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MACHINE TRANSLATION IMPLEMENTATION AMONG LANGUAGE SERVICE PROVIDERS IN SPAIN: A MIXED METHODS STUDY

ABSTRACT

This article presents a mixed methods study on the implementation of machine translation (MT) and post-editing (PE) among Spanish language service providers and the methodology used. In the first phase, questionnaires were used to collect quantitative data about each business's profile and the proportion of businesses using MT and PE. In the next phase, a focus group session was used to collect qualitative data to complement the quantitative results and understand businesses' motivations and the procedures followed to adopt (or not adopt) an MT system. The results of the two phases are presented separately and then integrated in the discussion. This sequence does not imply the primacy of quantitative data; in fact, both types of data contribute equally to an understanding of the studied phenomenon. The quantitative results show that 47.3% of Spanish language service providers covered by the study use MT and that 45.5% of these use MT in only 10% of their total projects. The qualitative results reveal that the decision to implement an MT system depends on multiple factors: the business's economic capacity, technological capacity and the knowledge and attitude of the business's human resources.

KEYWORDS: translation studies, machine translation, post-editing, language service providers, mixed methods research

1. INTRODUCTION

Due to the importance of translation in international communication, many businesses and public institutions are investing a large quantity of resources in the research and development of machine translation (MT), despite MT technology is not welcome by all stakeholders in the translation community. Language service providers and professionals may choose to implement proprietary MT systems or free systems. The former are commercial systems adapted to the specific needs of the business. In terms of language combinations and topics, these systems can offer high-quality translation, but they can be expensive and can require a significant investment of time and human resources. The latter are lower quality and do not guarantee the confidentiality of the information input into the system. There are also mixed options, such as the Moses MT system (Koehn et *al*. 2007), which offers free and open access but requires a significant investment of time and personnel to customize it and achieve optimal results. From a technological and

conceptual perspective, MT systems can be broadly classified into rule-based machine translation systems, statistical machine translation systems (Koehn 2010) and the new neural machine translation systems. The difference between these systems lies in how they obtain translation equivalencies. Rule-based systems obtain equivalencies by applying grammatical and semantic rules; statistical systems use statistical probability calculations to combine the most frequent words and phrases. Hybrid systems have also been developed. Neural MT maps input sequences into vectors and then target sequences are decoded from those vectors (see Sutskever, et *al.*, 2014 for Google's NMT systems; for a general view on translation technologies, see Chan, 2015).

Regardless of which system is used and its integration with other tools such as CAT tools, corpus or termbases, producing a text of acceptable quality requires a process of specific review or post-editing (PE), which should be performed by specialists. The implementation of an MT system entails significant changes in the translation methods used by businesses and professionals. Unfamiliarity with these new tasks can breed insecurity, which may provoke rejection of the technology among translators who are accustomed to working with computer-assisted translation (CAT) tools.

CAT tools or translation memories are repositories of translated texts aligned with their original texts. Their function in translating new text is to suggest translations of a particular segment of the original text in their memory. In other words, translation memory eliminates repetitive tasks for the translator. Increasingly, however, this technology is being replaced by machine translation (MT). Unlike translation memory, an MT system produces text completely translated from an original. In other words, the MT system performs the process of translation.

Analysing the phases and workflow processes required when using MT and determining which tasks should or could be executed by the translator is the objective of the project ProjecTA.[1] The study presented in this article is part of this project. The objective of this study is to measure the degree of MT implementation among Spanish language service providers. The research questions are as follows:

- What is the degree of implementation of MT and PE among Spanish language service providers?
- What common traits characterise businesses that use MT and PE?
- What factors influence businesses' implementation of MT and PE?

To gather data, a questionnaire was created. Respondents from the businesses completed the questionnaire online. The questionnaire collected data about the number of participants who used MT and gathered profile data such as the size of their business, the turnover, or the sectors in which they worked.

