Spring 4-11-2011

Driving Shareholder Value Through The Use Of Machine Translation Within Customer Support

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Machine Translation (MT) is an increasingly mature field of applied computer technology, aimed at translating texts from one natural language into another. This paper focuses on the use of MT within Customer Support (CS), where it can support multi-lingual, multi-channel strategies. The paper shows how MT within CS positively impacts on shareholder value, through its influences on increasing and accelerating cash flows, reducing cash flow volatility and vulnerability and increasing the residual value of a business. Four application types of MT are recognized: multi-lingual chat and e-mail, multi-lingual knowledge base, multi-lingual forums and blogs and multi-lingual social media. Current use of MT concentrates on the more traditional multi-lingual knowledge base aspect of MT. However, respondents suggest that, with increased knowledge by managers of the strengths of MT, broader application can be achieved. This would further improve CS, increasing customer satisfaction, ultimately leading to higher customer loyalty and enhanced shareholder value.

Keywords: Machine Translation, Multi-channel, Multi-lingual, Customer Support, Shareholder Value.

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1   Introduction

As more companies have expanded into global markets, their customer bases have become more diverse and can span multiple countries and continents in which people speak different languages. Changing demographics in developed economies are further contributing to multilingual diversity. Customers prefer information in their own native language (DePalma and Kuhns, 2006), leading to continuously evolving language requirements for businesses. The complexity of products and customer has grown and customer self-service content, such as online knowledge base articles, FAQs and other content types are becoming the primary support information sought by customers. Digital support content continues to increase rapidly with new and updated content being added daily. As companies allow customers to add information to discussion forums and help-focused blogs, community created content is also being added to online support information. Customers often contact a call centre when they cannot find a solution to issues they are experiencing. Multi-lingual call centres are

expensive and such calls cost over $30 per instance (Joscelyne and Van der Meer, 2007) to resolve. It is much cheaper if customers find information on their own, or if the translation element could be automated as part of customer communication. The ideal solution might be to have all customer service (CS) content translated into multiple languages to allow all customers a self-service capability that speeds up the CS process and increases satisfaction. However, human translation of time-critical content is time-consuming and often not cost-effective to justify translating large volumes of content into multiple languages. Machine Translation (MT), also called automatic or automated translation, could possibly help to address these issues. In the past, automated language support has not received the level of attention that reflects its importance (Goffin, 1999) and research in this area said to be lacking (Hull and Cox, 1994).

This paper focuses on the use of MT in Customer Support (CS) and more specifically on the impact of providing customers with content in multiple languages via multiple channels on shareholder value. Case study methodology is used to investigate how leading companies deliver and manage CS, how they employ MT, and what broader multi-lingual strategies have been adopted.

The paper starts with exploring various aspects of MT, followed by an investigation of links between MT, customer support and shareholder value. We then go on to present the findings from the empirical research, ending with conclusions and discussion.

2   MACHINE TRANSLATION

MT is the application of computers to the task of translating texts from one natural language to another (EAMT, 2010). Hutchins and Somers (1992) depict MT as computerised systems responsible for the production of translations from one natural language into another, with or without human assistance, reflecting that MT output is often revised ('post-edited'). Functionally speaking, MT parses text into parts of speech such as nouns, verbs, and adjectives. Then it processes these linguistic components according to linguistic rules, statistical algorithms, or a combination of these methods (DePalma and Kuhns, 2006). Slocum (1985, p. 2) articulates the technological building blocks that are part of MT: '*An MT system is solely responsible for the complete translation process from input of the source text to output of the*

target text without human assistance, using special programs, comprehensive dictionaries, and collections of linguistic rules (to the extent they exist, varying with the MT system).'

