Machine Translation and Translation Memory Systems: An Ethnographic Study of Translators' Satisfaction

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Abstract

The translator's workplace (TW) has undergone radical changes since microcomputers were introduced on the market and, as a result, digitization increased enormously. Existing translation-related technologies, such as machine translation (MT), were enhanced and others, such as translation memory (TM) systems, were developed.

It is a noteworthy fact that implementing new translation-related technologies in the TW is done in various conditions according to specific goals that subsequently define new work conditions for translators. These new work conditions affect translators' satisfaction with their job, and their satisfaction will influence career development and employee retention in the translation industry over the long term.

In the past two decades, Language Service Providers (LSPs) have started integrating MT into TM systems to benefit from MT suggestions when TM is not helpful. Neither TM nor MT is unfamiliar to the translation industry, but the combination, i.e. TM+MT, is fairly new. So far, there have been few studies on translators' satisfaction with TM+MT. This study consists of an ethnographic research project on seven translators in a Canada-based company where TM+MT is used. Observations, semi-structured interviews, and in-house document analysis have been used as data collection methods.

The data obtained has been analyzed and discussed based on Rodríguez-Castro's task satisfaction model (2011). This model addresses intrinsic and extrinsic sources of translators' satisfaction with the activities they do in their job. Investigating the factors and variables of her model in the aforementioned company, I concluded that those sources of

satisfaction cannot be considered separately from the job-context factors, such as the company's policies in implementing TM+MT.

Résumé

L'espace de travail du traducteur a radicalement changé depuis l'introduction sur le marché des microordinateurs et la numérisation a, en conséquence, considérablement augmenté. Les technologies d'aide à la traduction existantes, comme la traduction automatique, ont été améliorées et d'autres, comme les systèmes de mémoire de traduction, ont été développés.

Il est à noter que la mise en place de nouveaux outils d'aide à la traduction dans l'espace de travail du traducteur se fait dans des conditions différentes selon des objectifs spécifiques qui, à leur tour, définissent les nouvelles conditions de travail des traducteurs. Ces nouvelles conditions de travail affectent la satisfaction professionnelle des traducteurs, et leur degré de satisfaction influencera, à long terme, le développement et la rétention des employés dans l'industrie de la traduction.

Au cours des vingt dernières années, les prestataires de services linguistiques ont commencé à intégrer la traduction automatique aux systèmes de mémoire de traduction dans le but de profiter des suggestions offertes par la traduction automatique, dans les cas où celles de la mémoire de traduction ne suffisaient pas. Ni la mémoire de traduction (TM) ni la traduction automatique (MT) ne sont étrangères à l'industrie de la traduction, mais la combinaison des deux est relativement récente. À ce jour, il n'existe aucune étude s'étant exclusivement intéressée à la satisfaction des traducteurs à l'égard de la combinaison TM + MT. Cette étude consiste en un projet de recherche ethnographique sur sept traducteurs d'une entreprise localisée au Canada, où la combinaison TM + MT est utilisée. Des observations, des entretiens semi-dirigés et l'analyse de la documentation interne ont été employés comme méthodes de récolte des données.

Les données obtenues ont été analysées et discutées sur la base du modèle de satisfaction des tâches de Rodríguez-Castro (2011). Ce modèle a abordé les sources de motivation intrinsèques et extrinsèques du traducteur vis-à-vis des activités qu'il accomplit dans son travail. En étudiant les facteurs et les variables du modèle de Rodríguez-Castro au sein de l'entreprise mentionnée ci-dessus, j'ai conclu que ces sources de motivation ne peuvent être considérées indépendamment des facteurs liés au contexte professionnel, comme les politiques de l'entreprise quant à la mise en place de la combinaison TM + MT.

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Abbreviations

ALPAC ..... Automated Language Processing Advisory Committee

CAT ..... Computer-Aided Translation

CBMT ..... Corpus-Based Machine Translation

EBMT ..... Example-Based Machine Translation

FTP ..... File Transfer Protocol

FOK ..... Feeling of Knowing

LSP ..... Language Service Provider

LTM ..... Lexeme-Based Translation Memory

MT ..... Machine Translation

PM ..... Project Manager

RBMT ..... Rule-Based Machine Translation

SL ..... Source Language

SMT ..... Statistical Machine Translation

ST ..... Source Text

STM ..... String-Based Translation Memory

TL ..... Target Language

TM ..... Translation Memory

TM+MT ..... Combination of Translation Memory and Machine Translation

TEnT ..... Translation Environment Tool

TS ..... Translation Studies

TT ..... Target Text

TU ..... Translation Unit

TW ..... Translator's Workplace

XLIFF ..... XML Localisation Interchange File Format

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1. Introduction

Ever since the first generation of computers came into existence, traditional (i.e. pre-computer) ways of transporting, communicating, accomplishing tasks, and even thinking have undergone radical changes. This transformation is now referred to as the digital era. History shows us that humanity tends to develop tools or discover ways to make essential tasks easier.

Modern industry is founded upon technology, from manufacturing various products with all sorts of tools and machines to packaging and delivering final products to customers. New technologies are constantly being developed to facilitate and accelerate the ease and rapidity with which tasks are completed. As a result, the workplace has generally become a place of constant change.

The translation industry has benefited from technology. Modern translators have new tools and resources at their disposal to help them with the translation process, from producing a translation to editing and submitting the final translated text to their clients. Hence, variability is also seen in the translator's workplace (TW[1]).

Over the past 70 years, that is, since computers have been applied in translation practice, the TW has evolved enormously. During this time, many influential developments have occurred. For example, computational linguistics emerged in the 1950s, and, as a result, easier and faster ways of storing and analyzing linguistic data were developed. Microcomputers came out in the 1970s, and their storage capacity immensely increased.

[1] This abbreviation is usually used for the translator workstation or workbench, but, in this study, it is used only for the translator's workplace. Since the word *workplace* encompasses a larger sphere that includes both humans and tools, it is more useful than *workstation* for the present research.

These developments in technology and linguistics brought about increased opportunities for translators to experiment with new tools and resources to help them with their job. Today, machine translation (MT)[211][2], translation memories (TM)[212], and concordancers [211] are among numerous tools that can be found in the TW.

As they improve the TW, researchers in various fields (e.g. linguistics, terminology, translation, and computer science) are not only improving available lexical resources, TM systems, MT systems, and other translation tools to serve translators better; they are also designing new translation tools to facilitate the translation process (Melby, 2006).

The development and use of a translation tool are not limited to the technical aspect. The human aspect is as significant. A tool is developed for a specific purpose (e.g. attaining higher production and/or quality). To achieve that purpose, many factors should be considered, such as the way a tool is implemented in the TW, the way translators are trained to use it, the way translators use it compared with the way their employers or clients want them to use it, translators' perception of the tool, and their general satisfaction with the tool. These and other factors that can influence the extent to which a specific translation tool is successful in the TW.

In this study, I will look at the integration of machine translation into translation memory systems (called TM+MT hereafter[3]) in the TW from the translator's point of view. I

[2] Some concepts have been defined in the glossary; therefore, they have been crossed-referenced to the page number where the definitions can be found.

[3] Coined by Dr. Julian Zapata Rojas, School of Translation and Interpretation, University of Ottawa. The term *TM/MT*, which refers to the same combination, is also found in Pym (2013). However, it does not match my interpretation of the combination TM+MT. In this study, TM+MT is built on a common database, and both tools

will investigate the way TM+MT is implemented by the management and used by translators. The way translators think it has affected their job. Looking at relevant contextual factors, I will study translators' task satisfaction with the use of TM+MT in the TW.

In the following pages, I will give a brief history of translation technology and its relationship to the TW (section 1.1). Then I will explain TM and MT and their combination in the TW (section 1.2 and section 1.2). This will be followed by an explanation of the importance of the study (section 1.3), the objectives of the study (section 1.5), the research questions (section 1.4), a literature review (chapter 0), the theoretical framework (chapter 3), the methodology (chapter 4), the data collection (chapter 5), the data analysis and discussion (chapter 6), and finally the conclusion (chapter 7).

1.1. Beginnings of translation technology

The idea of automatizing translation goes back to the 1940s, when rudimentary electronic computers were first designed (Ulitkin, 2011). At that time, MT systems were termed "translating machines."[4] MT was first introduced as a general-purpose machine that could work as a mechanical multilingual dictionary. Subsequent developments in MT systems occurred in 1947 based on wartime successes[5] in code breaking (Anastasiou, 2010). Starting in 1951, the Massachusetts Institute of Technology (MIT) launched extensive research on

cooperate at the same time to give translators suggestions. It is different from those TM systems that have an external MT as an add-on feature.

[4] This term was first used by French-American Georges Astrouni and Russian Petr Petrovich (Anastasiou, 2010).

[5] In 1949, Warren Weaver, the director of natural sciences at the Rockefeller Foundation, was impressed by the way Britain was using their pioneering Colossus computer to crack the military codes made by Germany's Enigma encryption machine. In fact, using Britain's approach, He shaped the concept of machine translation (Ulitkin, 2011).

MT. Research extended to other countries as well. Nevertheless, most of the research was conducted in the USA with considerable funding from government, military, and private sources (Somers, 2003a).

In order to track the results of this huge investment, the United States[6] set up the Automated Language Processing Advisory Committee (ALPAC) in 1964. The committee's 1966 report described MT as being slower, less accurate, and even more expensive than human translation. The report thus dashed hopes for any potential success in MT development and, for a while, led to research abeyance on MT. ALPAC did, however, recommend more fundamental research in computational linguistics. In the 1970s and 1980s, other countries continued researching MT, including the USSR, Canada, Western European countries and Japan. The research also benefited from structural linguistics and computer science in developing new algorithms and programs (Somers, 2003a). However, the general outlook of MT researchers and users was already damaged.

This damage was caused mainly by the idealistic preliminary approach to MT, and, in a 1980 memorandum, this idealism became Martin Kay's main criticism of MT research. He criticized any radical and idealistic view of machine translation or translation technology in general that embraced the idea of fully automatizing translation. The first step toward (semi) automatizing this complex phenomenon was, according to Kay, to gain an adequate understanding of its different aspects so as to develop suitable tools for each one. Then the functionalities of different tools should be harnessed by appropriately combining them or

[6] The Department of Defense, the National Science Foundation, and the Central Intelligence Agency established the Joint Automatic Language Processing Group (JALPG). Subsequently, JALPG set up ALPAC in April 1964 (Hutchins, 1996).

adapting them to each other. Kay proposed a translator's "workstation" or "workbench," which basically consists of a good multilingual text editor, a terminal with a screen divided into two windows (the source text appearing in the upper window and the translation being written in the bottom one), electronic dictionaries, and finally an MT system to translate selected units provided that the translator is able to postedit [212] the results or that the system's setting allows the translator to choose whether s/he wants a specific unit to be translated by MT.

Before Kay's memorandum, all of these ideas had already been hinted at in various works and crude systems. For instance, in 1965 the German Federal Armed Forces Translation Agency used computers to develop glossaries. [211] Later, the 1966 ALPAC report on MT suggested the development of computer-based aids for translators. Then, in the 1970s, multilingual term banks,[212] such as EURODICAUTOM[7] and TERMIUM *Plus,*®[8] were compiled.

In fact, the idea of a translator's workstation strengthened with the introduction of small-scale inexpensive computer hardware called microcomputers and later known as personal computers. Computer-aided (or –assisted) translation (CAT)[211] then provided translators with various software programs while keeping translators in control of the translation task (Somers, 2003b).

[7] In 2007, EURODICAUTOM was incorporated into Inter-Active Terminology for Europe (IATE), which was composed of earlier terminology databases, such as TIS, Euterpe, Euroterms and CDCTERM (Bilgen, 2009).

[8] The Government of Canada's terminology and linguistic data bank.

With changing human expectations of MT in the translation process, new tools and resources were gradually introduced into the TW. Now computers and the Internet are basic requirements for translation (see Melby, 2006; Pym, 2013; Lafeber, 2012). In the following section, I will introduce some of the most commonly used tools and resources in the TW.

1.2. Modern translator's workplace

Translators require various resources and tools to do their jobs. The new ways of collecting and storing those resources (e.g. dictionaries, corpora, glossaries, terminological databases [TDBs]) as well as the programs that facilitate/accelerate extracting information from those resources (search engines, concordancers, etc.) are called translation technologies, and they are constantly improving.

Owing to the importance of technology in a translator's job (and vice versa[9]), a modern TW can benefit from various tools and resources. These tools and resources include a word processing environment (Zetzsche, 2007), automatic speech recognition (He & Deng, 2011), electronic corpora (Mosavi Miangah & Mohammadi Dehcheshmeh, 2012), lexical resources (Ulitkin, 2011), term banks and termbases (Allard, 2012), XLIFF Editors (Anastasiou , 2012), TM systems (see section 1.1.1, " Translation memories") and MT systems (see section 1.1.2, " Machine translation").

1.1.1. Translation memories

As I mentioned in the previous section, TM systems are an important part of the modern TW. Due to the undeniable importance of these systems in the translation industry and the fact

[9] While technology can help the translation process, translation can also help the development of technology by making communication possible among researchers, programmers, and users.

that they are the focus of the present research project, it would be beneficial to expand on the history, definition, and characteristics of TM systems.

1.1.1.1. A brief history of translation memories

The idea of TM originates with Peter Arthern (1978), who proposed storing translations in order to recycle them when a new source text (ST) is translated. He maintained that in contrast to MT, the translations retrieved from storage would be grammatically correct and would help translators save time. Early TM systems included ETOC,[10] developed by Sumita and Tsutsumi (1988), and Bilingual Knowledge Bank, developed by Sadler and Vendelman (1990).

Unlike the actual implementation of TM in 1988, the exact time TM was introduced to the general consciousness of Translation Studies (TS) researchers is difficult to pinpoint. Addressing in a translators' magazine the notion of "bi-text," Brian Harris (1988) proposed something like TM without using the name. Right after Harris' article, Cave (1988) announced that Logos[11] had just begun marketing a tool similar to what Harris had proposed. Later in 1991, a *Language International* article announced that "text banks" (collections of previously translated texts) had just emerged, In the 1992 proceedings of Aslib's annual conference series, *Translating and the Computer*, three separate articles (Freibott, 1992; Le-Hong, Höge, & Hohman, 1992; Svanholm, 1992) mentioned TM without actually defining it.

[10] Easy TO Consult is "a translation aid that provides a useful capability for flexible retrieval of texts from a bi-lingual dictionary or a translation database accumulated by the user or other users. The retrieval mechanism is based on syntax-matching driven by generalization rules" (Sumita & Tsutsumi, 1988, p. 1)

[11] Logos was founded as a translation company in 1979, and today it is a large LSP (History, n.d.).

Finally, Brace (1992) reported on a TM tool developed by Trados, on the ESPRIT[12] project as well as on projects at IBM's European Language Services (Denmark) and at the Official Languages and Translation sector of the Canadian Department of the Secretary of State in Ottawa (now Public Services and Procurement Canada).

1.1.1.2. Translation memory definition

Available definitions for the term *TM* have caused confusion over the nature and functionalities of three apparently similar concepts: TM, TM systems, and translation environment tools (TEnTs). To clarify the distinctions among these three concepts, I rely on Allard's 2012 comprehensive explanation.

First, a *TEnT* is a "tool suite" that include a variety of features and tools integrated to contribute to translation work. Any TEnT includes at least a TM and a terminology database which are linked to a text editor[13] (Allard, 2012).

Second, the main tool in any TEnT is TM. *TM* consists of a "database of previous translations" (Somers, 2003c, p. 31) paired with their corresponding STs. Each pair of texts is divided into smaller segment [212] pairs called translation units (TU) (Allard, 2012).

Third, TMs may be more helpful in the translation process if translators can search in them and retrieve repetitive passages easily (Allard, 2012). *TM systems* have various

[12] Energy Systems Prototyping, Research, Innovation and Translation. This is an initiative of the University of Virginia for the purpose of helping "transform industry in Southside Virginia utilizing housing designs created through the University's School of Architecture. [The university of Virginia] is the lead partner on the grant to design and manufacture affordable and energy-efficient housing systems as well as disaster recovery housing systems" (ESPRIT Initiative, para. 3).

[13] The number of other available tools varies from one product to another, with each one made for a specific purpose and user. Other tools might be available in TEnTs, such as spelling and grammar checkers, concordancers, and MT systems.

functionalities to make the extraction of data easy and efficient for translators. Some well-known examples of TM systems are SDL Trados Studio by SDL plc, Wordfast Pro by Wordfast LLC, MultiTrans Prism by RR Donnelley, and LogiTerm Pro by Terminotix.

Other important terms related to TM systems should be explained, such as matches and the modes of using TM systems. Briefly, a TM system suggests various matches (see section 1.1.1.3, " Different types of matches") that have been found for a segment or sub-segment in the new source text, and the translator uses them based on linguistic and contextual factors. The way matches are used partly depends on whether an *interactive* or *pre-translating* mode is used. These terms will be explained in detail in the following section.

1.1.1.3. Different types of matches

When a new source text is compared to a TM, various types of matches are retrieved for different chunks of the source text. According to Bowker (2002), there are generally six types of matches[14]:

- A system displays an *exact or 100% match* only when the new source segment is identical to the stored source segment both linguistically and in terms of formatting. It would be the same, for example, in spelling, punctuation, inflection, number, italics and bold.
- A *full match* occurs when a new source segment matches a stored source segment in all constituent parts, except in terms of variable elements (i.e. placeables or named

[14] There other types of matches based on the TM system, e.g. context match and perfect match in SDL Trados Studio; I, however, explained only the most common ones.

entities) including numbers, dates, times, currencies, measurements, and proper names.

- When new and stored source segments are similar but have some different words, a system displays a *fuzzy match* and generally applies formatting to draw the translator's attention to the differences. Fuzzy matching may be set to different levels of sensitivity, which Bowker calls the "sensitivity threshold." It ranges from 1 to 99 percent, and the user must set it in such a way that the system does not yield too many silences[212] or too much noise[212]. By and large, translators prefer to set the threshold between 60 and 70 percent (Bowker, 2002).
- In the absence of exact or fuzzy matches for a specific source segment, translators can benefit from *term matches,* in which case, particular terms, or even phraseological units, are searched in the bilingual/multilingual termbase. This process is called "active terminology recognition."
- A *sub-segment [212] match* is retrieved between two small chunks of segments, even if there is not a high degree of similarity between the complete segments.
- *No match* is self-explanatory. When no match is found in a TM for a specific segment, the translator translates the new source segment from scratch. However, in order to benefit from technology in the translation process, machine translation can be integrated into TM as a complementary tool when there is no alternative to translating from scratch. Nevertheless, this integration is not simple and needs to be carefully examined and designed to suit translators' needs. This is the main focus of the present study.

1.1.1.4. Interactive translation and pre-translation

A TM system is composed of tools that facilitate searching in a database of previous translations. When translating a ST with a TM system, the translator typically moves through the ST segment by segment. The system searches through the translation database to find matches for each segment. Based on the context, the translator rejects, accepts, or modifies the match(es) proposed by the system, and if there is no match, s/he translates it from scratch (McBride, 2009).

There are two modes of working with TM: interactive translation and pre-translation. In the former, a translator consults directly with the system while translating and has the latitude to choose the match that best fits the context in question. In pre-translation, the TM finds and chooses matches in the database and replaces the corresponding source segments with their translations. In this mode, a translator works on a hybrid version of the ST in which similar segments and sub-segments have already been replaced by their corresponding TM matches automatically (Wallis, 2008).

In a pilot study, Wallis (2008) compares the two ways of working with TM in terms of production, quality, and translator satisfaction.[15] The results of her study show that the two modes are comparable in terms of productivity but that the quality of translation is slightly higher in the interactive mode. In addition, pre-translation was evaluated as the preferred way of dealing with TM for clients who do not want their TM and TDBs to be directly accessible to translators. Translators, however, preferred the interactive mode over

[15] Satisfaction here refers to the translators' perception. It is very limited compared to the satisfaction that my research studies.

pre-translation. This preference relates to translator satisfaction, which is the focus of the present study and will be discussed in detail later on.

1.1.2. Machine translation

According to Hutchins and Somers (1992), MT is now a "traditional and standard name for computerised systems responsible for the production of translations from one natural language into another" (p. 3). The older names, such as "mechanical translation" and "automatic translation" have gone out of fashion at least in the English language.

As I explained in the beginning of section 1.1, " Beginnings of translation technology," the idea of automatizing translation began with the idealistic ambition of replacing human translation completely—a plan which eventually failed and led to a change of perspective toward using MT. Given the vicissitudes of MT research from the mid-20th century to the present, I will explain MT development in detail. The two main paradigms developed during this period are the following: rule-based machine translation (RBMT) and corpus-based machine translation (CBMT).

1.1.2.1.Rule-based machine translation

RBMT systems work based on source-language (SL) and target-language (TL) linguistic information that is retrieved from (bilingual) dictionaries and grammars covering the main (simple) semantic, morphological, and syntactic regularities of both languages (Hutchins, 2003, p. 506). The sub-approaches to RBMT are explored below.

1.1.2.1.1. Direct approach

The simplest linguistic approach to MT is the first-generation direct approach that is dictionary-based. It translates an ST into a target text (TT) with as little semantic and

syntactic analysis as necessary. This approach includes one bilingual dictionary and one program for analysing and generating texts. Such direct translation systems are necessarily bilingual and usually unidirectional (Hutchins, 2003, p. 503). Given the complex nature of translation, language specialists, such as translators and linguists, were concerned about the low quality of the translation produced by direct systems. To improve the quality of MT, the indirect approach was developed.

1.1.2.1.2. Indirect approach

To develop systems that work more like the complicated process of human translation, the second-generation indirect approach came into existence. It has two different architectures: interlingual and transfer (Arnold, 2003).

The fundamental idea behind the indirect approach is that an ST is translated into a TT via an intermediate representation (of the structure and/or content). In the interlingua approach, STs are converted into semantico-syntactic representations which are common between multiple languages but are not necessarily universal. In the next stage, the interlingua representation is generated into the TL. There are therefore two stages in this approach: (1) SL to interlingua and (2) interlingua to TL. The first procedure is SL specific but not oriented toward any specific TL. Meanwhile, the programs for synthesizing a TL are TL specific and not designed for input from a particular SL. This design contributes to an economy of effort in a multilingual environment: a SL analysis program can be used for multiple TLs and a TL synthesis program can be used again. Nevertheless, interlingua may get more complex in a multilingual environment. To remedy the challenges of such complexity, interlinguas are designed according to a logical artificial language or a natural

auxiliary language, such as Esperanto, which has a set of semantic primitives found in all languages or a universal vocabulary (Hutchins, 2003, p. 503).

In the transfer approach, there is an extra stage in which first the SL syntactic representation is transferred into the TL syntactic representation, and then the TT is generated out of the TL representation (Arnold, 2003). The representations are language dependent. As Hutchins (2003, p. 503) explains, there are three stages underlying this approach: (1) an ST is analysed into abstract SL-oriented representations; (2) such representations are converted into equivalent TL-oriented representations; and (3) the final TT is generated from the TL-oriented representations. In the interlingua approach, all the ambiguities of the ST need to be resolved. In the transfer approach, on the other hand, only the ambiguities inherent in the language itself (e.g. homonyms and ambiguous syntactic structures) are resolved.

Bernard Vauquois' famous pyramid diagram (Figure 1.1.) clearly shows the differences among direct, interlingua, and transfer approaches.

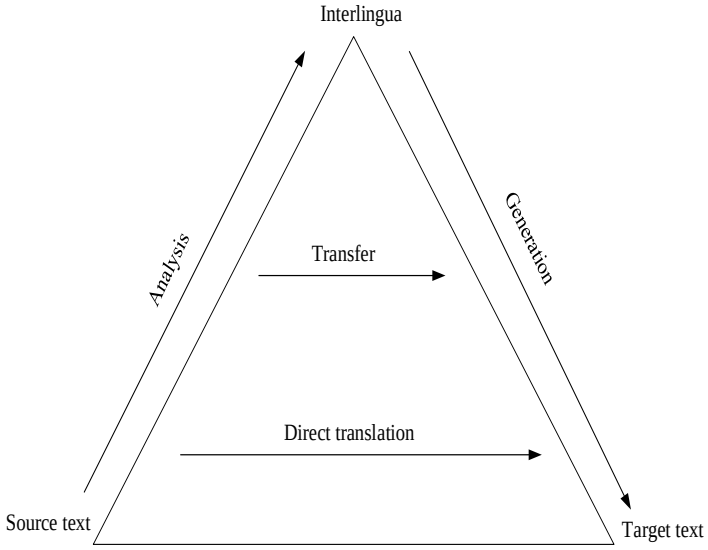

Figure 1.1 Bernard Vauquois' pyramid

1.1.2.2. Corpus-based machine translation

CBMT (also called data-driven MT) is based on bilingual corpora. There are two types of CBMT: example-based machine translation (EBMT) and statistical machine translation (SMT).

1.1.2.2.1. Example-based machine translation

An EBMT system works on analogy: it divides an ST into fragments or a sequence of words and compares them with the bilingual corpus on which it has been trained to find the closest matches possible in the TL. Then the extracted matches are recombined to formulate the TT (Hutchins, 2005). According to Somers (1998), "[t]his approach is . . . claimed to result in more stylish, less literal translations, since it not essentially based on structural analysis of the input" (p. 148).

1.1.2.2.2. Statistical machine translation

An SMT system works based on "probabilities calculated by considering millions of words of parallel texts" (Somers, 1998, p. 148). An ST is translated on the basis of the probability distribution. In other words, if there are multiple TL equivalents for a SL phrase, the goal is to select the one with the highest probability (Costa-Jussà, Farrús, Mariño, & Fonollosa, 2012).

SMT systems have some advantages: they do not require linguistic knowledge; they reduce the human resource cost; they are easy to build and to maintain if data is available; and they are trained with human translations independent of language pairs (Costa-Jussà et al., 2012).

In short, both RBMT and SMT have some pros that the other system does not have. To take advantage of the potential of both systems, hybrid MT systems were developed.

1.1.2.3. Hybrid machine translation

The idea behind hybrid MT systems is that MT can benefit from the approaches of both RBMT and SMT. As Zbib et al. (2012) puts it, "[a] hybrid approach can take advantage of the strengths of both SMT and RBMT. It can leverage the language specific information of RBMT systems to help SMT where such information is hard to learn automatically" (p. 68).

There are two main hybrid system types: (1) a system wherein the SMT is leading (i.e. the SMT does the translation and RBMT provides complementary information, such as lexical information in the form of new phrase pairs) or (2) a system wherein the RBMT is leading (i.e. the RBMT is in charge of translation and the SMT provides complementary information, for example, by enriching the RBMT dictionary by providing new phrases).

1.2. Integration of machine translation into translation memory (TM+MT)

As I mentioned before, over the last two decades, the TW has been introduced to numerous tools, some newly built and others improved based on existing models. These tools include automatic speech recognition [211], XLIFF Editors [213], TM, and MT.

MT has existed since the beginning of computing and natural language processing in the 1940s. It is not, therefore, new to computational linguistics, computer science, and translation. However, the way of using it has undergone some changes. The use of MT has varied from the idealistic goal existing between 1950 and 1980 of translating any text and taking the place of human translators, to the aim arising in 1980 and continuing to the present of translating with the help of posteditors or using MT as a component of a TEnT. The latter is the focus of my research.

As pinpointed above, MT can be used as a component of a TEnT. In this way, MT can act as a supplement to TM. Since a TM often cannot provide useful matches for all the segments of a text, a translator has to translate text segments or sub-segments from scratch. The idea is to expedite translation and reduce the translators' workload by using MT to help translate the untranslated parts. Depending on the type of available data, MT can be based on the TM database, an external database, or both.

Recently, researchers have conduct various studies on different aspects of TM+MT and ways of improving it. Invaluable research has been carried out on TM+MT that will be outlined in the literature review (Chapter 2). For now, I will take a look at the history of how MT started to enter TEnTs.

1.2.1. History of TM+MT

In 2002, Foster, Langlais, Macklovitch, and Lapalme (the researchers of RALI[16] at the time) introduced a text prediction tool, TransType,[17] which was an interactive MT designed for translating from English into French. This tool was developed to integrate MT into the translation process as another reference for translators and not a replacement for them. TransType suggests translation completions automatically in real time, and translators have the option of accepting the suggestions or simply ignoring them by typing their own translations. Foster et al. (2002) believed that TransType could benefit translators in three ways: speeding up typing, proposing translations, and reducing the number of errors.[18] In 2004, Esteban, Lorenzo, Valderrábanos, and Lapalme (2004) enhanced[19] the tool in TransType2 (TT2) by incorporating various language combinations (English, French, Spanish, and German).

Following the invention of TransType, Koehn and Haddow (2009) proposed new ways MT could assist in the translation process: (1) suggesting sentence completion; (2) providing a table of translation options that would include suggestions, ranked and colour-coded by probability, for each word or phrase; and (3) postediting a translation already

[16] In 1997, the Department of Computer Science and Operations Research at the Université de Montréal was awarded a contract to take over Canada's research program in CAT tools. Recherche appliquée en linguistique informatique, a natural language processing lab, was established to apply and promote the research results (History, 2016).

[17] This project had already started in 1997, funded by the Natural Sciences and Engineering Research Council of Canada (NCERC) (TransType, n.d.).

18 Based on the RALI's website, "when the translator makes a mistake, the system can provide a warning, either implicitly by failing to complete the mistake or explicitly by attaching an annotation for later review" (TransType, n.d.).

[19] "Several technological enhancements were added to the initial prototype in order to improve its prediction capabilities and usability" (TransType, n.d.).

suggested by MT. In this last form of assistance, a full-sentence translation produced by MT is added, and translators are able only to correct any type of errors they see in the MT suggestion. The system compares the translator's translation and MT output by string edit distance and displays the changes. This is a good way of alerting translators if they mistakenly drop or add content. To illustrate this function, the researchers provided an example of a segment that had been translated by MT and then post-edited (see Figure 1.2)

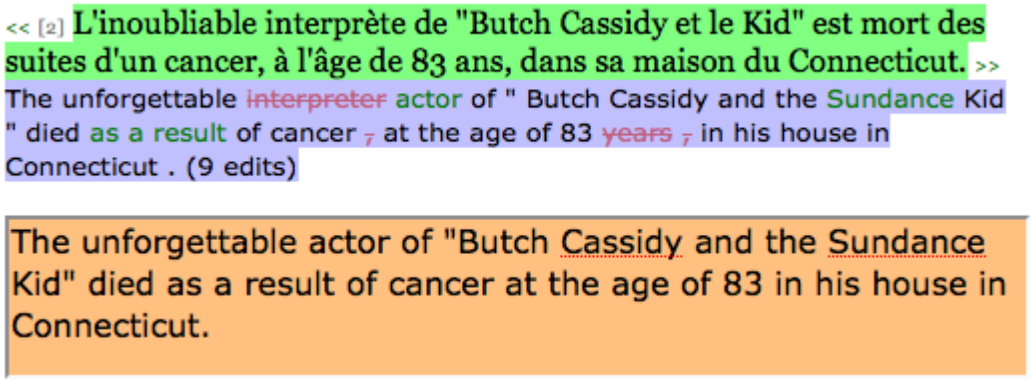

Figure 1.2 An example of the post-editing function (Koehn & Haddow, 2009, p. 74)

The results of their experiment on 10 translators using these forms of MT assistance showed that they all improved both their speed and accuracy, some more significantly and some less (see Koehn and Haddow, 2009).

As integrating MT to the translation process was gaining ground, TM was finding a crucial place in the translation industry. As a result, researchers narrowed their focus on the integration of MT into TM systems.

Based on my research, the earliest academic work on integrating MT interactively into the TM systems can be seen in a study by Carl and Hansen (1999). These researchers compared the results of three systems: an EBMT, a string-based TM (STM), and a lexeme-

based TM (LTM).[20] After evaluating the quality of the translations produced by the three systems and discovering their strengths and flaws in producing a TT, they concluded that it might be a good idea to integrate all three in order to capitalize on each system's potential and compensate for each system's flaws.

In another study, Carl (2000) presented two variants of algorithms in an EBMT system and compared the quality of their outputs with an STM system's output and the combination of EBMT and STM's output. He concluded that the combination of the two systems outperformed each system working alone and that in order to use their individual features in an optimized way they should be combined.

In 2001, Champollion asserted that although MT was in its infancy, it would become an important part of the translation business considering the fast pace of development in the computer industry and the compilation of extensive knowledge bases, such as dictionaries, glossaries, and TMs that improve MT quality.

One year later, Carl, Way, and Schäler proposed that an integrated translation environment merging TM, various MT technologies, other linguistic resources and tools, as well as human translators would provide a valuable environment[21] responsive to the increasingly high translation demands of the modern world (2002).

[20] To avoid any confusion over machine translation, I emphasize that the last two systems are *translation memory systems*. "In the STM[,] the surface forms of the reference translation's source language sides are used as a match string, whereas the LTM match strings are based on the lexemes of the reference translation's source language content words" (Carl and Hansen, 1999, p. 617).

[21] What we call TEnT today.

Predicting the future of translation and translators, Melby (2006) suggested that MT systems would be integrated into TM provided that both tools were based on the same parallel corpus, which, according to him, might increase the quality of TM+MT output.

On the business side, Wordfast 3.10 (a TEnT) provided a link to major MT packages in 2000, and Wordfast 5.50x (Version history, n.d.) provided access to web-based machine translation in 2006. Also, the SDL Trados 2007 Suite (a TEnT) added its in-house MT in 2008 (*What is new in SDL Trados 2007 Suite?,* 2014). That same year, Swordfish 1.0-7a (a TEnT) provided inside access to Google's machine translation engine (Swordfish I Release History, n.d.). Shortly afterwards, in January 2009, MultiTrans (a TEnT) began using an SMT system called Systran in January 2009 (Systran and MultiCorpora integrate technologies for increased translation quality and volume, 2009). The same year, Google launched its Translator Toolkit, in which Google translate is offered when there is no match for a segment.

Following this history of TM+MT, it would be beneficial to explain the importance of the present study.

1.3. Importance of the study

Technology has made the TW dynamic. As new translation tools are developed and implemented in the TW, they change translators' working conditions. These changes naturally influence translators' satisfaction with their job. Evaluating employees' level of job satisfaction in all professions is important, and translators are no exception to this.

Research has shown that higher job satisfaction among employees reinforces a chain of positive actions leading to improved company performance (Heskett, Jones, Loveman,

Sasser, & Schlesinger, 1994). It also impacts employee productivity, absenteeism, and retention (Derek & Wilburn, 2002). Other studies have shown that those businesses with higher job satisfaction reduce turnover by 50% from the norm, lower labour costs by 12%, and increase customer satisfaction to an average of 95% (Freeman, 2005 in Sageer, Rafat, & Agarwal, 2012).

In the translation sector more specifically, Rodríguez-Castro (2011) states: "Understanding translator satisfaction is crucial, since translators are the key component of the translation industry, an industry largely dependent on human capital, despite the heavy adoption of technological methods" (p. 32). Rodríguez-Castro holds that translators' satisfaction will influence "career development, employee retention, and management of turnover and attrition" (p. 30).

According to Liu (2013), job-related happiness[22] is worth investigating because it "not only affects the development of existing translation practitioners but also impacts upon the potential attraction for young people to enter the field" (p. 124). Liu also indicates that job-related happiness influences both translators and the quality of their translations.

The present study focuses on the implementation of TM+MT and its influence on the translators' level of satisfaction. This focus necessitates studying translators as the main users of TM+MT. Based on my readings, in most of the works written on TM+MT so far, research questions focus on texts and tools, and they usually result from product–oriented research methodologies. These studies are invaluable but, because none of them has

[22] Liu (2011) uses the term *job-related happiness* instead of *job satisfaction* since she believes job satisfaction is an inadequate measure of the themes in happiness (see section 2.3).

considered translators' actual work conditions, they are insufficient for an in-depth understanding of translators' work conditions and satisfaction. In addition to asking translators for their perceptions of TM+MT and their working conditions, it would be beneficial to delve into studying translators' satisfaction with regard to working with TM+MT, by conducting a broader contextual study.

One way to conduct this contextual study is to carry out ethnographic research by studying translators in their actual work settings. An ethnographic study on TM+MT can provide more detailed information about translators' working conditions and how translators deal with the various aspects and functionalities of TM+MT.

Moreover, the study can help companies and software developers to improve TM+MT and adjust it to the translators' needs. Last, but not least, it can be an informative source to enrich translation workshops and courses at universities and institutes and to adapt training to non-academic work conditions.

1.4. Research question

According Marshman (2014, p. 400), translators' satisfaction with translation technologies is influenced by a number of factors that need to be investigated extensively. One of the factors she mentions that extensive research should study is the translators' background and practices (including their specialization, the text types they translate, their amount of experience working with specific tools, and their use of such tools). The effect of this factor on translators' satisfaction with translation technologies has been addressed in previous studies (see García, 2006; Lagoudaki, 2008; Marshman & Bowker, 2012). Another factor Marshman (2014) mentions is the changes in working practices and workflows as a result of

adjustment to the use of translation technologies. This factor has been addressed in previous studies as well (see LeBlanc, 2013; Pym, 2011; Pym, 2013). The third important factor is the way these technologies are implemented and administered by the management (LeBlanc, 2017; Taravella & Villeneuve, 2013).

