demand. To avoid bigger price changes, secure this deal now.	Normalmente esto significa que la disponibilidad se está acabando debido a la gran demanda. Para evitar cambios de precio mayores, consigue esta oferta ahora.	esto significa que se están realizadas por alto demand. evitar mucho precio changes, segura favor , esta oferta	esto generalmente significa que la disponibilidad se está agotando debido a la alta demanda. Para evitar mayores cambios de precios, asegure este acuerdo ahora.
Price trend	Tendencia de precios	tendencia de precio	tendencia de precios

These are the seats you already booked	Estos son los sitios que has reservado ya.	estos son los asientos que ya reservado	estos son los asientos que ya has reservado
Modify booking	Modificar reserva	modificar la reserva	modificar reserva
Please help keep our lines free	Por favor, ayúdanos a tener las líneas libres.	por favor , ayudar a mantener nuestras líneas gratis	por favor ayuda a mantener nuestras líneas libres
Travel Alert: The unprecedented impact from COVID-19 has resulted in an overwhelming increase in service requests from our customers. If you have a departure within the next 48 hours, we are already prioritising your request. We ask you to delay calling if your request is not urgent, so we can better support travellers with imminent flights.	Alerta de viaje: El impacto sin precedentes del COVID-19 ha tenido como resultado un aumento desmesurado de solicitudes de servicio de nuestros clientes. Si tienes una salida en las próximas 48 horas, ya estamos dando prioridad a tu solicitud. Rogamos que aplaces tu llamada si la solicitud no es urgente, para que podamos dar un mejor soporte a los viajeros con vuelos inminentes.	viajar sin precedentes alert: las repercusiones de covid-19 fondo abrumador aumento de un servicio solicitudes de nuestra customers. si has una salida en las próximas 48 hours, ya estamos supone tu request. pedimos que retraso que si tu solicitud no es urgent, para que podamos mejor apoyo los viajeros con inminente vuelos	alerta de viaje: el impacto sin precedentes de covid-19 ha resultado en un aumento abrumador en las solicitudes de servicio de nuestros clientes. Si tiene una salida dentro de las próximas 48 horas, ya estamos priorizando su solicitud. le pedimos que demore las llamadas si su solicitud no es urgente, de modo que podamos ayudar mejor a los viajeros con vuelos inminentes.
Your request has already been submitted	Tu solicitud ya se ha enviado.	tu solicitud ya se ha presentado	su solicitud ya ha sido enviada
We are currently processing your previous request on Friday. We are prioritising our responses based on departure date, you can expect a response	Estamos procesando tu anterior solicitud con fecha de viernes. Estamos priorizando nuestras respuestas en base a la fecha de salida. Tu respuesta llegará	estamos procesando tu solicitud de anterior friday. que se supone nuestra respuestas basada en la salida date, podrás esperar una respuesta	Actualmente estamos procesando su solicitud anterior el viernes. Estamos priorizando nuestras respuestas en función de la fecha de salida, puede esperar una respuesta
before you are due to travel	antes de tu viaje	antes de usted por viaje	antes de viajar
as soon as possible.	lo antes posible.	en cuanto possible.	tan pronto como sea posible.
Thank you for your patience and understanding.	Gracias por tu paciencia y por tu comprensión.	¡ gracias por tu paciencia y understanding.	Gracias por su paciencia y comprensión.