2.1 Functions and workflow of MT

MT output can serve multiple purposes and can be used in different ways. While post-editing is often the norm, there are certain circumstances when MT output may be left unedited (as a raw translation), or only lightly corrected, for example if it is intended only for specialists familiar with the subject of the text. Output may also serve as a rough draft for a human translator, as a pre-translation. Hutchins (2005) distinguishes four basic MT functions:

> 1) **Dissemination**: the production of translations of 'publishable' quality where the raw MT output is insufficient and human assistance is needed in the form of post-editing (revision) of the output text, pre-editing of the input, using a controlled language, or restricting the system to a specific subject domain,
>
> 2) **Assimilation**: the translation of texts for monitoring (or 'filtering') or skimming information, or the translation of texts for occasional users,
>
> 3) **Interchange**: the communication between different languages by individuals, by correspondence, by email or by telephone,
>
> 4) **Database access**: the use of translation to assist in getting information from a database in a foreign language, one that the user does not well understand – i.e., these days this means mainly the use of translation aids for searching the Internet, for accessing web pages.

Other writers, such as DePalma and Kuhns (2006) distinguish between push and pull paradigms for the use of MT. An example of Assimilation, and also the pull paradigm, is so-called translation 'gisting', which provides a rough translation to gain a basic understanding of the content (Hurst, 2008). MT is currently most suited to technical content rather than literary translation for a number of reasons. This is because, firstly, volumes of technical content are much larger and thus there is a more compelling business case. Secondly, MT can ensure consistency of terminology, which is more critical when translating technical content to avoid confusion among readers. Thirdly,

there is a lack of available human translation resources in specialist fields and thus increasing productivity/throughput is key to meeting demand for translated content. Finally, current MT systems are lacking in style, but excel at terminology and thus are more suited to technical rather than literary content.

The following is a basic description of the sequential workflow steps.

Text acquisition: The process of creating an electronic file from the translatable content that can be processed via MT. Today's MT solutions can process many different file types as long as they are machine readable and may involve an optical character recognition (OCR).

Possible pre-editing: Pre-editing involves a level of content re-writing bearing in mind MT limitations to maximise the quality of the MT output.

Pre-processing: Is traditionally viewed as a technical step that involves the separation of translatable and non-translatable (e.g. formatting or tagging information) content within an intermediate translation document. The end result is that non-translatable content is protected and only the translatable content can be converted via MT into the target language.

Dictionary Creation or System Training: The result in both cases is that the MT system will better understand the source content and provide better translations.

System translation: This is the actual MT stage during which the source content is processed to achieve a target translation. Throughput speeds are dependent on a number of factors, including architecture and processor speed and can vary from around 5000 words to 500,000 words per minute.

Possible post-editing: According to Wagner (1985) 'post-editing entails correction of a pre-translated text rather than translation 'from scratch'. A linguist will revise the MT output to the required standard.

Post-processing: At this stage, the formatting is re-merged or re-applied to the translated file to ensure a similar appearance to the original source file.

Printing/publishing: Finally, the content will be printed or rendered to a website or other medium for publication.

2.2 Authoring

The way in which a source document is written can positively influence translatability using MT, and co-determines output quality. 'Controlled authoring' is the process of applying a set of predefined style, grammar, punctuation rules and approved terminology to content during its development (Broin, 2009). Companies such as Xerox, Caterpillar, and others used MT systems with a 'controlled language' from the late 1970s – many companies followed their example (Hutchins, 2009). The best-known variant is possibly ASD-STE100 Simplified Technical English. Content is either created using controlled authoring practices from the start, or by pre-editing it before applying MT. The extra expense in creating clearer source content is easily justified when translating into multiple target languages. MT is best suited for content with a restricted vocabulary and grammar, which often includes knowledge bases, manuals, and other content in the customer support arena (Yanishevsky, 2009). Originally developed from the concept and technology of Translation Memory (Allen, 1999), authoring memory tools can improve source content for translation with MT. The objective is to aid authors create higher quality content that is consistent with corporate terminology, style guides, and previously written content, and speed up translation.

2.3 Post-editing

A number of researchers have written on the topic of post-editing of MT content and how this process improves quality (see, for example, Wagner 1985, Veale & Way 1997, Allen 2003, Joscelyne and Brace 2010). MT post-editing is defined as 'the correction of machine translation output by human linguists/editors' (Veale and Way, 1997). Different levels of correction exist, resulting in either a publishable document (full post-editing) comparable to high quality human translation, or an understandable document (light post-editing), containing correct terminology and names, expressed in unambiguous but not necessarily elegant sentences (Joscelyne and Brace, 2010).