This study asks the following question:

How do the factors listed below affect translators' task satisfaction with TM+MT?

- Translators' educational, technical, and professional background;
- The changes that TM+MT might make to the translation process; and
- The ways the management implements and administers TM+MT.

In this study, translators' task satisfaction with TM+MT is researched according to these three aspects in order to achieve the main objective of this study. This objective will be discussed in the next section.

1.5. Objective of the study

This study aims mainly to discover the interactions existing among the three factors listed above that influence translators' level of satisfaction with using TM+MT.

To this end, translators' educational and professional histories are investigated in relation to their ways of thinking about the tool and their ways of dealing with various translation problems that might be caused by TM+MT. The latter entails observing translators during the act of translation and keeping track of their behavioural patterns. Immediate questions during translation and retrospective interviews can shed some light on

the possible relationship between translators' professional and educational background and the way they work with and think about TM+MT.

More interestingly, this study investigates the possible discrepancies between the way translators use TM+MT and the way they think or talk about it. This study attempts to reveal possible reasons behind positive and negative attitudes toward TM+MT.

Another aspect of my study will be investigating the way the management administers and implements TM+MT as well as the way they interact with their staff in this regard.

2. Literature review

In both the academic and business world, translation tools are usually introduced, promoted, and evaluated according to their technological features, including their databases, functionalities, and output quality (e.g. Austermühl, 2001; Bowker, 2002; MultiTransTM: Translation Management Solution, n.d.; SDL Trados Studio 2015, n.d.; Zerfass, 2002; Zhang & Kikui, 2006). As Marshman (2014) states, "[t]echnological and practical strengths and weaknesses of language technologies are discussed frequently in the literature, and several projects have monitored technology use" (p. 383). These technologies, however, are not used in a vacuum; therefore, "another factor should be considered: the user's reactions to the changes that technology can bring to the working environment" (Marshman, 2014, p. 383). I concur that there are other factors that can affect their functionality and eventually the way translators work with, think, and feel about those tools. I will explain some of these factors in the following paragraphs.

Considering the fast pace of content production in the digital era and the fierce competition in the translation industry over making content available in various languages, increasing translators' productivity is obviously a concern of translation companies seeking to stay competitive in the market (see Bowker, 2005; Fulford & Granell-Zafra, 2005; Taravella & Villeneuve, 2013). That being said, the management of translation companies have an important role in determining the way translation tools are supposed to work or be used by translators to meet their production goals:

> Faced with theoretically infinite possibilities of organising task execution by combining human endeavour and machine work, organisations must decide which combination will indeed sustain performance and serve language professionals, and

> which is bound to be frustrating. In other words, they must find a balance between people, work environments and processes.
>
> (Taravella & Villeneuve, 2013, p. 66)

All the decisions on choosing specific tools, implementing them, training translators, and so forth might affect tool functionality, the translators' performance, and their perception of the tool. For example, whether translators use pre-translation or interactive translation with a TM system has been found by Wallis (2008) to affect translation quality and translators' satisfaction. Usually, the company or the client decides which mode the translator should use.

Furthermore, a translator's knowledge, experience, skillset, personal ways of using translation tools, perception of technology, and many other related characteristics can be factors too (see Lagoudaki, 2008; Marshman, 2014; McBride, 2009). All the above factors shape the way a translation tool is used and perceived, and can (in)directly influence translators' overall satisfaction with their work with that tool.

Since the focus of this study is translators' task satisfaction with working with TM+MT, I will investigate the connection between the above factors in shaping their satisfaction. I will thus introduce the literature that has focused on TM+MT. Subsequently, I will introduce a theoretical framework through which the above factors are studied to evaluate translators' task satisfaction with working with TM+MT.

The literature written on TM+MT focuses on the concepts of translation quality and translators' productivity from a technological perspective. I will look at the works on the technological aspect of TM+MT in the following section.

2.1. Technological features of TM+MT

In a large-scale project, Kanavos and Kartsaklis (2010) tested multiple TM+MT configurations in real-world scenarios and compared their effects on the translators' productivity to understand which one is the best way to integrate an MT system into TM. They evaluated the productivity of a TM+MT while working in two modes: (1) MT is applied once to the whole translation project and the translators are exposed to a hybrid text where TM matches and MT translations have replaced the corresponding ST (sub-) segments (I call this pre-translation mode); (2) MT is employed on demand or sentence by sentence, and translators have the leeway to choose or reject the suggested matches or translations (I call this interactive mode). In addition, Kanavos and Kartsaklis compared the productivity of using SMTs and RBMTs integrated into a TM system.

Before discussing the results of their study, I should point out that, although the results differed in various aspects, they all shared the same outcome: despite their differences, TM+MT in general increased the translators' productivity to a level (either substantially or slightly) that would not be possible with a typical TM workflow.

In their study, Kanavos and Kartsaklis (2010) found that applying MT to TM in the interactive mode is "more efficient and better controlled" (Kanavos and Kartsaklis, 2010, p. 17). Since a translator can quickly decide on whether to keep a fuzzy match, use MT suggestion, or translate from scratch, the interactive mode speeds up decision-making in the translation process and thus increases productivity. Although they find the interactive mode more efficient, Kanavos and Kartsaklis do believe using the pre-translation mode is the only option for those TM systems that do not have a flexible plug-in architecture for connecting

to external applications (such as MT). In this case, the ST segments for which over 80% matches are found in the TM are replaced by those matches, and the rest are sent to an MT system and pre-translated. Later, translators edit the TM matches and MT translations, and, if they have rejected any of the MT translations, they either look for a better option in alternative resources (e.g. termbanks and web searches) or translate them from scratch.

SMT, another technological aspect under study in Kanavos and Kartsaklis, was shown to be productive from the very beginning of the experimental translating process. Meanwhile, RBMT decreased productivity in the first 20% of the work because some time had to be spent building custom dictionaries for the RBMT. Nevertheless, Kanavos and Kartsaklis assert that this extra time-consuming phase could be minimized or even eliminated if custom dictionaries have already been built.

Coming from a different angle, Läubli, Fishel, Volk, and Weibel (2013) suggest that even highly specialized texts may contain general vocabulary and that using TM+MT where SMT has been trained on only in-domain TM data is not sufficient to cover the out-of-domain vocabulary. To better understand how to avoid or minimize any challenge that this might bring to the translating process, Läubli et al. (2013) conducted an experimental study on German-French and German-Italian language pairs. They show that TM's domain-specific parallel corpora used for training SMTs can be supplemented with general-domain parallel corpora for improving translation, provided adequate weights[212] are assigned to general and specific-domain language and translation models. These weights reflect the similarity of out-of-domain data to in-domain text materials.

The reason for assigning weights is that large general-domain parallel corpora may cause mistranslation because of domain mismatches or may not contain many of the domain-

specific terms in the source text. Recognizing this, Läubli et al. (2013) combine specialized- and general-domain parallel corpora, and, instead of separating data and models simply into a binary categorization of in-domain and out-of-domain, they assigned weights to different in-domain and out-of-domain language and translation models.

In order to evaluate the results of the new weighted model in comparison to the unweighted ones, Läubli et al. (2013) asked two professional translators to translate some texts from an automobile company's website from German to French and Italian using a TM combined with three different SMT systems: (1) the baseline system, which was a standard phrase-based SMT trained on in-domain data; (2) the unweighted combined system trained on both in-domain and out-of-domain data; and (3) the weighted combined system, which was trained on both in-domain and out-of-domain data to which they gave what they felt was a suitable weight.

The translations made by all three systems in both language combinations were evaluated automatically and subsequently by a human evaluator. The overall evaluation results show that the unweighted combined system produces higher quality translation than the baseline system, and that the weighted combined system yields higher quality translation than the baseline and unweighted combined systems. Based on this study, TM+MT should be trained on both in-domain and out-of-domain data to whose language and translation models suitable weights are assigned. This increases the final translation quality.

While Läubli et al. (2013) investigate the importance of in-domain and out-of-domain data in training SMTs as a supplemental tool in TM, Moorkens (2012) categorizes common inconsistencies (e.g. terminology, formatting, and punctuation) occurring within two

English-to-German and two English-to-Japanese TM systems. Moorkens bemoans the fact that those inconsistencies are propagated in similar segments and cause increased cost and effort for companies and translators respectively. This can have negative effects on translators' productivity. Following that study, Moorkens, Doherty, Kenny, and O'Brien (2013) raise the question of whether a TM contains inconsistencies and SMTs are trained on the "inconsistent" TM data, the SMT translation will become inconsistent. They nevertheless believe the SMT output is still more consistent than the TM output, even if it is trained on inconsistent TM data. They hypothesize that when TM data is "cleaned" of inconsistencies with SMT output, the SMT trained on the "cleaned" data yields even more consistent output: a virtuous circle of improvement. The output quality increases and subsequently translators' productivity, since they need to make fewer corrections.

To test their hypothesis, they conducted an experimental study on English-into-German and English-into-Japanese translations. They identified inconsistencies in the target segments of the TM and trained an SMT based on the inconsistent data. Then they replaced inconsistent nouns and verbs with nouns and verbs from the SMT output (since according to their hypothesis, SMT provides more consistent data than TM data, even if it is trained on inconsistent TM data). Next they created cleaned (consistent) data for the TM on which a cleaned SMT was presumably trained afterwards. The translation outputs of cleaned and uncleaned data SMT were compared and evaluated, and the results confirmed their hypothesis. In general, their study proposes a (semi-) automatic way of cleaning TM data of inconsistencies (with the help of SMT output and/or manually) and shows that clean data results in clean translations. Although their focus is on cleaning target segments in TM data,

by giving some examples, they also argue that cleaning a source text from inconsistencies before translating (i.e. pre-editing) will result in a more consistent translation.

Briefly, the above studies on the technological aspects of TM+MT show us the following:

- TM+MT should provide translators with an interactive mode of translating (see Kanavos & Kartsaklis, 2010);
- If the MT system in TM+MT is RBMT, custom dictionaries should be built beforehand (see Kanavos & Kartsaklis, 2010);
- An SMT system trained on weighted in-domain and out-of domain TM data provided a higher quality output than the SMT system trained on unweighted in-domain and out-of domain data or the systems that are trained on only in-domain data (Läubli et al., 2013); and
- An SMT system trained on more consistent data proved to yield more consistent output (Moorkens et al., 2013).

The above studies show that the technological features of TM+MT can be improved to make translators more productive. These features, however, are out of reach for translators. The nature of the database and system configurations are not decided by translators but by the managers and/or software developers.

In fact, the translators' role is absent in these studies; there is no mention of whether all the above recommendations work for all translators (as the core of the translation process) and translation projects.

2.2. Translators' thoughts on TM+MT

Lagoudaki (2008) conducted a large-scale online survey of translation professionals through translators' forums and associations as well as academic institutions. Any translator using or having an interest in TM systems was invited to participate. Almost a sixth of 824 respondents[23] used a TM system with an integrated MT functionality.[24] Lagoudaki asked them for their viewpoints on the usefulness of MT functionality in TM and received different opinions that varied based on the respondents' amount of experience, computer skills and preconceived ideas.

A total of 45 respondents found MT to be an option when there is no match for a particular (sub-) segment in a TM. They thought that, even if an MT lacks syntactic and semantic quality, it gives them some useful clues for deciding faster about editing or omitting suggested translations or translating them from scratch. However, 10 respondents found MT translations very annoying and complained about their poor quality. Their other complaint was that sometimes MT translations are syntactically and semantically perfect but do not fit a specific context pragmatically because of their inappropriate terminology usage, style, and tone.[25]

Lagoudaki also asked the respondents to offer recommendations for improving the capabilities of MT to make it more helpful to them in TM+MT. Those translators who were

[23] In her study, 90% of participants were identified as translators and 73% were working as freelancers. Their personal details (e.g. age, sex, and education) were not mentioned.

[24] She did not explain how MT was incorporated into a TM system in each case.

[25] This is one of the criticisms about TM suggestions as well.

favourably disposed toward TM+MT were the ones who made suggestions. Some of those suggestions were as follows:

- MT functionality should be available in case there is no match or in case the fuzzy match is below the user-defined threshold, e.g. 75%. To be more fruitful in such cases, MT should be trained on a separate database of parallel corpora. Moreover, within the TM options, translators should be able to select two databases: a project-specific one (as primary) and the master one (as secondary).
- Users should be able to turn the MT functionality on or off based on their preferences.
- There should be the possibility of integrating automated and user-dependent feedback (new knowledge) into the "knowledge base"[26] dynamically and interactively.[27]

In her study, Lagoudaki found that the negative or positive disposition of translators toward MT was based on their work experience. The more they were experienced in translating in general, the less they were interested in using MT. The language pair they worked with was another factor in determining their degree of satisfaction.[28] Those

[26] In an email on January 9, 2016, I asked Dr. Lagoudaki to clarify this term: "A database that on top of language data it also [sic] contains metadata (knowledge) associated to each translation unit."

[27] In an email on January 9, 2016, I asked Dr. Lagoudaki to clarify this sentence,

> "Automated feedback is the metadata that the system is programmed to give and on to [sic] a particular match/translation (e.g. quality of match). User-dependent (user-generated would be a better name actually) is the metadata that the editor/translator may write for the particular match/translator (e.g. context, register). Both of these were asked to be easily viewable and recorded in a dynamic and interactive way. There are several ways a system could do that within the translation editor (see how some MT & TM systems in the market already do that) without disrupting the translator's/editor's work. Collecting these two in an organised manner would enhance the knowledge base of the system."

[28] The satisfaction in Lagoudaki's study is a simplified one compared to the satisfaction that I will study in this research.

translators working on highly inflected languages such as Polish and Greek thought that MT performs poorly.

Lagoudaki (2008, p. 267) made an important point at the end of her study: "The key to a mutually beneficial relationship between a translator and an MT feature appears to be the cautious application of MT and the consultation of MT suggestions as if they were just another source of reference."

Lagoudaki made invaluable contributions in her study by showing how looking at the issue from the users' (translators') perspective can provide a valid source of information for improving translation tools, such as TM+MT. She also showed that translators' personal characteristics (such as their amount of experience) and work conditions (such as their language combination/direction) can affect their attitude toward TM+MT. Furthermore, she discovered some information on the challenges translators face while working with TM+MT and received recommendations from translators regarding how to meet those challenges.

There are a few drawbacks to Lagoudaki's study. Although her findings are informative, they can come across as somewhat unsystematic and disorganized. For instance, participants in the survey who have different positions are not necessarily users of TM+MT and talk about it while situating themselves in diverse work contexts. These diverse situations were not spelled out and consequently the results of the study are ambiguous. Also, the countries of the respondents were not noted, although each country provides a different sociological and technological environment for translators. Finally, although Lagoudaki's study was especially useful in its day, considering the improvement of TM+MT since 2008, a number of the above issues might have been solved or changed; there might

exist a difference in the issues experienced by translators using TM+MT at that time and those experienced by today's translators.

In another study, García (2010) acknowledged that modern TM systems offer the option of MT translation for the segments that have no match in the memory. In order to confirm whether this option benefits translators and improves translation quality, he carried out an experimental study in which he compared the quality of translations in which the participants use the MT output with those done from scratch (without using the integrated MT function). He conducted this comparison by evaluating the translations of 14 educated bilingual participants (who had an interest in translation but were not professional translators) who translated with the Google Translator Toolkit (GTT) from English into Chinese. The participants were given two texts each day on two separate days, and they translated in reverse procedural order, i.e. they translated one text with MT and the other without the help of MT. They, therefore, were switching between the control group (translating from scratch) to the experimental group (translating with MT).

GTT has a default function providing MT for those segments that have no exact match in the memory.[29] Users can turn off this function and translate from scratch, but Google emphasizes that users should not change this default order. García's goal was to investigate the effect of using the GTT default function, aiming "to determine whether, at present, machine-translated text might indeed allow the translator to translate faster, while producing quality that was indistinguishable from that produced by traditional means" (García, 2010, p. 9). The results show that the participants' translating speed with MT was higher in 53% of the cases; however, there is not a significant difference in translation speed

[29] GTT lacks important functionalities, such as quality assurance features, and capability of processing desktop publishing files. Among other functionalities, GTT, however, provides *high fuzzy matches* which are near-perfect matches (see https://support.google.com/translatortoolkit/answer/6306370?hl=en).

between the control and experimental groups. Also, in 33 cases out of 56, the MT output was assessed more positively.

What is more important for my research is that García studies the perception of participants before and after using MT.

He briefly touches on their perception and states that 11 participants out of 14 expected to do better with MT in terms of quality and productivity and that this number increased to 13 after they used it. The main reason given for their positive perception is that MT helps them save time and energy on typing and searching in dictionaries, since MT results are sometimes fixable with just a few clicks of the mouse.

García (2010) believes this positive support for MT is unexpected. Since during the experiment they were not allowed to use dictionaries, MT must have provided lexical information. According to Garcia,

> [it] provides a potential reason for the degree of approval of MT in the community at large, despite what academia may think or teach. It points to the possibility that young translators of tomorrow — for whom computers are work, play and social environment combined — are already training themselves in proofreading MT, often against the explicit advice of their teachers (p. 16).

Nonetheless, García does not take into account two important points and their possible effects on the results. His participants were not translators but educated bilinguals who may or may not have had experience in translating. This fact brings up the question of whether their way of using GTT to translate is comparable with that of translators. Moreover, the participants' viewpoints on MT would have be impacted by the strictly controlled, experimental work setting; the study approaches translators as individuals working separately from their surrounding conditions. However, García does mention that "the experiment was conducted in the 'non-traditional' environment of GTT and that GTT is a tool

intended for use by the 'educated bilingual' rather than by the professional translator" (García, 2010, p. 9). Nevertheless, the participants' positive perception might be the result of using MT as a dictionary. Had they been allowed to use dictionaries or search in the web, they might have shown a different attitude toward GTT.

2.3. Implementing and administering TM+MT

Taravella and Villeneuve (2013) argue that the profession of translation is undergoing significant changes, mostly because of the vast development in information technology. The fact that various tools have been introduced to the TW might make it confusing to choose the one that works best for a specific LSP. They also claim that in general LSPs work with a collection of tools that can be combined in various ways in the TW. MT can also be interactively used as a part of the TW without completely replacing human translators. To provide the best collection of tools in the most productive and effective manner, an LSP should take two factors into account: the LSP's priorities and goals and the main users of those tools (mostly translators). In other words, an LSP should find "a balance among people, work environment, and processes" (Taravella & Villeneuve, 2013, p. 66).

To specify the type of system needed in an LSP, Taravella and Villeneuve explain the concept of an information system (IS) and its importance in the translation industry. They mentioned Ein-Dor and Segev's (1993, p. 167) definition of IS: "any computerised system with a user or operator interface is an information system." Taravella and Villeneuve note that, according to Glass, Ramesh, and Vessey (2004), what makes research in IS different from other computing disciplines is that it deals with areas related to "organizational concepts, especially usage/operation, and technology transfer, although it explores systems/software topics all primarily at a behavioral level of analysis" (p. 93). They conclude

that this makes IS the right discipline for their research on the translation industry, which is about the effects of using language IS on human translators and LSPs.

Taravella and Villeneuve's research focus is on Canadian LSPs. In their article, they propose to investigate the way language IS should be implemented in Canadian LSPs in order to support translation production processes and ensure the professional well-being and motivation of translators.

2.4. Job satisfaction in translation studies

There are a limited number of works written on job satisfaction in TS, most of which are related to interpreting, including Chang (2008), Chen (2007), Pöchhacker (2009), Pym (2006), and Tryuk (2007). Although interpreting and translation both belong to the TS field, they have different processes and societal statuses. Therefore, although looking into interpreters' job satisfaction would be informative, since the focus of this study is translators who work with written texts, I chose to limit the literature to the most relevant works written on translator's job satisfaction.

In two articles, Katan (2009a, 2009b) published the results of his research examining "the habitus of the translator and [comparing] it with the academic belief in functionalism and the empowerment of the translator either as a mediator or as a social agent" (Katan, 2009a, p. 111). He also studied the "translator and interpreter perception of their working world, their mindset . . . , and the impact of Translation Studies and university training on that world" (Katan, 2009b, p. 188). To this end, he distributed a questionnaire in 25 countries around the world through personal contacts, academic colleagues, past students, professional translators, and a small number of national translation associations. A total of 890 respondents (542 translators, 172 fulltime interpreters, 176 teachers and students)

completed the survey. They were working in various areas of specialization and language combinations.

The first part of the questionnaire focused on practical information, such as the respondents' academic and professional training. The rest addressed their attitudes and beliefs about the profession itself, the way the profession should be taught, the ideal and realistic role and status of the profession, and personal satisfaction.

In the questionnaire, the respondents were asked whether translating and interpreting are professions. In all, 96% of translators and 96% of interpreters agreed that they are professions. Meanwhile, 4% disagreed (4% of translators and 4% of interpreters), mainly because they do not possess enough control over their job , have no career structure, are hired as part time employees, face the public perception of translation and interpretation as the jobs that any bilingual person can do, and experience a lack of societal recognition (Katan, 2009a, p. 125).

Although most agreed that translating is a profession,[30] when respondents were asked about the level of social status and esteem this job has in the market, there was less agreement. They were given three options with which to rate their job's status in the market: high, middling, and low. In total, 43% of interpreters graded their job as high, 48% middling, and 9% low. In contrast, 10% of translators graded their job as high, 59% middling, and 31% low.

To determine what they meant by high, middling and low, Katan (2009a, 2009b) asked the respondents to give an example of a job that has a very similar status. Among the

[30] Katan (2009b, p. 192) defines profession as a societal recognition that is received by certain occupations at certain points in time.

respondents, 54% of both translators and interpreters chose teachers and secretaries as people with jobs with a similar status. None suggested experts or specialists, which according to Katan (2009a, p. 128) are the social statuses much vaunted by academics in TS.

They were also asked where the competition comes from. Almost a quarter of respondents (8% of translators and 15% of interpreters) believed secretaries were the main competitors. The competitors generally belong to two groups: non-specialist translation amateurs, who are anyone with a university degree and knowledge of a foreign language, and subject specialist translation amateurs, who have subject-specific knowledge and are bilingual/multilingual and hence able to translate within their own fields of expertise. It is important to mention that both translators and interpreters believed "e-tools," MT, or CAT are talked about frequently but are not serious competitors "yet."

In another question, the respondents were asked about autonomy. Over 50% (of both translators and interpreters) thought they had high, managerial control over their output. Up to 90% of them believed they had at least technical control[31] over the task to be done.

In the end, Katan (2009a) says, although translators' and interpreters' "time, effort, professionalism, qualifications, and constant study is [sic] rarely valued," their job satisfaction level is surprisingly high. The vast majority of respondents are pretty (50%) or extremely (21%) satisfied. When "fairly" satisfied is taken into account, 91% of the respondents are satisfied with their job.

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[31] In an email on June 23, 2016, I asked Dr. Katan to clarify this term:

> Very briefly technical control as I understand it means having control over the production itself, like any 'technician'. The technical assistant does not have that control. The translator has technical control when his/her competence [sic] regarding the translation itself are [sic] not questioned. Clearly, though [sic] the translation itself might then be modified without the translator's knowledge or consent.

Katan believes this result is surprising, because translators and interpreters are acutely aware of their lack of societal recognition, lack of visibility, and "unfair treatment in the workplace" (p. 204), particularly in the translators' case. It is also unexpected because the respondents were concerned about deprofessionalization due to their competitors mentioned above. Katan finds the key elements contributing to their satisfaction in the final general comments at the end of his survey. These elements are job flexibility, continuous learning, and finding *le mot juste*. In conclusion, he mentions that more research needs be done in this respect.

In his study, Katan (2009) took the first steps toward examining the common general assumptions regarding translators' and interpreters' perception of their working world and provided evidence to (dis)prove them. Katan acknowledges the limitations of conducting such a survey and provides a detailed analysis of what the sample of respondents represents. He touches upon the concept of satisfaction briefly in pages 204–205 and enumerates the influential factors that came up in the answers. However, he provides only a continuum of "not at all" to "extremely" as options for respondents to choose from to measure their satisfaction. This continuum does not necessarily clarify if their answers are merely momentary opinions or consistent mental states toward their job as a whole. Only 198 respondents gave a general explanation of why they thought a particular way; the rest of the respondents only chose among the options.

In another similar study, Setton and Liangliang (2009) conducted a survey to investigate translators' and interpreters' perceptions of their professional identity or status as well as the norms to which they conform in certain situations. A total of 62 translators and interpreters from China, Taiwan, and Shanghai completed the survey. The authors

acknowledged that their study was sensitive to cultural, social, and historical contexts and could not be generalized to a "Western" model.

In their questionnaire, Setton and Liangliang (2009) addressed concepts such as job satisfaction, status perceptions and aspirations, and opinions on adopting potentially beneficial measures to the profession. However, they asked about the above concepts in only four questions:

- First, they asked the respondents whether they were satisfied with their job by giving multiple choices: very satisfied, satisfied, fairly satisfied, neutral, and dissatisfied.
- They also asked them whether they plan to change their job.
- This was followed by a question about their views on the translators' training and certification requirements in the job market.
- In the last question, they asked the respondents to find the closest job to their job in terms of status.

This questionnaire ignores the possible effect of the last two questions on job satisfaction itself and limits their study to a general and vague understanding of job satisfaction. The researchers also jumped from the job satisfaction question to a "conclusion" question asking about the respondents' tendency to change their job without giving any clear picture of what the factors affecting their job satisfaction are. Has this question examined their general level of job satisfaction or their immediate perception at the time of completing the survey?

The other questions were related to demographic data, attitudes regarding norms (such as loyalty and saving face), and cultural or national affinities. There was also a question that invited reactions to the questionnaire itself.

The researchers concluded, "job satisfaction is high, especially among the (better paid) interpreters. Translators have more to say about status and money but are mostly satisfied" (Setton & Liangliang, 2009, p. 234). As mentioned before, the concept of job satisfaction was approached as a general term without any information regarding its definition, its founding sub-concepts, and their interrelations. At the end, however, they suddenly mention status and money as the factors of job satisfaction, although they did not address them in the job satisfaction question.

There are other questions in their survey which might have influenced the degree of job satisfaction. Nevertheless, they were addressed separately.

In their study, Setton and Liangliang (2009) found that there was no clear agreement on whether training or certification may help the profession but there was a clear interest in government intervention whether through official recognition or compulsory licensure.

Regarding job autonomy and control, the results showed that half of the participants were affected by the imposed norms or client directives. Nevertheless, they believed "pragmatic, business-like attitudes to T&I [translator and interpreter] practice may show a more realistic attitude to the translator's role as a neutral and basically powerless intermediary" (Setton & Liangliang, 2009, p. 236).

In 2011, Liu carried out an empirical study to investigate the correlation between visibility and "job-related happiness" among translators. Referring to the literature on translators' visibility, she mentions that while translators are considered self-sacrificing mediators or assistants, people continue to enter the profession and remain translators for years. With this in mind, she conducted a study on the correlation between visibility and job–related happiness.

She uses the term *job-related happiness* instead of "job satisfaction" in her study, because it not only covers "whether or not the needs of the translators are fulfilled but also studies the affective feelings of the translators. [W]e do not use the term 'job satisfaction' because job satisfaction is often interpreted in terms of needs that are satisfied" (Liu, 2011, p. 43).

> Our working definition of the translator's job-related happiness contains two elements. First of all, happiness depends on the alignment between what an individual wishes to receive and what the job allows the person to obtain. Second, it is comprised of the affective feeling of positive emotions when an individual deals with translation. This definition incorporates both environment-centered and person-centered perspectives: the first element reflects the environmental perspective while the second element reflects the person-centered approach.
>
> (Liu, 2013, p. 126)

Therefore, the term job satisfaction is less than adequate when compared to the term job-related happiness (Liu, 2011, p. 44).

It seems less optimal to consider the term "job satisfaction" as inadequate in this study since the term has evolved from a concept regarding simply the fulfillment of needs to a concept related to a wide range of factors (see section 3.1, "Job satisfaction definition"). In addition, this brings terminological clutter to TS without a well-justified reason. Hence, I use the term *satisfaction* in the present study.

To conduct the study, Liu (2013) designed a questionnaire (with 77 questions) and distributed it among translators in Hong Kong, China, Taiwan, and Macao. A total of 193 people completed the survey. The results showed there was a positive correlation between visibility and job-related satisfaction.

In the end, she mentioned the sample of her study was small and the results could not be generalized.

In another invaluable article, LeBlanc (2017) presents parts of the results of an ethnographic study he conducted in 2012 on 50 language professionals in three different LSPs in Canada. He acknowledges that the implementation of TM systems has changed the business and administrative practices in those LSPs. He, therefore, looks closely into the experience of translators, their reaction toward those changes, and the way they see their profession evolving in the coming years.

He first investigates the effect of TM implementation on the establishment of new guidelines regarding productivity requirements and enforced recycling of existing translations. These guidelines, he adds, are sometimes established by the management after consulting with tool manufacturers and not translators or revisers. He then seeks the participants' viewpoints about the changes and new policies.

His findings show that translators feel pressured by an increase in their productivity requirement (i.e. the number of words translated per hour), which, in their view, will lead to poor translation quality. This added pressure is also likely to discourage new translation graduates from entering the language industry.

Regarding the enforced recycling of existing translations, his participants warned against negative outcomes, such as poor translation quality, propagation of wrong translations, and translators losing their authority.

Moreover, his participants were not very optimistic about the future of their job and believed that continuing these administrative policies will eventually lead to lack of autonomy, a deprofessionalization of translation, and a shift in translators' status from language specialists to producers of words.

In the end, LeBlanc (2017) affirms that

> The industry as a whole need[s] to focus more on the human aspects of the interaction between translators and technology. While the tools in and of themselves may be empowering translators in some regards, the practices that have followed their implementation must be taken into account as well (p. 58).

Job satisfaction is a vast realm of study in various fields, such as management and psychology, and it has been studied in various conceptual frameworks and contexts (see section 3.1, "Job satisfaction definition"). Unfortunately, the above studies do not specify from which perspectives they look at job satisfaction and they simplify it to translators' perception. Although they introduce new concepts and factors, study their interrelations, and contribute to the overall concept of satisfaction, they could use a more systematic approach to investigating more factors.

Nevertheless, they can certainly be used as a springboard to study satisfaction in the translation industry more comprehensively. The new concepts and factors can be researched and analyzed. Some examples of these concepts and factors have been presented above and include professional autonomy (Katan, 2009b), the importance of translation training and certification as well as payment in the profession (Setton & Liangliang, 2009), and the effect of visibility on translators' social exchanges and pay (Liu, 2011).

In her PhD dissertation, Rodríguez-Castro (2011) addresses job satisfaction in the translation industry the most systematically and comprehensively. In an original contribution, she deeply investigates several fields (including organizational and industrial psychology, occupational psychology, and management studies) with a view to importing new concepts and perspectives into TS and applying them in the context of the translation industry. She designed a three-faceted model of translator satisfaction in which she distinguished between task, job, and professional satisfaction as well as differentiated

between common concepts, such as task and job. Based on my research, her models have not been tested in any studies other than the large-scale survey (with the participation of 250 translators from Canada, Australia, the US, the UK, Iran, Argentina, and Spain) that she conducted herself in the same project. She demonstrated her models to be valid in the translation industry. This model will be explained in detail in the following chapter (Theoretical framework").

3. Theoretical framework

Having discussed various studies addressing job satisfaction in the translation industry, I will present the theoretical framework of this study by first explaining its foundational premises.

3.1. Job satisfaction definition

Job or employee satisfaction is a widely used concept in scientific research, yet there is no consensus on what job satisfaction is (Saari & Judge, 2014). The *Cambridge English Dictionary* (2016) defines job satisfaction as "the feeling of pleasure and achievement that you experience in your job when you know that your work is worth doing, or the degree to which your work gives you this feeling." Numerous scholarly definitions have been proposed for job satisfaction ever since Hoppock published his 1935 work entitled *Job satisfaction*. He defined job satisfaction as "any combination of psychological, physiological, and environmental circumstances that causes a person truthfully to say, 'I am satisfied with my job'" (p. 47). Locke (1969) suggests that job satisfaction is "the pleasurable emotional state resulting from the appraisal of one's job as achieving or facilitating the achievement of one's job values" (p. 316). Schultz (1982) states that job satisfaction is "the psychological disposition of people toward their work and this involves a collection of numerous attitudes or feelings" (p. 287). Another definition was provided by Conway, Williams, and Green (1987): "a feeling, or affective state, that an employee holds in relation to his or her job" (p. 48).

The above list continues with more recent definitions. Statt (2004) defines job satisfaction as "the extent to which a worker is content with the rewards she or he gets out of her or his job . . ." (p. 78). In addition, Kaliski (2007) states that "[j]ob satisfaction is a

worker's sense of achievement and success on the job" (p. 446). Kian, Wan Yusoff, & Rajah (2014) state that "job satisfaction is an emotional response that will results *[sic]* in broad behavioural actions towards working environment" (p. 100).

According to Worrell (2004), the important point to note after reviewing the above definitions is that "the definition of job satisfaction has visibly evolved through the decades, but most versions share the belief that job satisfaction is a work related positive affective reaction. There seems to be less consistency when talking about the causes of job satisfaction" (p. 11).

This inconsistency is clearly visible in the literature on job satisfaction. Various scholars state that job satisfaction has been considered to be composed of various facets of a job (Brown, Hohenshil, & Brown, 1998; Ferratt, 1981; Smith, Kendall, & Hulin, 1969; Wexley & Yukl, 1984) and that satisfaction is tied to these facets rather than "a global measure that reflects a level of satisfaction constant across the varied components of a job" (Conway et al., 1987, p. 56). These facets are "distinguishable elements within the job, such as pay, the task itself, the work group, the supervisor, and the organization" (Conway et al., 1987, p. 49).

Various theories and ideas differently approach how these facets affect job satisfaction. There are two prominent conceptual frameworks to which these theories and definitions belong: content and process theories. In this section, the objective is not to dwell on all theories, but, first, to clarify what job satisfaction is, and, second, to explain the foundations of the theoretical framework I will be using in this study. To this end, I will

briefly explain the aforementioned conceptual frameworks and their differences, then elucidate how their premises are related to the present theoretical framework.

3.1.1. Content theories

Content theories foreground factors and needs that stimulate and inspire employees' behavior and performance (Kian, Wan Yusoff, & Rajah, 2014). Their focus is on "employees' internal factors that energize and direct their working behaviour" (p. 96). To further explain this premise, one cannot overlook Maslow's hierarchy of needs.

Abraham H. Maslow (1954) presents a five-tier hierarchy of human needs that are the sources of motivation. These needs are often illustrated as a pyramid (see Figure 3.1), where the lowest level displays the most fundamental needs (such as physiological needs) and the top level shows self-actualization (such as the need for creativity and growth). He states that needs should be satisfied in order of importance to reach the higher-level needs that eventually lead to higher-level motivations[32]: "if all the needs are unsatisfied, and the organism is then dominated by the physiological needs, all other needs may become simply non-existent or be pushed into the background" (Maslow, 1954, p. 82).

[32] Locke and Latham (2004) define motivation as

> [I]nternal factors that impel actions and external factors that can act as inducements to action. The three aspects of action that motivation can affect are direction (choice), intensity (effort), and duration (persistence). Motivation can affect not only the acquisitions of people skills but also how and to what extent they utilize their skills and abilities (p. 388).