What would you like to do?	¿Qué te gustaría hacer?	¿ quieres a do?	¿Que te gustaría hacer?
Rebook flight	Cambiar fecha de vuelo	nuevamente vuelo	reservar vuelo
Most airlines are providing FREE rebooking!	La mayoría de las aerolíneas están ofreciendo cambio de fechas GRATUITO.	más aerolíneas se rebooking! gratis	¡La mayoría de las aerolíneas están ofreciendo reservaciones gratis!
Cancel flight	Cancelar vuelo	cancelar tu vuelo	cancelar vuelo
You may incur a fee by cancelling your flight	La cancelación del vuelo puede generar costes.	puede que asumir una cancelación cobre por tu vuelo	puede incurrir en una tarifa al cancelar su vuelo
Change booking dates	Cambiar fechas de reserva	cambio de fechas	cambiar fechas de reserva
Please select new flight dates:	Selecciona nuevas fechas de vuelo:	selecciona un nuevo vuelo dates:	seleccione nuevas fechas de vuelo:
New departure date	Nueva fecha de salida	nueva fecha de salida	nueva fecha de salida
New return date	Nueva fecha de vuelta	nueva fecha de vuelta	nueva fecha de regreso
Please accept terms and conditions before continuing	Acepta los términos y condiciones antes de continuar.	por favor , aceptar términos y condiciones antes de continuar	por favor acepte los términos y condiciones antes de continuar
I understand that many airlines are waiving their change fees, but that by requesting a change of dates, I may be required to pay the difference if prices increase. Each request will be reviewed with the airline and advise via email.	Entiendo que muchas compañías aéreas están eliminando las tarifas por cambios, pero que si solicito un cambio de fechas, posiblemente deba pagar la diferencia si los precios aumentan. Se revisará cada solicitud con la compañía aérea y lo notificará mediante e-mail.	puedo entender que muchos compañías aéreas son waiving sus cambiar fees, , sino que , al solicitar un cambio de dates, esta podría ser necesaria a pagar la diferencia si los precios increase. cada petición sea revisado- con la compañía aérea y asesorar por e @-@ mail	Entiendo que muchas aerolíneas están renunciando a sus tarifas de cambio, pero que al solicitar un cambio de fechas, es posible que deba pagar la diferencia si los precios aumentan. cada solicitud se revisará con la aerolínea y se le asesorará por correo electrónico.
Request change of dates	Solicitar cambio de fechas	solicitud de cambio de fechas	solicitar cambio de fechas
Change of dates requested	Cambio de fechas solicitado	cambio de fechas solicitado	cambio de fechas solicitadas

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Thank you for your request. Due to the current high volume of requests, we are prioritising by original departure date and will reply via email as soon as possible.	Gracias por tu solicitud. Debido al gran número de solicitudes actual, estamos priorizando la fecha de salida original. Enviaremos la respuesta por e-mail lo antes posible.	¡ gracias por tu request. debido a la actual alto volumen de requests, que se supone por original de la fecha de salida y respuesta tan pronto como possible. por e @-@ mail	gracias por tu solicitud. Debido al alto volumen actual de solicitudes, estamos dando prioridad a la fecha de salida original y responderemos por correo electrónico lo antes posible.
Cancel booking	Cancelar reserva	cancelar tu reserva	cancelar reserva
Attention! Every airline has different cancellation policies.	¡Atención! Cada compañía aérea tiene una política de cancelación diferente.	attention! cada compañía ha diferentes cancelación policies.	¡atención! Cada aerolínea tiene diferentes políticas de cancelación.
We will request a full refund of your tickets, but should this not be available, please let us know which cancellation options you would accept.	Solicitaremos el reembolso íntegro de tus billetes, pero si esta opción no fuese posible, indícanos las opciones de cancelación que aceptarías.	vamos a solicitar un reembolso de tu tickets, pero esto no debe ser available, por favor indícanos que usted accept. cancelación opciones	solicitaremos un reembolso completo de sus boletos, pero si esto no está disponible, infórmenos qué opciones de cancelación aceptaría.
In case a full ticket refund is not available:	En caso de que no pueda realizarse un reembolso íntegro de tu billete:	en caso un billete reembolso no es available:	en caso de que no haya un reembolso completo del boleto:
Would you accept a voucher from your airline for the total amount of your tickets?	¿aceptarías un bono de la compañía aérea por el importe total de tus billetes?	¿ aceptar un cupón de la compañía aérea para el importe de tu tickets?	¿aceptaría un cupón de su aerolínea por el monto total de sus boletos?
In case the airline does not offer a voucher for your tickets:	En caso de que la compañía aérea no ofrezca un bono por tus billetes:	en el caso de la aerolínea no dar un cupón por su tickets:	en caso de que la aerolínea no ofrezca un cupón para sus boletos:
Would you accept a tax refund only?	¿aceptarías una devolución de impuestos solo?	¿ aceptar un impuesto reembolso only?	¿aceptaría solo un reembolso de impuestos?
Yes	Sí	sí	si
No	No	no	No