The overall aim of MT is to accelerate throughput at acceptable quality levels (and where possible reduce costs). Efficiency can be measured through indicators such as the Translation edit rate (TER) as described by Snover et al (2006). Post-editing can cut costs and time by 35% to 70% (TAUS, 2010). Ongoing efforts to optimise post-editing are focused on improving raw translation quality to reduce the post-editing

workloads. Post-editors should be provided with a feedback mechanism for corrective input and enhancement of the MT system (Joscelyne and Brace, 2010). The feedback loop is also described as the 'Virtuous Circle of MT Quality' (Thicke, 2009).

Recently, a process called automatic post-editing (APE), whereby the output of a first MT system is post-edited by a second system, has been suggested by Kuhn et al (2010). Automated post-editing through the use of regular expressions has also delivered demonstrable productivity gains (Guzman 2008).

2.4   Quality Management and Measurement

There are various techniques to automatically measure MT quality, including BLEU, NIST, F-Measure, and Metero (Joscelyne, 2006). The IBM Watson Research Center developed the bilingual evaluation understudy (BLEU) metric in 2001 (Papineni, 2002). BLEU assumes that the closer the MT output comes to the human translation, the better the result. These measures compare MT output with reference translations.

Traditionally, for texts that are intended for dissemination, post-editing has always been considered to be essential (Allen, 2003). More recent evidence has shown that end users or customers will accept a level of quality that is lower than fully publishable. Joscelyne (2006) describes a paradigm shift that is occurring from publisher-defined quality to user-defined quality. This is due to an increasing expectation for information, opinion and news to be immediately available and actionable (e.g. problem-solving information). In an attempt to draw a distinction with FAHQT, the Translation Automation User Society (TAUS) refers to Full Automated Useful Translation or FAUT. Furthermore, DePalma and Kelly (2009) suggest the concept of 'Zero translation' as the less preferred alternative to the use of MT. However, the post-editor remains an important constituent in the MT process and is key to providing publishable quality. Finally, it is worth noting that correctly optimised MT can actually improve quality for large volumes of content (Thicke, 2009).

2.5   Developments in Machine Translation

A number of recent developments and trends bear relevance to the future application of MT. Many can be considered 'disruptive innovations' (Christensen and Raynor, 2003) within translation and customer support alike.

- Speech translation including telephone interpreting and video interpreting (Kelly, 2008).

- Integration of MT into general document processing technology (Arnold et al, 1994).

- Social Networking and Media: Web 2.0 has introduced the social networking/computing capability and has results in consumer-generated content swamping and disrupting traditional media (Governor et al., 2009) through blogs, wikis, tweets, and other media. But the huge possibilities of devising MT for social networking in general appear to have not yet been tackled (Hutchins, 2009).

- Crowdsourcing and Translation Collaboration: Facilitated by Web 2.0, the move toward more asynchronous, geographically dispersed translation projects involves multiple, concurrent translators collaborating via the internet (DePalma and Kelly, 2008). One large company involved many of its worldwide employees with a crowdsourced approach to correcting and validating machine translation output (DePalma and Kelly, 2008). This method would provide for a feedback of proofread documents into the MT system to enhance the future output

- Handheld Devices: As telecommunications technology develops, MT applications are being extended for use on phones and other mobile devices. Many 'apps' exist today for download onto mobile devices that allow machine translation of text, pictures, and spoken content.

- Data Sharing: The Translation Automation User Society (TAUS) Data Association (founded in 2008) aims to create a shared industry database of translation memories and terminology. Data sharing is supporting growth and automation including MT development. Recent research has shown, however, that while there can be benefits to data sharing, smaller amounts of high-quality data can provide better results than large amounts of relatively unclean data (Vashee 2008 and 2009). Terminology consistency is an important driver for better quality. Levitt (2007) describes strategies for cleansing language assets such as translation memories.