After the questionnaire results were analysed, it became necessary to augment the quantitative data to gain insight into the businesses' motives for implementing and their attitudes toward using MT and PE. Especially for questions that allowed participants to select "other" as a response, the unstructured data indicated that at the time of creating the questionnaire, the researchers were unaware of certain relevant variables (Creswell, 2003; Kelle and Erzberger, 2010). Therefore, a qualitative data-gathering phase was

added. Qualitative information should complete and elucidate the quantitative data and contribute to their interpretation (Bryman, 2006; Creswell, 2003; Greene et *al*., 1989). This sequential explanatory design emerged during the research process (Creswell and Plano Clark, 2007; Morse and Niehaus, 2003). A focus group session was chosen as the data collection method. This method is considered more efficient than individual interviews and allows researchers to obtain an equivalent amount of data (Morgan, 1997). Using this method, qualitative information was obtained that provided new perspectives on the results of the quantitative study.

The following sections present a literature review of relevant studies (section 2); the study methodology (section 3); and the quantitative and qualitative results, which are presented separately (section 4) and then integrated in the discussion of the results (section 5).

2. LITERATURE REVIEW

In the field of translation studies, specifically in translation process research and translation didactics, it is typical to combine quantitative data collection methods (e.g., keylogging or eye-tracking) and qualitative methods (e.g., interviews or think-aloud protocols) to triangulate results. Translation researchers typically do not characterise this design using the term 'mixed methods'. Studies that explicitly use the term 'mixed methods' include the works of Burns et *al*. (2009) on the learning process of a doctoral student; Kuznik et *al*. (2010) on the use of public opinion polls in translation studies; Doherty (2012) on the effects of controlled language on the reading and comprehension of texts translated via machine translation; Doherty and Kenny (2014) on the design and evaluation of a course on statistical machine translation for translation students; and Moorkens (2015) on the consistency of translation memory corpuses.

To date, most of the studies on the use of translation technologies in general and of MT in particular have used quantitative methods. This section reviews the relevant research on the topic, classified according to area studied: studies of the international market, studies of the national market, and studies on professionals.

Approaching the international studies in chronological order, we first discuss the ambitious study headed by Rinsche and Portera-Zanotti (2009) regarding the size of the language industry in the European Union. The primary data were collected using a 50-item online questionnaire. Of the 562 respondents polled about the technology, only 36 (3.26%) confirmed using MT. The authors conclude that the use of MT will grow because of the increasing need for translation in a globalising world. They also identify a deficit of MT experts. In 2010, TAUS presented the results of an online survey of language service providers in Europe, America, and Asia to evaluate the use of PE of MT. Of the 75 businesses that responded to the questionnaire, approximately half (49.3%) offered PEMT services (Joscelyne and Brace, 2010). Two studies published in 2014 merit mention. The first, *The Languages Services Market* by DePalma et *al*. (2014), is a quantitative study performed using a survey whose results showed that 38.63% of the study participants offer MT services and that the annual growth rate for translation services was 6.23%. In the second, the TAUS's *MT Market Report 2014* (Van der Meer and Ruopp 2014), the authors created surveys and interviewed not only language service providers but also MT developers, users, MT marketing companies, and consultants. It is

the only study so far to feature such a wide range of respondent profiles. The study concluded that the use of MT will continue to grow and eventually be integrated with other translation technologies such as CAT tools. The Spanish project VITAE (2015) studied the viability of implementing proprietary MT systems in businesses. The study compared various MT systems and performed a detailed case study of a business that implemented proprietary MT systems. The authors concluded that to be maximally useful, an MT system should be able to integrate itself with the CAT tools the company already uses.

Amongst the national-level studies, three surveys from Spain are notable for their scope: the *Estudio de situación del mercado español de servicios de traducción* [Study of the Status of the Spanish Translation Services Market] (ACT, 2005), launched by the Translation Specialist Centers Group (Agrupación de Centros Especializados en Traducción - ACT); the *Libro Blanco de la Traducción Editorial en España* [White Book of Editorial Translation in Spain] (2010), initiated by the Ministry of Culture; and the *Libro Blanco de la traducción y la interpretación institucional* [White Book of Institutional Translation and Interpretation] (2011), overseen by the Ministry of Foreign Affairs and Cooperation. Only in the first of these three studies and only under the heading 'technologies' was the use of CAT tools and MT systems analysed. This study also assessed the use of layout and desktop publishing systems and multimedia systems. At the time of data collection, 10.91% of the companies used MT systems. It was not uncommon, in certain cases, for respondents to confuse MT and CAT tools (ACT, 2005: 51). Almutawa & Izwaini (2015) researched the extent of MT use in the Arab world, focusing on Saudi Arabia. To gather data, they created three questionnaires directed at different populations: translation businesses, governmental and non-governmental organisations, and universities. One of the study's conclusions is that MT use is low because of the low quality of machine translation in Arabic. The most recent quantitative study of this type was published by Christensen and Schjoldager (2016) on the use of CAT tools in Denmark. Of the 25 responses received, 0% of the respondents used MT as their only tool, and only 5% used MT in combination with translation memories.