I understand that by requesting a cancellation, the selected flights will be cancelled. It will be assessed each claim and provide a refund if the required criteria is met.	Entiendo que al solicitar una cancelación, los vuelos seleccionados se cancelarán. Se evaluará cada reclamación y proporcionará una devolución si se cumplen los criterios exigidos.	puedo entender que , al solicitar un cancellation, los vuelos seleccionados será cancelled. va a ser evaluados cada pretender y proporcionar un reembolso si la necesaria criterios es met.	Entiendo que al solicitar una cancelación, los vuelos seleccionados serán cancelados. se evaluará cada reclamo y se proporcionará un reembolso si se cumplen los criterios requeridos.
Please accept terms and conditions before continuing	Acepta los términos y condiciones antes de continuar.	por favor , aceptar términos y condiciones antes de continuar	por favor acepte los términos y condiciones antes de continuar
Cancel my booking	Cancelar mi reserva	cancelar mi reserva	cancelar mi reserva
or	o	o	o
I would prefer to change my booking dates	Prefiero cambiar las fechas de mi reserva.	esta parecería cambiar las fechas mi reserva	preferiría cambiar las fechas de mi reserva
Booking cancellation requested	Cancelación de reserva solicitada	reserva cancelación solicitada	cancelación de reserva solicitada
Our agents are processing your request and will contact you shortly via email. We are prioritising requests based on departure date and will respond to you as soon as possible. Thank you for your patience and understanding.	Nuestros agentes están procesando tu solicitud y se pondrán en contacto contigo en breve por e-mail. Estamos priorizando las solicitudes en base a la fecha de salida y te responderemos lo antes posible. Gracias por tu paciencia y por tu comprensión.	estamos procesando tu solicitud de nuestros agentes y pondremos en contacto contigo por e @-@ mail. en breve se supone peticiones basada en fecha de salida y responder a usted tan pronto como possible. gracias por tu paciencia y understanding.	nuestros agentes están procesando su solicitud y lo contactaremos a la brevedad por correo electrónico. Estamos priorizando las solicitudes en función de la fecha de salida y le responderemos lo antes posible. Gracias por su paciencia y comprensión.
Travel Alert - COVID-19	Alerta de viaje: COVID-19	viajar alerta - covid-19	alerta de viaje - covid-19

As many airlines are changing their flights at short notice to adapt to the latest medical recommendations, we strongly recommend that you double check the status of your flights directly on the airline's website.	Dado que muchas compañías aéreas están cambiando sus vuelos con poca antelación para adaptarse a las últimas recomendaciones médicas, te aconsejamos encarecidamente que compruebes el estado de tus vuelos directamente en el sitio web de la compañía.	como compañías aéreas son modificar sus vuelos al a adaptarse a las últimas recommendations, médicos que recomendar que usted doble comprueba el estado de tu vuelo directamente en el airline's website.	Como muchas aerolíneas están cambiando sus vuelos con poca antelación para adaptarse a las últimas recomendaciones médicas, le recomendamos que verifique el estado de sus vuelos directamente en el sitio web de la aerolínea.
See more	Más información	ver más	ver más
Cancel this booking	Cancelar esta reserva	cancelar esta reserva	cancelar esta reserva
Rebooking policy	Política de cambios	la política rebooking	política de reserva
Flights with free rebooking	Vuelos con cambios de reserva gratis	vuelos baratos a rebooking gratis	vuelos con reserva gratuita
Flights with free rebooking only	Solo vuelos con cambios de reserva gratis	vuelos baratos a rebooking sólo gratis	vuelos con reserva gratuita solamente
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
Whether your ticket already includes free rebooking, or you add our Flexible Travel Dates service, your flights are covered should you need to change them.	Ya sea que tu pasaje incluya la nueva reserva gratuita o que agregues nuestro servicio de fechas de viaje flexibles, tus vuelos están cubiertos en caso de que debas cambiarlos.	si tu billete ya incluye libre rebooking, o usted añadir nuestra fechas de viaje flexibles service, tus vuelos están cubiertas debe necesitas cambiar them.	si su boleto ya incluye una nueva reserva gratuita o si agrega nuestro servicio flexible de fechas de viaje, sus vuelos están cubiertos en caso de que necesite cambiarlos.
UNDERSTOOD	LO ENTIENDO	entendido	entendido
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad