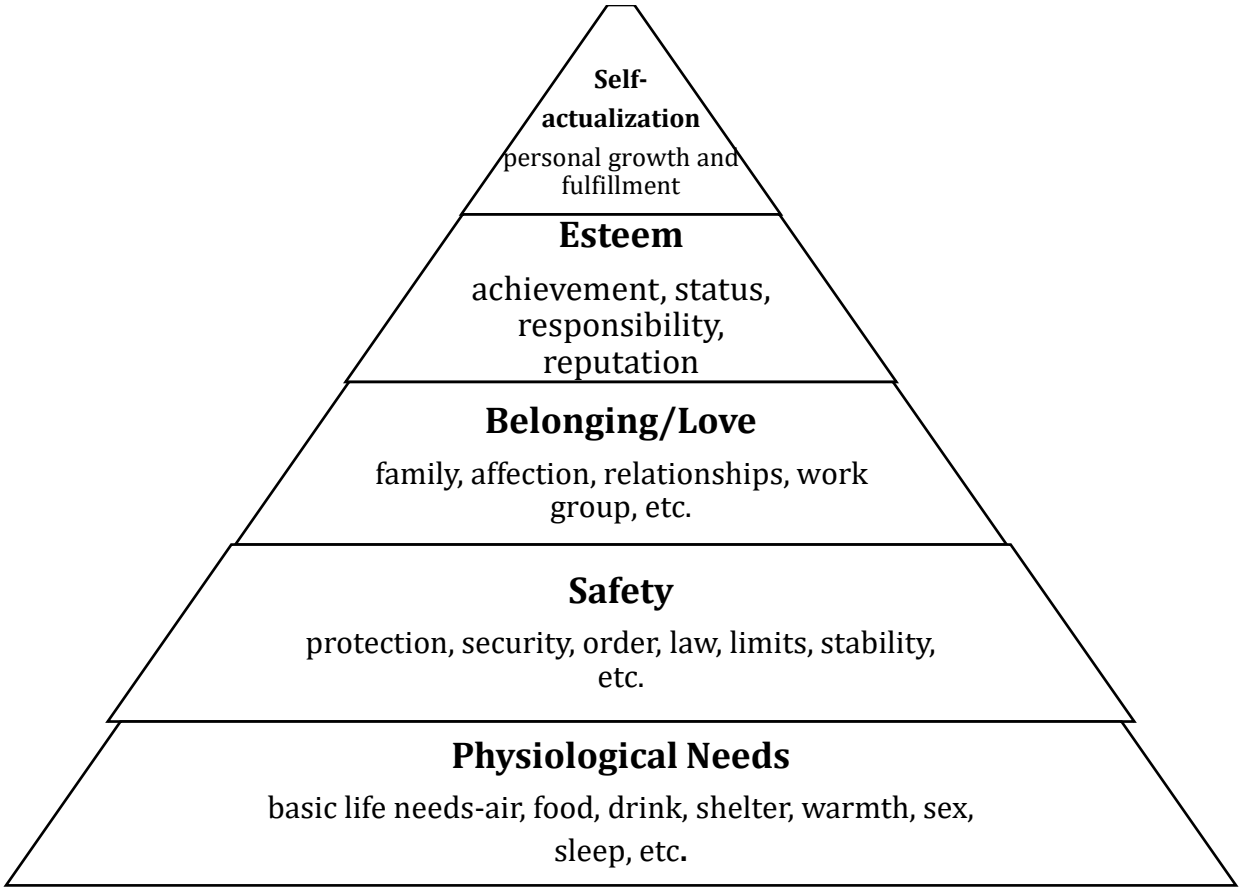


Figure 3.1 Maslow's Hierarchy of Needs (Rodríguez-Castro, 2011, p. 53)

Building on Maslow's theory, Frederick Herzberg (1959) present his two-factor theory. According to Herzberg, there are, on one hand, motivators/job-content factors associated with the intrinsic characteristics of a job. They help an individual to grow psychologically, cognitively, and professionally. These motivators are the higher-level needs presented by Maslow (1954) and include, for example, content or nature of tasks, recognition for achievement, responsibility, and career opportunities. On the other hand, there are hygiene factors related to extrinsic characteristics of the job or the situational context. These factors are the lower-level needs presented by Maslow (1954) and include, for instance, salary, company policies, and interpersonal relations with coworkers and superiors.

Contrary to Maslow, Herzberg (1959) asserts that satisfaction and dissatisfaction are not two opposite poles of a continuum. The opposite of *satisfaction* is *no satisfaction*, and the opposite of *dissatisfaction* is *no dissatisfaction*:

> . . . the factors involved in producing job satisfaction were *separate* and *distinct* from the factors that led to job dissatisfaction. Since separate factors needed to be considered, depending on whether job satisfaction or job dissatisfaction was involved, it followed that these two feelings were not the obverse of each other. Thus, the opposite of job satisfaction would not be job dissatisfaction, but rather *no* job satisfaction; similarly, the opposite of job dissatisfaction is *no* job dissatisfaction, not satisfaction with one's job. The fact that job satisfaction is made up of unipolar traits is not unique, but it remains a difficult concept to grasp.
>
> (Herzberg, 1966, p. 76)

Based on Herzberg's definition of satisfaction and dissatisfaction, if workers are paid a high salary but are not recognized for their achievements, they are neither dissatisfied nor satisfied. On the other hand, if workers are recognized for their achievements and given greater responsibility but are not paid enough, they are not only satisfied but also dissatisfied, because satisfaction and dissatisfaction do not form a continuum. Figure 3.2 illustrates Herzberg's theory.

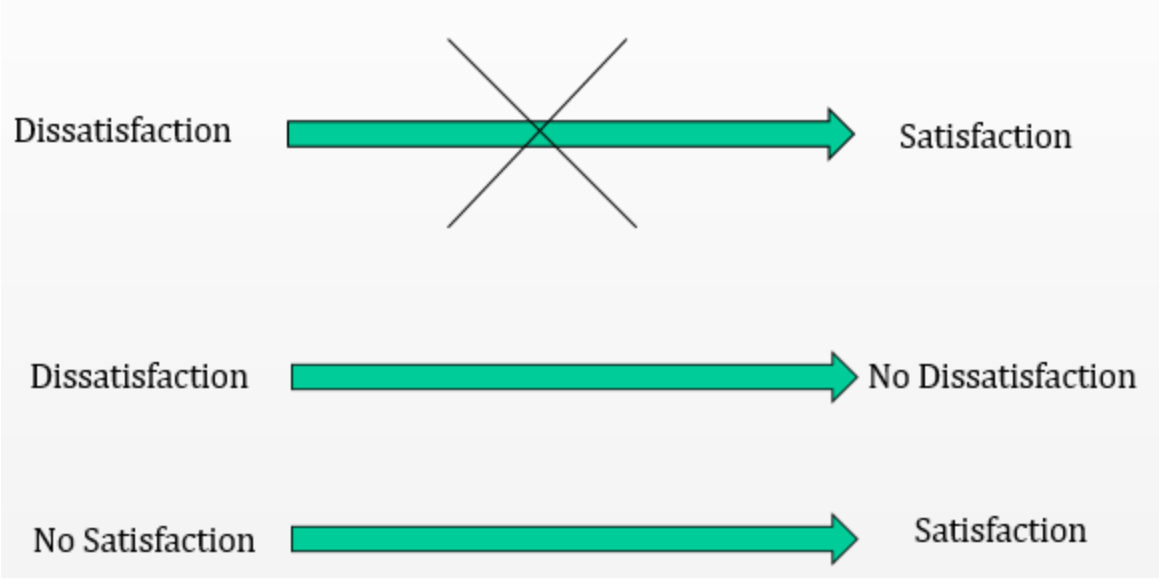


Figure 3.2 Satisfaction and dissatisfaction in Herzberg's two-factor theory

Herzberg and Maslow are the best-known theorists of content theories and provide the fundamentals of the theoretical framework for this study. Looking at these two theories suffices to explain the foundation of the content theories that emerged after them. There are other theories that fall into the content theory category: Alderfer's (1969) Existence, Relatedness, and Growth (ERG) theory and McClelland's (1985) Theory of Needs.

According to Rodríguez-Castro (2011), content theories address aspects that influence people's feeling towards their job, but this traditional notion of job satisfaction disconnects people from the work setting. In contrast, process theories look at satisfaction and work motivation from a dynamic perspective and relate human behaviours with group and social processes at work. In the following section, process theories will be explained in further detail.

3.1.2. Process theories

Process theories assess job satisfaction by looking at "how well the job meets one's expectations and values" (Worrell, 2004, p. 12). The main theorists within this framework are Adams and Vroom.

According to Adams (1965), people consider their job as a series of inputs and outcomes. Inputs are factors such as education, skills, age, and effort, while outcomes are factors such as bonuses, benefits, and autonomy. His Equity Theory states that people seek fairness and equity in social encounters. Job satisfaction, therefore, is the direct result of how fairly individuals have been treated in comparison to other coworkers. In other words, people feel satisfied with their job if their input or contribution to a job and the resulting outcome are proportional to that of their coworkers. This is the outcome-to-input ratio. If the ratios are equal, job satisfaction is achieved, and, if they are not, the inequity leads to job dissatisfaction.

Like Adams (1965), Vroom (1964) incorporated the element of workers' expectations into his Expectancy-Instrumentality-Valence Theory, in which he generated a three-variable equation for assessing job satisfaction scientifically. In his theory, he included the personal decision making of employees within their workplace. They might choose to do or not do a task based on how able they are to perform that specific task and how fair the amount of compensation is. In his equation, expectancy is an individual's perception of how well s/he is able to do a specific task; instrumentality is an individual's confidence that s/he will be compensated fairly for accomplishing that task; and valence is the value of the expected reward. Vroom assigns a probability value to each one of the variables in his equation. When

all three variables are high, the employees will be satisfied and motivated; if they are low, their satisfaction and motivation will decline.

Other scholars have developed process theories, such as Locke and Latham's (1990) Goal-Setting Theory and Skinner's Reinforcement Theory (1938). Since the present study does not deal with process theories, it suffices to outline only the foundations and main theories related to this framework.

3.2. Translators' satisfaction

Rodríguez-Castro's (2011) three-facet model of translator satisfaction is mainly founded upon two well-known theories: Herzberg's two-factor theory and Maslow's theory. To outline the development of her model, I will explain how she used their concepts and principles in the translation industry.

In her PhD dissertation, Rodríguez-Castro mentions that she used Herzberg's two-factor theory to develop a model for translator satisfaction and complemented this framework with some concepts from Maslow's theory and intrinsic motivation theories. Her model is subdivided into three facets of satisfaction: task, job, and professional satisfaction. She embeds the key intrinsic factors, such as achievement and recognition, in the facets of task and professional satisfaction. In addition, she incorporates the context or extrinsic factors, such as salary and administration, into the facet of job satisfaction. The three facets of translator satisfaction are as follows:

- Task satisfaction is defined as "the feeling of success and happiness experienced by a worker during performance or upon completion of a task" (p. 101).

- Job satisfaction is "an individual's emotional feeling or overall impression toward the 'whole' of a set of tasks performed in any work environment(s) over a longer period of time" (pp. 124—125). This facet is heavily tied to work context, organizational dynamics, and team dynamics.
- Professional satisfaction denotes "the feelings of fulfillment, status, or achievement that an individual develops when acquiring knowledge and skills which allow him or her to optimize his or her career path and achieve professional recognition" (p. 161). This facet combines the concepts related to "the development of a sense of identity as a translator and as a member of a social network of individuals playing similar roles and performing similar tasks: e.g. a sense of belonging to a community" (p. 162).

All three facets were defined and tested separately from each other in Rodríguez–Castro's study.

The objective of the present study is not to evaluate translators' job satisfaction in general but to investigate their satisfaction with the activities they accomplish with the help of TM+MT. Among the three facets of task, job and professional satisfaction in Rodríguez-Castro's model, task satisfaction suits this objective.

In this study, the question is how translators' satisfaction with the tasks they accomplish in their job is affected by their educational background and professional experience, the changes TM+MT makes in the translation process, and the ways the management in a workplace implements TM+MT. Since this question revolves around both intrinsic factors (including translators' education and the translation process) and extrinsic factors (including the ways managers implement TM+MT), task satisfaction should be

contextualized in a work setting. To this end, I will investigate the factors of task satisfaction introduced by Rodríguez-Castro's model and situate them in the work context to find any relationship between extrinsic and intrinsic factors.

Rodríguez-Castro conducted a large scale study on all three facets by disseminating a questionnaire with two main sections: (1) Demographic and Professional Profiles and (2) Translator Satisfaction Index. The first section included variables, such as age, gender, income range, job experience, and technical expertise. The second section included questions assessing the theoretical constructs of the three facets of translator satisfaction. A total of 250 translators who were actively involved in the translation industry responded. The largest group of respondents were from Canada, the US, and Australia. There were also other respondents from Iran, Spain, Argentina, and the UK.

Rodríguez-Castro divided her respondents into three groups: novice, experienced, and expert translators. Novices possess 1 to 4 years of experience, experienced individuals 4 to 10 years of experience, and experts more than 10 years or 10,000 hours of work experience in a particular job, subject field, or area of translation. Some of her relevant findings on task satisfaction will be mentioned in the next section explaining the theoretical framework.

3.2.1. Task satisfaction

According to Rodríguez–Castro, tasks are a set of activities that form the parts of a work project with a clearly set duration (p. 102). General tasks in the translation industry include translating, editing, proofreading, project management, desktop publishing (e.g. formatting and compilation), and service-related tasks (e.g. consulting and marketing).

As Rodríguez–Castro puts it, task satisfaction is a positive feeling during or after the completion of task, and it is closely tied to the individual's feeling of knowing (FOK), an "internal monitor" that knows whether specific information exists in the memory (Koriat, 2005, p. 90). FOK is a metacognitive process referring to "individuals' judgments about their degree of accuracy for recognizing or knowing a task or answer and predicting one's knowledge" (Bembenutty, 2009, p. 589). It is also referred to as task familiarity and task awareness. In this model, it is related to the translator's level of technical expertise, years of professional experience, specialization, and formal education (Rodríguez-Castro, 2011).

Task satisfaction is composed of interrelated concepts which categorize its properties. These related properties, called factors, "act or interact in an empirically meaningful way and are statistically measurable" (p. 99). They are measured by survey items called variables.

In the present study, the variables proposed by Rodríguez-Castro will be used to structure the interviews, observations, and other methods of data collection (see section 4.1.2.2, Data collection").

The concepts which compose task satisfaction are self-efficacy, nature of the task, job-fit, and self-fulfillment.

3.2.1.1. Self-efficacy

Self-efficacy is the self-evaluation of one's capability to bring about particular behavioral outcomes and meet the goals set for the tasks being performed (Rodríguez-Castro, 2011). It is fundamental to human motivation, perseverance, resiliency, and adaptation (Löve , Moore, & Hensing, 2012). According to Bandura (1991), people with low levels of self-efficacy avoid

difficult tasks, since these tasks are personal threats to them. Low aspirations and weak commitment to the goals they choose to pursue are other negative impacts of low levels of self-efficacy.

To achieve a higher level of self-efficacy, the desired behavioral outcomes and goals should be known or clarified before starting a translation project. Rodríguez–Castro calls these outcomes and goals task scope and task description; they are measured by various survey items displayed in Figure 3.3.[33]

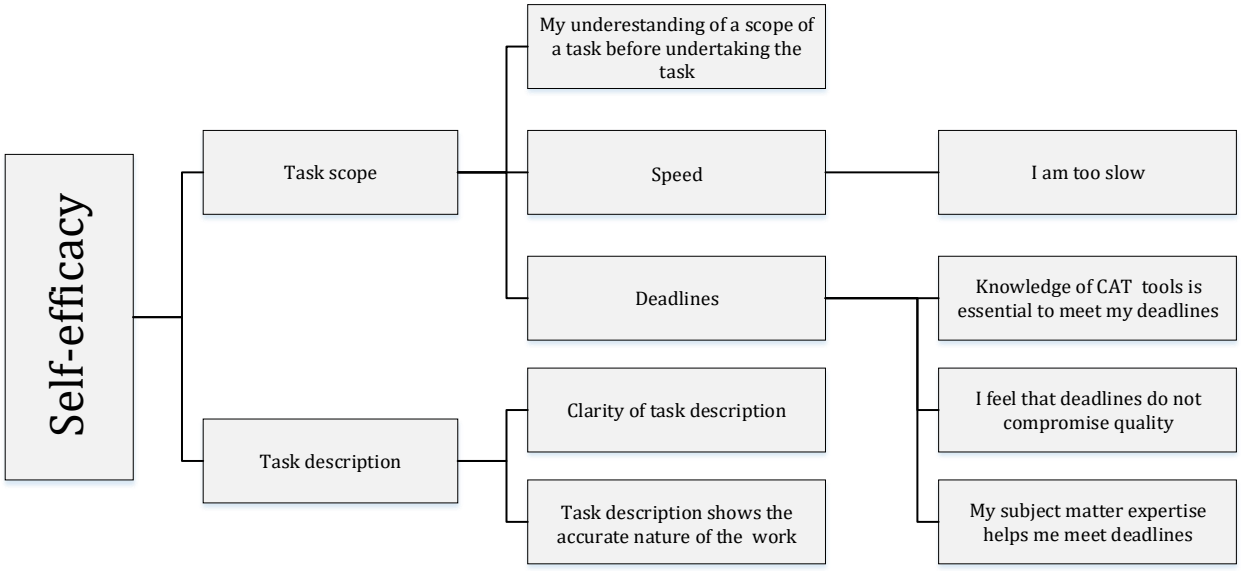


Figure 3.3 Factors and variables—Self-efficacy (Rodríguez-Castro, 2011, p. 107).

Noting differences amongst novices, experienced translators, and experts, Rodríguez–Castro's study indicates that, due to their higher level of FOK or task awareness and task familiarity, experts are able to "reshape and adjust the translation and localization

[33] It is necessary to mention that I have made the use of pronouns consistent in this model by using "my" instead of "you" in the first variable.

process to meet deadlines and understand quality requirements" (p. 280). Unlike novices, experts believe deadlines do not compromise quality and their expertise facilitates meeting deadlines. With regard to task description, novices tend to rely more on task descriptions than experts do. For the rest of the factors, experts and novices do not show statistically significant differences.

3.2.1.1.1. Task scope

In the translation industry, Rodríguez–Castro defines task scope as "the range of *discrete activities* [emphasis added] included in the task and *how long* [emphasis added] they might take" (p. 107). In her model, work experience and the number of projects done by translators (the number of projects done contribute to FOK) play a crucial role in fully understanding task scope. Although task scope is different from one translation project to the next, she believes that the higher the translators' experience level is, the better they will be in comprehending the pragmatics of task completion. In her study, task scope is measured by the following survey items (see Figure 3.3):

- Translators' level of understanding the desired products and goals, the activities that should be done to meet those goals, the amount of time that each activity takes, etc.
- Translators' self-assessment of their pace in doing the assigned task.
- Translators' assessment of their subject matter expertise and knowledge of CAT tools in helping them meet the deadlines. Also, translators' assessment of the effect of deadlines on the quality of translations.

3.2.1.1.2. Task description

Rodríguez–Castro defines *task description* as "the general parameters of the task . . . [including] the general situation surrounding the task, the 'brief' for the task, the nature of the inputs, the expectations for the outputs, *the tools* [emphasis added] that could be and should be used, etc." (p. 108). In her model, task description is measured by the following survey items (see Figure 3.3):

- Clarity of task description: translators' evaluation of the clarity of the task description depends on their level of expertise and experience. In comparison to novice translators, experts and experienced translators are expected to understand task descriptions better and usually do not require an elaborate task description. They also "have a greater tolerance for unclear or inaccurate task descriptions" (p. 108).
- Likeness of task description to the actual nature of the task.

3.2.1.2. Nature of the task

Nature of the task has been recognized as one of the major intrinsic motivators that lead to workers' satisfaction. It is often named "work itself" (Rodríguez–Castro, 2011, p. 109). Taber and Alliger (1995) define nature of the task as "the intrinsic properties of a job," including "the variety, interest, challenge, status, autonomy, flow, and other features of the tasks that are performed on the job" (p. 102). Among these, the frequently cited desiderata, according to Herzberg (1959), are "creative and challenging work, varied work and an opportunity to do a job completely from the beginning to end" (p. 61). Rodríguez–Castro's model extracts and presents the most important factors found in Herzberg's definition (see Figure 3.4).

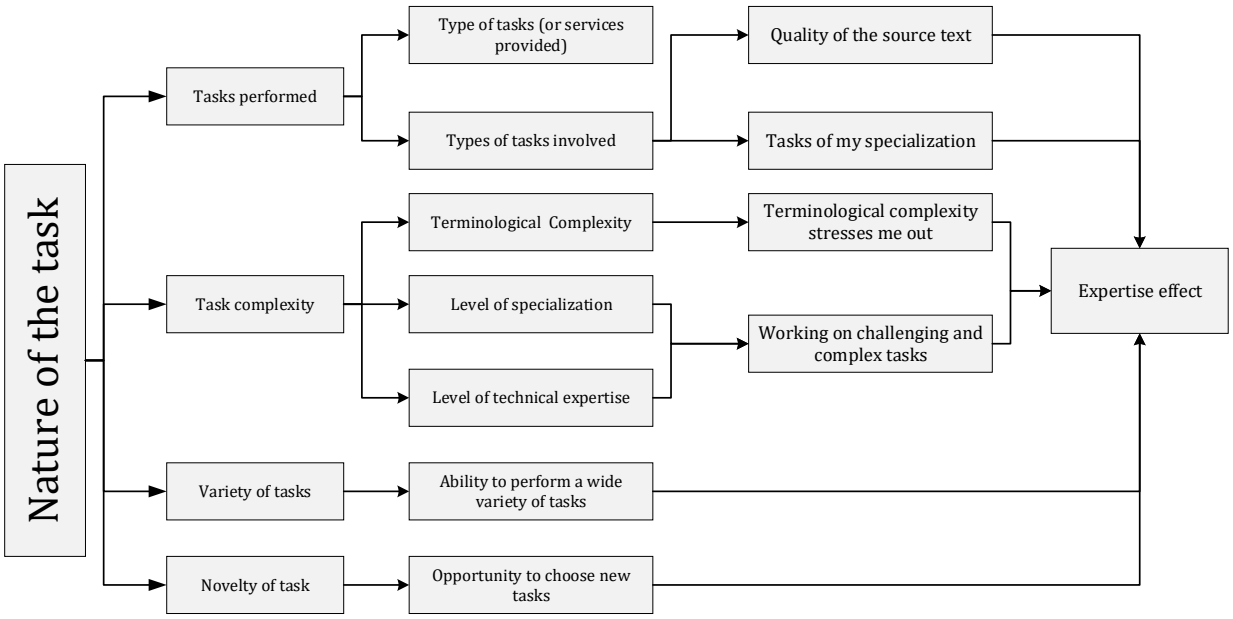


Figure 3.4 Factors and variables—Nature of the task (Rodríguez–Castro, 2011, p. 109).

3.2.1.2.1. Tasks performed

Rodríguez–Castro categorizes translation into general and specialized translation. General translation is a type of task that deals with texts that "may not belong to an area of specialization, requiring a lower level of subject matter expertise" (p. 109). In contrast, specialized translation deals with texts that belong to "highly technical fields or domains that require a high level of subject matter expertise to complete their task" (p. 110).

Rodríguez–Castro believes that highly specialized translators show higher task satisfaction if they translate specialized texts, because they enjoy the challenges of translating complex texts, including those directly related to their field of specialization. The factor of tasks performed is measured by the following survey items (see Figure 3.4):

- Types of tasks or services provided, such as translating general or specialized texts.
- Types of tasks involved as they are dependent on the quality of the ST and its relatedness to the translator's level of specialization.

3.2.1.2.2. Task complexity

Based on Herzberg's explanation of "work itself," tasks can be "overly easy or overly difficult" (p. 48). Rodríguez–Castro considers the expertise and experience of translators as the significant determinants here. *Task complexity* is measured by the following survey items (see Figure 3.4):

- Terminological complexity: terminological complexity stresses me out.
- Level of specialization and technical expertise: working on challenging and complex tasks.

Her study shows that low task familiarity generates a significantly higher level of stress in novices compared to experts. As a result, novices are more concerned about the terminological complexity of an ST.

3.2.1.2.3. Variety of tasks

According to Herzberg (1959), the tasks in a job can be creative or monotonous. He proposes that tasks should be designed in a way that they are not monotonous but instead promote workers' "creativity." Task variety is measured by the following survey item (see Figure 3.4):

- Ability to perform a wide variety of tasks.

Experts have a greater ability to perform a wide variety of tasks than novices. According to Rodríguez–Castro, "offering both novices and experts the opportunity to undertake a wide variety of tasks and tasks related to their area of specialization can be used as enhancers of task commitment" (p. 285).

3.2.1.2.4. Novelty of the task

According to Rodríguez–Castro's model, some translators become demotivated and bored when doing the same tasks every day. This makes them seek novelty in their daily tasks. For example, they might seek to translate new text types. Rodríguez–Castro did not reveal any link between the translators' attitude toward novelty and their level of expertise or experience. She says that novices and experts do not show a significant difference in how they approach the opportunity to choose new tasks or new roles. *Novelty of the task* is measured with the following survey item (see Figure 3.4):

- Opportunity to choose new tasks.

3.2.1.3. Job-fit

According to Rodríguez–Castro, the concept of *job-fit* (p. 114) can be defined as the feeling of compatibility between a worker and the work setting. Job-fit theories have been very useful in human resource management by helping to "reshape retention strategies and enhance employee involvement by reinforcing self-fulfillment motivators" (p. 114). The components of job-fit are displayed in Figure 3.5.

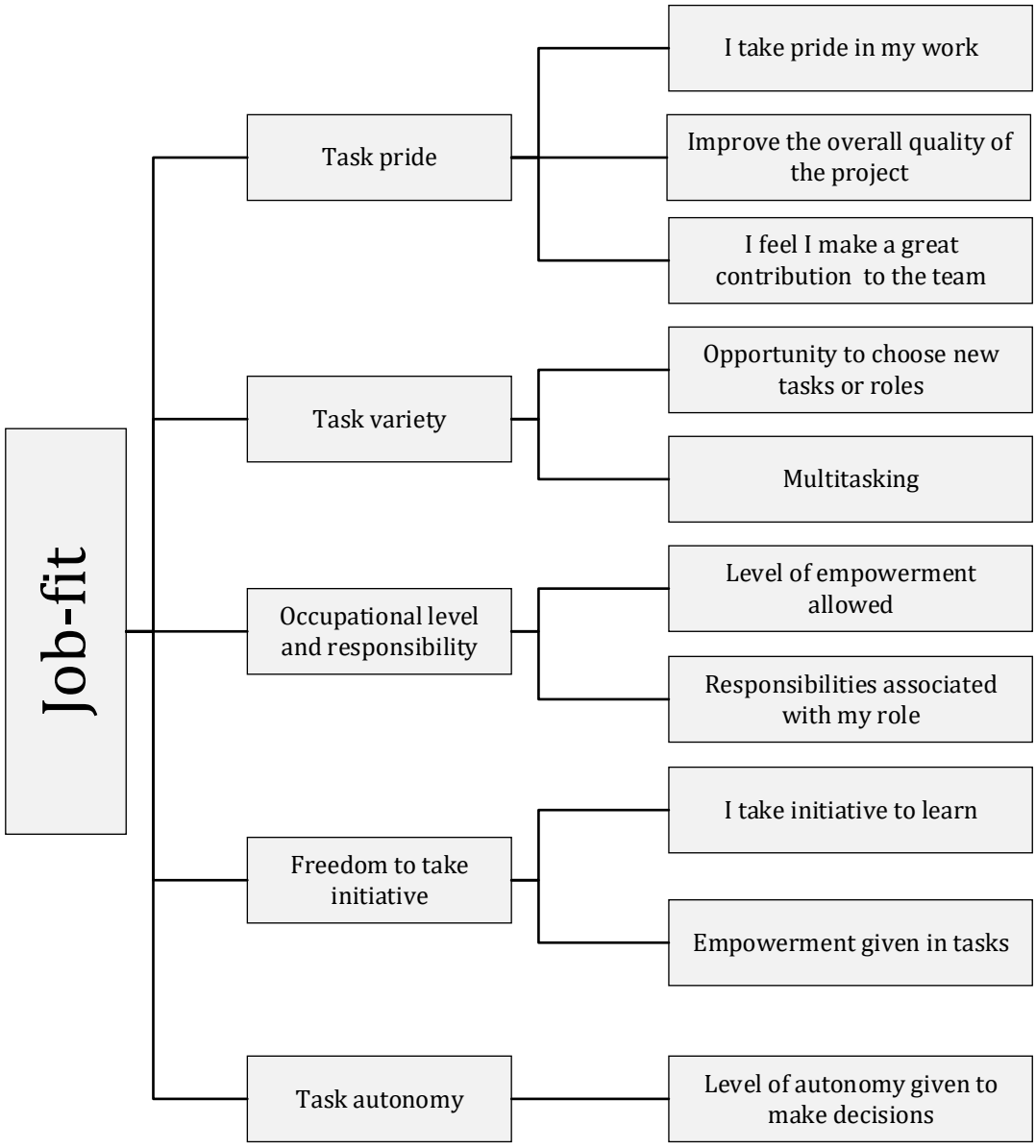


Figure 3.5 Factors and variables—Job-fit (Rodríguez–Castro, 2011, p. 114).

3.2.1.3.1. Task pride

Task pride can be defined as an individual feeling of "I do what I like" (p. 114). This can be contextualized in the translation industry, where translators might be happy with the tasks they do and be proud of the fact that they do what they like and are good at. It can come from various motivators, such as feeling of ownership, professional identity, perception of public

image, reputation, and the feeling of contributing to the success of a project or team effort. This factor can be measured by the following survey items:

- I take pride in my work.
- I improve the overall quality of the project.
- I feel I make a great contribution to the team.

3.2.1.3.2. Task variety

According to Rodríguez–Castro, *task variety* reflects "a perceived individual feeling of possessing a wide range of skills necessary for the successful completion of a broad range of tasks" (p. 115). The ability to use a wide variety of skills to accomplish multiple tasks can be a motivator at work. Translators handling a wide variety of tasks have a higher level of satisfaction since they can use their skills to deal with an array of new challenges. As already mentioned above, experts show a greater ability to perform a wide variety of tasks; they are therefore more likely to have a higher level of satisfaction. The factor of task variety is measured by the following survey items:

- Opportunity to choose new tasks.
- Multitasking.[34]

3.2.1.3.3. Occupational level and responsibility

Rodríguez–Castro believes higher *levels of the occupation* lead to more satisfaction. This factor is studied as a function of "task autonomy[68], […] years of experience […], technical

[34] "… performing tasks more or less in parallel is called 'multitasking'" (p. 103). For example, a translator might be able to work as a translator and terminologist in one project.

expertise, specialization, services offered and annual volume of work" (p. 116). Experts are more satisfied in relation to this factor, since they have a better understanding of the subject matter than novices do and thus undertake more responsibilities. They show "a significantly higher level of empowerment and participation in projects and tasks compared to novices" (p. 286). This factor is measured by the following survey items:

- Level of empowerment allowed.
- Responsibilities associated with a translator's role.

3.2.1.3.4. Freedom to take initiative

Freedom[35] *to take initiative* is an intrinsic attitude that shows an inherent desire to know or do more; it motivates translators to learn new tasks or processes (p. 117). Allowing professionals to handle the constant change in the industry better, it is important in a dynamic work environment. It should be noted that the extent to which translators are allowed to take initiative is dependent on their work setting, group dynamics, and years of experience in the position. This factor can be assessed by the following survey item:

- I take initiative to learn.

3.2.1.3.5. Task autonomy

Task autonomy is the amount of freedom and independence given to a worker in scheduling their tasks and determining the procedures to be used (Hackman & Oldhem, 1980). Rodríguez–Castro states that "when workers are given autonomy, their task identity or task

[35] The word *allowance* in the original model has been changed to *freedom* to make the concept more idiomatic.

pride is enhanced and they understand that the task outcome depends on their own efforts, initiatives and decisions" (pp. 117–118).

Gouadec (2007) defines an autonomous translator as a professional whose translations do not need editing. This can be a matter of skill (when s/he has very high translation skills) or cost (when there is no money to pay for the revision). Rodríguez–Castro's study shows that the higher the level of decision-making autonomy, the higher the translator's level of satisfaction. Experts enjoy a higher level of task autonomy than do novices. Task autonomy is assessed by the following survey item:

- Level of autonomy given to make decisions.

3.2.1.4. Self-fulfillment

Self-fulfillment is a positive job attitude that workers have when their individual needs are satisfied. Rodríguez–Castro explains self-fulfillment in the translation industry as follows: "translators want to feel that they learn from the task, and they often aim to be 'the best translators' so that they can differentiate themselves from competitors" (p. 119). The factors of self-fulfillment are self-actualization, opportunities to learn at work, and task appreciation or acknowledgement (see Figure 3.6), which will be discussed in the following sections.

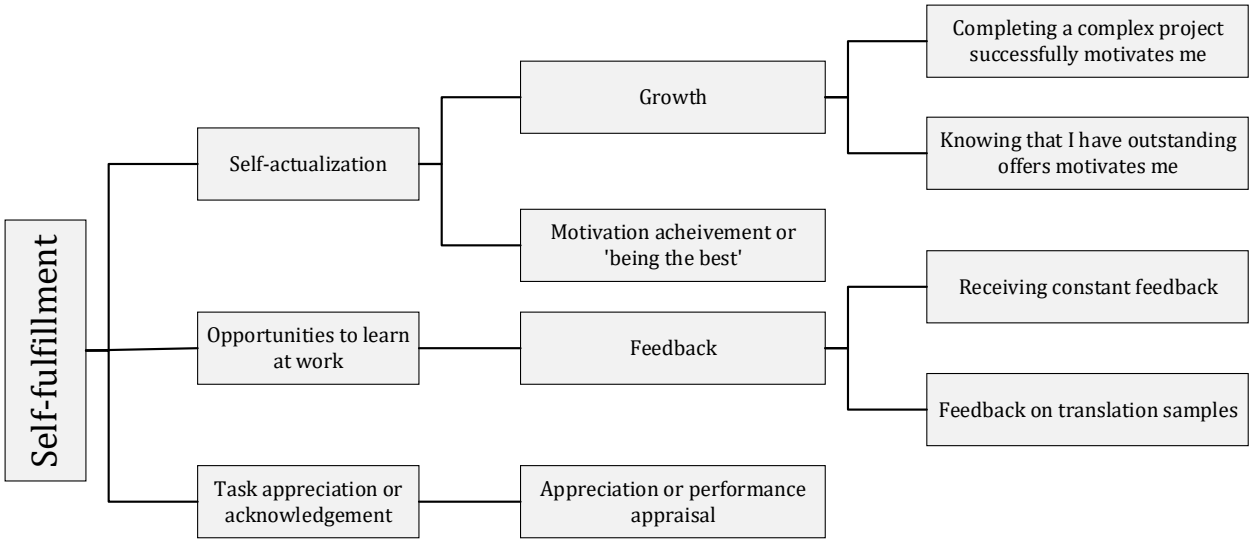


Figure 3.6 Factors and variables—Self-fulfillment (Rodríguez-Castro, 2011, p. 114)

3.2.1.4.1. Self-actualization

Self-actualization is an individual's tendency "to become actualized in what he is potentially" (Maslow, 1954, p. 383). Self-actualization, according to Herzberg, should be ranked first among the job attitudes leading to the highest satisfaction level among workers. It is related to "the wish of being [sic] better or wanting greater abilities" (p. 119). This concept is composed of two factors—growth and motivation for achievement:

- *Growth*: growth-need strength is how strong an individual's desire is to achieve growth satisfaction from his/her work. People who have a strong need for personal accomplishment, self-development, more knowledge, and more understanding respond positively to changes in their jobs or to any opportunities for job enrichment (Hackman & Oldham, 1980).
- *Motivation for achievement*: how strong an individual's desire is to excel, to succeed in difficult tasks, and to perform better than other workers (p. 120). Herzberg (1959)

gives some examples of achievements: completing a task successfully, finding solutions to problems, and achieving good results after work is accomplished.

Rodríguez-Castro believes that both motivation for achievement and growth are stronger among experts than among novices, except that novices become more motivated if they receive outstanding offers. She mentions that this apparent tendency needs further investigation because it does not support the existing literature. Growth is measured with the following survey items:

- Completing a complex project successfully motivates me.
- Knowing that I have outstanding offers motivates me.

3.2.1.4.2. Opportunities to learn at work

Well-established companies with a strong commitment to the constant process of improvement can offer opportunities to learn at work by investing in lifelong learning for employees. These opportunities are offered to mostly in-house translators or salaried employees (Rodríguez-Castro, 2011). This concept involves mainly the factor of feedback.

Ammons (1956) defines feedback as knowledge of performance and asserts that it generally boosts learning and motivation. Looking into the literature written on the positive effects of feedback on performance, Kluger and DeNisi (1996) show that this effect can also be negative if negative feedback is frequently received. According to Locke & Latham (1990), feedback can lead to setting higher or complex goals, which may lead to better performance. Meanwhile, McDowell (2008) believes novices do not tend to seek feedback on their work since they find it threatening and uncomfortable. Experts, on the other hand, consider feedback as an opportunity to learn more and therefore constantly seek it.

The factor of feedback is measured with the following variables:

- Receiving constant feedback.
- Receiving feedback on translation samples.

3.2.1.4.3. Task appreciation or acknowledgement

Task appreciation or acknowledgement is "the opportunity to receive an expression of positive appraisal after successful task completion" (Rodríguez-Castro, 2011, p. 123). As Hackman and Oldham (1980) put it, being recognized after completing a specific task leads to increased motivation, performance, and satisfaction. Rodríguez-Castro shows that experts are more satisfied with performance appraisal than are novices. This factor is measured by the following survey item:

- Appreciation or performance appraisal.

The variable of receiving appreciation on the successful completion of a task and the variable of receiving feedback, as explained in section 3.2.1.4.2, are similar but are used to measure two different factors. The former can be provided verbally and/or financially (such as a raise in the salary) for reinforcing motivation and encouragement, and the latter is for providing workers with information on their performance to help them improve their skills and learn at work.