Regarding the use of translation technologies amongst professionals, in a study performed by Trad Online (2011), respondents were asked if technology would entail significant changes in their work methods. This quantitative study was based on a 20-item questionnaire. Of the 1330 translators who responded, 48% thought technology would change their working methods, but not in a significant way; only 22% believed the changes would be significant. Also noteworthy is a study by Torres-Domínguez (2012) consisting of a 60-question online survey completed by 509 translation professionals and students from 59 countries. Of the respondents, 23% said they used MT. In a study by Zaretskaya et *al*. (2015), 736 professional translators responded to a 10-item online questionnaire. Of these respondents, 36% used MT.

From a methodological perspective, it is clear from the literature review that the preferred data collection method is a survey and that the studies emphasise quantitative results.

3. METHOD

The mixed methods approach is justified by our rationale. First, we collected quantitative data on the number of businesses using MT and PE, what type of programs they are predominantly using, and what the common traits of these businesses are. Second, qualitative data have been gathered on the implications that (possible) users associate with this technology and that influence the decisions made by businesses. This sequence does not imply the primacy of quantitative data; rather, both types of data have contributed equally to understanding the studied phenomenon.

3.1. Quantitative Phase

The quantitative phase of the research consisted of a cross-section study based on a questionnaire. Because no directory exists specifically for language service providers with headquarters in Spain, the research team created its own. This was done by searching for the corporate web pages of language service providers. The result was a list of 187 businesses of varying sizes located across all regions of Spain.

An online survey format was chosen because it offers the advantages of speed, low cost, and ease of accessibility to highly busy people (Díaz de Rada, 2012), such as the managers of these businesses. In addition, online surveys allow the interviewee to choose when to respond and to take as much time as necessary. It also prevents the bias created by the presence of an interviewer and protects anonymity more effectively (Kreuter et *al*., 2008).

One of the specific disadvantages of Internet surveys is representativity. Representativity problems occur for two fundamental reasons: difficulty accessing a study's population because of low levels of Internet access and a low response rate (Díaz de Rada, 2012). In this study, the 187 businesses each had their own Internet connections, which resolved the first problem. The response rate achieved was 29.4%, with 55 valid responses. In a previous study of the entire Spanish translation sector, 55 companies were interviewed (ACT, 2005); in a European study, responses were obtained from 10 Spanish language service providers (Rinsche and Portera-Zanotti, 2009).

Prior to creating the electronic questionnaire, the survey questions were submitted for evaluation by two business representatives, who evaluated the suitability of the content and the clarity of the wording. An expert from the Applied Statistics Service of the Universitat Autònoma de Barcelona (UAB) advised the researchers on the classification of each question. Next, the form itself was generated using the Google Forms application. Finally, a pilot study was performed with two businesses in the sector, and the results were used to refine the questions. The questionnaire could be completed in approximately eight minutes.

In accordance with UAB's data protection guidelines, the questionnaire included the standard clauses on confidentiality and anonymity. Likewise, in accordance with Spanish legislation regarding personal data protection, the files in which the data were to be stored were legalized.[2]

The questionnaire was sent to the companies in January 2015. Participants agreed to provide their answers for research purposes. During the month of February, two reminders were sent via e-mail. Reponses were received during January and February. In March, telephone calls were made inviting the businesses that had not yet responded to complete the survey. Data processing was conducted between April and June 2015.

The questionnaire contained seventeen multiple-choice questions structured into two large blocks. The questions gathered information about 1) the profile of the business and 2) the extent of the use of MT and PE.[3]

The data analysis revealed that an instrument using closed-ended questions was useful for obtaining data about the profiles of the businesses and about the proportion of businesses using MT and PE and for what types of jobs. However, the instrument proved insufficient for obtaining an in-depth understanding of the factors that influence businesses' decisions to implement an MT system in their workflow and, particularly, to understand their motives for doing so. Therefore, a qualitative study was added.