Thanks to our agreements with airlines, we are able to offer free rebooking on all flights showing this symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer nuevas reservas gratuitas en todos los vuelos que tengan este símbolo.	gracias a nuestros acuerdos con airlines, somos capaces de dar libre rebooking sobre todos los vuelos mostrando este symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer una nueva reserva gratuita en todos los vuelos que muestren este símbolo.
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
Thanks to our agreements with airlines, we are able to offer free rebooking on all flights showing this symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer nuevas reservas gratuitas en todos los vuelos que tengan este símbolo.	gracias a nuestros acuerdos con airlines, somos capaces de dar libre rebooking sobre todos los vuelos mostrando este symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer una nueva reserva gratuita en todos los vuelos que muestren este símbolo.
UNDERSTOOD	LO ENTIENDO	entendido	entendido
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Rebooking at no extra charge	Nuevas reservas sin costo adicional	no necesito gestión rebooking en	cambio de reserva sin cargo adicional
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Rebooking at no extra charge	Nuevas reservas sin costo adicional	no necesito gestión rebooking en	cambio de reserva sin cargo adicional
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Rebooking at no extra charge	Nuevas reservas sin costo adicional	no necesito gestión rebooking en	cambio de reserva sin cargo adicional
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad

Whether your ticket already includes free rebooking, or you add our Date Change Option service, your flights are covered should you need to change them.	Ya sea que tu pasaje incluya la nueva reserva gratuita o que agregues nuestro servicio de opción de cambio de fecha, tus vuelos están cubiertos en caso de que debas cambiarlos.	si tu billete ya incluye libre rebooking, o usted añadir la opción de cambio de fechas service, tus vuelos están cubiertas debe necesitas cambiar them.	si su boleto ya incluye una nueva reserva gratuita o si agrega nuestro servicio de opción de cambio de fecha, sus vuelos están cubiertos si necesita cambiarlos.
UNDERSTOOD	LO ENTIENDO	entendido	entendido
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
Thanks to our agreements with airlines, we are able to offer free rebooking on all flights showing this symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer nuevas reservas gratuitas en todos los vuelos que tengan este símbolo.	gracias a nuestros acuerdos con airlines, somos capaces de dar libre rebooking sobre todos los vuelos mostrando este symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer una nueva reserva gratuita en todos los vuelos que muestren este símbolo.
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
Thanks to our agreements with airlines, we are able to offer free rebooking on all flights showing this symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer nuevas reservas gratuitas en todos los vuelos que tengan este símbolo.	gracias a nuestros acuerdos con airlines, somos capaces de dar libre rebooking sobre todos los vuelos mostrando este symbol.	Gracias a nuestros acuerdos con las aerolíneas, podemos ofrecer una nueva reserva gratuita en todos los vuelos que muestren este símbolo.
UNDERSTOOD	LO ENTIENDO	entendido	entendido
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Rebooking at no extra charge	Nuevas reservas sin costo adicional	no necesito gestión rebooking en	cambio de reserva sin cargo adicional
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!