As was mentioned, Rodríguez-Castro's model is the most comprehensive model proposed by the literature written on assessing translators' satsifaction with their job. This model has taken into account a vast number of factors and variables that can affect satisfaction. However, there are some grey areas that need to be clarified. The following

section will address these areas in detail. A general criticism of Rodríguez-Castro's model will be presented, and then some specific issues in the task satisfaction model will be pinpointed.

3.2.2. Critiques of Rodríguez-Castro's translator satisfaction model

Rodríguez-Castro introduces her theoretical framework as Herzberg's two-factor theory complemented by Maslow's theory and intrinsic motivation theories. As mentioned in section 3.1.1, Maslow introduces a five-tier hierarchy of human needs which should be satisfied to reach satisfaction, while Herzberg distinguishes between job-content factors and hygiene factors. The job-content factors lead to *satisfaction* and hygiene factors lead to *no dissatisfaction*.

To construct her model, Rodríguez-Castro introduces three facets of translator satisfaction along with their various variables and factors. Despite the aforementioned difference between Herzberg's and Maslow's theories, she treats hygiene factors as leading to satisfaction in the facet of job and professional satisfaction (p. 126). This overlooks the fact that Herzberg's two-factor model posits that hygiene factors do not lead to satsifaction; they lead to no disatisfaction. This oversight suggests the model may be based on Maslow's theory complemented by Herzberg's two-factor theory, instead of the other way around. This confusion appears again when Rodríguez-Castro explains her theoretical framework by saying that "satisfaction is not the opposite of dissatisfaction, but a continuum" (p. 54). In Herzberg's theory, satisfaction and dissatisfaction are not two poles of a continuum. Although Rodríguez–Castro defines Herzberg's factors correctly following this quote, the question remains: "which one of the two theories is exactly the basis of her model?"

With regards to the self-efficacy concept, Rodríguez–Castro assesses translators' understanding level of task scope by asking whether they are generally satisfied with their understanding of the scope of a task before undertaking a task. She provides the following five answers from which translators had to choose: very satisfied, somewhat satisfied, neither satisfied nor dissatisfied, somewhat dissatisfied, or dissatisfied. Based on her survey results, translators' understanding level of task scope is associated with their task awareness, which increases with more hours of practice and years of experience.

As a researcher, I will not follow suit and ask a direct question about how much translators understand the scope of the activities they accomplish every day. First, the question is vague in the sense that it does not clearly show that the question is meant to inquire about the type of activities involved as well as the time required to accomplish them. Second, even clarifying the question would not necessarily yield realistic and comparative results for each translator, since they could present only their immediate reaction to the question. Some translators, specifically novices, might not be conscious of their possible lack of understanding the task scope[36]; and, even if they are aware of it, they might be reluctant to admit that they do not know what they are doing.

Another problem in using Rodríguez-Castro's approach without some modifications is that some of her terms are not clearly defined. For example, she uses the term *task* in *type of tasks* and *type of tasks involved* in the concept of *nature of the task*. The former refers to "a set of routine activities" (p. 102) such as translating, and the latter refers to activities or sub-

[36] Rodríguez–Castro emphasizes that novices often show "a feeling of overconfidence in task completion" (p. 106). Their lack of skill and awareness lead them to overestimate their expertise (Kruger & Dunning, 1999).

tasks, such as the ones that should be accomplished during the translation process. This confusion of terms may cause ambiguity in collecting and analysing data.

In the present study, I will adopt Rodríguez-Castro's approach with a few modifications. Firstly, although I will base my data analysis on Rodríguez-Castro's model, I should clarify that it is based on Herzberg's two-factor theory complemented by Maslow's theory. Secondly, hygiene factors will be analysed as needs that should be met in order to reach no dissatisfaction. Thirdly, job-content factors will be analyzed as the sources of motivation that eventually lead to satisfaction.

My intention is to study both intrinsic and extrinsic factors that lead to satisfaction (in)directly. In doing so, I do not study intrinsic factors seperately from extrinsic factors. The questions that will be asked of translators will be contextualized, so they will not be ambiguous. The terms also will be completely clarified in the data analysis section. Finally, Rodríguez-Castro's model will be complemented or changed with new variables that might come up during the study. The changes in her task satisfaction model will be presented in chapter 6, "Data analysis and discussion." In the next chapter, the methodology of the present study will be explained..

4. Methodology

In this chapter, I will first detail my research method and explain my rationale for adopting it. I will then elaborate on my research setting.

4.1. Research methods

After evaluating various potential methods for conducting the present study, I determined ethnography to be the most suitable methodology for fulfilling my research objectives, which include studying various factors influencing translators' task satisfaction with working with TM+MT, and for eventually answering my research question dealing with the possible effects of TM+MT, the way it is implemented, and the impact of translators' professional and educational background on their satisfaction with working with TM+MT. In the following sections, I will explain some methods that I could have adopted in this study as well as the reasons why I did not adopt them. I will then define ethnography, explain its characteristics in detail, and show why it is the most appropriate methodology for my research project.

4.1.1. Some possible research methods

As mentioned in section 1.5, the Objective of the study is to evaluate translators' task satisfaction by investigating the way TM+MT is implemented and administered by an LSP; the effect of TM+MT on the translation process; and the translators' professional and educational backgrounds. To achieve this objective, I need to study translators' behavioural patterns in various contexts such as in the translation of different text types. Such research could provide valuable information about how translators use TM+MT and how it has affected their translation practice. I also require the leeway to decide on the amount of time

it will require to study translators in order to have a sense of their behavioural patterns. Some reactions or practices might happen rarely during the translation process, and they might be misinterpreted as behavioural patterns if they are not studied in a longer period of observation. I would also like to access "peripheral information," e.g. the project managers' work processes and the company's manuals, so as to gain better understanding of the work conditions and administrative characteristics of implementing TM+MT. Finally, I need to look at the data from various angles to make connections among variables in different ways (see Figure 4.1).

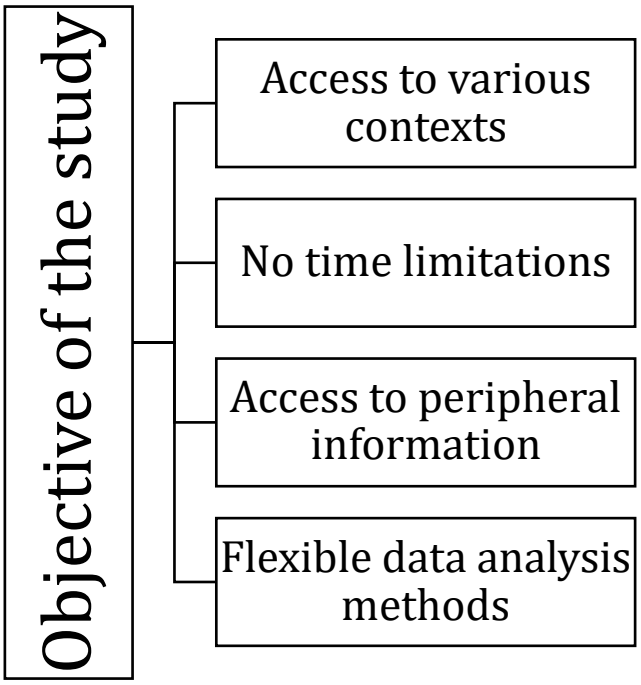


Figure 4.1 The methodological desiderata of the present study

Considering the above requirements, I examined various research methods and evaluated all the negative and positive aspects to find out which one suits my study best. Below, I will explain several available options beginning with defining what online and offline research methods are.

Krings (as cited in Dam-Jensen & Heine, 2009) proposes two main categories of research methods in TS: offline and online methods. He defines these two methods as follows: offline methods are the ones used after the translating activity is done, and online methods are used simultaneously with the translating process. Each one is composed of various approaches based on the question under investigation. His classification of the methods is displayed in Figure 4.2.

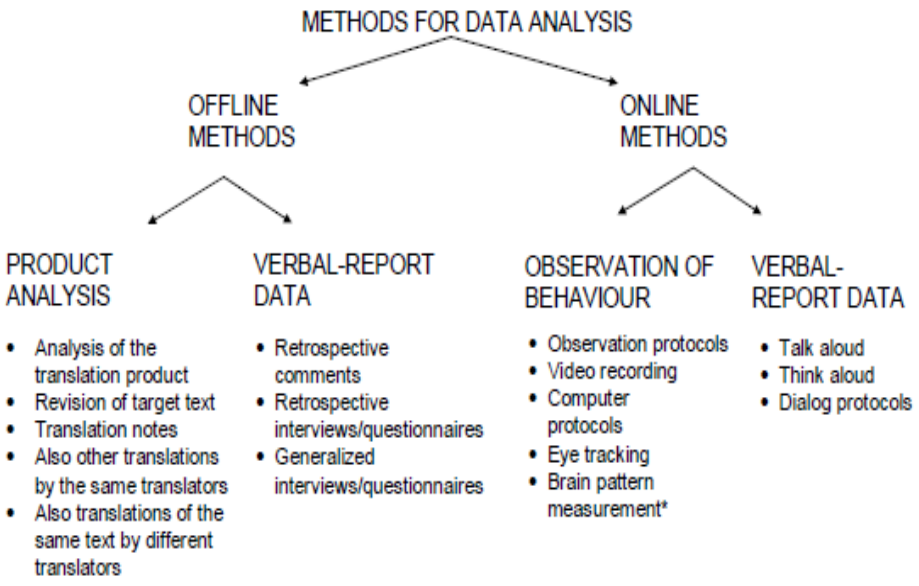


Figure 4.2 Methods for data analysis *(Dam-Jensen & Heine, 2009, p. 3)*.

To investigate translators' task satisfaction, some of the methods in both categories are useful. Combining several methods, I need to observe translators closely and take notes via an online method, in other words, via observation of behaviour. Then I need to interview the observed translators via an offline method—verbal report data—in order to ask some general questions and some retrospective questions about their translation.

I evaluated several possible methods, including conducting a survey, an experiment, a think-aloud protocol, lengthy interviews, and eye-tracking tools. I concluded that they

might not be the best options for carrying out the present study. Here the two methods that were most promising will be evaluated in detail.

The first involves conducting a survey with various questions aimed at determining translators' thoughts or feelings about using TM+MT as well as their needs and preferences when using it. An important benefit of using this method would be that I could distribute a questionnaire to various social networks and translators' virtual communities (such as proz.com and translatorscafe.com). By accessing such a large number of participants who live around the world and who work in diverse conditions, I could gather a significant amount of data.[37] Another benefit is that, if a large number of people participate, the generalizability of the final results will be significant. Moreover, data analysis methods (such as various descriptive statistical analyses) for surveys are well defined and frequently used in other research projects.

There are, however, limitations to this method in terms of my research objectives. A questionnaire would not be able to account for a translator's work conditions in depth. Translators use TM+MT for various language combinations, text types, and deadlines, as well as under different managerial policies, which could affect how TM+MT is taught to the translators by their organizations, how it is implemented, and how it is used. I would not be able to access all this information by asking only a limited number of questions. Furthermore, as already seen in the theoretical framework section, task satisfaction involves various factors, which are measured by numerous variables. Survey questions might be able to target

[37] This is what Lagoudaki has done in her study. All the disadvantages mentioned about her study therefore apply here as well.

translators' immediate feelings or preconceived ideas about TM+MT, but they are unable to shed light on translators' behavioural patterns while using TM+MT.

The second of the two alternative methods for the present study would consist of conducting an experiment in which a number of translators would be provided with TM+MT, asked to do a translation project within a specific period of time, and studied in terms of their behavioural patterns while they work. Afterwards, I would interview the translators to understand what they think or how they feel about using TM+MT.

This method has several advantages. First, it is not very time-consuming and labour-intensive; it could be done for a specific period of time on a single day. Moreover, adapting participants to an experimental condition is easier than adapting research objectives to the natural work conditions of a company (see section 4.2.1). Finally, as in the case of a survey, the results of an experiment could be analyzed by well-defined, frequently used, mostly quantitative methods (e.g. statistical methods).

There are, however, a number of limitations to this method. For example, it would require a drastic change in the actual work environment and require controlling variables that could happen in an actual translators' workplace. In other words, translators would have to be moved out of their daily work setting to a place where various variables are under the researcher's control. Therefore, there would be no actual managerial policies in force which might be different from mine as an academic researcher conducting the experiment only for her research purposes. Additionally, behavioral patterns and satisfactions/dissatisfactions would be also temporary and specific to the conditions of that

experiment. Consequently, the obtained results would not be completely reliable as a "sufficient" and "representative" source of information in this case.

The above methods have not been used in this research project due to these limitations. Considering the aforementioned requirements of my research, I found the ethnographic method to be most suitable for achieving my research objective.

4.1.2. Ethnography

Different researchers have suggested different definitions of ethnography, and obviously new disciplines have added new twists to those definitions (see O'Reilly, 2009; Singer, 2009). I will provide a definition which, to the best of my knowledge, is one of the most comprehensive. I will also highlight the most important aspects of the ethnographic approach.

According to Handwerker (2001), ethnography "consists of the processes and products of research that document what people know, feel, and do in a way that situates the phenomena at specific points in time in the history of individual lives, including pertinent global events and processes" (p. 7). Pelto (2013) explains the main points of ethnography in this definition as follows:

- Ethnography documents not only people's idea systems but also their behaviors, events, and actions (Pelto, 2013). In a similar fashion, LeCompte & Schensul (1999) also explain,

  > [T]he content of an ethnography can address some or all of the following: beliefs; attitudes; perceptions; emotions; verbal and nonverbal means of communication; social networks; behaviors of the group of individuals with friends, family, associates, fellow workers, and colleagues; use of tools; technology and manufacture of materials and artifacts; and patterned use of space and time (p. 4).

- According to Pelto (2013), the word "culture" in Handwerker's definition is a system of properties found in the history of each individual life. Each individual is a "unique mental pattern" (p. 23) that can be called a personal culture.
- Ethnography refers to not only the product (i.e. "an interpretive story, reconstruction, or narrative about a group of people") but also the process (involving "longer term, face-to-face interaction with people in the research community using various data collection tools") (LeCompte & Schensul, 1999, p. 4).
- Ethnography is not specific to anthropology; a wide range of disciplines (e.g. education, healthcare, and urban geography) benefit from this approach in their research.

4.1.2.1. History of ethnography

The origin of ethnography lies in anthropology. The origin of anthropology can be tracked back as far as when the first person travelled to another culture to write about his/her experiences—this person could be considered an anthropologist of sorts (Howitt, 2010). Later on in the 1890s, many sociologists, notably those of the Chicago School, were using this methodology, although they did not label their research paradigm "ethnography" (Pelto, 2013). They focused on understanding urban environments, and the first research of this type was conducted in Chicago itself (Howitt, 2010). At the time, those researchers and many others who used ethnography labeled themselves differently, using such terms like *folklorists* and *folk culture researchers* (Pelto, 2013). Nowadays, as a methodology, ethnography has passed through the boundaries of anthropology, its parent discipline, and found its way into other disciplines (McEwan, 1993).

An ethnographer can benefit from various sources of information in his/her research. To collect information from those sources, s/he needs different data collection methods. The most important data collection methods in an ethnographic approach that will be explained below.

4.1.2.2. Data collection

There are various methods of collecting data in an ethnographic approach. The three most common are observations, interviews, and surveys (LeCompte & Schensul, 1999), which will be explained in the following section.

4.1.2.2.1. Participant observations

Participant observation has been the hallmark of anthropology. It is looked up on as more of a strategy than "a unitary research method" (Davies, 1999, p. 67), since it is composed of various methods (e.g. taking photographs and videos and doing surveys). The classic form of participant observation consists of a researcher spending a period of time among a group of people whom s/he intends to study. This includes "participating in their daily lives in order to gain as complete an understanding as possible of the cultural meanings and social structures of the group and how these are related" (Davies, 1999, p. 67).

The main characteristics of a typical classical participant observation are as follows:

- First, part of the research time is spent on getting to know people and gaining their trust in order for them to be willing to share information with the researcher.

- Second, since the researcher can access firsthand information by observing people's actions and listening to their conversations, later on, s/he is able to ask informed questions regarding the observed activity.
- Third, only a small percent of activities needs to be recorded at the end (i.e. those that are relevant to the study at hand).
- Finally, many unplanned activities might occur in participant observations that can end up being invaluable sources of information (Pelto, 2013).

Based on the literature written on participant observation, there are two important issues that must be taken into account: "reactivity" (Pelto, 2013, p. 137) and "going native" (Davies, 1999, p. 70). Reactivity happens when participants alter their behaviour in the presence of the researcher as a reaction to a newcomer whom they do not trust. There might also be reluctance to talk about sensitive matters and important stories until the researcher gains their trust (Pelto, 2013). On the other hand, the researcher might be immersed in the environment to the extent that the participants will not be alarmed or self-conscious as a result of his/her presence. This immersion is what Davies calls "going native," which might endanger the researcher's ability to notice and analyze native cultural assumptions.

This is related to what Sands (1990, p. 117) calls emic and etic perspective in ethnography:

> Ethnographers utilize two concepts—*emic* and *etic*—to help them understand a culture. The emic perspective is that held by participants who are 'insiders' and encompasses group-defined terms, categories, and meanings. In contrast, the etic perspective is that of those who are outliers [i.e. outsiders] to the

> group. When researchers apply extrinsic, abstract categories to a given culture, they are employing an etic perspective.[38]

Returning to what observations can entail, in the middle of an observation, the researcher can engage in some informal conversations or mini-interviews about the immediate action s/he is observing. They can be about the action, its quality and its comparison to previous actions, and so forth (Pelto, 2013).

4.1.2.2.2. Interviews

Interviewing is the most widely used research method in the social sciences (Davies, 1999; O'Reilly, 2009). Basically, interviews are placed on a continuum from structured to non-structured (Cook & Crang, 1995; Davies, 1999; O'Reilly, 2009):

- *Structured interviews*: the researcher asks a set of pre-determined questions without adding to or deleting from the list. S/he does not even change the word order of the questions. Most often, the interviewees have the freedom to answer, but in the most highly structured ones, they are given a group of answers from which they are asked to select (Davies, 1999; O'Reilly, 2009). This type of interview is "a one-off occurrence, and there is no presumption of a continuing relationship between interviewer and interviewee" (Davies, 1999, p. 94).
- *Unstructured interviews*: this is very close to "naturally occurring" conversation, although the researcher already has some topics on his/her mind and directs the conversation toward what s/he wants to study (Davies, 1999, p. 94). This type of

[38] In the present study, I am both an outsider and insider to the participants in the sense that I have been working as a translator for many years but not with similar tools. I can therefore identify to some extent with the translators whom I will observe.

interview is “much more free-flowing and formless”; the researcher can add questions if need be, and the interviewees can respond to the questions in any way they desire (O'Reilly, 2009, p. 126).

- *Semi-structured interviews*: the researcher prepares a list of questions or topics beforehand. Some of the questions might need fixed answers while others might be presented as topics to be discussed in depth. The researcher has the leeway to insert new questions, delete irrelevant questions, and change the wording. This type has characteristics of both structured and unstructured interviews (Davies, 1999; O'Reilly, 2009).

In fact, semi-structured interviewing has gained popularity in ethnography due to its advantages. As O’Reilly (2009, p. 126) puts it, “conversations encourage reflexivity on both parts, enable the time it takes for participants to explore their own beliefs, and to express contradictory opinions, doubts, fears, hopes, and dreams.” Further, the questions are surrounded by a context and a relationship between the researcher and the interviewees; hence why sometimes this type of interviewing is called ethnographic interviewing (Davies, 1999).

4.1.2.2.3. Surveys

An ethnographic survey, which can be in the form of a questionnaire or interviews, is a structured method of data collection built on the unstructured and/or semi-structured observations and interviews in an ethnographic study. Their reliability and validity is based on prior investigations, i.e. observations and interviews in a specific research setting. A researcher uses surveys as a quantitative set of data enriching/complementing qualitative

data. This quantitative data either will support qualitative data or will call for further data collection and analysis to resolve any contradictions between quantitative and qualitative data (Schensul, Schensul, & LeCompte, 1999).

Ethnographic surveys have specific features: they are preferably the last step in the process of data collection, and survey items are the product of systematic analysis of qualitative data. The fact that an ethnographic survey is founded upon a study of a particular context enhances its validity and helps the researcher understand to what extent the results of in-depth detailed investigations on a small sample are generalizable to the whole population (Schensul, et al., 1999).

Similar to other types of surveys, ethnographic surveys can be conducted as structured interviews or questionnaires. To ensure that the participants in the survey fully understand the questions, the researcher can conduct a pilot test (Schensul, et al., 1999).

4.1.2.3. Some reflections on the ethnographic approach toward translation

Ethnography is not a new field for many TS scholars (Hubscher-Davidson, 2011). Both the terms *translation* and *ethnography* have been used metaphorically to refer to the same action; "[t]he idea that ethnography is a kind of translation . . . has largely been treated metaphorically, as an implication of the broader movement to see cultures as texts to be interpreted" (Leavitt, 2014, p. 194). For example, Valero-Garces (1995) believes that there is a parallel between the ethnographers' and translators' roles as interpreters of cultural experiences. Another example is Anderson (2003), who explains how ethnographers turn into translators of culture and how they represent a particular culture through writing, constructing ethnography through translation processes.

This way of approaching translation and ethnography gradually extended to using ethnography in studying the translation process (see Koskinen, 2006; 2008; Kussmaul, 1997; Lauffer, 2002). It stems from the belief that translation is a situated activity. According to Risku and Windhager (2013, p. 35), "[translation] cognition is not just an information processing activity in isolated brains; it is a context-dependent interaction of mind, body and environment."

This process-oriented approach toward studying translation was strengthened with the development of various technologies for data collection, such as video recorders, eye tracking tools, keystroke logging tools, and screen capture software.

A few studies have applied the ethnographic approach when studying translators and translation technologies (Désilets, Melançon, Patenaude, and Brunette, 2009; LeBlanc, 2013; 2017; Buttacavoli, 2014).

Désilets et al. (2009) observed and interviewed eight professional translators in Canada in order to discover how they used linguistic resources and technology when they encountered translation problems in terms of, for example, terminology, phraseology, and named entities. In another ethnographic study, LeBlanc (2013, 2017) observed and interviewed fifty language professionals, including translators and revisers, in three different LSPs to find out their perceptions of TM systems and their satisfaction with the changes TM systems have brought to business practices. Finally, Buttacavoli (2014) conducted an ethnographic study to examine the cognitive modes translators create to test and judge new technologies. Despite the valuable contributions of these studies, there remain many opportunities to benefit from ethnographic studies in translation technology research.

As Rogers and Bellotti (1997) argue, ethnography is used to shed light on the conditions of a particular work setting and to determine important aspects of existing work practices, and then to find out how those conditions, practices and technologies can be improved.

In other words, ethnographic studies can be informative sources for business managers and software developers seeking to understand users' needs and adjust technology to those needs for better results. This understanding is crucial in developing translation tools, since some software developers may design tools that are not completely suitable or helpful to translators. The proposed ethnographic study is like an interpreter between two groups of people, translators and business managers, or translators and software developers, who speak two different "languages."[39]

4.1.2.4.Advantages and disadvantages of the ethnographic method in the present study

According to Koskinen (2008), ethnography brings about flexibility and complexity in a research design. For instance, a researcher can benefit from multiple sources of data, multiple methods of analyzing them, multiple settings, timeframes, and so forth (Hubscher-Davidson, 2011).

- Multiple sources

[39] The word "language" was mentioned by Dr. Michel Simard (research officer at the National Research Council Canada) in an informal discussion about the present study at the University of Ottawa (2013). He maintained that translation researchers and computer science researchers look at things differently and talk in different languages. As a result, there is sometimes a lack of understanding between these groups. In my opinion, an ethnographic study can play the role of an interpreter to facilitate the dialogue between not only translators and computer science researchers but also translators and business managers, catering to the development of new tools or the improvement of existing ones.

An ethnographic study is composed of various complex sets of data, such as records/transcripts of interviews, field notes, written documents on the research object (e.g. translation drafts, policy statements, contracts, emails), and so on (Buzelin,[40] 2011).

- Multiple methods of analyzing data

As Buzelin (2011) puts it, "data never speak for themselves. Analysis is the art of making your data speak and become meaningful. It is a lengthy, difficult, [and] painful process." Although ethnographic studies are usually qualitative in nature, the obtained data can be analyzed both qualitatively and quantitatively if there is a sufficient number of participants for quantitative analysis. Researchers will be able to study a large number of participants if they do their research for several years. This possibility of course does not apply to the present study due to the time available to conduct this research.

    - Multiple settings

An ethnographic study can be conducted in multilocal, transnational, and virtual settings. It is not necessarily limited to a single setting (Koskinen, 2008).

In the present study, multiple settings means multiple projects where each translator works with a different project having a different deadline, text type, ST difficulty level, client, and so forth in a single company setting.

    - Timeframes

[40] A PowerPoint document.

An ethnographical study can be conducted in cyclical processes as well as collective and individual memories.

This is an important advantage that helps to avoid an experimental situation with a restricted timeframe. As mentioned above, this research can be done without any temporal restrictions.

Despite all its positive features and in comparison to other methods, ethnography is time-consuming in terms of observing individuals and interviewing them. It is also labor-intensive in terms of taking notes during observations, organizing them, transcribing the recorded interviews, and scrutinizing the company's various relevant documents, etc. Because it is so time-consuming and labor-intensive, it has to be done on a limited number of participants and consequently does not provide a suitable amount of quantitative data to make generalizations. Making such generalizations is not, however, my research objective.

Another drawback of this methodology is that, since it is a (semi-)structured methodology, I might unconsciously skip some useful information during the study. In that case, if I go back to seek the missing info, the context might be different from the original context where I did my research, and consequently the aspect I focus on might change. More information about the effect of these limitations on my study will be given in section 7.2 "Limitations."

In the following section, I will describe the setting where this research was done.

4.2.Research setting

This is a study of one branch of an international LSP in Canada. As per research ethics requirements, the name and location of the company will not be disclosed. Likewise, the names of the staff members remain anonymous and translation tools are named by their nature, not their brands. Pseudonyms for the company and its staff members are used for ease of reading and reference.

In the next section, I explain the reasons why at the beginning of my study, my attempts to find a suitable LSP to study were unsuccessful. I then briefly explain some general, but relevant, features of the company I did study (henceforth referred to under the pseudonym "LinguiPlus"), and I explain the openness of the company toward welcoming new translation technologies into its business practices since its formation. I will then provide a brief background on the implementation of TM+MT by LinguiPlus. Next, the 'macro-features' of LinguiPlus, the staff, their numbers, positions, and roles will be explained to provide a sense of scale and function; this will be complemented by a description of the tools and resources staff use to do their jobs. This section concludes with an explanation of the entire process of doing a translation project. This will throw some light on each stage, from receiving texts to delivering translations of texts.

4.2.1. Limitations of finding a suitable LSP to study

Before finding LinguiPlus, I approached three other translation companies in two cities. Unfortunately, this was a major time-consuming process since I was unsuccessful in getting their permission. Some of the reasons that I faced rejection from those companies are as follows:

- The translators' extremely busy schedules discouraged the managers from having a researcher in their company, since providing me with the requested information may have distracted the translators from daily work.
- They did not see any potential short-term financial benefit in helping an academic researcher (see Appendix II: Proposal to LinguiPlus).
- Some of these companies kept it confidential that they use MT in their translation projects because this knowledge might have decreased their clients' trust in the translation quality or affect the price they are willing to pay. It is necessary to mention that I assured them confidentiality in my request but they were cautious (see Appendix II: Proposal to LinguiPlus").

In another company that I approached, and they gave me the permission, TM+MT was used for translating a specific text type which works very well with MT. This did not match my research purpose, which is studying translators working on various text types.

In order to gain an understanding of LinguiPlus' approach and outlook toward translation technology, it is useful to learn about the company's history in using technology, which is where we now turn.

4.2.2. Company's history of using CAT tools

The process of accepting new technologies in a translation company can shed some light on the specific path they have taken in the marketplace and how much they have benefited from new technologies in their business.

4.2.2.1. Before implementing TM+MT

LinguiPlus has apparently always been a "forerunner"[41] in implementing new translation technologies since it was founded. For over a decade, they used an RBMT system, whose output was satisfactory enough "due to the technical nature of the input" (according to one of the managers of the translation department,[42] henceforth referred to as Ms. Smith). The management and translators were apparently very satisfied with it, since, as Ms. Smith explained, "only 5% of the output needed to be fixed." However, the company who developed the above-mentioned MT system went out of business, and they had to give up that tool. At the time, LinguiPlus was only postediting the RBMT results. After ending the use of MT, they were introduced to a TM system that they have been used ever since for a wide variety of text types (both general and specialized).

4.2.2.2. Implementing TM+MT

LinguiPlus began to think about integrating MT into TM in 2009. First, they were introduced to a new SMT system, then they decided to use it in combination with the TM system that they were already using. They ran a two-part pilot study on 4 translators working on general texts with TM+MT for seven months. The test was extended to other offices in Canada and they asked translators to provide feedback on the results. According to the management and translators, the quality of the MT output at the beginning was very poor but the translators' feedback helped the developers to improve the quality. Hence, the second phase of the pilot project started with the improved version.

[41] This is according to the president of LinguiPlus.
[42] The staff and their positions are explained thoroughly in section 2.2.3. "staff."

The results showed better quality, but still there was room for more improvement. At that time, the developers and LinguiPlus' managers believed the more the corpus on which the MT is trained grew, the better results it would give.[43] Here are the overall results of their pilot project:[44]

- No significant increase or decrease was seen in the translators' productivity.
- Autonomous translators[45] saw it as a distraction to their work process. They tended more to use their own knowledge and intuition.
- Less experienced translators seemed to be favorably disposed toward TM+MT since they could only postedit the results instead of translating from scratch.

At this stage, LinguiPlus decided to launch MT officially at their offices in 2010. However, translators were mostly reluctant to use MT in combination with TM. This raised the following question:

Why implement it at all if no increase has been seen in translators' productivity and translators' feedback does not show that they are content with TM+MT?

I asked this question to the LinguiPlus' managers and their answers were as follows:

- Ms. Smith occasionally translates (when translators are not able to meet the deadlines), and she had a positive personal experience translating with TM+MT,

[43] Today, they think they can increase the quality of MT results by changing SMT into a hybrid system (according to Ms. Smith).
[44] This is according to the rollout PowerPoint they showed to their staff on October 5, 2010, before they implemented TM+MT officially.
[45] They are the most experienced and fastest translators in the company (see section 4.2.3 "Staff").

which saved her time with regard to searching and typing. This seems to be one of the main factors for implementing TM+MT.

- They believe that translators' complaints against MT were rooted in a fear of losing their job as translators and becoming posteditors.
- They think this is the future. Introducing new technology into their business boosts their reputation in the translation industry.
- According to the president of LinguiPlus (henceforth referred to as Ms. Harvey), the volume of translation demands had dropped massively over the previous five years. She referred to an *Ottawa Citizen* article by James Bagnall (2015) to support her claim.[46] She concluded that this reduction has led the company to find new initiatives to help it stay as competitive as possible in the market. She mentioned that the price they were offering to their clients was the same as that of decades ago. She, therefore, believed that some technologies like MT act as a counter-balance, allowing them to stay reasonably priced, yet profitable in the marketplace.

These answers show that there were various factors affecting the decision of the managers to implement TM+MT. These factors have convinced them that—despite the translators' complaints—they should use TM+MT.

To provide more context about the people directly involved in a translation project, the staff and their responsibilities are summarized in the following section. The exact

[46] Bagnall (2015) states: "Public accounts data suggests federal government spending on independent translation firms – that is, excluding the Bureau and its subcontractors – shrank by 50 per cent from 2010 to last year to $24 million. The number of words translated also plummeted" (para. 36).

position of each staff member will not be named, however, in order to maintain confidentiality.

4.2.3. Staff

In this section, I will enumerate the linguistic positions at LinguiPlus. Then, I will explain the company's requirements for employing translators as well as the employees working hours.

4.2.3.1. Positions

The company is composed of various departments, including Translation, Desktop Publishing, Project Management, Allocation,[47] Information Technology, Accounting, and Sales. For the purpose of this research project, I will only look at the Translation Department in detail.

The department has 5 project managers (PMs), 4 proofreaders, 17 translators (5 of whom are autonomous translators), 14 revisers[48], 2 terminologists, and 7 quality control (QC) staff. All these positions are explained below in the order in which a translation project is done:

- *PMs* are responsible for assigning the STs received from clients to the language department for a variety of reasons, including translation and revision services. They pre-process (see section 4.2.5.1, Pre-processing and assigning texts") the texts they receive from the clients. They are also in charge of doing modifications on the text to make it compatible with the programs translators use (e.g. removing images) and

[47] Allocation staff distribute projects to in-house and freelance translators.
[48] Sometimes Mr. Smith revises and translates, if they are in a rush mode to meet the deadlines. Moreover, they outsource part of their translation projects to freelance translators, therefore, they need a good number of revisers.

removing those parts that should not be translated. They also check the spaces to make sure that unsuitable spacing in the documents, specifically, in PowerPoint decks, do not affect the ability of MT to translate properly

- *Translators* translate documents they received from their PMs in their personal platform based on the PMs and/or client's instructions and the finalized deadlines.
    - *Autonomous translators*[49] are the most experienced and fastest translators at LinguiPlus whose translations are not sent for revision and quality control, because in the past they have met the quality expectations of the clients and the management fully trusts their work. Some of them might be occasionally assigned to do revisions.
- *Revisers* revise translations and provide their feedback to the translators. For this purpose, they compare the ST with the TT in the TM segment by segment to find mistakes and check if the translator has met the company's translating standards.[50]
- *Proofreaders* proofread texts (such as brochures and website content) that have been translated for publication. They use some tools[51] to compare STs with their corresponding TTs for some elements such as idiomacity, structure, colors, and fonts. Their job is less detailed than that of revisers and they proofread after revision has been completed.

[49] The original name the company uses for this position is "traducteurs autonomes," but for the purpose of this study, I have translated it into "autonomous translators."
[50] There are some unofficial translation standards that must be followed by translators at LinguiPlus.
[51] Refer to section 4.2.4.2, Tools."

- If a translated text is for internal use in an organization and is not expected to be published, it is sent to *QC staff*. They check prominent details such as dates, numbers, and punctuation. They do not compare the TT with its ST at this stage.
- *Terminologists* create term records and correct the terms in the database. They also provide consultation for employees in the translation department who have terminological questions or inquires.

Since the focus of this study is on translators, the next section explains the requirements that translators had to meet for employment with LinguiPlus.

4.2.3.2. Translators' employment requirements

Translators are hired based on specific criteria; the two main ones, as explained by the management of LinguiPlus, are:

- The language into which they translate must be their native language[52];
- They must have a university diploma in Translation.

Based on the interviews that I had with the participants, in practice the management also evaluates the quality of a sample of translation provided by the job applicant, although it should be noted that the management did not mention this criterion.

[52] Although the management strongly emphasized this criterion, I observed a translator who was translating from her fourth language (English) to her third language (French). In a response to my question about the reason she was hired there, the management said that her French was good enough for the job.

4.2.3.3. Translators' work hours

The company is open from 7 am to 9 pm. Translators are required to work for 7 hours and 30 minutes, and they have 30 minutes for a lunch break. They, therefore, are expected to be physically present at the company for eight hours per day.

The types of tools and resources they use will be discussed in the following section.

4.2.4. Equipment

In general, translators have state-of-the-art resources and tools at their disposal.[53] In the case of LinguiPlus, some of the tools were adjusted to the needs of the company, and some of them were designed in-house and are not necessarily available. In the following sections, some of those resources and tools the staff use are introduced.

4.2.4.1. Resources

Having permanent access to a high-speed Internet connection gives translators the possibility of using various online resources, including Google Search (e.g. usually government websites and searches on the Internet), termbanks (e.g. Termium), monolingual and bilingual dictionaries (e.g. Le Grand Robert et Collins Dictionnaire), bilingual corpora/concordancers (e.g. TransSearch and Linguee), and so on. The client specific term base and Antidote are among the frequently used resources as well.

[53] Some of the tools are not updated, such as Antidote 7 (at time of conducting my study the latest version was Antidote 8; as of this writing the latest version is Antidote 9).

Another resource for translators is reference documents (in various formats, such as Microsoft Word and PowerPoint) provided by clients. These usually consist of previous translations of similar texts in specific fields that might be helpful to the translators.

If translators cannot find the desired information, they refer to the revisers and/or their peers.

4.2.4.2. Tools

I begin with the tools used by proofreaders and PMs; then, I will explain the tools available to the translators in detail.

The proofreaders use the ApSIC Xbench 2.9 program [211] as well as Antidote [211] to check the accuracy of the text. Moreover, an important part of the PMs' jobs has been centralized in an in-house designed program through which they pre-process STs for both TM and MT on a single interface without spending the time to switch between the two programs.