3.2. Qualitative Phase

The qualitative phase consisted of a focus group session with leaders from language service providers. The businesses represented in the focus group regularly collaborate with UAB in providing opportunities for students in the master's degree in Translation Technologies (Tradumàtica). Participating in the focus group session were 11 experts from seven businesses and five ProjecTA research team members, two of whom acted as moderators. The session was held on June 18, 2015 at the Faculty for Translation and Interpreting (UAB), lasted an hour and a half, and was audio-recorded.

During the focus group session, the participants were asked their opinion regarding the results obtained from the questions assessing the use of MT and PE in businesses. The moderators presented six questions from the survey and their respective results, which were discussed sequentially (see subsection 4.2).

4. RESULTS

In this section, we present the most significant quantitative and qualitative results of our study separately (see Torres-Hostench, Presas and Cid, coords. 2016, for complete results).

4.1. Quantitative results

The quantitative results obtained from the online survey are presented in the following two subsections: profile of the businesses and use of MT and PE.

4.1.1. Profile of the businesses

The 55 businesses that responded to the survey are distributed across 16 cities, although they tend to cluster in Madrid and Barcelona. Ten have headquarters in other, predominantly European, countries.

Most of the companies are microbusinesses (61.8%) and small businesses (23.6%)[4]. More than half (61.8%) had less than 500,000 euros turnover, 25.5% were above this level and 7 did not provide this information. The oldest was founded in 1963 and the most recent in 2015. A total of 50% of the businesses were created prior to the year 2000.

All of the businesses offer translation services. Between 55% and 84% offer additional reviewing services (editing of originals, concept editing, and PE). The other services offered include alignment of translation memories and parallel bilingual texts (49%), creation and management of terminological databases (47%), terminological concordance (29%), PE of MT provided by clients (31%), and pre-editing of documents provided by clients (24%). Furthermore, the businesses mentioned other services, including interpretation, localisation, subtitling, layout, review of printers' proofs, sworn translations and transcriptions.

The most frequent source languages reported were Spanish and English, followed by German, French, and, though uncommon, Italian and Portuguese. Other peninsular languages (Catalan, Basque and Galician) were rarely mentioned as source languages. The target languages with the highest demand were English and Spanish, followed by French and German. To a far lesser degree, translations were sometimes sought into Portuguese, Italian, Arabic and, infrequently, Catalan, Basque and Galician.

The businesses covered by our study work for several client types and more than one sector. The respondents' clients included private businesses in Spain (98%) and other countries (81%), individual clients (63%), public Spanish institutions (61.8%), EU institutions (14.5%), and international institutions (14.5%). The sectors to which these clients belong, in order of frequency, are industrial and technical (87%); technology and telecommunications (78%); judicial and legal (78%); marketing (78%); economic and financial (76%); tourism and leisure (67%); health and pharmaceutical (64%); real estate and construction (44%); editorial (16%); and other (7%).

4.1.2. Use of machine translation and post-editing

Of the 55 businesses that responded to the survey, 52.7% stated they did not use MT, and 47.3% reported using it. The data on use of MT were cross-referenced with the data on the size and age of the businesses. In the microbusiness group, the majority (62%) do not use MT, though 38% do. In contrast, in the small business group, the majority do use MT (70%). In sole proprietorships and medium-sized businesses, the percentage was evenly balanced at 50%. These results did not conform to the researchers' expectations: the use of MT seemed low, and it was the small businesses with lower economic capacity that were more likely to implement MT.

The 29 businesses stating they did not use MT responded to a multiple-choice question about why they made this decision. They could select from the following options: 'not confident in MT' (chosen by 35.6%), 'clients do not demand it' (33.3%), 'translators do not accept it' (20%) and 'other' (6.9%). The "other" option elicited responses related to the low quality of MT, the high cost of proprietary systems, and technological difficulties. These answers revealed that the survey's multiple-choice items were not comprehensive.

Regarding the approximate percentage of MT use across all of a business's services, the respondents could be ordered into percentiles. The responses to this question revealed that even in businesses that use MT, its rate of usage is low: approximately half of the companies (45.5%) use MT for a maximum of 10% of their projects.