Rebooking at no extra charge	Nuevas reservas sin costo adicional	no necesito gestión rebooking en	cambio de reserva sin cargo adicional
FREE rebooking included!	¡Nueva reserva GRATUITA incluida!	gratis rebooking included!	¡reserva gratis incluida!
Rebooking at no extra charge	Nuevas reservas sin costo adicional	no necesito gestión rebooking en	cambio de reserva sin cargo adicional
Eligible for Flexible Travel Dates	Elegible para fechas de viaje flexibles	elegibles en fechas de viaje flexibles	elegible para fechas de viaje flexibles
Some of our tickets include free rebooking thanks to our agreements with airlines. For all others, our Flexible Travel Dates service is available to protect your trip.	Gracias a nuestros acuerdos con las aerolíneas, algunos de nuestros pasajes incluyen nuevas reservas gratuitas. Para todos los demás, nuestro servicio de fechas de viaje flexibles está disponible para proteger tu viaje.	algunos de nuestros billetes incluye los gastos de registro rebooking gracias a nuestros acuerdos con aerolíneas para todos others, nuestra fechas de viaje flexibles servicios disponibles para proteger tu viaje.	Algunos de nuestros boletos incluyen cambio de reserva gratuito gracias a nuestros acuerdos con aerolíneas. para todos los demás, nuestro servicio de fechas de viaje flexibles está disponible para proteger su viaje.
Eligible for Date Change Option	Elegible para la opción de cambio de fecha	elegibles en la opción de cambio de fechas	elegible para la opción de cambio de fecha
Some of our tickets include free rebooking thanks to our agreements with airlines. For all others, our Date Change Option service is available to protect your trip.	Gracias a nuestros acuerdos con las aerolíneas, algunos de nuestros pasajes incluyen nuevas reservas gratuitas. Para todos los demás, nuestro servicio de opción de cambio de fecha está disponible para proteger tu viaje.	algunos de nuestros billetes incluye los gastos de registro rebooking gracias a nuestros acuerdos con aerolíneas para todos others, la opción de cambio de fechas servicios disponibles para proteger tu viaje.	Algunos de nuestros boletos incluyen cambio de reserva gratuito gracias a nuestros acuerdos con aerolíneas. para todos los demás, nuestro servicio de opción de cambio de fecha está disponible para proteger su viaje.
Got your flight sorted? Got a hotel? Well now you're ready to start planning your trip! Here are some discounts from our partners just for you. To enjoy your discount, simply follow the next steps!	¿Ya tienes tu vuelo? ¿Tienes hotel? ¡Genial!, ya puedes empezar a planificar tu viaje. Aquí tienes descuentos de nuestros socios exclusivos para ti. Para disfrutar de estos descuentos,	¿ te ha surgido tu vuelo sorted? sobra un hotel? ahora bien you're dispuestos a empieza a planear tu trip! algunas de descuentos de nuestros socios sólo para más información de discount,	¿ordenó su vuelo? tienes un hotel? bueno, ahora estás listo para comenzar a planificar tu viaje! Aquí hay algunos descuentos de nuestros socios solo para usted. Para disfrutar de su descuento,