Also, some translators have been using a TEnT for almost 15 years at the time of conducting the present study. LinguiPlus integrated SMT in 2009. The SMT suggestions are shown in the TEnT's interface by default, but the MT has a separate interface that can be accessed separately from the TEnT if need be. The features of TM+MT will be touched upon in the following section.

4.2.4.3. TM+MT specifications

The database feeding the TM has been divided into multiple parallel corpora based on the clients and not subject areas. Some of those corpora are rich enough for the SMT to yield

useful results, but some of the smaller corpora are used only in the TM system, and translators will not be using SMT for those specific clients.

Additionally, updating TM and SMT databases is done differently. The TM database is updated in real time with each single segment that is translated. This quality makes it possible for the TM to provide context matches[211].

The SMT database, however, is not updated at the same time as TM. The system has been set to give a notification to one of the managers to run the update function after it detects the addition of 10,000 new units to the memory, and usually it takes them a couple of weeks to reach that amount of input, depending on the translation projects they receive. The reason they do not update it daily is that updating the SMT database is a time-consuming process, and the management avoids doing that if the number of newly translated segments is not cinsiderable.

Besides the specifications of TM+MT, LinguiPlus has its own process of translating with TM+MT, which will be explained in the following section.

4.2.5. General process of completing a translation project with TM+MT

Every translation project received from clients goes through various people with different roles in the translating workflow. The general process of translating will be explained below in detail.

4.2.5.1. Pre-processing and assigning texts

PMs receive new texts via File Transfer Protocol (FTP)[211] or emails from their clients along with some reference material and instructions. The text types are usually identified by

clients; otherwise, PMs are responsible for doing that. Upon receiving a new translation project, PMs prepare a work item for their internal system including all information necessary for invoicing purposes.

Using specific tools, PMs remove any part of the document that might not be compatible with their translation tools (e.g. images).

As mentioned in section 4.2.4.2, Tools", a major part of the PMs' project preparation has been centralized in a single in-house program. PMs are able to "pre-process" texts by defining the context, client, language pair, and other features for each project.

However, what should be specifically noted in the pre-processing stage is that they define values for the matches and the MT results, meaning that they set the program to show the MT result if there is no match over 70-80%[54] in the TM. The settings are out of the control of the translators, although apparently they are able to turn off MT if they think it is not useful[55]. After pre-processing the text, PMs would be aware of the number of exact, fuzzy, and no matches for billing purposes. Moreover, PMs fix the misused line breaks that might interfere with the performance of the TM+MT.

The last stage of pre-processing is selecting jobs for a translation project among internal/ external translating, revising, proofreading, and quality control. PMs might choose all or some of the above jobs based on each project's requirements.

[54] The value can be changed between 70 and 80% for each specific translation project.

[55] The management claims that translators are free to turn on/off MT whenever they desire. However, in my interviews, I found out that the non-autonomous translators are told by their revisers not to turn off that option.

4.2.5.2. Translating

The pre-processed texts are sent to the translators. If they come up with questions for which they cannot find any answer, they refer to their revisers, PMs, or peers via an Instant Messaging program called Skype for Business, an email, or in person at the neighboring cubicle[56]. If there is any problem with the spaces and format of the ST, they send the file back to their PMs to fix it. At the end of the translation process, they edit the TT in Antidote and then send the finished work to the next person in charge[57].

4.2.5.3. Correcting

Revisers are responsible for comparing STs with their corresponding TTs and fixing linguistic and terminological problems. In addition, they sometimes correct the memory or ask terminologists to fix some terms in the termbase.

Proofreaders are responsible for the next stage in the process, which is a quick check on some details such as numbers and dates; occasionally, they have to compare TTs with their originals.

The last group is the QC staff who check TTs for their naturalness and idiomacity without any comparison with their STs.

[56] Translators' offices are small cubicles.

[57] It depends on how many stages PMs request to be done after translating. If the translator is autonomous, s/he will send the translated text directly to the client.

5. Data collection

Using an ethnographic approach, I benefited from various sources of information, including observing and interviewing staff members, having informal interactions with them, and going through the company's relevant documents and website. The data collection process is outlined in this section.

5.1. How did I choose the participants?

According to LeCompte and Schensul (1999), researchers should identify a set of inclusion criteria or a list of characteristics that make the potential participants eligible for the research. Here are the three categories of criteria that should be determined in participant recruitment:

- *Logistical criteria* depend on the resources available for the study. The researcher should select each participant after doing a cost-benefit analysis of time, money, and distance. Here, some participants, no matter how useful they are for the study, might be excluded (LeCompte & Schensul, 1999).

  Based on the available resources, this study was done in a Canadian company for three consecutive weeks without any necessity to provide specific tools or resources to the participants.

- *Definitional criteria* determine participants based on their characteristics such as age, sex, and ethnicity. The size of the group to be chosen could be influenced by the available time and financial resources.

The major criterion I used to for choosing participants was that they be translators who work with TM+MT, i.e. "criterion sampling" (Pelto, 2013, p. 146).I did not see any necessity to select participants with specific characteristics, such as age, sex, and experience; rather, I believed that having a wider range of individuals relevant to the research question would be very beneficial to this small-scale study, as diversity among participants would make the results more informative (Bryman, 2004). This type of sampling is called "maximum variation sampling" (Pelto, 2013, p. 146).

I, however, used "opportunistic sampling"[58] to choose people other than translators (i.e. general participants [107]) to talk with or observe. There were some people who voluntarily began to help me and provide me with relevant information.

- *Conceptual criteria* deal with this question: How big or small should the size of the sample be? Does the selected sample group contain sufficient number of participants with the characteristics of interest in a research study?
- In this study I will provide a detailed description of each observation and interview; necessity of providing a detailed description naturally leads me to select a small sample to study. Therefore, based on consultation with Dr. Matthieu LeBlanc[59], Dr. Jean Quirion[60], and Dr. Pierre-Jérôme Bergeron[61], it was decided that the sample size

[58] According to Pelto (2013, p. 148), regardless of one's research scope, one should have some basic ideas based upon which to carry out purposeful sampling. "However, you are likely to encounter situations in your field work for which you have no advance information, and therefore you have to take whatever individuals or events (or other units) come along."
[59] Professor and Vice Dean, Faculty of Arts and Social Sciences, Université de Moncton.
[60] Associate Professor and member of Faculty of Graduate and Postdoctoral Studies, School of Translation and Interpretation, University of Ottawa.
[61] Former assistant professor, Department of Mathematics and Statistics, University of Ottawa. He is currently working at McGill University.

should limited to maximum ten translators. Dr. Bergeron opinioned that the focus of my study should be on the important and visible advantages and disadvantages that most participants share; therefore, studying up to ten translators would be sufficient.

In the following sections, the participants' characteristics are explained.

5.2. Participant recruitment

There are two major groups of participants in this study: general and specific. The former is a group of people with whom I was in touch to obtain more information in addition to the information I received from the specific participants. The differences between them will be clarified in the following sections.

5.2.1. General participants

As noted above, in order to obtain more information and also understand the translation workflow better, I communicated with staff members other than translators. I interviewed a translator who is paid per word, Ms. Harvey, President of LinguiPlus, Ms. Smith, Director of Translation Department, and Ms. Nelson, Process Improvement Analyst, about integrating MT into their TM system, the motivation behind it, its effect on the translators' productivity, LinguiPlus' outlook toward translation in the market(place), and other diverse topics that are discussed in detail in chapter 6, "Data analysis".

I also observed a project manager pre-processing a text before assigning it to a translator and a reviser revising a translated text. This provided me with some general information on the positive and/or negative effects of TM+MT on the translation quality from the revisers' perspective.

5.2.2. Specific participants

I observed and interviewed seven translators whose ages ranged from 25 to 45 years. They were five female and two male translators. Since the number of participants is low, I refer to all with the pronoun "she" to avoid any identification. All the participants were full-time employees paid per hour, contrary to other LinguiPlus translators who were paid by the word (see section 5.2.2.1. "Limitations"). Three of them were autonomous translators, one of whom was a reviser who did translation when she did not have any revising job depending on the assignments given to them. The two other autonomous translators were occasionally given revising jobs. Moreover, one of the translators was a proofreader, and she translated when there were not any pending proofreading jobs. Their professional job experience ranged from 4 to 9 years.

All participants possessed a four-year Bachelor's degree in Translation and some of them had language-related degrees. Most of them had done an internship in the same company, other companies in Canada, companies in European countries, or simply worked under the supervision of a freelancer. One of the autonomous translators had not done any internship at all.

Only two translators were briefly trained in CAT tools during the last year of their studies. The others were trained when they were hired at LinguiPlus, or they were trained during their internship there.

For more information about the specific participants of the study, refer to Table 5.1

Participant	Position	Age Group	Education	Type of employment
T1	Autonomous translator & reviser	39-45	B.A. in translation	Full time
T2	Translator	25-31	B.A. in translation	Full time
T3	Autonomous translator	32-38	B.A. in translation	Full time
T4	Autonomous translator	32-38	B.A. in translation	Full time
T5	Proofreader	39-45	B.A. in translation	Full time
T6	Translator	25-31	B.A. in translation	Full time
T7	Translator	25-31	B.A. in translation	Full time

Table 5.1 The participants' characteristics

5.2.2.1. Limitations

I did not have any leeway to invite all translators to participate in my study due to the company's control over the process. The management did not allow me to observe the translators who were paid by the word in order to avoid any distraction or negative effect on their productivity. I, therefore, only observed those translators who were paid by the hour.

The main difference these translators had from the ones paid by the hour is time pressure. Translators paid by the word had to be faster in order to get paid more. Observing and interviewing translators paid per-word may have brought to light the effect of TM+MT on their work load, productivity, quality of translation, and remuneration. What I did learn from the translators I was able to observe, however, proved to be very beneficial to this study.

The general process of doing the study included observing and interviewing some of the staff members during (and outside of) work hours, as well as scrutinizing relevant internal documents of LinguiPlus and its website. Each stage and its limitations are explained in the following sections:

5.3. Time spent at the company

I spent three weeks, 13 hours a day (195 hours in total) in LinguiPlus observing and interviewing participants, searching through the company's internal documents such as manuals and bulletin boards, asking questions from other staff members, and reflecting upon data. All data was recorded and digitized on site.

5.4. Observations

Before observing the translation process, I observed a PM pre-processing an ST before assigning it to a translator. She explained and showed me all the stages and answered my questions. This provided important information regarding the criteria PMs used to customize TM+MT for a specific project, choose people for each translation project, determine a deadline for each project, transfer client's requests to translators, communicate with translators to help them with questions, and charge their clients.

I also observed a reviser revising a TT produced with TM+MT to see the amount of correction she had to do on the TT. Revisers had access to both the original suggestions from TM+MT and the postedited version; therefore, they were able to see where those suggestions had been changed. In this way, I could see where they were content or frustrated with translators' choices, and which choices was related to TM+MT. Moreover, it showed me to

what extent translators' works were controlled by their supervisors, and when they received feedback from them.

Next, I started to observe seven translators doing various translation projects with TM+MT. I looked into the ST segments and the quality of translations suggested by TM or MT, how translators responded to each suggestion and solved translation problems, the tools and resources they used to find information, and how and when they communicated with PMs, revisers, and terminologists. The exact duration of each observation is displayed in Table 5.2.

Participant	Observation Period	Number of Words Translated/Revised
Project manager	00:20:00	Not Applicable
Reviser/T1	00:18:00	400 (revised)
T1	01:22:00	1,142
T2	01:33:00	1,610
T3	01:58:00	1,994
T4	01:50:00	1,957
T5	02:00:00	976
T6	02:27:00	1,070
T7	02:01:00	784
Total	Approximately 13 hours	9,533 translated words

Table 5.2 Observations' details

The average time I observed translators was 1 hour and 53 minutes. The maximum duration of observing translators was 2 hours and 27 minutes, and the minimum duration was 1 hour and 22 minutes. In addition, the average number of words translators translated with TM+MT during my observations were 1,362 words. The maximum number of words translated was 1,994 in 1 hour and 58 minutes, and the minimum was 784 during 2 hours and one minute. All the participants translated a combined 5,061 words for seven hours of working per day.

The observations of specific participants are placed at the core of my analysis based on the Rodríguez-Castro's model. The observations of the general participants are used when the context or reason of a translator's specific behaviour needs more clarification.

5.4.1.1. Limitations

- Since TM+MT was only used for some of the translation projects at LinguiPlus, translators could be assigned projects with or without TM+MT (see 2.2.4.3. TM+MT specifications). Moreover, some of the translation projects with TM+MT were very short, and I had to continue my observation of a single translator the next day she used TM+MT. This, therefore, led to multiple interruptions in the middle of observations, and occasionally I had to start observing another translator while I was waiting for the previous one to receive a translation assignment with TM+MT. That being said, the numbers shown in Table 5.2 for each participant are the sum of all observations of that individual.
- I have an advanced knowledge of the French language. At this level, I am able to discern semantic and syntactic issues in the French translated segments, but stylistic issues and translators' creativity is not perceptible to me. More knowledge of French language would have enriched my ability to better comprehend translators' work linguistically and the interaction among them.

5.4.2. Interviews

I interviewed one of the translators paid per word in addition to the main seven participants of the study. I also interviewed Ms. Harvey, Ms. Smith, and Ms. Nelson. The duration of each interview is mentioned in Table 5.3. This does not include the informal conversations I had with them about TM+MT.

Fortunately, after being assured of the confidentiality of their comments, all interviewees agreed to have their voice recorded during the interview.

For more information about the duration of each interview, see Table 5.3.

Position	Duration of the Interview
Ms. Harvey	00:13:43
Ms. Smith	00:48:20
Ms. Nelson	00:55:35
Translator (paid per word)	00:20:34
T1	00:44:11
T2	00:36:14
T3	00:20:21
T4	00:26:19
T5	00:19:57
T6	00:37:05
T7	00:14:17
Total	05:00:00
Total Interview Time with Translators	3:18:00
Mean Interview Time with Translators	00:28:28
Total Interview Time with General Participants	2:00:00
Mean Interview Time with General participants	00:30:00

Table 5.3 The interviews' durations

The mean duration time of the interviews with the translators was 28 minutes. The maximum interview length with translators was 44 minutes and 11 seconds; the minimum time was 14 minutes and 17 seconds. In addition, the mean interview duration time with general participants was 30 minutes. Ms. Harvey, the president of LinguiPlus, was interviewed for the shortest duration, and Ms. Nelson was interviewed for the longest duration.

5.4.2.1.Limitations

- Almost all interviewees had poor listening and speaking skills in English. In addition, English is my second language as well. Therefore, I had to repeat my questions or explain them with examples in order to provide clarify. This made almost all questions directed. Consequently, I may have unknowingly missed some valuable information they wanted to provide but because of language issues did not present itself.
- Since the translators' schedules were strictly dependent on the urgency of the translation assignments, they occasionally did not have enough time to be interviewed immediately following a translation project during which they were observed. Consequently, I sometimes had to interview them before observing them and ask questions about the immediate translation project by politely interrupting them in the middle of their work. As a result, the participants may have missed an opportunity for retrospective thinking about a particular job (if they were interviewed before translating). Also, the participants were not able to provide a lot of information due to time constraints during translation.

5.4.3. Informal interactions

I benefited from informal conversations with other members of the staff during coffee/lunch breaks as well as talking to them outside of LinguiPlus.

5.4.4. Various documents

Bulletin boards, the company's website, and manuals for newly-hired translators, revisers, and proofreaders were other useful sources of information I utilized for this research project.

Despite all limitations, the flexibility of the ethnographic approach in gathering data from various sources enriched my study. Using NVivo 11,[212] I have categorised the data obtained under the various factors and variables of my theoretical framework; these are analysed and discussed in detail in the next chapter.

5.5. The researcher

Due to the importance of clarifying a researcher's characteristics and position in an ethnographic approach, I deem it necessary to provide relevant information about myself, including my educational background, professional experience, knowledge of CAT tools, language skills, and possible biases.

- In addition to studying in the current TS Ph.D. program, I have a Bachelors and Masters of Arts degrees in TS.
- I have almost ten years of experience translating from English-into-Farsi and vice versa in Iran.
- I started researching translation technologies ten years ago. However, regarding the actual experience of working with CAT tools, I should mention that at the time, the translation work process in Iran was very different from that of the Canadian

translation industry. TM and MT have not found their position in the market yet, therefore, I did not use TM or MT during my professional translation experience.

- I have a near-native knowledge of English language (the SL of LinguiPlus' translation projects) and advanced knowledge of French (the TL of LinguiPlus' translation projects).
- Because of my educational and professional background, I can relate to the translators working conditions, hence my interpretation of the data may have some biases in favour of translators.

6. Data analysis and discussion

In this section, I analyze and discuss the collected data according to the Rodríguez–Castro's model (see section 3.2.1). The factors which are analysed and discussed are self-efficacy, the nature of the task, job-fit, and self-fulfillment, respectively. The variables that have been discovered via observations or derived from in my interviews, however, are partly different from the variables in Rodríguez–Castro's model. In the present study, some of her variables have not been addressed due to lack of information, and some others have been added since they came up during the study. In other words, Rodríguez–Castro's model will not be discussed in this chapter with the exact same wording and in the exact same order as was discussed in chapter 3.

It is necessary to mention that all of the interviewees but one were Francophone and English was not their native language, therefore, numerous grammatical and idiomaticity issues occurred in their interviews. Due to the high frequency of those issues, I decided to leave the quotes as they were, with the exception of removing the identifying information to respect the guidelines of Research Ethics and Integrity at the University of Ottawa. Despite those issues, the interviews are informative and should be intelligible for readers.

Due to the importance of translators' professional profiles in Rodríguez–Castro's model, a table containing translators' characteristics will be provided for the second time in the following section (see section 5.2.2). The table will be followed by a detailed explanation of translators' characteristics which were not mentioned in chapter 5.

6.1. Translators' professional profile

Rodríguez–Castro emphasizes that task depends on FOK which is deeply associated with translators' professional profiles. Due to the importance of FOK in task satisfaction, I have presented translators' professional profiles in the order of translators' years of experience in Table 6.1, as well as a detailed explanation of each column. I will refer to this table throughout this chapter.

Regarding formal education, all translators have a four-year Bachelor of Arts degree in translation from various universities. They, however, vary in the number of years they have worked as professional translators. To avoid identifying translators based on their years of experience, I have shown T2 and T7 as translators with the lowest professional experience among the participants; then, I assigned to each translator the number of years they have more professional experience than T2 and T7; for example, T5 has one year more experience than T2 and T7, or T6 has three years more experience than T2 and T7.

Translators	Formal education	Years of professional experience	Subject matter	Experience with CAT tools
T2	B.A.	Base	General	2-3 months + on the job
T7	B.A.	Base	General	On the job
T5	B.A.	1 year	General	On the job
T3	B.A.	2 years & a half	General/Specialized	On the job
T6	B.A.	3 years	General	8 months + on the job
T4	B.A.	3 years	General/Specialized	On the job
T1	B.A.	5 years	General	6 months + on the job

Table 6.1 Translators' professional profiles

Translators' knowledge of the subject matter is tied to their work experience in a specific field for specific clients. Translators say almost all the STs are general texts requiring no specialization to be translated. They only need consistent terminology, and, although they may be about, or in, a specific field, they are not necessarily highly technical. They are usually written for a public audience, (e.g. health brochures) However, the most experienced translators are occasionally given specialized texts to translate.

The next column in Table 6.1 indicates translators' knowledge of CAT tools and the way they gained that knowledge. They usually received their knowledge on the job with the brief training that LinguiPlus provided, as well as through self-practice. Only three out of seven translators (T1, T2, and T6) were trained in CAT tools before being hired at LinguiPlus. Their amount of training is explained in more detail below.

In the final year of her university program, T1 had 6 months of training in a TM system, and during the following 6 months, she worked with the same TM system in an actual work context as a part of her internship. T2 also worked with TM and terminological databases during her two-to-three-month internship. T6 had some training in translation technologies at university and did an internship for 8 months.

The rest of the translators did not have any knowledge of, or experience working with, CAT tools before being hired, other than working with general programs such as Microsoft Office and using the Internet for searching. They learned how to work with CAT tools either by working several weeks under the supervision of senior translators, or with self-practice. Thus, it can be concluded that their knowledge of CAT tools is tied to their work experience.

Having explained the translators' professional profiles, I now turn to analysing various concepts and factors pertaining to task satisfaction at LinguiPlus. One of the concepts of task satisfaction that depends on translators' profiles is self-efficacy. This concept has been researched among the translators of LinguiPlus, and the results are discussed below.

6.2. Self-efficacy

As previously explained, self-efficacy refers to translators' evaluation of their capability to influence the goals and outcomes of the tasks they accomplish in their job (see section 3.2.1.1, Self-efficacy). It is composed of two main factors, task scope and task description, which will be analysed in the context of LinguiPlus.

6.2.1.Task Scope

Rodríguez–Castro defines task scope as the various activities that are included in a task and how long each one takes to be completed (see section 3.2.1.1.1, Task scope"). The translators'

levels of understanding task scope is one of the variables of self-efficacy, and it is discussed next.

6.2.1.1. Understanding the task scope

The only available data to assess this factor of self-efficacy is the translators' professional profiles. Since, unfortunately, I did not receive more information about this factor, I must base my assessment on Rodríguez–Castro statement rather than qualitative data: hours of practice and years of experience helps translators to be more accurate in their problem solving and better understand the pragmatics of translation. While this is a useful statement, it should be noted that it is not sufficient for making a definite conclusion. According to the statement, Table 6.1 shows that T1 likely has the most, and T2 and T7 likely have the least understanding of the task scope due to the length of their practice and experience. As noted, this factor needs more information and research to be assessed accurately.

Another variable of the task scope is knowledge of CAT tools that can facilitate or accelerate the translation process.

6.2.1.2. Knowledge of CAT tools

As mentioned above, most translators were hired at LinguiPlus without any knowledge of CAT tools. To be able to work in a company, that uses technology in almost all of its translation projects, translators should be prepared to use CAT tools, at least through some in-house training. I searched for the records of CAT training at the company and I accessed an internal document explaining to translators how to use the TM system from a technological perspective. For example, the document explained how to format text display and how to insert a term from a terminological database into the segment being translated.

I, however, did not find any training on critical thinking about CAT tools or how to use them in the translation process (for example, in what situations specific tools and resources are best suited).

T4 voiced this point clearly by saying that the CAT tools training LinguiPlus provides to translators is mainly about how to use the functionalities. Then, they are placed in front of computers translating actual projects.

After implementing TM+MT, LinguiPlus provided a group session explaining the goals behind integrating MT into TM and the results of the trial project they carried out to evaluate TM+MT's performance (see section 4.2.2.2). They also showed translators some screen shots of the TM+MT interface and some examples of translations done by MT, as well as how translators can use suitable pieces of translation and edit or erase the rest.

T5 and T6 claimed it was easy to learn how TM+MT worked and implied that they did not need any more training beyond that one session, "it was just once, because it's not really that complicated" (T5); "it's pretty simple, because what we do with it is just looking at the suggestion" (T6).

There was only one translator, T2, who did not get any training in this regard. Moreover, T7 only received several pages of guidelines explaining how to use the TM+MT from a technological standpoint.

T1 has experienced translating before and after the implementation of TM+MT. Comparing the two periods, she believes TM+MT slows her down except in translating more technical projects with which she is not familiar; MT gives her a base understanding of

technical terms with the help of which she can start searching. This increases her productivity in translating technical projects.

T3 confirms TM+MT has increased her speed since MT provides her with the base; she double-checks the terms but it gives her a general idea of the sentence. Also, she adds, "it helps you sometimes in a way that you don't have to write the whole sentence from scratch. You already have some elements to use." Observing her work, I noticed she almost always used MT suggestions.

T4 thinks TM+MT is not very helpful and actually slows her down. For some specific clients, it helps, according to her, but generally she is faster without it.

Interestingly, T5 believes that TM+MT has no effect on her speed of translation, and she would be fine if she did not use MT for her future projects. Observing her work, I, however, discovered that she is very flexible in using MT suggestions. She only corrects and replaces some elements and in some cases she accepts MT suggestions without any changes.

T6, in general, is negatively disposed toward TM+MT. Although it helps her with specific projects, most of the time, she says, "it just goes quicker to erase what [MT] gives you and start from fresh."

As the least experienced translators among the participants, T2 and T7 both prefer to use TM+MT as a means of increasing productivity in all projects since they find it difficult to meet their deadlines without it. Not knowing the suitable contexts for using MT, and not having the freedom to turn it off and on have decreased some parts of T2 and T7's self-efficacy in translation projects where MT is not available, because they find themselves slow without it.

To summarize, the most experienced translators take advantage of MT in some of the translation projects at their own discretion but the least experienced translators, T2 and T7, are dependent on MT to meet the required productivity. Therefore, it is hard for them to translate the projects where MT is not included, and this negatively influences their confidence in their own translation skills.

Now, a question arises: what aspects of knowledge of CAT tools best facilitate translators' productivity? Based on the data I received through interviews and observation of specific translation settings, I deduce that there are two aspects: The first is technological knowledge, which includes translators' familiarity with interfaces, functions, buttons, and so on. The second is application knowledge, which includes a translator's awareness of where, when, and how to use those tools. When both are available, translators should have the freedom to use or not use the tool.

Another variable of task scope is the translators' subject matter expertise and its effect on their speed. This variable is discussed below.

6.2.1.3. TM+MT and subject matter expertise

What I mean by the word "expertise" in this research is the extent to which a translator is familiar with a particular subject field and its terminology. It does not necessarily mean being specialized in a field other than translation. Among the translators I studied, there were no specialists in that sense, but there were some areas where they had been working for a while, and they were quite familiar with the terminology of the subject matter being translated.

According to all the participants, they translate mostly general texts for specific clients, and those who have been working with these clients for a number of years generally know the clients' preferences and expectations regarding terminology and quality.

For highly technical texts, some translators take advantage of MT as a source or a guide for finding equivalents for terms. T6 and T1 find MT helpful for translating technical projects. T6 mentions that, "… when you are not familiar with the subject, it helps. It gives you a starting point for what to search."

T1 claims that she is fast at translating texts without using MT for a client whom she has been providing translation services for years:

> The first two or three years I was here, I did mostly one client, [Food Leadership]. I knew it like the back of my hand. So I didn't need [MT] to tell me that [Food Leadership] was supposed to be [Leadership Alimentaire] in French. I knew it, and I could just type it in, and it was just fine, but when I started working on [Eco Petroleum] or other customers, [MT] helped me, because it just gave me the names of those chemicals, and I didn't have to look for them.

This indicates that MT can be helpful for contributing to a translator's knowledge of the subject matter, meaning it can be used as another resource or tool in the workplace to help save time when searching for specific terms. As T3 explains, "it's not an absolute tool; you have to use your own judgement and see if it can help or not."

On the other hand, overestimating the MT's capabilities to find equivalent terms may increase terminological mistakes, and hence the chance of receiving negative feedback from the clients, and as a result, decrease translators' belief in their abilities. Informed use of MT, in contrast, contributes to the translators' self–efficacy in translating projects with which

they are not familiar. The degree of reliance on MT is determined based on the amount of translators' CAT tools knowledge and translation experience.

In conclusion, lack of familiarity with a subject matter is not a concern for translators at LinguiPlus, since they are mostly assigned to general texts, and if they are given technical texts, they can use MT as a guiding tool to find the equivalent terms.

However, accelerating translation brings up another question: Does increasing the speed of translating, due to tighter deadlines, affect quality? This question is addressed in the following section.

6.2.1.4. Translators' productivity and the target text quality

One of the reasons for which tools are implemented by companies is to increase productivity. Regarding the effect of productivity on translation quality and the role of TM+MT at LinguiPlus, I asked two questions in my interviews: Has the implementation of TM+MT increased the productivity expectations of the management at LinguiPlus? And if so, how has higher productivity influenced translation quality?

In my second interview with Ms. Smith, one of the managers of the Translation Department at LinguiPlus, I asked her about the number of words translators are required to translate per day, and whether it has been increased since TM+MT was implemented. She replied that the number of words increased by 100 words per day two years ago. Before implementing the MT six years ago, and four years after implementing it, the number had not changed. She explained that the increase was a sudden decision of the president of the company and had nothing to do with TM+MT. In contrast, three translators hypothesized that the number increased because of the integration of MT into TM, or at least that TM+MT

an influencing factor.

In her interview, T1 acknowledged the effect of implementing TM+MT on the productivity expectations of her employers:

> At first, I remember that when [TM+MT] was implemented, I don't remember exactly what was said and how but yes! The expectation was that we would be able to go through so many more words a day as a company.

She also believed that it was because of the obligation imposed by LinguiPlus and not the positive effect of TM+MT that translators became more productive.

T4 was not sure whether the increase in productivity happened at the same time as the implementation of TM+MT, "at some point, they raised their productivity expectations but [I'm] not sure if it was at the same time with when [MT] came."

T5 pinpointed the raise in productivity expectation as occurring after the implementation of MT: "I think they want more now. After [MT], I think the budget is [X] words a day, and I think when I started . . . it was [100 words less]."

With a different perspective, T6 thinks MT was only one factor affecting the productivity expectation, "[MT] is another factor. We have [MT], we have translation memory, and we have tools to help us so they say since we have all of that, you should work faster."

On the contrary, the management emphasized that the use of MT did not lead to any remarkable raise in productivity, and their decision to raise the productivity requirement had nothing to do with TM+MT. Most translators, on the other hand, consider TM+MT to be the main reason, and this might be one of the reasons they are disposed negatively toward MT. Perhaps this discrepancy between management and staff pertains to communication, as

it seems the employees were not given clear reasons for the increase in productivity expectations.

Regarding the clients' or employers' expectations of quality and the effect of productivity increases on quality, four translators unanimously mentioned that they were expected to produce work of the same quality as the time before TM+MT was implemented, but the pace of work is expected to be higher. In one case, T1 did not seem to be concerned about the drop in the level of quality as a result of higher productivity. She stated:

> When it's really rushed, it's me personally that I tend to say, 'well! The client has a crazy expectation, they will get what we can give to them.' The way I was raised as a translator, and I did my internship, my boss in [X] was like, 'OK! They gave us crazy work conditions, that's the best they can get. We cannot give them a super quality if they don't give us enough time or tools.' We do our best but I guess sometimes we go faster and probably we miss a few things but trying not to obviously.

It is necessary to mention that T1 is an autonomous translator whose translations do not undergo revision or quality check, and she has more control over her products than a regular translator. Therefore, that might be one of the reasons why she is not concerned about the effect of productivity on her translation quality.

In another case, T3 implied that TM+MT aids in overcoming translation problems and go faster, not for increasing quality:

> They always expect the same quality. I think [MT] is provided to help us, being faster probably and having less trouble translating sometimes, but it's not an absolute tool; you have to use your own judgment, and see if it can help or not. That's my personal opinion.

Based on the above findings, TM+MT plays both the role of a protagonist and antagonist in translators' workplace; on the one hand, it is used to facilitate and accelerate

translating, on the other hand, it is assumed by employees that the implementation of TM+MT means more work with the same quality expectations.

The second main factor for assessing self-efficacy in Rodríguez–Castro's model is task description. In the following section, I explain to what extent tasks are clarified for translators at LinguiPlus.

6.2.2. Task description

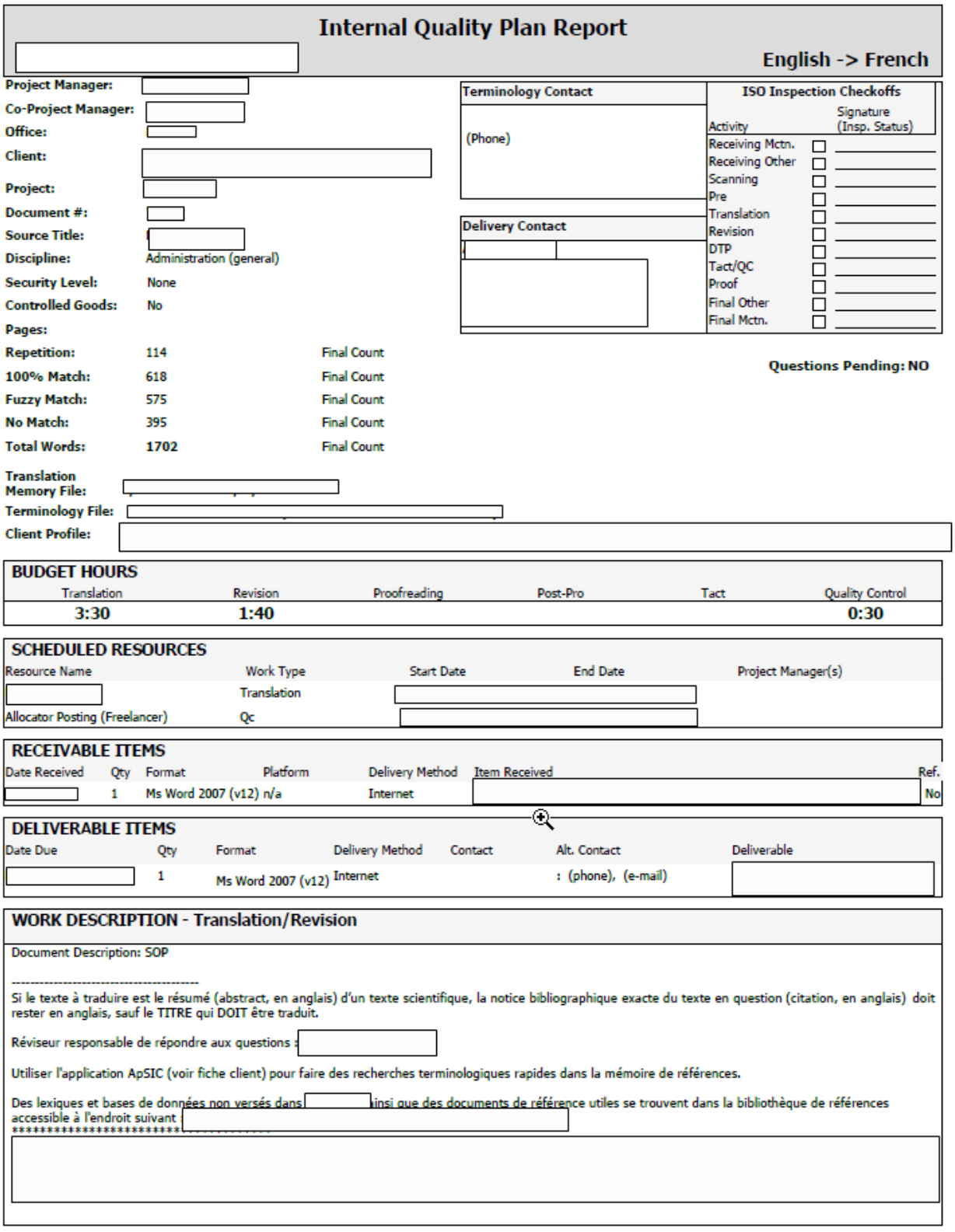
A clear, accurate task description can be a complementary resource to the translators' understanding of the task scope, specifically for novices. Providing accurate information about the time needed to translate a specific project and the available tools helps translators anticipate activities and plan their time precisely (see section 3.2.1.1.2, Task description).

Figure 6.1 and Figure 6.2 are the screen shots of a task description given to a translator for a project.[62] In this description, translators are not informed if MT is included in the translation process or not. They usually come to know if MT is to be used in a project after they receive the pre-processed text (see section 4.2.5.1) in the TM system. Moreover, only autonomous translators have the leeway to turn off/on the MT function; the others are required to leave the MT on if it is included in the project.

The "budget hours," or the time estimated for doing each specific project, is based on the number of 100% and fuzzy matches and the number of total words. Based on my informal conversations with some of my participants, estimates may not match exactly the time needed to do the job.

[62] All of the information that might lead to the identification of the company has been removed.

Some translators mentioned that the discipline of the ST is often determined incorrectly or imprecisely. This lack of accuracy might be due to the fact that most texts are "general" and classifying those texts might be more challenging than the ones that are highly technical.



Internal Quality Plan Report

English -> French

Project Manager:
Co-Project Manager:
Office:
Client:
Project:
Document #:
Source Title:
Discipline: Administration (general)
Security Level: None
Controlled Goods: No
Pages:
Repetition: 114 Final Count
100% Match: 618 Final Count
Fuzzy Match: 575 Final Count
No Match: 395 Final Count
Total Words: 1702 Final Count

Translation Memory File:
Terminology File:
Client Profile:

Terminology Contact
(Phone)

Delivery Contact

ISO Inspection Checkoffs

Activity	Signature (Insp. Status)
Receiving Mctn.	
Receiving Other	
Scanning	
Pre	
Translation	
Revision	
DTP	
Tact/QC	
Proof	
Final Other	
Final Mctn.	