Of the 26 companies who stated that they use MT, 11 (42.3%) are equipped with one or more proprietary MT systems; five (19.2%) did not use proprietary systems; and 10 (38.5%) did not respond to this question. Of the companies with proprietary systems, one is a medium-sized business, seven are small businesses, and three are microbusinesses. Statistical MT systems were the most frequently used proprietary systems. To a lesser degree, the businesses reported using rule-based systems and hybrids. After cross-referencing the data about the type of system used with the frequency of MT use in these companies, the results showed that companies using rule-based MT systems make intensive use of them (more than 50%). In the case of hybrid and statistical systems, this relationship cannot be as clearly established: some businesses with proprietary systems use MT for less than 10% of their projects, and others use it for up to 50% of their projects. These divergent results were unexpected for the research team.

A total of 20% of the businesses that completed the survey did not perform PEMT. Of the businesses that did offer this service (80%), almost half (47%) of the PE jobs corresponded to less than 10% of total work volume.

The objective of the last question of the questionnaire was to obtain data on the translators' attitudes toward PE. Three possible answers were provided: 'Without problems', 'With Reservations', and 'Do not accept'. Within each of these options, respondents could explain their degree of agreement: 'All', 'Most', 'Some' or 'None'. The majority of responses corresponded to 'Some / most accept post-editing tasks with reservations' (28 responses), followed by 'Some / most accept post-editing tasks without problems' (25 responses). The least frequent response was 'Some / most do not accept post-editing tasks' (19 responses). These responses reveal that PE is a task that arouses mixed feelings.

The quantitative data analysis raised several questions for the researchers: 1) Should the MT implementation level be considered high or low? 2) What considerations are taken into account when deciding to implement a proprietary MT system in one's business? 3) Why is the use of MT not generalised to all types of services? 4) What obstacles or incentives do companies have to use a proprietary MT system? 5) What are translators' attitudes toward MT and PE? These questions were posed to the experts in the focus group session. In the following section, the qualitative results are summarised.

4.2. Qualitative results

In the focus group, the results of six survey questions related to the use of MT and PE were presented. Below, the questions and answers are reproduced, as well as each of the primary responses to the results that emerged during the session.

> Question: Is MT used in the workflow of your business?
> Answer: 47.3% use MT, 52.7% do not use MT.

These results surprised the attendees: their perception was that the use of MT had increased in recent years, and they expected a higher percentage. Nevertheless, they predict that MT use will continue to expand. They recalled that several years ago, the expansion of CAT tools was in doubt and that these finally achieved widespread adoption. In addition, important clients are requesting the use of MT with increasing frequency. Possible reasons for this result include the following:

- Respondents did not know for certain whether they used MT because it is often integrated into CAT tools systems.
- Subcontracted translators use MT without notifying the language service provider.
- Companies use MT without openly admitting it.

The latter point led to a discussion of transparency with clients and to what degree it is necessary to inform them that MT is used to perform their translation. If clients knew that MT was used, they might demand a price reduction. The companies believe that this would lead to a loss of income.

> Question: If MT is not used, why not?
> Answer: **'**Not confident in MT' (35.6%); 'Clients did not request it' (33.3%); and 'Translators reject it' (20%). In the space provided for explaining the 'other reasons' response, participants noted the poor quality of translations and economic and technological difficulties.

Other reasons added by the experts included the following:

- Lack of confidentiality in free MT systems: documents sent to free systems become part of the system's corpus and therefore become accessible to other users.
- Companies' lack of technological capacity.
- Insufficient understanding or prejudice among translators who believe that MT is provoking changes in the translators' trade.
- Inability to bear the implementation costs of a proprietary MT system and the associated training.

Regarding the latter point, experts note that MT and PE use saves time and increases productivity, which compensates for income lost due to lower fees.

> Question: 'Of all the translation projects in your business, what percentage use MT?'
> Answer: 0-10% (45.5%); 10-20% (9.1%); 20-30% (7.3%); 30-40% (3.6%); 50-60% (3.6%); 60-70% (less than 3%); 70-80% (3.6%); 80-90% (3.6%), +90% (3.6%); and No answer (18.2%).

Again, the participants expressed surprise at what they considered to be low usage percentages. The main themes that emerged during the discussion included the following:

- The differences in percentages may be explained by the varying specialities of the language service companies. In general, whether a business makes major or minor use of MT is related to the language combinations worked with, the types of projects, the topics of the projects, the delivery timeframes, the types of clients and their specific demands, and acceptance among the translators.
- If the CAT tools with which a business works are of good quality, the use of MT is, to a degree, less reasonable.