	solo tienes que seguir estos pasos:	simplemente la próxima steps!	simplemente siga los siguientes pasos.
Step 1 - copy the code you'd like to use	Paso 1: copia el código que deseas utilizar.	paso 1 - copiar el código you'd emplear	Paso 1: copia el código que te gustaría usar
Step 2 - click on "get my discount"	Paso 2: haz clic en "obtener descuento".	paso 2 , haz clic en conseguir mi descuento	paso 2 - haz clic en obtener mi descuento
Step 3 - Select your product on our partner's website	Paso 3: elige el producto en el sitio web de nuestro socio.	paso 3 - selecciona un producto en nuestro partner's sitio web	Paso 3: selecciona tu producto en el sitio web de nuestro socio
Step 4 - enter your code before finishing your purchase	Paso 4: introduce nuestro código antes de finalizar tu compra.	paso 4 , introduce tu código antes de para tu compra	Paso 4: ingresa tu código antes de finalizar tu compra
Get my discount	Obtener descuento	consigue mi descuento	obtener mi descuento
Up to 5% off!	¡Hasta un 5 % de descuento!	hasta 5% off!	¡hasta 5% de descuento!
Valid until 5	Válido hasta el 5	hasta 5 válido	válido hasta 5
Fly anywhere with flexibility	Flexibilidad en tus vuelos	vuela con flexibilidad .	vuela a cualquier lugar con flexibilidad
Book with flexibility	Reserva con flexibilidad	reservar con flexibilidad	reservar con flexibilidad
Free rebooking or Date Change Option available on all flights	Nueva reserva u opción de cambio de fecha gratis en todos los vuelos	gratis rebooking o la opción de cambio de fechas disponibles en todos los vuelos	Opción de cambio de fecha o reserva gratuita disponible en todos los vuelos
Airline rebooking included	Nueva reserva incluida	compañía aérea rebooking incluido	reserva de aerolínea incluida
Great news! This airline provides free rebooking	¡Tenemos buenas noticias! Esta aerolínea permite realizar nuevas reservas	gran news! la compañía aérea rebooking proporciona gratis	¡una gran noticia! Esta aerolínea ofrece reservas gratuitas
Free rebooking available	Nueva reserva disponible	rebooking gratuita disponible	reserva gratuita disponible
Add our Date Change Option on the next page for free rebooking	Agrega la opción de cambio de fecha en la página siguiente	añadir la opción de cambio de fechas en la próxima página gratis rebooking	agregue nuestra opción de cambio de fecha en la página siguiente

			para volver a reservar gratis
What if I can't travel?	¿Qué ocurre si no puedo viajar?	lo que si esta can't travel?	¿Qué pasa si no puedo viajar?
Delay your trip or come home early with no extra fees	Retrasa o adelanta tu viaje sin costo adicional	adelanta tu viaje o llegar los primeros con no necesito gastos de gestión	retrasar su viaje o llegar a casa temprano sin cargos adicionales
Date Change Option	Cambio de fecha	opción de cambio de fechas	opción de cambio de fecha
Need to delay your trip? Want to come home early? No problem! Change your travel dates up to 24 hours before your departure	¿Necesitas retrasar tu viaje? ¿Deseas regresar a casa antes? ¡No hay problema! Cambia las fechas de tu viaje, hasta 24 horas antes de la salida de tu vuelo	debemos adelanta tu trip? quieren venir a casa early? no problem! cambiar las fechas de tu viaje hasta 24 horas antes de la salida	necesita retrasar su viaje? quieres llegar temprano a casa? ¡No hay problema! cambie las fechas de su viaje hasta 24 horas antes de su partida
Changes are possible up to 24 hours before your departure. All travelers must be EEA residents. Our fees are non-refundable. Read full terms and conditions here	Los cambios se pueden realizar hasta 24 horas antes de la salida del vuelo. Todos los viajeros deben ser residentes del EEE. Nuestras tarifas no son reembolsables. Lee los términos y condiciones aquí	es posible hacer cambios hasta 24 horas antes de la salida del vuelo. todos los pasajeros tienen que ser residentes del aee. los gastos de gestión de son non-refundable. lee los términos y condiciones	Los cambios son posibles hasta 24 horas antes de su partida. Todos los viajeros deben ser residentes de EE. Nuestras tarifas no son reembolsables. lea los términos y condiciones completos aquí
Points of interest	Lugares de interés	puntos de interés	puntos de interés
None	Ninguno	ninguno	ninguna
New!	¡Nuevo!	new!	¡nuevo!
Confirmation email resent	E-mail de confirmación reenviado	e @-@ mail de confirmación resent	El correo de confirmación ha sido reenviado
It should be with you within 24 hours.	Lo recibirás en las siguientes 24 horas.	debe ser con usted en 24 hours.	Debería estar con usted dentro de las 24 horas.
Something went wrong	Algo salió mal	se ha producido un error	algo salió mal
The email couldn't be sent. Please try again later.	Lo sentimos, el e-mail no se pudo enviar. Intenta nuevamente.	la dirección de e @-@ mail no puede ser sent. inténtalo de nuevo después.	No se pudo enviar el correo electrónico. Por favor, inténtelo de nuevo más tarde.