Questions Pending: NO

BUDGET HOURS

Translation	Revision	Proofreading	Post-Pro	Tact	Quality Control
3:30	1:40				0:30

SCHEDULED RESOURCES

Resource Name	Work Type	Start Date	End Date	Project Manager(s)
	Translation			
Allocator Posting (Freelancer)	Qc			

RECEIVABLE ITEMS

Date Received	Qty	Format	Platform	Delivery Method	Item Received	Ref.
	1	Ms Word 2007 (v12)	n/a	Internet		No

DELIVERABLE ITEMS

Date Due	Qty	Format	Delivery Method	Contact	Alt. Contact	Deliverable
	1	Ms Word 2007 (v12)	Internet		: (phone), (e-mail)	

WORK DESCRIPTION - Translation/Revision

Document Description: SOP

Si le texte à traduire est le résumé (abstract, en anglais) d'un texte scientifique, la notice bibliographique exacte du texte en question (citation, en anglais) doit rester en anglais, sauf le TITRE qui DOIT être traduit.

Réviseur responsable de répondre aux questions :

Utiliser l'application ApSIC (voir fiche client) pour faire des recherches terminologiques rapides dans la mémoire de références.

Des lexiques et bases de données non versés dans ainsi que des documents de référence utiles se trouvent dans la bibliothèque de références accessible à l'endroit suivant :

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Figure 6.1 An example of a two-page task description that project managers give to translators at the time of assigning a project.

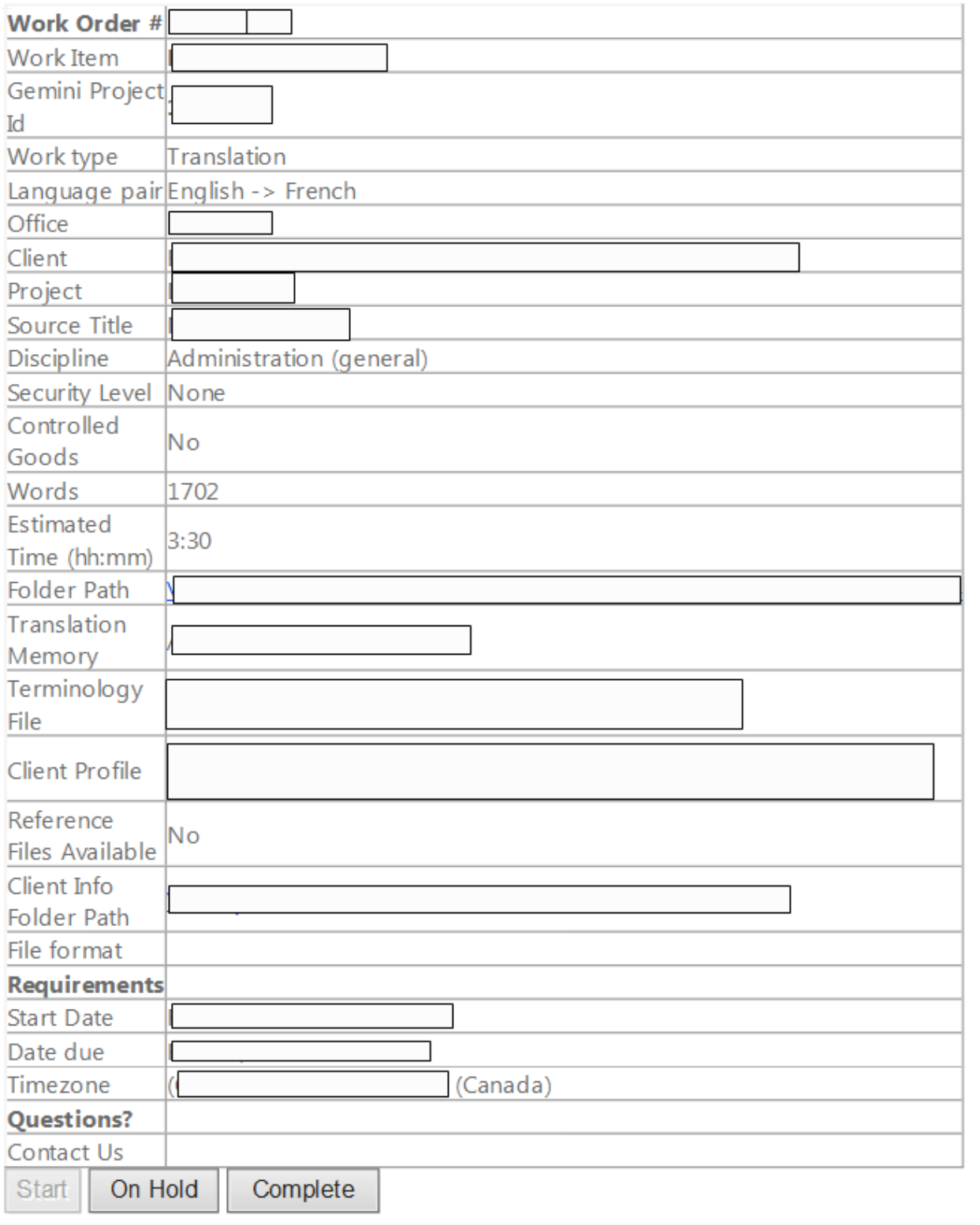

Figure 6.2 An example of a two-page task description that project managers give to translators at the time of assigning a project.

Understanding of the task scope among less experienced translators can be improved by providing an adequate, clear task description. Lack of a clear description might affect the time translators finish their tasks as well as the quality of their work, and this, consequently, may impact their self-efficacy negatively.

6.2.3. Conclusion and adjustments to Rodríguez-Castro's model of self-efficacy

This study shed light on multiple aspects that are suggested for improvement at LinguiPlus: first, the company could benefit by providing more training on both technical functions and suitable applications of CAT tools, or simply hire translators that already have that knowledge. Furthermore, lack of subject matter expertise can be compensated by proper use of translation technology. Also, increasing productivity expectations pressurizes translators to produce more work with the same quality at LinguiPlus. Finally, giving a detailed, accurate task description helps translators plan their time more efficiently. These points have been explained in the above sections and will be further discussed in chapter 7, "Conclusion."

Based on my observations and interviews at LinguiPlus, I have introduced slight changes in the way variables are presented in Rodríguez-Castro's model. I combined deadlines and speed of translation into one variable, *productivity*, since they are closely tied to each other and cannot easily be separated; productivity is a general term that includes both speed and deadlines. In addition, the personal prounouns mentioned in her model have been removed to aviod implying that the only way to study those variables is asking direct questions from translators. This way, the variables can be adjusted to the ethnographic appraoch using various data collection methods. All the variables in Rodríguez–Castro's model have been addressed but in a different order (see

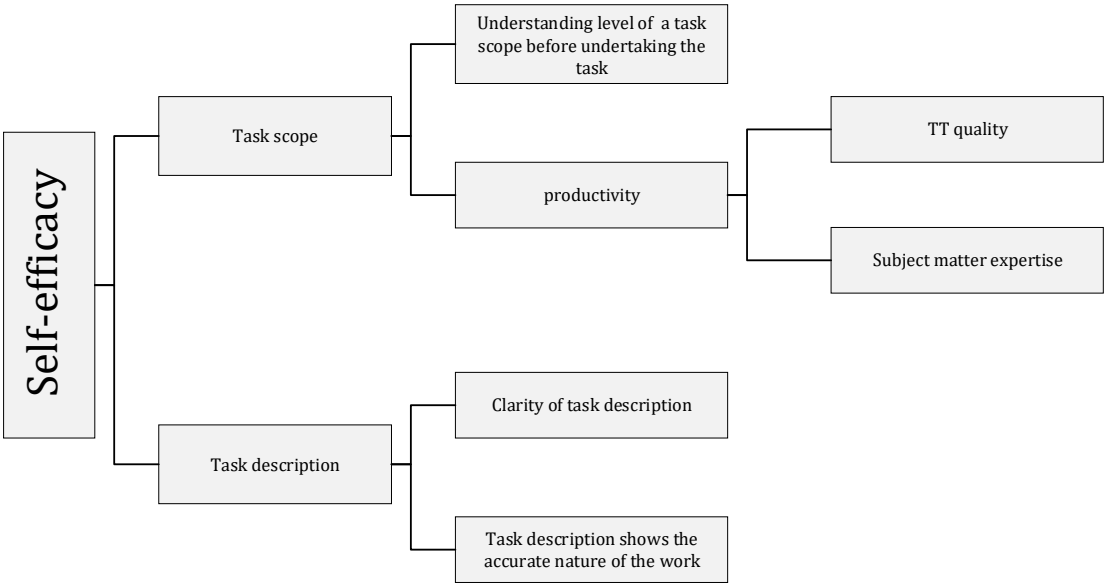

Figure 6.4). The original model of Rodríguez-Castro has been presented here (Figure 6.3) to facilitate comparison between the original and the adjusted model.

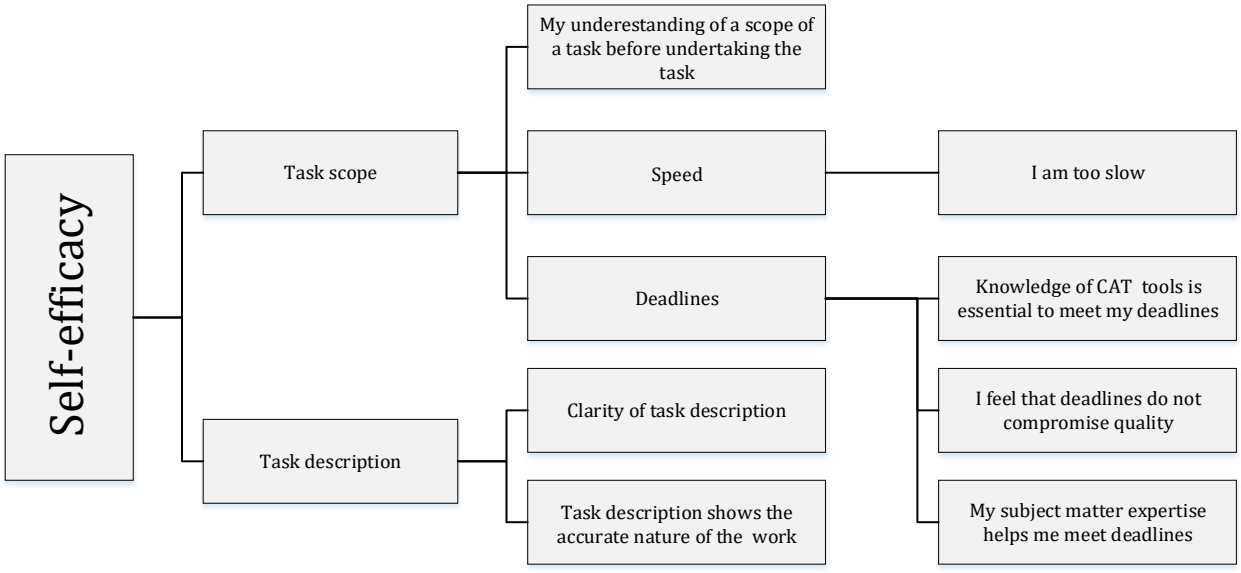

Figure 6.3 Factors and variables—Self-efficacy (the duplicate of the original model)

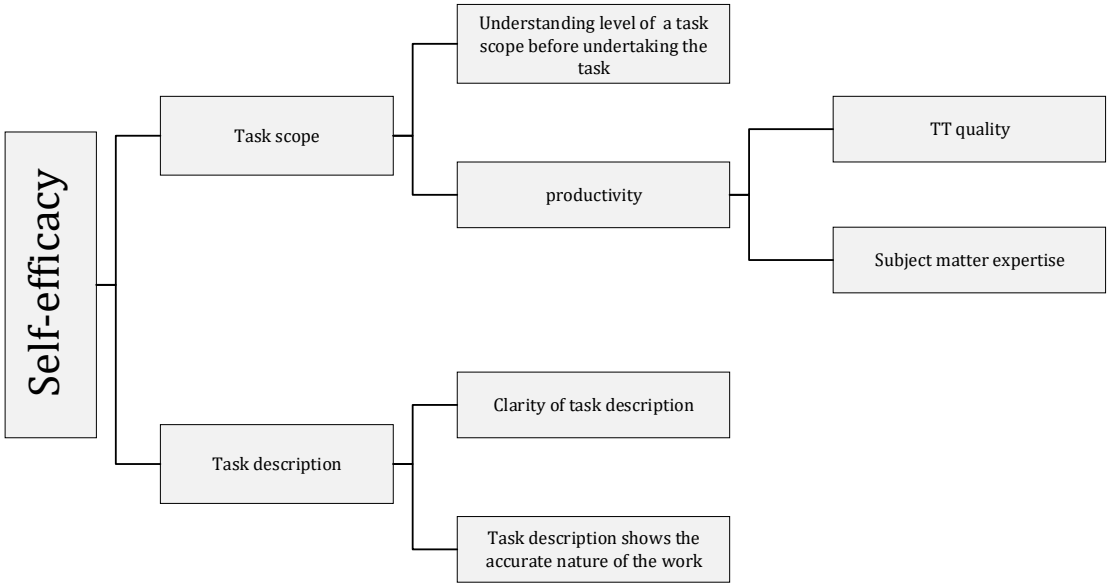

Figure 6.4 The adjusted self-efficacy variables at LinguiPlus

Having shown the adjustments made to the original self-efficacy model, I will analyze the second concept of task satisfaction—the nature of the task or work itself—at LinguiPlus. The nature of the task is mainly about the characteristics of the activities translators accomplished. In the next section, I will discuss the nature of the task at LinguiPlus.

6.3. Nature of the task

Nature of the tasks, or work itself, refers to the job characteristics that lead to task satisfaction (see section 3.2.1.2, Nature of the task"). It is composed of four factors: tasks performed, task complexity, variety of tasks, and novelty of the task. Each one has been investigated at LinguiPlus through various methods and will be discussed shortly.

6.3.1. Tasks performed

Tasks performed have been investigated through the following variables: types of the tasks provided by an LSP and types of the activities involved in each task (see section 3.2.1.2.1, "Tasks performed").

6.3.1.1. Types of the tasks or services provided

Considering the definition of general and specialized translation by Rodríguez-Castro, I asked the participants what text types they are assigned for translation. Only two of the autonomous translators (T3 and T4) were assigned specialized or technical texts, although they also mostly work on administrative or general texts. In my observation of T3 and T4, they both translated specialized texts.

Each task included sub-tasks or activities that should be accomplished. In the following section, the variables that affect the type of the activities involved in a translation is explained in detail.

6.3.1.2. Type of activities involved

The activities involed in each translation project change with the variables of source text features and tasks related to translators' specialization. These variables are discussed below.

6.3.1.2.1. Source text features

Based on interviews and observations, the following features are considered important aspects of an ST, impacting the type of activities involved in each translation project. These features influence the performance of TM+MT, and hence add to or diminish the workload or change the activities translators accomplish in their job. This could influence translators' attitude toward TM+MT and their job as whole. The following examples and findings are the ones that came up during the observations and are by no means complete.

Source text quality

If an ST is composed of lengthy, complex sentences, all translators spend much more time on fixing MT output. Four translators, as well as Ms. Smith, corroborate that MT underperforms with lengthy, complex sentences. For example, Ms. Smith says, "it all depends how well the English is written. If it's a clear English then it's helpful. When it's ambiguous or the sentences that are too long . . . [she stopped talking]." Similarly, T3 believes, "it . . . depends on the complexity of the sentence to start with. If it is a very complex sentence, the result would be less significant, if it is a simple sentence, it can give a better result." T6 also shares the same opinion: "the longer the sentence, the more complex it is, the more challenging it is for [MT]. If it is a simple subject-verb-complement sentence, it works fine, but if it is a little more complicated than that it has its issues." She also adds, "it also underperforms in translating long sentences, specifically if the English version is not well written, so the translator has to spend much time to fix it."

In addition, T7 pinpoints another problem caused by lengthy sentences: "in the long passages, usually [MT] misses words."

Figure 6.5 is an example of poor MT performance as a result of poorly written ST.

1	VSWG·members·are·also·encouraged·to·please·update·your·information·on·the·DAT·and·BAT·registries·on·the·VSWG·CNPHI·site·in·order·to·ensure·that·this·information·is·up·to·date·and·of·value·to·other·jurisdictions·who·may·require·additional·BAT·or·DAT·in·an·emergency.	AT	Les·membres·du·groupe·de·travail·sont·également·encouragés·à·veuillez·mettre·à·jour·vos·renseignements·sur·l'antitoxine·diphtérique·et·les·registres·des·chauves-souris·sur·le·site·du·Réseau·canadien·de·renseignements·sur·l'approvisionnement·en·vaccins,·afin·de·s'assurer·que·ces·renseignements·sont·à·jour·et·utile·pour·d'autres·territoires·de·compétence·qui·peut·nécessiter·plus·de·chauve-souris·ou·diphtériques·en·cas·d'urgence.

Figure 6.5 A screenshot of TM+MT interface (long, complex sentences)

In Figure 6.5, the sentence is unnecessarily long and complex. It could be broken up

into two or three sentences. In addition, "VSWG members" and "you" refer to the same people but in third person and second person, respectively. As a result, the translation is syntactically and semantically wrong. Two examples of those issues are as follows: *utile* and *peut* should have been plural since they are related to *renseignements* and *territoires*, respectively. Moreover, an example of a semantic problem is translating *BAT* meaning *Botulism Antitoxin* as *chauve-souris* instead of giving its correct equivalent French acronym or full form. However, that issue is not related to the sentence length and complexity but to the MT failure to recognize the meaning of capitalization.

Source text format

In my observations, I noticed translators have to refer to the ST in the PowerPoint format to look for more context more frequently than they would if the ST was in the Word Document format. Moreover, texts with bullets and numbering are more challenging for the MT to translate. Some of the translators, Ms. Smith, and the PM, also mentioned this in their interviews. Ms. Smith explained, "PowerPoints, when they were just bullet form, very bad, because it doesn't understand the logic. When it's more technical, like a user manual, a guide, a report, we had pretty good outputs." She also adds, "most people say that it's awful with PowerPoints."

To investigate more, I asked the translators to capture the image of the problematic MT suggestions when a text is in the bullets and numbering format. The following examples show some of those problems which might not be necessarily caused by the bullets and numbering format of the text but they happened when the text was is that format.

Figure 6.6, segment 23 shows an example of a poor MT output when the ST was in bullets and numbering format.

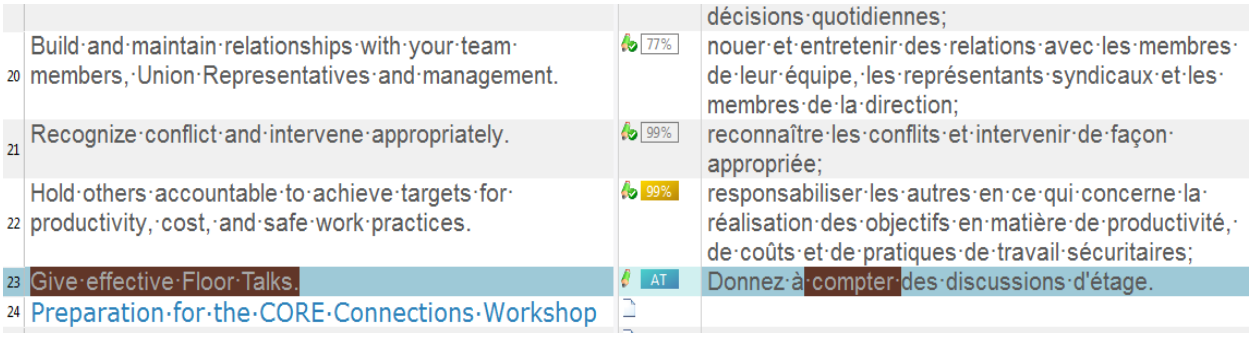

Figure 6.6 A screenshot of TM+MT interface (bullets and numbering)

As could be seen in segment 23, the translation is a combination of unrelated words that has no meaning in French.

Another example can be seen in Figure 6.7[63].

Figure 6.7 A screenshot of TM+MT interface (bullets and numbering)

As can be seen in Figure 6.7, MT has not kept the consistency between the bullets, meaning that the nouns at the beginning of each bullet are all without articles except

[63] Segment 1 at the very top of the image shows the MT suggestion, and segment 26 shows the edited version by translator. From now on, all the images will show the MT output at the very top and the postedited version at the bottom. The remaining segments are provided for more context. The percentage beside each segment shows the match found in TM for that specific segment, and the abbreviation *AT* stands for *automatic translation* showing the MT suggestion

segment 26. The translator had to remove the article before *identification* to make it more consistent. The unchanged MT output is shown at the top of the image.

Another format that is challenging for MT to translate is PDF. PDF texts also impose some other issues on translators. As the PM explains:

> Sometimes the client extracts PDF files in MS Word, and so it makes all kind of [hard] returns between these words that cause they split in the middle of sentence, and the PM's job is to fix them before sending the file for translation. Sometimes, we miss some of them, and [translators] usually ask us to redo the project, but if it's only one or two, they can do it [themselves]. The main problem is the returns in a phrase. Sometimes the project is full of [hard] returns.

Some other ST features

From my observations I found that translators have to do extra activities to overcome issues such as the following:

- MT underperforms in terms of acronyms and abbreviations. It usually gives full forms instead of the equivalent abbreviations or acronyms, and in some cases those full forms are wrong (see *BAT* for *Botulism Antitoxin*, *DAT* for *Diphtheria Antitoxin*, and *VSWG* for *Vaccine Supply Working Group* in Figure 6.5).

- If there is some punctuation marks attached to words without space in between, MT leaves them un-translated, for example, *one-to-three* is rendered as *one-to-three*. This flaw disrupts the translation flow of the rest of the sentence.

  Figure 6.8 shows an instance of un-translated words due to the attached punctuation: *informant/market*. This could be one of the main reasons the French translation is meaningless in this particular case.

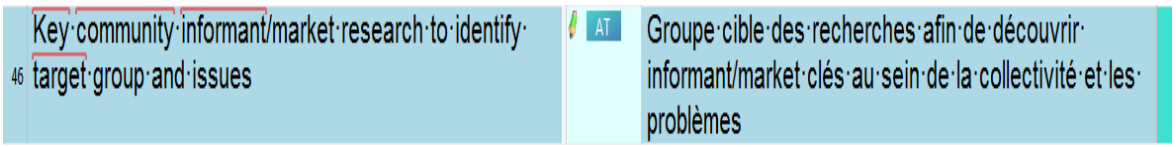

Figure 6.8 A screenshot of TM+MT interface (long, complex sentences)

- Numbers should be double-checked to see if they match their equivalent French form; for example, MT does not translate *490 K* to *490 000* in French.

- MT translates proper names that should not be translated and vice versa. Translators have to double-check proper names frequently.

T1 and Ms. Smith mentioned two additional points in their interviews:

- MT underperforms in translating spoken language (T1).

- The more technical and scientific, the better MT works (Ms. Smith).

6.3.1.2.2. MT output textual features

The textual features of MT output that influence the activities accomplished by translators during translation are explained in this section. The screen shots offer a few examples, since I was able to ask translators to save them during the middle of their translation.

Semantic features

Sometimes, polysemic words and homonyms are translated incorrectly because of the MT's lack of understanding the context. As T6 mentioned in her interview,

> [b]ut then again, it makes some terminological errors, sometimes we have to laugh and we send emails to each other because it is so funny what [MT] gives us. Just an example, I can give you on top of my head. I translate a lot for [Food Leadership], and then sometimes when the client speaks of *flyers*, at the beginning when they introduced [MT], it told us flyers was *voltigeur* and it's a *ciculaire*. Voltigeur is in the

> circus, someone who is flying so we have laughed about it but you know the bigger your TM is, the better [MT] will be, but it still exists. You see that once in a while, and you say 'Ah [MT]! You know!'

Another example occurred during my observation of T1; I noticed MT translated the verb "know" as "savoir" incorrectly in French in the following context: "il sait la vision" instead of "il connait la vision."

During my observations, multiple instances of misinterpreting the anaphoric, cataphoric, and exophoric references by MT occurred both semantically and syntactically. The translators had to double-check the references in the ST and make the necessary changes.

In addition to semantic features, many syntactic features of MT output affected the activities accomplished by translators.

Syntactic features

According to my observations, translators frequently had to correct the word order, gender, number, articles, prepositions, verb tenses, and verb conjugations in the MT output. In their interviews, translators referred to those syntactic problems as well: T1, T3, and T5 pinpointed the frequent gender issues in the MT output:

"… [the] computer doesn't see if it should be feminine or masculine, or if it should be singular or plural" (T1).

> It makes some errors sometimes because it uses the most recurrent thing in the memory, so sometimes it shows a masculine word while it should be feminine. So you have to adapt it to the context. . . So sometimes it really makes you stop, and you have to reformulate, and sometimes it is very good" (T3).

"The words are spelled fine but not grammatically correct like feminine and masculine aspects" (T5).

In addition to gender issues, T4 mentioned plurality problems in MT output: explaining that there were, "some grammar problems. If you have a plural subject, it won't necessarily give the plural equivalent. It is a recurrent error. I think it doesn't know yet. The general structure is kind of good. Also there are feminine/masculine problems as well" (T4).

Moreover, wrong word order is another issue I observed pertaining to MT output. Some examples of this are below:

Figure 6.9 shows an example of an incorrect word order suggested by MT. In segment 89, *programme cadre-Liaisons atelier* is an English word order that the translator changed into *l'atelier du Programme cadre-liaisons*. In addition, *day* has been incorrectly translated as singular in French.

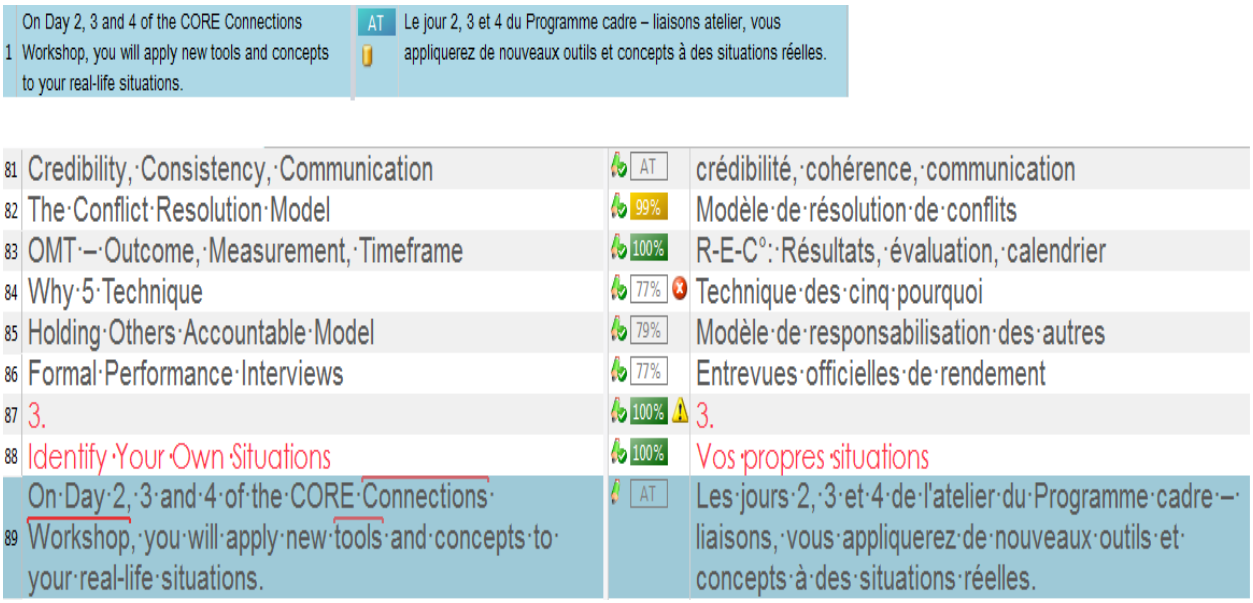

Figure 6.9 A screenshot of TM+MT interface (word order)

Figure 6.10 shows a wrong word order in the machine translation of segment 15. The unchanged MT is shown at the top of the page, and the postedited version has been shown at the bottom of the image.

Figure 6.10 A screenshot of TM+MT interface (word order)

In the next section, the stylistic features that influence the activities will be explained.

Stylistic features

Almost all of the participants agreed on the unidiomatic and literal style of MT output. In her interview, T1 explained that style is sometimes one of the reasons why she changes the MT output: "I would change sometimes for stylistic reasons because . . . [MT] made the sentence too long or too complicated."

T2 thinks that MT output might have made her translations less idiomatic, and she is concerned about the interference of English words and structures in the French translations, "quality wise, it is less idiomatic because it's full of English. In this situation, the French cannot be as rich..."

T3 is not as pessimistic about the MT output, explaining that "sometimes it's very good but sometimes it's very literal."

T4, who uses MT less than her colleagues, said, “the style is very literal, maybe that’s another reason why I just erase it.”

T5 asserted that she would not translate with the same style that MT does, “it wouldn’t be what I would write,” because it is too literal for her.

Literal translation could also lead to an unidiomatic or wrong word order or word choice. Here are some observed examples of MT poor word choices as a result of literal translation:

Figure 6.11, segment 36, is an example of literal translation by MT. The noun phrase *use of electronic postcard,* has been translated as *l'utilisation d'une carte postal électronique*. The translator made it more idiomatic in French by changing the word *utilisation* to *envoi*.

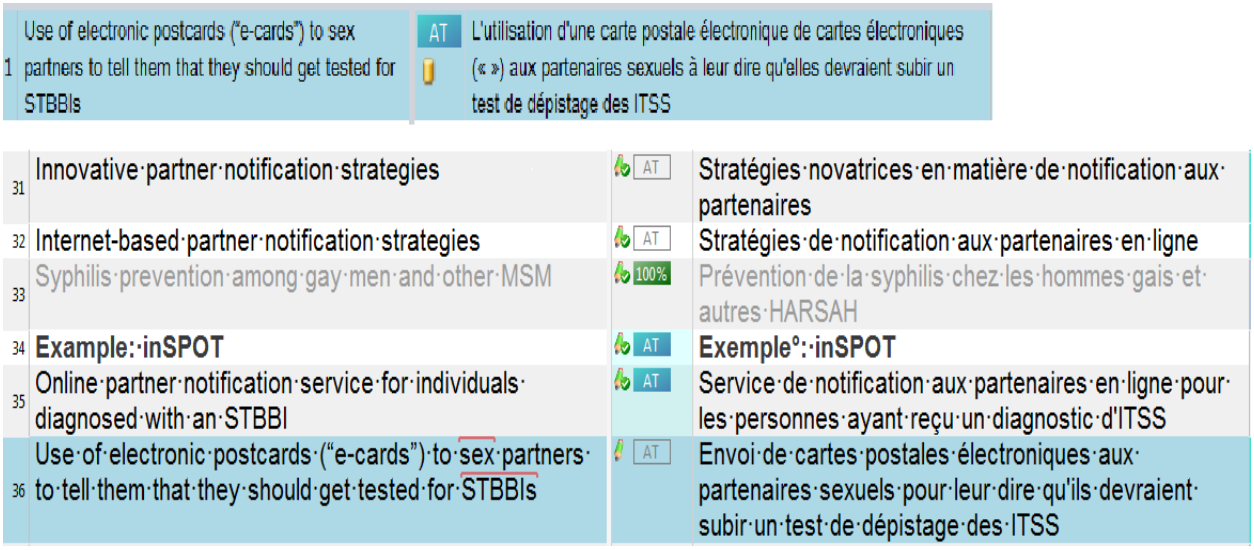

Figure 6.11 A screenshot of TM+MT interface (word choices)

In Figure 6.12, segment 90, the section after the comma has been translated literally. It therefore, is not idiomatic in French.

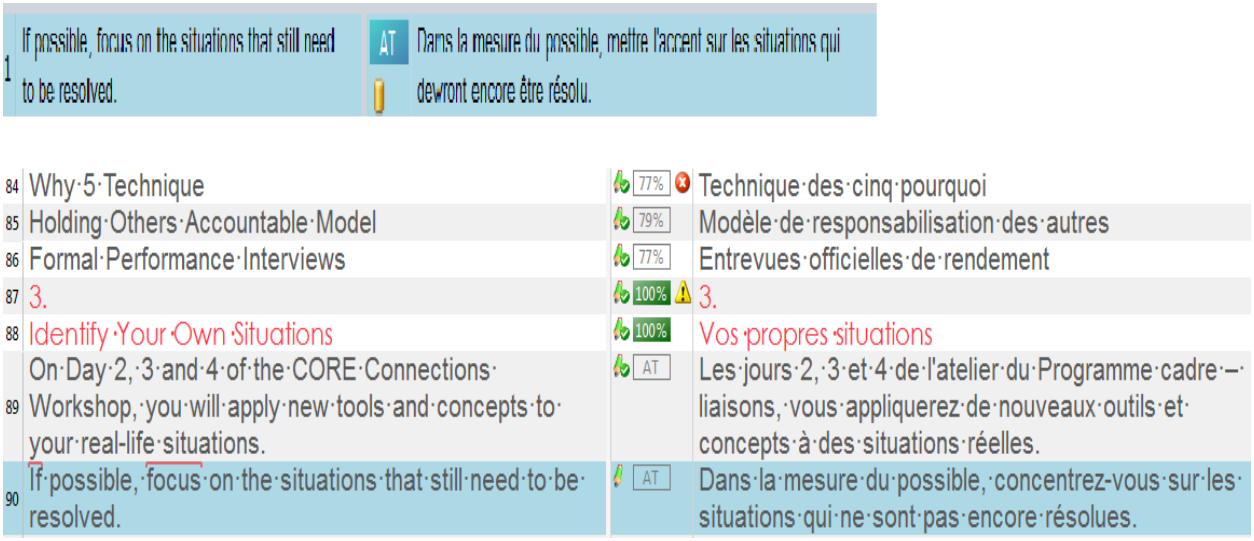

Figure 6.12 A screenshot of TM+MT interface (literal translation)

MT performs poorly in translating long noun phrases, since it cannot deduce the correct word order. An example of a poor translation as a result of a long noun phrase and a bullet and numbering format is shown in Figure 6.13, segment 27.

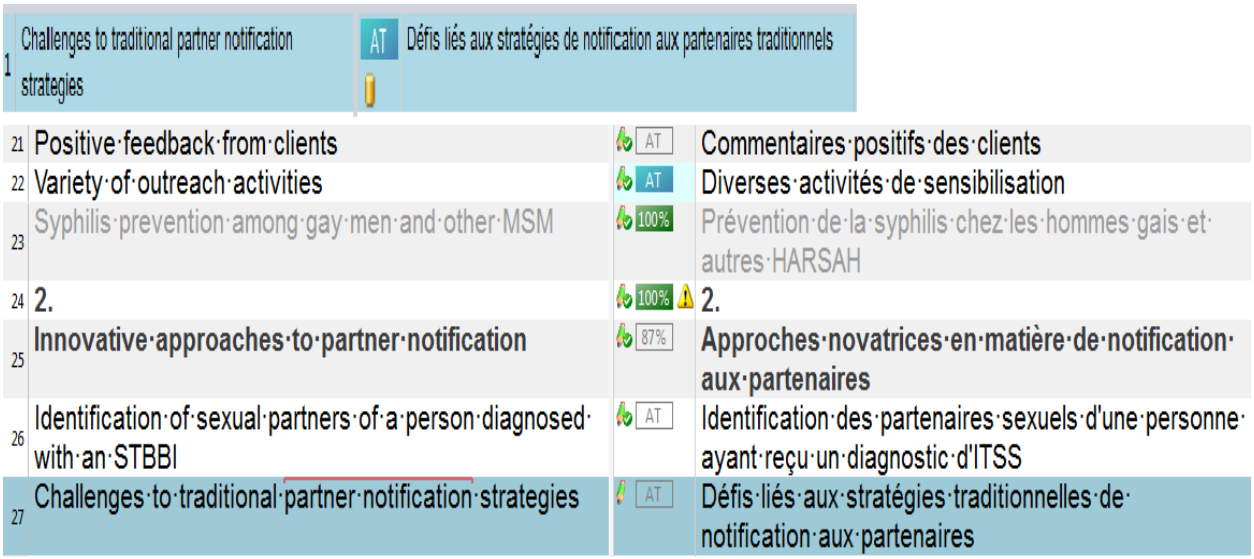

Figure 6.13 A screenshot of TM+MT interface (long noun phrases)

Another issue that translators have to frequently fix is missing words in MT output.

Missing words

In this section I present some examples of missing words in MT translations caused by a variety of reasons.

Figure 6.14 shows that although segment 73 and 74 are short, objects are still missing in the French translation. The unchanged MT suggestions are shown at the top of the image. Being formatted in a list or bullet and numbering might be one of the reasons why MT underperformed here.