The discussion emphasized that businesses' level of implementation of MT is unequal, both in Spain and internationally: in countries such as the USA, it is common, while in others, such as France, MT is being incorporated gradually.

Question: Does your business have a proprietary MT system?
Answer: 42.3% possess a proprietary MT system, 19.2% do not, and 38.5% did not respond.

The experts in the focus group noted three factors involved in the decision to adopt a proprietary system:

- Attitude of the business. Adopting a proprietary MT system entails changing the workflow of a business.
- Economic factors. These are linked with the previous idea: installing a proprietary system represents an economic investment, an initial decrease in productivity during preparation of the system (which will later be compensated for over time) and the necessity of training the translators.
- Other factors may include the typical types of projects a given business receives or the most frequent language combinations (which can influence the decision to use one type of system over another).

Question: What volume of work corresponds to MT PE projects?
Answer: Less than 10% (47.3%); 10%-20% (14.5%); 20%-30% (7.3%); 30%-40% (1.8%); 40%-50% (1.8%); 50%-60% (5.5%); 60%-70% (0); 70%-80% (1.8%); 80%-90% (0); and over 90% (0). No answer (20%).

Again, the low percentages observed in the survey surprised the experts. The general opinion, however, is that the use of PE can change depending on the sector and that, overall, PE demand will increase in the short term.

Question: Do your external providers accept MT PE assignments?
Answer: The majority of responses corresponded to the 'Some / most accept post-editing assignments with reservation' option (28 responses), followed by 'Some / most accept post-editing assignments without problems' (25 responses). The least frequent response was 'Some / most do not accept post-editing assignments' (19 responses).

The quantitative data revealed many reservations among translators about accepting PE assignments. The experts confirmed the existence of these reservations, although they asserted that they would decrease rapidly with the increase of MT use. They added that the most resistant translators were the eldest, suggesting that younger translators were more open-minded. However, the absence of reservations was not always interpreted as necessarily positive: in some cases, the lack of concern reflects the ignorance or inexperience of a new translator who does not thoroughly understand the quality problems associated with MT use.

5. DISCUSSION

In this section, we integrate the quantitative and qualitative results related to the use of MT and PE. When there is a discrepancy between the quantitative results and the results expected by the researchers, the mixed methods design allows a more thorough explanation of the studied phenomenon.

The first discrepancy arose in the degree of MT implementation among the businesses. The fact that less than 50% of the businesses confirmed using MT surprised not only the researchers but also the experts in the focus group, who questioned the candour of the respondents. There are two possible interpretations of these results.

If the respondents did not tell the truth, their reticence indicates that speaking of MT is a taboo subject. This taboo may exist because MT affects a key element of these companies' survival: fees. Clients interpret a translator's use of a machine translation tool as decreasing the amount of work actually performed by the translator. At what point, however, should the client be notified that MT was used during the process? Given these concerns, it is possible that both translators and businesses may use MT without admitting it publicly to avoid the perceived obligation to reduce fees. Furthermore, because these systems do not guarantee the confidentiality of data input into them, openly admitting to using free MT systems could cause clients to lose trust in the language service provider. As a result, some companies might hide their true MT-related practices because they fear losing clientele or seeing their earnings reduced.

However, assuming that respondents told the truth, we should determine why language service providers are not using a tool designed specifically for translation when free services are used daily by users of all profiles and ages, whether via computer or mobile device, to satisfy their translation needs. Based on the data gathered, both quantitative and qualitative, we observed various obstacles to the use of MT in a business:

- Technology – variable quality of the results of machine translation. Individual users of free MT must accept the quality they receive from free services, but translation businesses must provide service of the highest quality to justify market prices. It seems that the quality of existing systems is not sufficiently high to be used on professional translation projects.
- Finance – lack of ability to invest in proprietary systems. Proprietary systems, which guarantee total confidentiality of documents, are too expensive for many micro- and small businesses. In addition to the initial investment, proprietary systems also require a significant investment of money and human resources to maintain them. If the business is unable to invest in a proprietary system and cannot use free MT because of the lack of confidentiality of the materials submitted to the systems, the business has no choice but to forgo MT use.
- Training – lack of MT training among the businesses' employees.
- Personnel – fear of the disappearance of translation services as they currently exist and reticence from professionals for personal reasons related to survival.