Email already resent	El e-mail ya fue reenviado	dirección de e @-@ mail ya resent	correo electrónico ya reenviado
Looks like it's already on it's way. It should be with you within 24 hours.	Parece que ya fue enviado. Lo recibirás en las siguientes 24 horas.	parece que ya es en su way. debe ser con usted en 24 hours.	Parece que ya está en camino. Debería estar con usted dentro de las 24 horas.
Invoice successfully requested	La factura fue solicitada correctamente	factura solicitadas	factura solicitada con éxito
It should be with you within 24 hours.	Lo recibirás en las siguientes 24 horas.	debe ser con usted en 24 hours.	Debería estar con usted dentro de las 24 horas.
Something went wrong	Algo salió mal	se ha producido un error	algo salió mal
The invoice couldn't be requested. Please try again later.	La factura no se pudo enviar. Intenta nuevamente más tarde.	la factura no puede ser requested. inténtalo de nuevo después.	No se pudo solicitar la factura. Por favor, inténtelo de nuevo más tarde.
Invoice already requested	La factura ya fue solicitada	factura ya han solicitado	factura ya solicitada
Looks like it's already on it's way. It should be with you within 24 hours.	Parece que ya fue enviada. La recibirás en las siguientes 24 horas.	parece que ya es en su way. debe ser con usted en 24 hours.	Parece que ya está en camino. Debería estar con usted dentro de las 24 horas.
Book now and save on your next trip	Reserva ya y ahorra en tu próximo viaje	reserva ahora y ahorra en tu próximo viaje	reserve ahora y ahorre en su próximo viaje
Book your holiday now to get the best deal	Reserva ya tus vacaciones y consigue la mejor oferta	reserva tu vuelo ahora para conseguir la mejor oferta	Reserve sus vacaciones ahora para obtener la mejor oferta

Appendix B

Questionnaire.

Questionnaire
Which version(s) was the best quality?
Which version(s) was the worst quality?
Which version(s) was Machine Translation?
Which version(s) was Human Translation?
Which version(s) was the easiest to review?
Which version(s) was the most difficult to review?
Add any other comment you think relevant about this task.

Appendix C

In this Appendix C, we have added the explanation of each type of error used in the categorization of errors carried out in section *5.3 Error classification* (ATA, 2010).

<u>Syntactic errors</u>

Grammar (G):

A grammar error occurs when a sentence in the translation violates the grammatical rules of the target language. Grammar errors include lack of agreement between subject and verb, incorrect verb inflections, and incorrect declension of nouns, pronouns, or adjectives.

Syntax (SYN):

A syntax error occurs when the arrangement of words or other elements of a sentence does not conform to the syntactic rules of the target language. Errors in this category include improper modification, lack of parallelism, unnatural word order, and runon structure.

Punctuation (P):

A punctuation error occurs when the conventions of the target language regarding punctuation are not followed, including those governing the use of quotation marks, commas, semicolons, and colons. Incorrect or unclear paragraphing is also counted as a punctuation error.

Usage (U):

A usage error occurs when conventions of wording or phrasing in the target language are not followed ("We don't say it that way"). Correct and idiomatic usage of the target language is expected. This category includes definite/indefinite articles, idiomatic use of prepositions (e.g., "married to," not "with"), and collocations ("committed a crime," rather than "performed a crime").

Semantic errors

Addition (A):

An addition error occurs when the translator introduces superfluous elements of meaning, including aspects of tone (irony, intensification, etc.). Candidates should generally resist the tendency to insert "clarifying" material. Explicitation is permissible. Explicitation is defined as "A translation procedure where the translator introduces precise semantic details into the target text for clarification or due to constraints imposed by the target language that were not expressed in the source text, but which are available from contextual knowledge or the situation described in the source text" (Jean Delisle, Translation Terminology, Foreign Language Teaching and Research Press, 1991 p. 139).