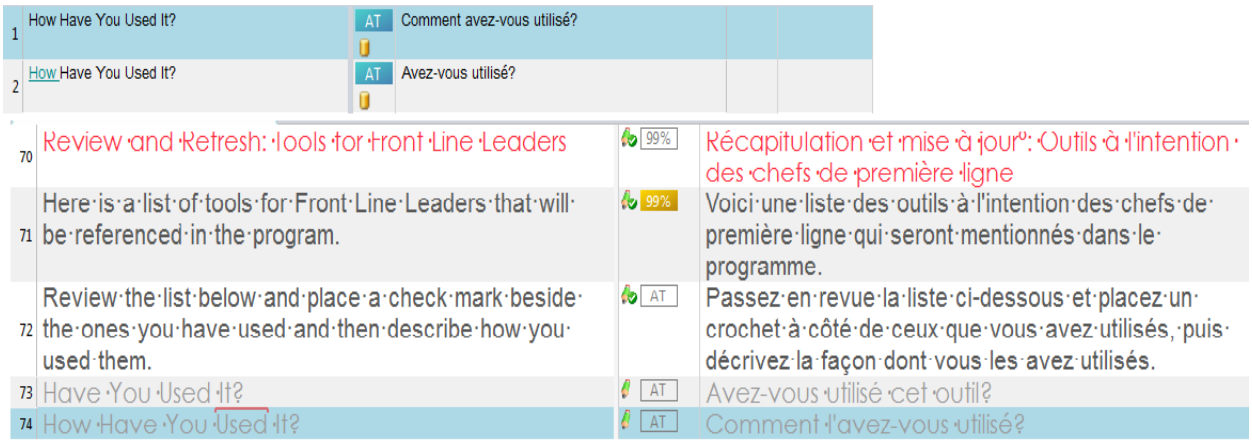

Figure 6.14 A screenshot of TM+MT interface (missing words)

Figure 6.15 shows the missing words, *consumer-centered-approach*, in the MT of segment 40. Being formatted as a list or bullet and numbering and having a punctuation mark attached to the words might be the reasons why MT underperformed here.

Figure 6.15 A screenshot of TM+MT interface (missing words)

Again, Figure 6.16, segment 32, shows missing words in the French MT, *internet-based*. Similar to Figure 6.15, the list or bullet and numbering format, as well as having a punctuation mark attached to the words, might be the reasons why MT underperformed here. Also, the translator had to remove the article *les* before *stratégies* in the translation to make the list more consistent.

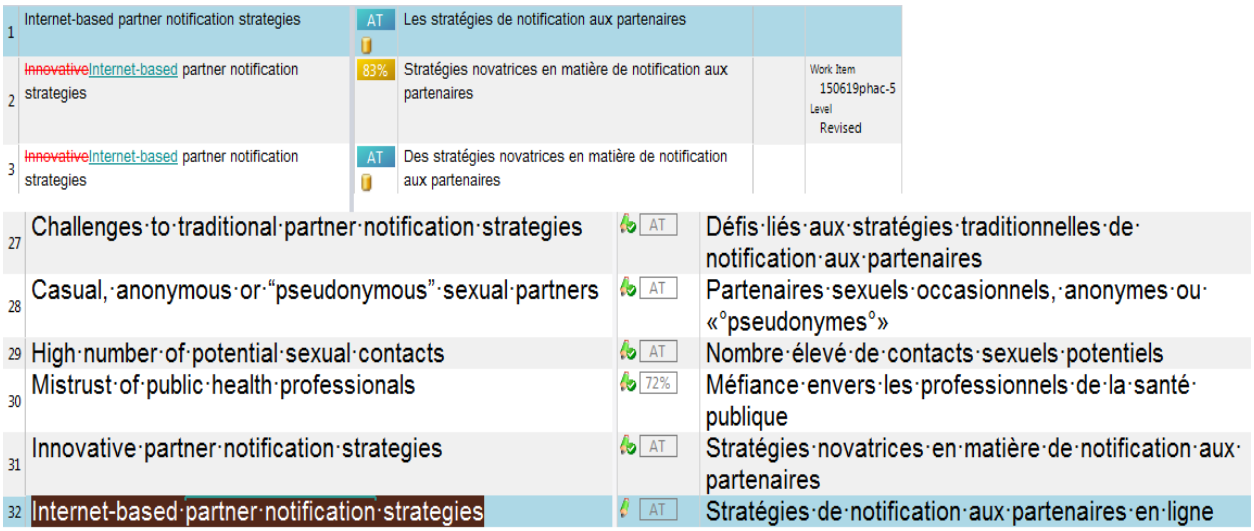

Figure 6.16 A screenshot of TM+MT interface (missing words)

As seen above, some of the repetitive MT errors seem to be simple, such as the difference between French and English numbers.[64] They could be solved by keeping in touch with translators and welcoming their feedback on the quality of TM output, although such interaction was not observed between translators and the management of LinguiPlus. Translators keep fixing those small problems constantly, and this makes their job tedious.

Moreover, as could be seen from some of my interviews with translators (e.g. T2, T3, and T4), they are aware of the MT problems, and they do not expect a machine to give them a perfect translation, otherwise, according to T4, human translators would not be needed any more. Their target of complaints is mostly the way MT is implemented and expected to be used by LinguiPlus, which will be discussed more in section 6.4.5, Task autonomy."

[64] I spoke with the outsourced developers of the MT at LinguiPlus in spring 2016, and they confirmed that these numerical issues can be easily fixed. They also mentioned that they were waiting for LinguiPlus to contact them to fix the issues with which their translators constantly deal, but they had not heard from them yet.

6.3.1.2.3. Tasks related to translators' specialization

According to Rodríguez-Castro, it can be expected that translaters will be more satisfied when accomplishing tasks in their areas of specialization. This could be complemented with the results obtained in this study, regarding the contribution of TM+MT to the tasks that are either within or outside the specilization of translators: if a translator is very experienced in translating a particular text type, MT is more harmful than helpful, but if a translator is not familiar with a specific text type, MT will facilitate and accelerate the searching process (see section 6.2.1.3, TM+MT and subject matter expertise").

T1 believes that MT works very well for her as a guide for translating texts with which she is not familiar (see section 6.2.1.3). However, it can be misleading and leads to inconsistency in texts of which she is specialized:

> Depends on the project, like I said, the projects that I'm not really used to, I will rely more on [MT], because I don't know the project much, and it gives me a lot, and I just have to modify a little, but for example, [Food Leadership], I've worked on it for [X] years, I know what's in the memory, and when [MT] gives me a sentence, and sometimes I feel I'm sure that it's in the memory, so I go and check, and sometimes [MT] gives you a few sentences, but it's almost here in the memory but differently. So if I accept the [MT's] translation, it's going to be different, and then it inserts something different in the memory, and then the client might wonder about the change. It doesn't happen all the time, but I noticed it with [Food Leadership], and I got that habit whenever it happened. So I checked the memory; did [MT] get this right?

Similarly, T6 confirmed that MT benefited her in translating texts in subject matter of which she is not familiar: "I don't rely on [MT]. I make my own research, you have to, but when you are not familiar with the subject, it helps. It gives you a starting point of what to search."

This way of using MT indicates that translators are using MT as Martin Kay recommended almost four decades ago (see section 1.1, Beginnings of translation technology"): as another tool in the workplace. Where and when MT is useful is decided by translators based on their knowledge and experience. Recognizing and using MT capabilities compensate for deficiencies in translators' abilities. That subsequently leads to more satisfaction with their ability to meet the goals and requirements of their assigned tasks.

The second factor of the nature of the task is task complexity, which is assessed through three variables. The results of analyzing this factor at LinguiPlus is presented in the next section.

6.3.2. Task complexity

Task complexity refers to the challenges translators face in translation. These challenges, according to Rodríguez-Castro, are perceived differently by various people (see section 3.2.1.2.2, "Task complexity"). Some tasks might be complex for one group of translators while they might be easy for others, depending on their professional profiles.

All the subcategories of *types of activities involved* can also bring complexity to the translators' tasks, but it cannot be simply determined which one complicates the tasks, since some might be difficult for some translators while they are easy for the rest. What is clear, however, is that those features change translators' activities during translation, and that is why they were anlyzed under *the task performed* in the present study.

According to Rodríguez-Castro's model, terminology is one factor that can complicate translators' tasks.

6.3.2.1.Terminological complexity

Rodríguez-Castro presented task complexity by three variables of terminological complexity, level of specialization, and level of technical expertise. The latter two variables have been rendered seprately from terminological complexity although they can be the sub-categories, dermining the level of terminological complexity of the text. Below, I have determined the level of terminological complexity with translators' level of specialization and technical expertise.

Regarding *the level of specialization*: the more translators are familiar with a specific text type or client, the easier translating the terms will be. For example, T1 is very familiar with the texts assigned by Food Leadership and know the terms very well. However, she has a difficult time translating Eco Petroleum texts because she is not familiar with their terms. This variable was discussed in more detail in section 6.2.1.3.

Regarding *the level of technical expertise*: terminological complexity can also be simplified with the help of technology. For example, T1 and T6 use MT for the texts they are not familiar with. This depends on translators' knowledge of the tool and where and when it can be useful to them. In general, translators were not concerned about the specialty of the texts since they were assigned general texts most of the time. Autonomous translators were often assigned specialized texts for which they used MT.

The last two factors of the nature of the task are task variety and novelty which is discussed next.

6.3.3. Task variety and task novelty

Possessing the ability and opportunity to undertake a variety of tasks is considered to be one of the boosters of task satisfaction, according to Rodríguez-Castro' model (see section 3.2.1.2.3). In her model, the factors of task variety and task novelty are measured separately. However, they are closely tied to each other in terms of the opportunity and the freedom to undertake a variety of tasks, some of which might be new tasks at the same time. A translator who has the leeway to do a variety of tasks might initiate novel tasks to improve their knowledge and skills. Merging the two factors in the present study facilitates describing where translators have the opportunity to conduct novel tasks, but it does not have any effect on the nature of both factors.

At LinguiPlus, the variety of tasks available to translators can be categorized into four categories:

- *Languages*: all the STs that need to be translated into French are in English. T1, T3, and T4 have experience translating from other languages, and T7 has experience translating from French into English; the language combination at LinguiPlus, however, is only English into French.

These four translators are able to accomplish tasks other than the ones they routinely do at LinguiPlus. However, having the ability to do a variety of tasks but not having the opportunity to put that ability into practice may cause frustration and ennui in their job. Also, Rodríguez-Castro believes that offering employees the opportunity to accomplish a wide variety of tasks related to their areas of specialization enhances their task commitment. Unfortunately, I do not have

translators' opinions in this respect, and thus I am only able to refer to Rodríguez-Castro's views here.

- *General tasks*: of the translators I observed, T1, T3, T4, and T5 were the only ones who had the opportunity to choose a task different from their main tasks. The main tasks of T1 and T5 were revising and proofreading, respectively. They were assigned translation projects when there was an urgency or a lack of available translators to complete those projects on time. They, therefore, had the opportunity to accomplish tasks other than their main roles as reviser and proofreader. Similarly, T3 and T4 are translators but they also do revising when the opportunity comes up. Other translators do not have the same opportunities.

  At LinguiPlus, the opportunity to do a variety of tasks seems to be available to those who has the skills for doing so, i.e. the opportunity comes with a high-level professional profile. T1, T3, T4, and T5 are experienced translators who are highly trusted in various projects, and their work is sent to the clients without being revised.

- *Tools*: translators have two main scenarios for using translation tools, depending on the translation project: translating only with TM, or translating with TM+MT, but only autonomous translators enjoy the freedom to turn the MT function on or off when it is available. The rest must wait for their PM to decide on the usage of MT in their projects. This has caused an unpleasant feeling of being obliged to use MT in some projects where translators do not feel the need to use MT.

- *Texts*: all the participants are mostly assigned general texts, although there is a chance they can translate specialized texts "once in a while" (T6). They did not complain

about the type of the texts they are offered to translate. Moreover, general texts can have various subject matters that diminish the monotony of their jobs. For example, an ST can be a PowerPoint on public health or a brochure on a specific administrative process.

In the above noted available variety of tasks, it seems that translators are not given the opportunity to conduct any novel tasks beyond what they normally do on a daily basis. Even translators with more freedom in choosing tasks are given a pre-determined variety of tasks that are part of their routine job.

6.3.4. Conclusion and adjustments to the Rodríguez-Castro's model of nature of the task

The MT used at LinguiPlus, adds to, changes, or complicates the activities translators accomplish in each project. As stated above, some of the activities can be simply removed by frequently asking for translators' feedback on MT performance and solving any issues that arise. In addition, the company's policy to match translators' abilities and knowledge with the tasks they perform can affect translators' level of satisfaction with the variety and novelty of their tasks. These points will be discussed more in chapter 7, "Conclusion."

Based on my observations and interviews at LinguiPlus, I have introduced changes in the variables presented by Rodríguez-Castro's model. I have replaced the word *task* with *actvity* for the reasons that I explained in section 3.2.2. Also, I introduced new variables that frequently came up pertaining to the type of activities. The rest of the model is almost the same with slight changes in the way it is presented, for example, I categorized the two variables of *level of specialization* and *level of technical expertise* as sub-categories of task complexity. Moreover, I removed two variables since they did not come up in the present

research context: terminlogical complexity stresses me out as well as working on challenging and complex tasks. In addition, I added the word *opportunity* to the ability to do a variety of tasks since it was part of Rodríguez-Castro's explanation but was not mentioned in Figure 6.17 (also see Figure 6.18). Rodríguez-Castro's origional model has been presented here to facilitate a comparison between the original and the adjusted model.

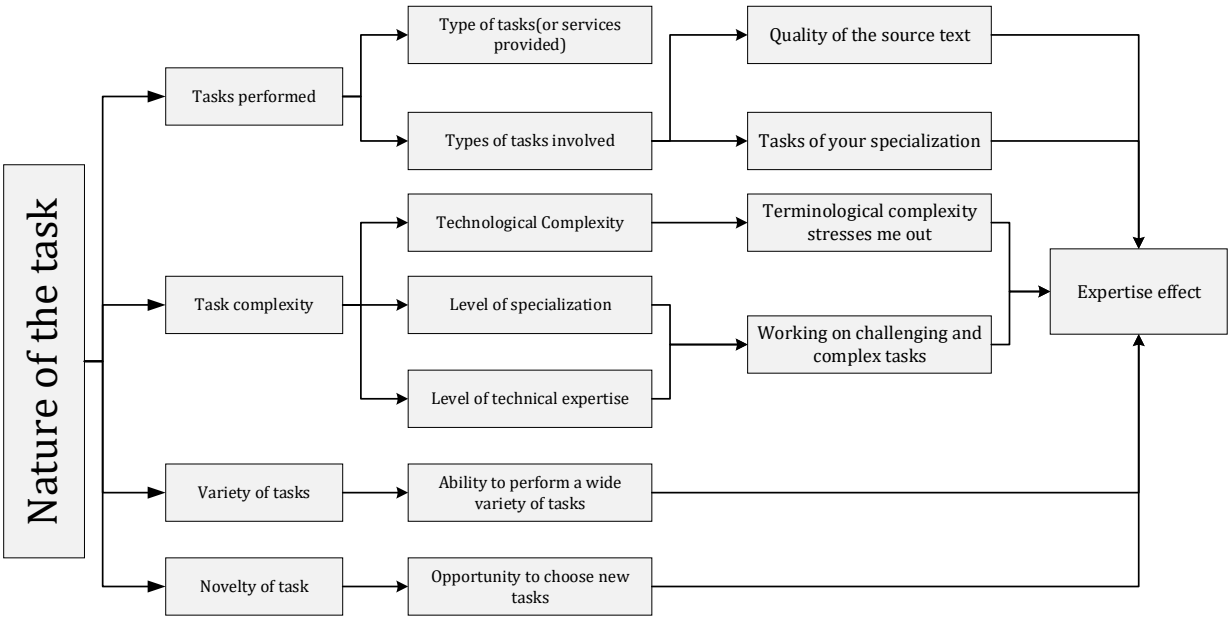

Figure 6.17 Factors and variables—Nature of the task (the duplicate of the original model)

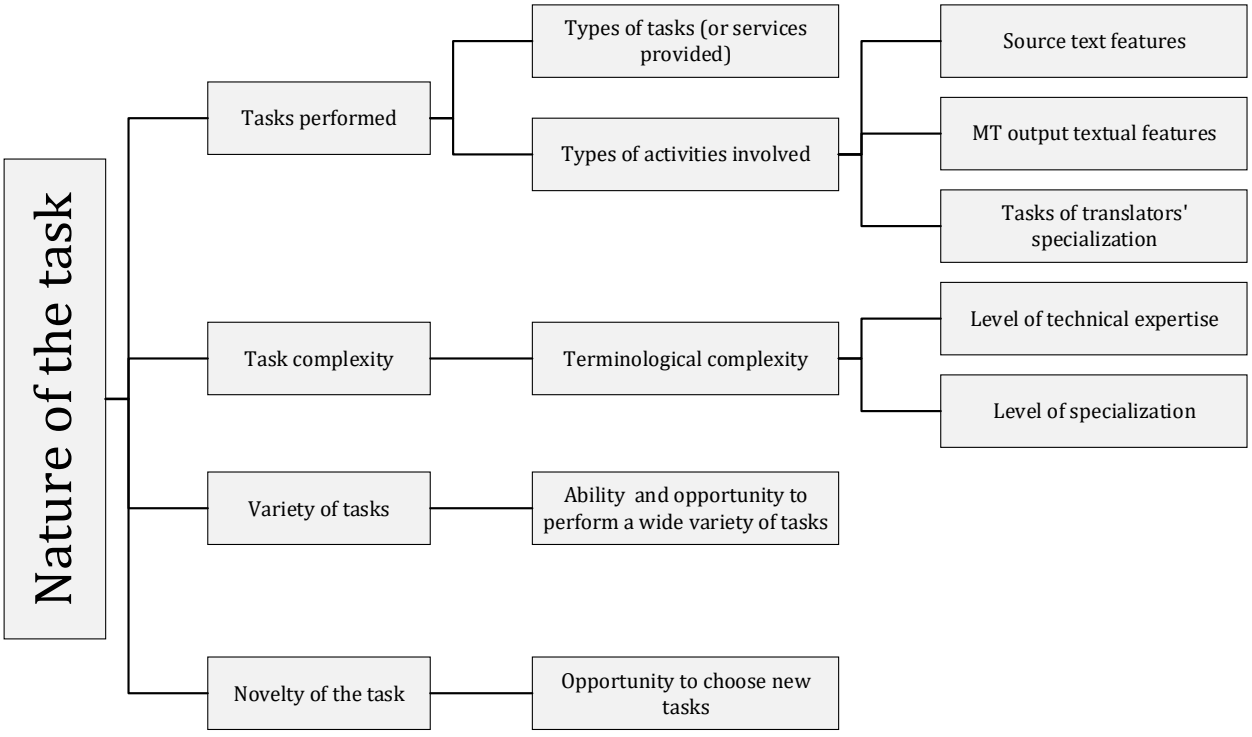

Figure 6.18 The adjusted nature of the task variables at LinguiPlus

The third concept of task satisfaction is job-fit which will is analyzed in the following section.

6.4. Job-fit

The concept of job-fit refers to the level of compatibility between a translator and his/her work setting (see section 3.2.1.3, Job-fit"). In the following sections, I explain the factors and variables of job-fit at LinguiPlus. The first factor is task pride.

6.4.1. Task pride

If a translator feels that s/he does what s/he likes to do, s/he has a high level of task pride (see section 3.2.1.3.1, "Task pride"). At LinguiPlus, TM+MT has had a reverse effect on the

task pride of some of the translators; three translators expressed that TM+MT gave them a feeling of degradation, and at times it has been perceived as a threat to their jobs.

For example, T1 thinks she is able to do what MT does and does not need MT as a help: ". . . I'm still somewhat frustrated that a machine does it for me. Sometimes I'm like, well, I would have found it myself anyway. It's just my pride . . ." She also talked about the hostile feeling translators at first had toward MT as a threat to their job:

> At first it was really frustrating, because it was imposed, and I and the others felt, well, they're going to take the work from us, not take the work from us but what we are going to do? Just correcting stuff that was made by a machine or what? But then we first saw the poor quality, we were like OK! No! Our job is safe. . .

T1's viewpoint is complemented by T4's and T6's opinion of MT's inability to help them in their tasks.

T6 also believes that MT cannot reach the level of human translators for now:

> It's a tool, it's there to help it. You don't have to take its suggestions if they make no sense. For now translator's judgment is better for now at least, you can ask me this question 20 years from now but for now, use your judgement.

Having a high level of confidence in her job, T4 explain that MT is just a distractor for her:

> I would say it's a barrier for me. It just distracts me. I think it's different with other people. They must like it because they are searching in different ways or tools to be faster. For me, because I'm already fast, I don't need that. It's just the way I translate, I don't need it. It's just that.

From a different perspective, T2 also voices her negative feeling toward MT, expressing that it has changed the process of translation, and what she does with MT is not translating: "[MT] is making me more of a translator-editor than a translator, and it's not good, because it's not as rewarding . . ."

T2's negative disposition toward MT remains even when she admits that MT has helped her reach the required productivity. She believes she is too dependent on MT and that makes her a less qualified translator:

> I'm much quicker with [MT] now, but the thing is that I never had the chance, you know, I only had [a little while] without [MT], so I was a junior translator, and I guess it takes some time to become productive, and because I had [MT] before having the time to become quicker on my own. I think it's a pity because I never learned [to be faster on my own].

She even claims she is not a translator anymore:

> I feel that after [x] years, if I hadn't had [MT], I would be a translator now. I would be quicker on my own. If I'm doing [x] words a day now, and it's good; without [MT], I wouldn't be able to do that. If during the last [x] years, I hadn't had [MT] at all, I'm sure that would be my productivity anyway, because I wouldn't have got used to [MT] and I would have acquired automatism that I don't have anymore. Maybe, I have even lost some of my skills. I would be a much more skilled translator if hadn't had [MT] during the past [x] years.

T7 has a similar opinion about MT: "I think I depend too much on it, and if I don't have it, I found it harder to translate."

On the other hand, T3 and T5 seem to have adjusted to the new tools and changes in the TW; they are quite confident about the importance of their contribution to their job and do not feel degraded because of MT. T5 considers MT to be another tool in addition to the others in her workplace: "I really don't think about it. To me it's kinda 'it's there' and 'it's a tool'. It can help but it can't do my job." T3 has a similar opinion regarding the role of MT in her job as a translator:

> I think [MT] is provided to help us, being faster probably and having less trouble translating sometimes, but it's not an absolute tool; you have to use your own judgment, and see if it can help or not. That's my personal opinion.

To summarize, translators' task pride has been affected by TM+MT in three ways: 1. they think they are capable enough to meet the required quality and quantity and they do not need MT to help them; 2. they cannot translate without MT and be as productive as expected; this makes them unsatisfied with their position as translators since they think they only edit MT suggestions rather than conduct their own translations; and 3. they are skillful translators but they can benefit from TM+MT; for example they can use MT suggestions as a basis for researching and formulating sentences, and this can help them save time by not having to type every single word.

As a translator, I have frequently seen the first-category mindset toward MT. Based on my knowledge and experience of working with translation tools, this mindset – that one is capable to translate without using MT – is not only caused by the poor quality of MT output (although this does not happen all the time), but it often stems from a lack of flexibility to the changes that the translation industry is undergoing. Adhering to the older definitions of translator and translation impedes translators from moving forward. If translators think that MT does the task they are supposed to do as translators, and that makes them non-translators, then using other tools such as TM systems should have similar effects on their jobs, yet TM systems do not attract as much hostility as MT does in the translation industry. This hostility is worth investing in future research.

The next factor to be analysed in the next section is task variety.

6.4.2. Task variety

This variable has been analysed thoroughly in terms of languages, texts, tools, and tasks at LinguiPlus in section 6.3.3. As previously explained, the most experienced translators seem

to have more opportunities to accomplish tasks other than translating, or translate specialized texts in addition to the general texts that they are routinely assigned. However, even those translators do not have the opportunity to put all their skills and abilities into practice. For example, some of them have the knowledge and experience of translating from other languages, but they are restricted to a single language combination at LinguiPlus.

Giving the opportunity to accomplish a variety of tasks is an influential variable in translators' task satisfaction. According to Hackman and Oldham (1980), translators who have a high need for growth will be more motivated if they are given the opportunity to realize their potentials. They can apply their skills to new challenges and this will boost their motivation, performance, and overall satisfaction.

Below, the factor of occupational level and responsibility will be analysed.

6.4.3. Occupational level and responsibility

Among the participants, T2, T6, and T7 have the lowest position and least responsibilities. They are regular translators who do not enjoy the freedom of turning on/off the MT function at their own discretion. In contrast, T1, T3, T4, and T5 have a higher occupation level and are assigned more responsibilities; for example, T1 is both a reviser and an autonomous translator, T3, and T4 are autonomous translators and sometimes they are assigned revising projects, and T5 is a proofreader who is occasionally assigned translation projects. These responsibilities seem to be associated with translators' experience and the quality of their work. However, T6 has more experience than T3 and T5 but possesses a lower occupational level and less responsibilities.

Based on my interviews and observations at LinguiPlus, TM+MT does not seem to have affected translators' occupational level and responsibilities. The translators I studied were assigned the same tasks as they were before implementing TM+MT. Conversely their occupational level and responsibilities have affected the translators' freedom of using TM+MT (see section 6.4.5, Task autonomy").

6.4.4. Freedom to take initiative

LinguiPlus has a top-down structure, and translators' actions are under their superiors' scrutiny. They are, however, able to take the initiative to use any available online and in-house resources and tools they think are useful. Regarding TM+MT, as I mentioned previously, MT is used only for specific clients; if translators are working with the clients for whom MT is not used, translators, according to Ms. Nelson (one of the managers of the Translation Department at LinguiPlus), are allowed to use the MT's separate interface if they need it. None of the translators, however, were aware of the existence of that interface. This can be considered a barrier from taking the initiative to use MT beyond what PMs require.

These last two factors, occupation level and responsibilities and allowance to take initiative, are closely related to the factor of task autonomy, which will be analysed next.

6.4.5. Task autonomy

Task autonomy in a TW is the level of freedom in planning the work schedule and deciding how the tasks should be done (see section 3.2.1.3.5, "Task autonomy"). Translators at LinguiPlus discussed their task autonomy when it comes to using TM+MT, from four aspects:

- *TM+MT and translators' role:* autonomous translators and revisers are not overly concerned about the existence of MT since they can turn the function off if they do not

consider it helpful; for example, T3 explicitly refers to her freedom in using TM+MT: ". . . in case you don't want to use [MT], you can turn it off. We are free to or not to use it." Moreover, T4 confidently avoids using MT because she believes in her ability to do her job fast enough without it:

> I don't think it's an imposition; I think they prefer me to use it, so I don't know what [Ms. Smith] would say if I told her I didn't use it. Probably she wouldn't care because I do my job very well.

Interestingly, T1 expresses her indifference toward the presence of MT in her translation projects because she has another main responsibility, revising: "Now I don't mind because I know I revise most of the time so I don't really,… [she cut the sentence here]." She, however, thinks MT is imposed on them.

Similar to T1, T5 and T6 believe that MT is imposed on them; for example, T5 says:

> When I open my translation project, it's already there. So it's an obligation, and I read it and if it's good I accept it. I won't automatically change it. If there are a couple of mistakes, I just erase the whole thing, because it's just a lot of clutter. So I just erase it and then start it.

T6 also confirms that she uses MT out of obligation:

> It's already, um, when you open a document in [TEnT], when you open each unit/each sentence, [MT] already gives you its suggestion, and then you can make adjustments to it. It already spits it out. You can't control it.

In contrast, T2 does not think MT has been imposed on them:

> It hasn't been imposed. They don't say 'OK! You use it or get out!' On the first day, I said, I don't really like it, but I'll see if it works and if it makes me go faster. So it was clear that I was faster with it.

- *The employers' productivity expectations:* meeting the high level of productivity

required by the company encourages translators to use TM+MT. Therefore, the employers' productivity expectations necessitate using MT in order to work faster:

T1 points out that the required productivity takes the freedom of choice to use MT or not: "I have to say because we have to be highly productive, [MT] helps in that aspect. If I didn't have to be worried about productivity, I would just leave the sentences and do my own thing . . ."

Likewise, T2 expresses the same opinion about productivity and using MT:

> I was never fast enough. With that tool, I got faster. So there was no other choice. It's either I use it, and everybody's happy with me, or I don't use it but everybody says OK! Good job [T2], but try to accelerate! So I just used it.

- *The company's way of integrating MT into TM:* as explained in section 4.2.5.1, PMs set a threshold between 70%-80% for TM in all projects, and if no match over that threshold is found in the memory, MT yields a suggestion. Some of the translators think the threshold should vary by project, and some others think the threshold should be lower than 70% because sometimes lower fuzzy matches are more helpful than MT suggestions.

For example, T3 suggested that for the threshold between 40-60%, they should see both TM and MT results. In addition, T1 discusses the usefulness of lower fuzzy matches, in comparison to the MT output:

> For [Food Leadership], like I said, [MT] gives me a sentence, so I read it, and I feel that there is something in the memory with the same English but different French but for [Food Leadership] the percentage is sometimes can be a little lower like 75, and it was perfect to use for us. We just had to change a little thing, and we didn't need [MT] to be there. I think the percentage is a little

> high. It's just because [Food Leadership] memory is so big and so full of content that it's useful but for others [she cut the sentence here] and plus [Food Leadership] is very repetitive. Once the sentence is there, you don't need [MT] to tell you what to write.

T2 expresses a similar opinion regarding the threshold:

> So sometimes it's good to have TM and not [MT] but for some other sentences a 70% match is not good enough. Maybe we should see the TM and [MT], both of them. That would be nice because I cannot say if there is a bad option. I think both are useful sometimes, and not useful some other times.

T3 and T4 talked about their preference for fuzzy matches with a lower percentage; T3 says, "I would prefer an option to see both, TM and MT. Everything between 40 and 60, we should have both, TM and MT." T4 also pinpoints, "sometimes, 70% match could be more helpful than [MT]. I would do less, like 60 or 65 and if it was less than 60-65, [then] OK! Put [MT]! But maybe it's too high."

- *The effect of the TM+MT on the translation process:* T2 and T7 think MT imposes suggestions on their minds, since it does not provide them with a choice and it hinder creativity. As T2 explains,, "the biggest problem I see is that it limits my creativity a lot and gets me stuck on the French suggestion, because once you read a sentence, you can't get your mind off it." T7 also refers to the same problem: "it inhibits my creativity, because when you see something, and you see it could be used, you don't bother to enhance it."

At LinguiPlus, task autonomy is generally given to the most experienced translators, yet at the same time they are restricted in other aspects such as setting a threshold for TM matches. A feeling that the management impose decisions on how and when to use MT is an obstacle to a higher level of job-fit. Hence, motivating translators with more choice and the

opportunity to show creativity would improve job-fit. As Hackman & Oldham (1980) explain, higher task autonomy makes workers participative and strengthens their work involvement.

6.4.6. Conclusion and adjustments to Rodríguez-Castro's model of job-fit

In general, translators at LinguiPlus hold negative views toward using MT. T3 and T5, however, are exceptions. This negative mentality may be due to the way translators assign a specific role to themselves and MT in the translation process. How important their role is, and how much MT should be relied on, are usually determined based on a translator's level of knowledge and experience. This is complemented by the level of autonomy some translators have, which impacts the views they have regarding MT's role in their job. As could be seen, most of the translators do not enjoy ("adequate") autonomy to decide how, when, and where to use MT. These points will be discussed again in chapter 7, "Conclusion."

Rodríguez-Castro's job-fit model, (Figure 6.19), includes variables that have been presented as questions used in her survey. I have changed those variables into general categories that encompass the points her variables raised, as well as ones that came up during my interviews and observations. For example, I merged the task pride variables into *translators' perception of their role.* I also complemented *I take initiative to learn* by adding *to use CAT tools*, since it came up in my observations and interviews. In addition, the level of empowerment originally belongs to the factor of ocupational level and responsibility and the factor of allowance to take intitiative can be shown to be dependant on the ocupational level and responsibility as well since the higher the occupational level is, the more empowered translators are, and hence the more freedom they have to take initiative. These changes are not drastic, but they present the model more clearly (see Figure 6.19). Rodríguez-Castro's origional model has been presented here to facilitate comparison between the original and

the adjusted model.

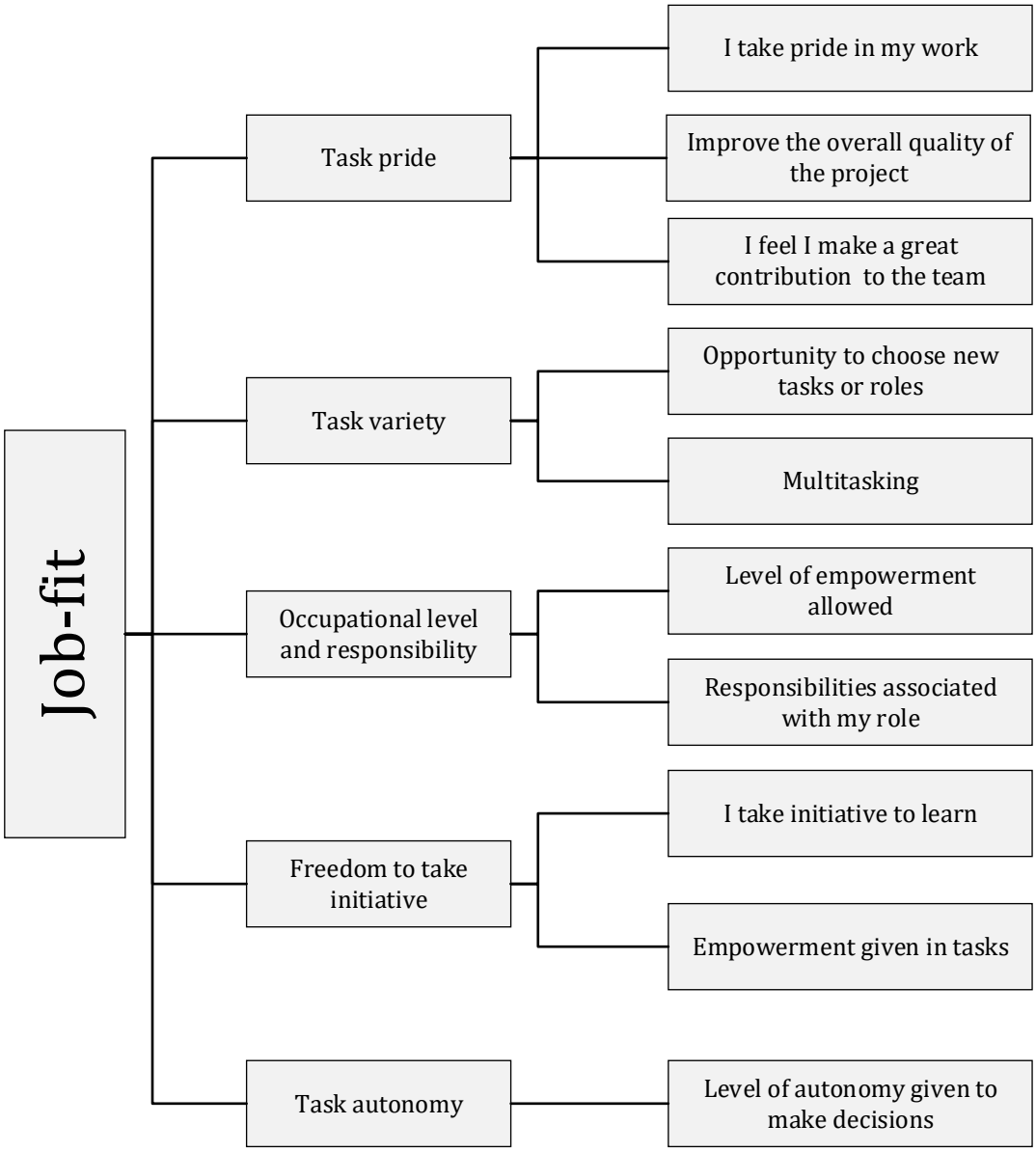

Figure 6.19 Factors and variables—Job-fit (the duplicate of the original model)

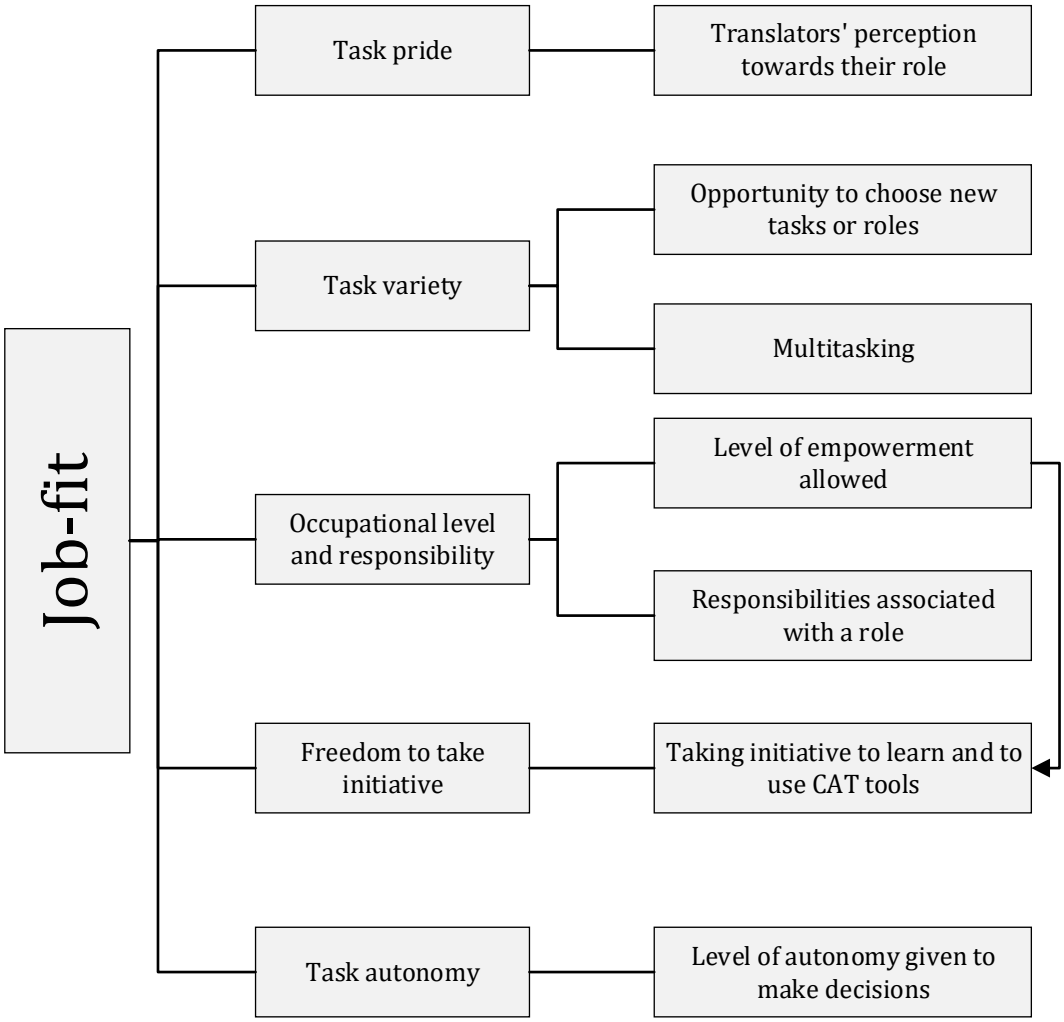

Figure 6.20The adjusted job-fit variables at LinguiPlus

The concept that is closely related to job-fit is self-fulfillment which is analyzed in the following section.