If these obstacles are typical, not using MT is not a lightly made, strategic decision. Rather, it represents a company's inability to stay current. Therefore, Spanish businesses may have problems with competitiveness in the short and medium terms as the demand for MT becomes generalised amongst clients.

Despite these obstacles, there are businesses that do use MT, although it is used for a small percentage of jobs. MT, it seems, is not the preferred option for translation service providers. This result surprised the researchers, who expected more widespread use. The focus group session revealed that the choice to use MT to complete a project depends on a series of factors such as language combinations, the material, timeframe, type of client

and the client's specific requests, the specialty of the business, etc. Thus, even if a business has the ability and intention to use MT, it may decide not to do so due to one of these factors.

6 CONCLUSION

The use of mixed methods is not typical in studies on the translation market. Indeed, this study began as a quantitative study. The initial purpose was to understand the current scope of MT and PE use by Spanish language service providers. The results showed an overall picture of the sector that merited deeper analysis; the researchers did not have sufficient information to interpret the results obtained. Thus, a qualitative phase was incorporated that allowed the data to be interpreted based on the perceptions of experts and representatives of the sector. In this way, the data were not analysed based on the suppositions of the researchers but instead according to the opinions of the participants (Creswell, 2003; Rossman and Wilson, 1985; Tashakkori and Teddlie, 1998). The qualitative phase was constructed after the first quantitative phase, and the complementary nature of these methods has been extremely productive because of its ability to offer deeper insight into the research problem.

The application of a mixed methods design in this study has allowed us to identify the crux of the current conflicts related to MT use by language service providers, which undoubtedly has more value and utility than the mere provision of quantitative data. Conversely, without the quantitative data, we would not have been able to present an objective picture of the current situation regarding MT use by Spanish language service providers.

In this study, the researchers initially assumed that MT is a competitive advantage for businesses. Therefore, the experts chosen for the focus group were from companies that already use MT. The results of the survey and the discussion in the focus group session challenged this assumption, however. Indeed, they revealed the necessity of more deeply understanding the other perspective. Therefore, individual interviews will be conducted with businesses that do not use MT.

The results and conclusions of this study are part of the project ProjecTA. The ultimate objective of the project is to generate recommendations and standards so that businesses and professionals can integrate MT into their workflow. This market study on the use of MT by businesses suggests broader implications, however. First, it offers information to language service providers not using MT that they can use in their decision-making process. Second, it offers data and reflections that translator training centres can use to develop curricular design so that future translators learn that there are language service providers that use MT. Students should learn how to deal with translation workflows which include machine translation and postediting.

This study also opens new avenues for investigation. Future research on MT in Spain could survey a wider range of agents beyond language service providers. It would be interesting to design other studies to gain further insight into professional translators' attitudes toward MT, the type of MT tools they use, and what they need to make them

more effective. Furthermore, it would be desirable to understand the perceptions that clients ordering linguistic services have of MT and the perceptions of the businesses that develop and market MT systems. With the aim of gaining a more complete vision of the studied phenomena, it would be desirable for the described studies to have mixed methods designs.

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ENDNOTES

[1] The Project ProjecTA (Proyectos de traducción con Traducción Automática Estadística y Posedición) is funded by the Ministry of Economy and Competitiveness, Reference FFI2013-46041-R.

[2] The legalization of a file entails an initial report from the person responsible for the research project; the resolution of the rector from UAB authorizing the creation of the data file; the publication of the resolution in the Official Journal of the Government of Catalonia (*DOGC, Diari Oficial de la Generalitat de* Catalunya) and the entry of the file in the Data Protection Registry of Catalonia.

[3] The questions relating to MT use are reproduced and discussed extensively in the report *El uso de traducción automática y posedición en las empresas de servicios lingüísticos españolas* [Use of machine translation and post-editing among Spanish Language Service Providers] (Torres-Hostench, Presas and Cid, coords., 2016).

[4] According to the business size parameters established by the Spanish Ministry of Industry, Energy, and Tourism, the following definitions were used: microbusiness, up to 9 workers; small, between 19 and 49 workers; medium, between 50 and 249 workers; large, more than 250 workers.