Omission (O):

An omission error occurs when one or more elements of meaning in the source language are left out of the target language. This covers not only textual information but also the author's tone (irony, intensification, etc.). Implicitation is permissible. Implicitation is defined as "A translation procedure intended to increase the economy of the target language and achieved by not explicitly rendering elements of information

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from the source language in the target language when they are evident from the context or the described situation and can be readily inferred by speakers of the target language.

Terminology (T):

A terminology error occurs in a general text when the candidate chooses a content word or phrase (noun, verb, modifier) with an incorrect or inappropriate meaning in relation to the source text. The T error also applies when a term appropriate to a specific subject field is not used when the corresponding term is used in the source text.

Too freely translated:

Translation is adding meaning that is not included in the source language.

Literalness (L):

A literalness error occurs when a translation that follows the source text word for word results in an awkward and/or unidiomatic rendition—for example, "reductions of taxes of income" instead of "income tax reductions."

False cognate:

False cognates are pairs of words that seem to be cognates because of similar sounds and meaning but have different etymologies; they can be within the same language or from different languages, even within the same family.

Ambiguity (AMB):

An ambiguity error occurs when either the source or target text segment allows for more than one semantic interpretation, where its counterpart in the other language does not.

Diacritical Marks / Accents (D):

A diacritical marks error occurs when the target language conventions of accents and diacritical marks are not followed. If incorrect or missing diacritical marks obscure meaning (sense), the error is more serious.

Capitalization (C):

A capitalization error occurs when the conventions of the target language concerning upper and lower-case usage are not followed.

Word Form / Part of Speech (WF/PS):

A word form error occurs when the root of the word is correct, but the form of the word (e.g. number or case of noun or pronoun) is incorrect or nonexistent in the target language (e.g., "tooths," or "conspiration" instead of "conspiracy"). A part of speech error occurs when the grammatical form (adjective, adverb, verb, etc.) is incorrect (e.g., "a conspire" instead of "a conspiracy").

Spelling (SP) / Character (CH) for non-alphabetic languages:

A spelling/character error occurs when a word or character in the translation is spelled/used incorrectly according to target language conventions. A

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spelling/character error that causes confusion about the intended meaning is more serious and may be classified as a different type of error.

Pragmatic errors

Misunderstanding (MU):

A misunderstanding error occurs when the translation clearly results from a misinterpreted word or idiom, or the incorrectly parsed structure of a phrase or sentence.

Mistranslation (M)-Misunderstanding (MU):

A mistranslation-misunderstanding error occurs when the translation clearly results from a misinterpreted word or idiom, or the incorrectly parsed structure of a phrase or sentence.

Register (R):

A register error occurs when the language level or degree of formality is not appropriate for the implied target audience of the exam passage. (e.g., In an academic textbook: "Some years, El Niño comes on with a vengeance" instead of "occurs with particular intensity").

Style (ST):

A style error occurs when choices of grammatical structure or other elements are inappropriate for the type of publication or other functional use specified by the TIs. Examples: (a) step-by-step instructions: if the target language typically uses infinitive

verb forms, then the use of imperative verbs is an ST error; (b) numerals: e.g., "39 thousand" is standard in some languages, but not in English.

Translation-Specific errors

Incomplete passage-Unfinished (UNF):

A substantially unfinished passage (more than a full sentence missing at the end) is not graded. Missing titles, headings, or sentences within a passage may be marked as one or more errors of omission, depending on how much is missing.

Inconsistency-Cohesion (COH):

A cohesion error occurs when a text is hard to follow because of inconsistent use of structural elements such as terminology, pronouns, inappropriate or missing conjunctions, etc. Cohesion is the network of lexical, grammatical, logical and other relations that provide links between various parts of a text, assisting the reader in navigating the text. Although cohesion is a feature of the text as a whole, graders will mark errors for individual elements that disrupt cohesion.