6.5. Self-fulfilment

Self-fulfilment means satisfying the need for constant learning and being "the best translator" among one's peers (see section 3.2.1.4, Self-fulfillment"). In this section, I will look into translators' self-fulfilment at LinguiPlus. The first factor to be discussed here is self-actualization.

6.5.1. Self-actualization

Self-actualization is a worker's desire to realize his/her potentials (see section 3.2.1.4.1, "Self-actualization"). At LinguiPlus, most translators, (T1, T3, T4, T5, and T6), do not see TM+MT as a tool that helped them to professionally grow in their job. They think MT is another tool or resource like the others and should be used whenever it is helpful.

However, while T2 and T7 admit that integrating MT into TM has increased their productivity, they do not look at this increase positively. They believe they depend on it too much and never learned to be as fast without using it. They also believe MT prevents them from showing their creativity in the TL. They, therefore, think MT has caused a regression in their translation skills.

Based on the results of this study, more experienced translators do not view TM+MT as a tool that satisfies their need to grow professionally. Ironically, while it has helped the less experienced translators to reach the required productivity, they consider it as a "disadvantageous help," leading to a lack of skills for accomplishing their tasks without using MT. Regarding the importance of self-actualization, Herzberg (1959) claims that it should be ranked first among the job attitudes that increase the level of satisfaction. Therefore, MT has failed to foster a positive attitude among translators at LinguiPlus.

The next factor to be discussed below is opportunities to learn at work.

6.5.2. Opportunities to learn at work

According to Rodríguez–Castro (2011), receiving feedback is the main factor in opportunities to learn at work (see section 3.2.1.4.2, "Opportunities to learn at work"). In this section I present the results of the study regarding feedback provided to translators at

LinguiPlus before turning the discussion to that of other learning opportunities at that company.

- *Feedback:* Based on the interviews, autonomous translators usually do not receive any feedback from the company since they send their translations directly to the clients. Moreover, the clients also do not provide any feedback unless they have any questions and complaints about translations. According to T1, sometimes the clients are not proficient in French, and they might complain about the stylistic consistency of a translation; that is why they have to use 100% matches all the time, even if the style is not according to the translator's preference.

  Other translators usually receive feedback from their revisers if there is a "problem" with their translations. In summary, translators do not receive feedback unless it is negative.

  In section 3.2.1.4.2, the importance of feedback on shaping attitudes toward a job has been discussed. It has also been mentioned that receiving feedback has a positive effect on performance unless the workers frequently receive negative feedback. This applies to LinguiPlus as well. Translators either do not receive feedback or, when they do, it is negative. Therefore, feedback becomes a source of anxiety and frustration, specifically for less experienced translators.

  Receiving feedback can help translators recognize where TM+MT has helped them improve or regress their translation quality. This would teach translators where, when, and how to use TM+MT (the proper use of TM+MT), which have been the major focus of the present study.

- *Other opportunities:* based on my research, LinguiPlus does not provide official, adequate training on the use of new tools and resources. Translators learn how to work with new tools in other ways: at the early stages of their job, translators usually work under the supervision of an experienced translator to whom they ask questions, they refer to tutorials, or they play with the new tools until they learn how to properly use them.

  For example, after implementing TM+MT, each translator was informed of, and learned, TM+MT differently. The management gave a short presentation on TM+MT to translators (of which T2 was not exposed at all), and T7 learned how to use it through reading some tutorials. Regarding that presentation, translators had different opinions. T5 and T6 think that was enough while T4 believes teaching only the technical aspects of using the tool was insufficient.

Rodríguez-Castro associates the opprtunities to learn at work with the LSPs' levels of maturity and commitment. Providing this opportunity for translators helps them adapt to the changing environment of the translation industry and continuous process of introducing new tools into their workplace. As was disscussed above, this opportunity, however,does not presently exist at LinguiPlus.

In the next section, the last factor of self-fulfillment at LinguiPlus is analyzed.

6.5.3. Task appreciation or acknowledgement

Recognizing translators' task performance and appreciating their success plays an important role in increasing their motivation for improvement (see section 3.2.1.4.3, "Task appreciation or acknowledgement"). At LinguiPlus, translators receive a raise in their

monthly salary, or are promoted to the reviser position, if they are productive "enough" and produce "enough" quality in their work, as determined by management. This increases their motivation and satisfies their sense of growth and achievement in their profession (self-fulfilment).

6.5.4. Conclusion and adjustment to Rodríguez-Castro's model of self-fulfillment

To summarize, translators at LinguiPlus believe that TM+MT has not been helpful in boosting their sense of self–actualization even when it increases their productivity. Furthermore, they do not enjoy significant opportunities, such as feedback, to facilitate learning at work and professional growth. As a result, those who feel the need for growth are frustrated. On the positive side, the company acknowledges their successes and good quality of work by giving them a raise in their salary and/or promoting them to a higher position.

Based on my interviews and observation at LinguiPlus, I have added *other opportunities* to *receiving constant feedback* to Rodríguez-Castro's model, since opportunities to learn at work are not necessarily restricted to receiving feedback. In addition*, feedback on translation samples* seems to be redundant as it is a part of receiving feedback; thus, I removed it. Rodríguez-Castro's origional model (Figure 6.21) is been presented here to facilitate comparison between the original and the adjusted model (Figure 6.22).

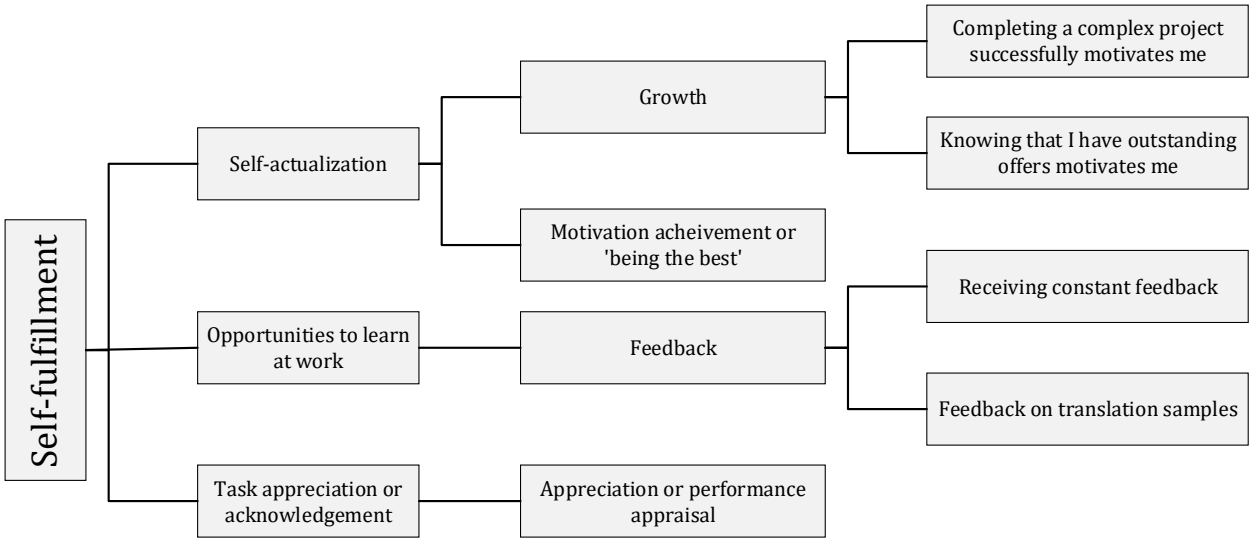

Figure 6.21 Factors and variables—Self-fulfillment (the duplicate of the original model)

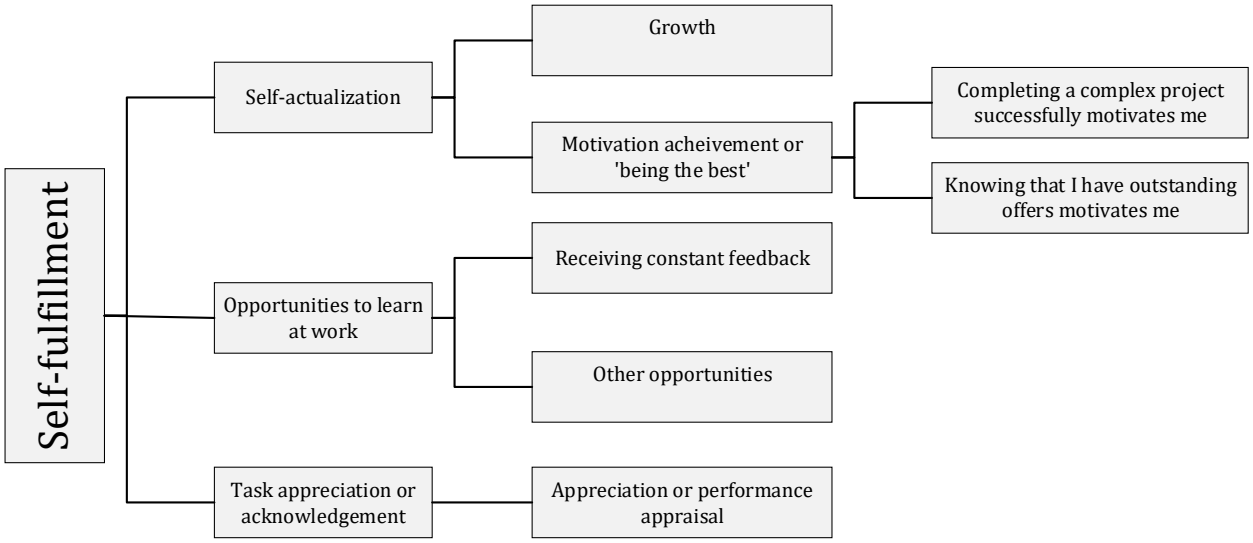

Figure 6.22 The adjusted job-fit and self-fulfillment variables at LinguiPlus

7. Conclusion

MT has remained a controversial topic both in and outside of academia since the idea of developing automatic translation began in the 1940s. In recent years, the translation industry has increasingly integrated MT into the TW, both as a replacement of, and as an aid for, human translators.

Over the past two decades, the translation industry has integrated MT into their TM systems in order to make up for the lack of (useful) matches in TM. For this study, I analyzed translators' task satisfaction with TM+MT. This entailed investigating three factors: translators' educational and professional backgrounds; the changes TM+MT makes into the translation process; and the way TM+MT is implemented and administered by the management.

This project utilized Rodríguez–Castro's model of task satisfaction (2011) and took an ethnographic approach toward studying a workplace where MT was integrated to a TM system. I spent three weeks collecting data via interviews, observations, and reading in-house documents, in a Canadian-based LSP. The data I obtained helped to answer the research question, and raised more questions for future research. These are discussed in the following section.

7.1. Interrelations among the three factors

The small sample of the study highlighted a number of patterns pertaining to the interrelations between the aforementioned three factors. The effect of the translators' educational and professional backgrounds on all four concepts of the task satisfaction model came out in the obtained data. This supports Rodríguez–Castro's (2011) assertion that FOK,

which is mostly reflected in translators' professional profiles, is closely tied to translators' task satisfaction.

7.1.1. Translators' professional and educational backgrounds

The level of professional experience seems to have a direct correlation with a translator's knowledge of CAT tools, subject matter, and task scope. This greater understanding accelerated translators and provided them with a positive sense of possessing mastery over their tasks.

Knowledge of CAT tools

Experienced translators, such as T1, T4, and T3, expressed having confidence in meeting productivity and quality expectations without using MT. They also emphasized that they use MT only when it is helpful to them. This shows their capability to distinguish situations where MT can be beneficial from those where MT would not bring any added benefit.

Most translators did not have any training or knowledge of translation technology prior to their employment at the company I was studying, and this can lead to two issues: 1) they try to learn how to work with CAT tools by using them in actual translation projects. This takes time and can cause frustration to translators and decrease their confidence in their abilities (self-efficacy) at an early stage in their career. 2) On the business side, inadequate training means employees are spending time on trial and error to find out how CAT tools work, which can lead to increased costs.

Training in CAT tools is an intricate topic. Over the past decades, most academic institutions in Canada developed courses in translation technology. However, translation in an academic context is different from translating in a business context. This leaves academic

training inevitably insufficient, since translators also need to learn how to use CAT tools in a business context. This raises an interesting question that would be worth further research: to what extent are academia and the translation industry responsible for translator's training in CAT tools?

Task scope

Providing an accurate task description requires an understanding of a few different factors. Specifying the tools and resources available for each project, the amount of time allocated to each project, and the exact text type in general and multi-disciplinary texts are the main factors needed for an accurate task description, yet frustration from not receiving proper task descriptions was expressed at LinguiPlus. Accurate knowledge of those three factors would help translators plan their time more efficiently before starting each translation project. Since companies do not always provide clear and accurate task descriptions, translators' experience and knowledge can aid in their understanding of the scope of a task.

Knowledge of the exact text type guides translators to suitable resources for each project. Recognizing the exact text type might take some time during translation, since translation technology has changed the way we read a text, i.e. segment by segment or even from the bottom to the top (Pym, 2011). Furthermore, the similarities between two text types may cause the mistaken use of inaccurate or unsuitable terminology. In this case, after recognizing the exact text type, some time should be spent correcting the segments that have already been translated.

Task complexity

More experienced translators are able to escape the complexities that MT might add to their routine activities through proper and timely use of MT; otherwise, it often becomes an annoyance (as T4 mentioned about the stylistic features of MT output). Less experienced translators rely on MT in all of their projects in which MT is included, even if it is not helpful for some of them, because they are not familiar enough with the timely and proper use of MT. Again, the question of training rises here: how much do training is efficient for translators to adequately handle complexities caused by CAT tools?

Task variety and novelty

LinguiPlus tends to provide experienced translators with more opportunities to do a variety of tasks, including novel ones, such as the TM+MT pilot project. According to Herzberg (1959) and Rodríguez–Castro (2011), providing the opportunity for translators to do a variety of (and novel) tasks increases their motivation and involvement in activities and mitigates the risk of experiencing boredom at work.

Nevertheless, considering the fact that translating is a detail-focused job, I am hesitant to claim that translation companies should always be able to provide novelty and variety of tasks to each and every employee. Monotonous tasks will always need to be done by some employees.

Task pride

The level of professional experience seems to have a direct correlation with that of task pride. Among the seven participants, more experienced translators enjoyed a higher level of task pride in comparison to less experienced translators. They often considered MT to be another tool or resource in the TW. They expressed that they were not fully dependant on

MT to do their job, and they used it only when it was helpful. Having a higher level of task autonomy, and the leeway to turn on or off the MT function, provides these employees with some freedom of choice that can influence how they view their job.

For less experienced translators, MT is a tool without which they are not able to meet the required productivity. They do not see this as an advantage, but, rather, as a cause for the reduction of their translation skills. MT is viewed as a competitor that has downgraded their status to posteditors.

Self-fulfillment

As mentioned above, not all translators think that MT has helped them grow professionally, even if it has accelerated some aspects of their job. Less experienced translators believe using MT to meet the required productivity has reduced their translation skills, leading to a diminished sense of self-fulfillment.

7.1.2. TM+MT changes in the translation process

I was unable to determine if TM+MT has increased the complexity of the tasks (see section 3.2.1.2.2, "Task complexity"), but it is clear that TM+MT has changed the activities translators need to do to accomplish a given task.

Here, again the important role of FOK shows itself. Translators' knowledge and experience of using TM+MT determines the way they adjust those changes and deal with possible complexities.

Translators at LinguiPlus benefited from MT mainly in three ways: as a facilitator for projects with complex or unfamiliar terminology; as a basic draft for generating a TT without

having to begin with a blank page; and as an accelerator of typing (copying and pasting suitable parts of MT suggestions) without making spelling mistakes.

On the other hand, they often complained about how MT is an obstacle to their creativity. Looking at MT suggestions prevents them from upgrading a TT stylistically. They also bemoaned that MT tends to translate literally, and that causes the interference of English structures in French. Propagation of Anglicisms in French by MT was among their concerns. This is related to their language ideology, particularly in an officially bilingual country like Canada with its specific political background where the French community attempts to increase the visibility level of their language.

7.1.3. Implementing and administering TM+MT by the management

Freedom of choice

In the interviews, translators talked about how the threshold set for TM matches is too low or too high in various situations (see section 6.4.4). They also spoke about lack of necessity to have MT when they have full mastery over a text type (see section 6.2.1.3). However, the LinguiPlus management tend to define a single way to use TM+MT in all projects. Here, FOK, including translator's knowledge of a subject matter and experience of using CAT tools, play an important role. The more that translators become experienced in this respect the more they are given the right to choose suitable tools and resources for specific projects.

The gap between the management and translators

The LinguiPlus management do not seem to deem it necessary to explain their decisions to the translators in terms of using specific tools and resources and increasing the expected production rate. As a result, translators do not feel being included in the decision making

processes that affect their job. They feel ignored by their superior, and unable to make their voice heard. This lack of transparency has made translators cynical regarding changes in their workplace.

One activity that can connect the management to the staff and help to optimize the tools available for translating is if management routinely welcomed translators' feedback on tools. This could help the managers fix the flaws of a tool or change the means of implementing the tool to make it more useful and efficient. At the end of the day, feedback helps companies boost translation quality and quantity and contributes to translators' satisfaction.

Training

The management does not provide objective criteria based on which translators' knowledge of CAT tools is assessed before employment. Sometimes they do not even include knowledge of CAT tools as a requirement for employment. Translators, however, have to use technology while translating at workplace. A compensatory approach could be providing training to translators in CAT tools upon their employment.

LinguiPlus does not invest much time and effort on training translators in CAT tools. Training is either inadequate or does not exist. Investment in training could prevent translators from wasting time to learning from their mistakes. Lack of training can generate frustration among translators and impose unforeseen costs on the company.

Despite all these interesting findings, this research had some limitations which are discussed in the next section.

7.2. Limitations

This research was done with various limitations, most of which were discussed in chapter 4. First, finding a host LSP was an extremely challenging and time-consuming process since these companies were either worried about the disclosure of the tools they use or they were simply too busy to host a researcher. Then, after finding a company, I did not have agency to select translators for study participation; the company suggested potential participants, and I recruited the participants from among those suggestions without question. Also, the nature of the job was such that translators would often switch into another project using a different tool because of an emergency, which occasionally disrupted my observations and interviews. Finally, my participants were all francophone and did not have strong English speaking skills, which made it difficult for them to express their opinions clearly.

Any potential negative effects from the above noted limitations on my results were minimized in various ways: I recruited translators that had different conditions, even in the limited pool of which I had access, and I, continued observations or interviews after the interruptions, asking translators to clarify their points in a different way so that I could understand them better.

There was one important limitation, however, that unfortunately affected my research: time. The long process of obtaining an approval from the Office of Research Ethics and Integrity, and also finding a host company, left me with a relatively short amount of time to conduct the study and write this dissertation. If I had more time to dedicate to research I would have tried to garner more information on some variables, such as task description and

task variety. That being said, I would like to emphasize that this research has produced useful results and will, hopefully, lead to new avenues for further research.

7.3. Future research

This study has opened a door to a series of possibilities for future research. These include the following:

- A large-scale survey driven from the findings of the present study could offer evidence to challenge or confirm the findings of this study, and hopefully it would provide enough results to make generalizations.
- The same research questions in the present study could be used for studying freelance and in-house translators. Freelance and in-house translators enjoy different working conditions, one of which is possessing more or less task autonomy.
- Translators may become frustrated after working for an LSP for a while, or in contrast, become even more enthusiastic about their job. In future research, the translator retention rate can be measured in LSPs, and the reasons behind the results should be investigated. In addition, the effect of CAT tools on the retention rate can be studied.
- Due to the importance of FOK in translator's satisfaction, more research could be done on translator training in CAT tools. For example, research could point to type(s) of technology courses that could most benefit translators before employment.

Future research possibilities are not limited to the above. Due to the complex nature of the translation industry and all the influential factors leading to its success, there are more possibilities that could be extracted through further research.

7.4. Closing remarks

Translation technology constantly introduces new tools to the TW. It constantly adds new functionalities and fixes existing flaws, which is a progressive process. It seems to me that the way translation technology is taught and implemented is a long overdue question. This question is usually disguised or ignored by repetitive complaints against the shortcomings of translation technology, MT in particular. Technology has already become embedded in the translation industry, and there is no going back. Therefore, it would be beneficial to consider, and research, how it can be best taught and implemented for translators, instead of constantly negating its advantages.

Training in translation technology is a complex issue. Academic training seems to have overlooked the fact that translation is considered as a business in LSPs. This makes it difficult for the newly-graduated translator to keep up with market demands. Moreover, using technology to increase their productivity gives translators a feeling of being debilitated in their job, because their attitudes and values toward translation are the ones that are taught in academia, where the actual work conditions in the industry are not fully addressed.

On the other hand, LSPs seem to be unaware of the latest academic programs and courses in CAT tools, and that is one of the reasons the industry has not determined an objective level of CAT tools knowledge in translation job descriptions. This gap is reflected in the interview I had with the president of LinguiPlus. She believed universities do not provide enough training on translation technologies to the students before they enter the job market:

> I will be more than willing if there is some education program in Canada or any of the education groups that are teaching translation, if they were interested in getting feedback from us, I don't think they are, but if they were, I would be more than willing to sit down with them and say, 'hey! You come in and talk to our people, look at our people, survey our people, or whatever that might be in order to get feedback on how to put a program together to teach people how to postedit, it's not an area that I know well, but I'm not sure how you put a course together and how to postedit but I think it is possible.' Most of the schools teaching translation in Canada, they'd rather have a traditional approach towards translation, and I'm not sure, at this point of time if any of them is offering courses in TM, which in my perspective is already 15 years in the market if not 20 years. They are slow to adapt, let's put it that way. So am I pursuing them? No! Would I be interested if they wanted to talk to us? Yes! But the frustration of moving at that pace for me is enough for me to keep me moving somewhere else.

As the quote suggests, the translation industry may underestimate universities' history of offering translation technology courses to students. For Example, the University of Ottawa has been offering a Bachelor of Arts program in Translation and Interpretation since 1971. Various courses are offered there, including terminology and terminotics, documentation and lexicology, and translation technology. These courses are complemented by the availability of state-of-the-art CAT tools in labs which provide translation students with an opportunity to improve their practical skills. This demonstrates that a bridge should be made between the industry and academia to not only provide a clearer image of the capabilities and deficiencies in both sectors, but also pave the way for constructive positive cooperation between the two.

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Appendix I: Ethics approval certificate

File Number: 02-15-08 **Date (mm/dd/yyyy):** 03/03/2015

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

Ethics Approval Notice

Social Sciences and Humanities REB

Principal Investigator / Supervisor / Co-investigator(s) / Student(s)

First Name	Last Name	Affiliation	Role
Jean	Quirion	Arts / Translation	Supervisor
Maryam	Mohammadi	Arts / Translation	Student Researcher

File Number: 02-15-08

Type of Project: PhD Thesis

Title: What do translators get from the integration of machine translation into translation memory systems? An ethnographic study

Approval Date (mm/dd/yyyy)	Expiry Date (mm/dd/yyyy)	Approval Type
03/03/2015	03/02/2016	Ia

(Ia: Approval, Ib: Approval for initial stage only)

Special Conditions / Comments:
N/A

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File Number: 02-15-08 Date (mm/dd/yyyy): 03/03/201

Université d'Ottawa University of Ottawa
Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement (2010) and other applicable laws and regulations in Ontario has examined and approved the ethics application for the above named research project. Ethics approval is valid for the period indicated above and subject to the conditions listed in the section entitled "Special Conditions / Comments".

During the course of the project, the protocol may not be modified without prior written approval from the REB except when necessary to remove participants from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the project (e.g., change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, including consent and recruitment documentation, should be submitted to the Ethics Office for approval using the "Modification to research project" form available at http://research.uottawa.ca/ethics/submissions-and-reviews.

Please submit an annual report to the Ethics Office four weeks before the above-referenced expiry date to request a renewal of this ethics approval. To close the file, a final report must be submitted. These documents can be found at: http://research.uottawa.ca/ethics/submissions-and-reviews.

If you have any questions, please do not hesitate to contact the Ethics Office at extension 5387 or by e-mail at ethics@uOttawa.ca.

Signature:

Rianna Marcotte
Protocol Officer for Ethics in Research
For Barbara Graves, Chair of the Social Sciences and Humanities REB

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Appendix II: Proposal to LinguiPlus

1. Background

Recently, various language service providers, such as LinguiPlus, have integrated machine translation (MT) into translation memory (TM) in order to boost their translators' productivity. Following this industry trend, researchers have studied this integration from different vantage points including the quality of translations produced by TM+MT and the best way through which MT should be combined with TM in order to increase productivity. The present researcher, however, noticed that translators, another crucial source of information, have been ignored in those studies. Studying translators who use the combination of machine translation and translation memory (TM+MT) yields invaluable information from another perspective. The present researcher, therefore, decided to study translators and gain information which might help translators and the company to make the most of the tools they have at their disposal.

2. Objectives

This study aims to learn more about:

- the benefits and pitfalls of TM+MT for translators in the translating process, such as the effect of TM+MT on terminological consistency and syntax;
- the way TM+MT is employed by translators, i.e. when they use MT;
- The translators' perception of working with TM+MT, i.e. does MT+TM make their job more creative or monotonous?

3. The advantages of the project for LinguiPlus

The present project will allow the researcher to:

- learn more regarding the use of MT+TM of which the company is not yet aware. Consequently, this might help to integrate MT into TM in a way that translators become more efficient and satisfied with their job;

- discover the problematic areas of TM+MT (that might decrease the productivity of translators and the quality of their work) from translators' perspective, and subsequently present invaluable information to refine those issues;
- be helpful in training translators to use TM+MT efficiently and make the most of all potentialities of TM+MT.

4. The disadvantage for LinguiPlus of not doing the project:

This project might unveil information that would not be available through normal management practices, and the useful methodology (i.e. ethnography) along with the personal experience of the researcher both as a translator and a translation teacher would be instrumental in discovering other potentials of TM+MT that could be used to boost productivity and quality. Without implementing this project, all the above possibilities will be simply ignored.

5. Promises to LinguiPlus:

After carrying out the present project, the researcher will provide a written report that summarizes and presents data and results; she will likewise gladly give a presentation to the company about the results.

6. The details of methodology

To carry out the present project, the researcher will need 6-9 translators willing to be closely observed while they are doing their routine job. Each observation will last approximately half a day (per participant). Subsequently, translators will be interviewed for 30-45 minutes about what they did during the observations and their personal opinions regarding TM+MT from various aspects.

It is necessary to mention that the observation will be done while they are doing their routine job; no extra texts will be given to them to translate.

The researcher will spend time on the site to collect, transcribe, digitize, and reflect upon data, and also possibly having some informal conversations with other staff members regarding topics such as the translation process and translation tools.

In addition, she might look at some manuals on using TM+MT.

7. The time needed to carry out the project

Three weeks

8. Ethics Approval

The researcher holds the approval of the Office of Research Ethics and Integrity at the University of Ottawa.

9. Confidentiality

The name of LinguiPlus and its staff will not be disclosed, unless it is the wish of the company. All information will remain strictly confidential.

The present project will be carried out for academic purposes and fulfilling the requirements of the PhD program. The dissertation could eventually be published, and relevant articles will be presented to academic journals for publication.

10. References

The following people are completely aware of the present project and its details. They have kindly been providing me with supervision and consultation from the beginning. For more information, please don't hesitate to contact them:

- **Jean Quirion** (supervisor of the project)
- **Matthieu LeBlanc** Associate professor

Appendix III: Letter of information–consent form

Title of the study:

What do translators get from the integration of machine translation into translation memory systems? An ethnographic study

Investigator: **Ms. Maryam Mohammadi Dehcheshmeh**

Under the supervision of

Dr. Jean Quirion (Associate Professor)

Invitation to Participate: You are invited to participate in the abovementioned research study conducted by Maryam Mohammadi Dehcheshmeh as a part of her doctoral project in Translation Studies.

Purpose of the Study: This study will investigate the translators' actual needs, challenges, and work processes while working with TM+MT. This will make a foundation that will contribute to a better understanding of translators' professional working conditions, and subsequently improving them if need be.

Information about the study: This is an academic PhD project that will be carried out by a PhD candidate of the University of Ottawa. The researcher has obtained the permission of the company's manager to implement her project, however the

company and the staff do not and will not have any role in conducting the study.

Participation: If you wish to participate in this study, you may contact Ms. Maryam Mohammadi Dehcheshmeh or call her to book an appointment. Participation should require approximately half a day of observation and 30-45 minutes of interview. This project is being conducted while you are doing your everyday job. Translation assignments are assigned by your employer for doing which you are paid by your company (i.e. you are observed while you are doing your routine job at the company). The researcher will observe your working process by sitting behind you and making a note of whatever is pertinent to her project. Then, a number of questions will be asked in an interview after the observation. Also, the interviews will be audio-recorded.

It is necessary to mention that since the researcher needs 6-9 participants, if the number of interested people surpasses that number, the selection will be made based on the differences between participants regarding their age, sex, years of experiences, etc. Those who have the most diverse characteristics will be selected for the study.

Risks: Since this study involves being observed while doing your routine job, responding to a few questions (e.g. regarding your age group, your language, and educational background) in which you are only asked only to provide your personal opinions, participation in this study involves no risk to the participants in any way whatsoever.

Benefits: Thanks to your feedback, this study will contribute to the researchers' understanding of translators' interaction with translation tools. This will provide a scientific foundation for improving these translation tools.

Compensation: For participation in this study, participants will not receive any compensation.

Confidentiality: The information that you will share will remain strictly confidential and will be used solely for the purposes of this research. Notes and audio recordings will be used for the purposes of data collection and analysis. The only people who will have access to the recordings and research data are Ms. Maryam Mohammadi Dehcheshmeh and Dr. Jean Quirion (her thesis supervisor). Your answers to the questions may be used verbatim in presentations or publications, unless it has some information that personally identifies you. In that case, the answers either will be modified or won't be used at all.

Anonymity: Anonymity is guaranteed since you are identified either by numbers or letters in the project. Only Ms. Maryam Mohammadi Dehcheshmeh will know the actual sources of all data.

Data Storage: The obtained data will be stored in a password-protected computer in the researcher's locked home office. Paper copies of the data will be digitized and kept in an electronic format. A copy of all original data (including paper copies of data) will be securely stored in the supervisor's (Dr. Jean Quirion) locked office at the School of Translation and Interpretation of the University of Ottawa. The obtained data will be deleted (in both digitized and paper forms) after the completion of five years.

Voluntary Participation: You are under no obligation to participate. You indicate your consent to participate in the study by accepting to be observed, by responding

to questions during an interview, and by signing this consent form. If you choose to participate, you may refuse to answer any questions. If you change your mind about participating, you may simply choose to withdraw from the observation and/or interview at any time. If you do choose to withdraw from the observation, your data will be immediately destroyed, unless you agree for it to be used in the study.

Information about Results: The research findings will be part of the principal investigator's doctoral thesis and will be published once the thesis is successfully defended and accepted. The research findings may also be published in the form of academic articles in peer-reviewed academic and professional journals, or they may also be presented in various conferences. No individual will be identified in any form at any time.

Should you have any questions or require more information about the study itself, you may contact Ms. Maryam Mohammadi Dehcheshmeh and/or Dr. Quirion as indicated above. If you have any questions with regards to the ethical conduct of this study, you may contact the Protocol Officer for Ethics in Research, University of Ottawa, Tabaret Hall, 550 Cumberland Street, Room 154, Ottawa, ON K1N 6N5, tel.: (613) 562-5387 or ethics@uottawa.ca.

There are two copies of this consent form, one of which is yours to keep.

Thank you for your time and consideration.

Acceptance: I, _____, agree to participate in the above research study conducted by Ms. Maryam Mohammadi Dehcheshmeh at the University of

Ottawa's School of Translation and Interpretation. This research is under the supervision of Dr. Jean Quirion.

_____ _____

(*Participant's signature)* Date

_____ _____

Maryam Mohammadi Dehcheshmeh Date

_____ _____

Jean Quirion Date

Glossary

All the definitions in the glossary have been presented for the purpose of this study and were not intended to be generalized to other contexts.

Antidote: a software program for French and English writing. It includes an advanced grammar checker, a collection of dictionaries, and interactive language guides. The latest version of this program so far is Antidote 9.

ApSIC Xbench: a quality assurance and terminology management tool used in some TEnTs.

Automatic speech recognition: the process of converting speech signals to their corresponding written words.

Computer-Aided or Computer-Assisted Translation/CAT: a translation strategy whereby human translators use various translation tools as an aid to translation.

Concordancer: a tool showing a list of the occurrences of either a word or a combination of words in context which are drawn from a corpus.

Context match: an occurrence when a segment in the TM is a 100% match for a ST segment, and they both have the same document context (About translation memory matches, 2010).

Concordance: a display of a selected token in a corpus.

Dependency tree: a tree that shows the syntactical relationships between the words of a segment.

File Transfer Protocol/FTP: a network protocol used for transferring files between computers.

Glossary: an alphabetical list of specialized terms with definitions.

Machine Translation/MT: a software program that automatically translates a text in the source language (source text (ST)) to a target language (target text (TT)).

Match: a segment [see *segment*] or sub-segment [see *sub-segment*] that has been found for a similar/same segment or sub-segment in the new ST based on their degree of similarity. TM [see *translation memory*] may suggest several matches, and a translator will opt for the best one based on linguistic and contextual factors.

Noise: an occurrence when irrelevant matches [see *match*] are retrieved by a TM.

NVivo: a computer software package for qualitative data analysis produced by QSR International (a qualitative research software developer).

Optical Character Recognition: transforming the image of a written or printed text into a machine-encoded text.

Postediting: it is "to edit, modify, and/or correct pre-translated text that has been processed by an MT system from a source language into (a) target language(s)" (Allen, 2003, p. 297).

Segment: sentence or sentence-like units in a TM.

Silence: an occurence when relevant matches [see *match*] are not retrieved in TM [see *translation memory*].

Sub-segment: it refers to units smaller than a sentence in a TM.

Term bank: a large-scale collection of information about terms and concepts they represent.

Translation Memory/ TM: a collection of previously translated texts aligned with their corresponding source texts. The working process of TM is recycling previously translated texts to speed up the translation process.

Weight: "in positional notation, factor by which the value represented by a digit in a digit place is multiplied to obtain its additive contribution in the representation of a number" (TERMIUM Plus®, 2017).

XML Localisation Interchange File Format/ XLIFF: an XML-based format designed to make translation files exchangeable between various tools by dint of separating the file formatting from its content and making a bilingual source and target language files.