- Cross-lingual Information Retrieval (CLIR): The goal of CLIR, or 'multi-lingual search', is to allow users to make queries in one language and retrieve

relevant documents in other languages (Bracewell et al., 2008). Recent research has demonstrated that, while certainly useful, writing a topic in another language and then asking Google to automatically translate it before launching a search degrades retrieval effectiveness, compared to a monolingual search in which requests and documents are written in the same language (Savoy, 2009).

MT is fast developing into a mainstream technology with a growing range of potential applications. It is still not suited to all content types, but its use cases have increased as the technology has matured. This development process has been driven in part by the effects of the Internet, which has increased the need for on-demand translation and is resulting in a reduction of the MT quality expectation that many users will accept.

3   Multi-lingual Customer Support

3.1   Customer Support Function

Despite its importance, little has been published on CS (Hull and Cox, 1994) and it often receives relatively little management attention (Knecht et al., 1993, Goffin, 1999). CS is, however, becoming an area of increasing priority for research (Loomba, 1996) and practical optimisation. CS is perceived by managers to be an essential part of their offer to customers and is an indirect indication of customers' opinion (Goffin, 1999). It plays a key role in ensuring customer satisfaction (Lele and Sheth, 1987) and can provide significant competitive advantage (Clark, 1987) as well as profit and revenue (Lele, 1986, Goffin, 1999). Product support is important in many sectors, in both high-tech and low-tech environments (Moriarty and Thomas, 1989). It has also been demonstrated to contribute to an increase in the success of new products as demonstrated, for example, by Cooper and Kleinschmidt (1993) and is increasingly becoming the order-winning criterion for many firms (Sterling and Lambert, 1987) and (Fites, 1996).

Multi-lingual CS, in particular, is receiving more attention due to the successes achieved by large software companies such as Intel, Microsoft and Symantec. Goffin (1999) defines CS as the name given to the various forms of assistance that companies offer customers to help them gain maximum value from their purchases. The support may be forthcoming at the time of purchase, during installation, during operation, or

repair and maintenance or upgrading (Armistead and Clark, 1990). The seven main elements of support that need to be provided to customers over the working lifetime of the products, as identified by Goffin (1999), are: installation, user training, documentation, maintenance and repair, online support, warranty and upgrades. In practice, most of these elements require different types of documentation to be available in the language of the user or technician. Bennett (2003) describes customer care activities as including the provision of post-sales servicing, information and advice on product use and the availability of new products, order fulfilment and re-order facilities, fast and effective procedures for processing queries and complaints, emergency help-lines, and convenient and confidential on-line payment systems.

Best-in-class organisations leverage multiple channels to eliminate unnecessary dispatches or service calls (also referred to as 'call deflection') resulting in cost savings (Dutta and Pinder, 2010). Many products are still accompanied by printed collaterals, which still play a key role in different industries, such as medical devices (Goffin and Price, 1996). Documentation can lead to lower support costs and increased productivity (Miskie, 1989). Legal requirements often drive the need to produce documentation (Esselink, 2000, Houlihan, 2009). There can be significant impact if documentation is poorly written (Shepherd and Brown, 1992, Independent, 1997, Miskie, 1989). Nevertheless, documentation also usually ends up being quite extensive (Markeset and Kumar, 2003) making translation an expensive and time-consuming task.

3.2   Distribution channels

Online support has historically included telephone support, although it has recently become more synonymous with support provided over the web, such as online Frequently Asked Questions (FAQs), online knowledge bases, remote troubleshooting and assistance via the web, and chat. Telephone support costs are lower than customer site visits (Goffin, 1999). Web-based support costs are significantly lower than telephone support costs (Simons, 2002). Companies such as Microsoft, Intel, and others, have established large web-based support repositories to enable self-service and are achieving significant cost savings.

As the number of available channels has increased through the advent of the web and new media, the literature has begun to speak more and more about 'multi-channel'

delivery (see, e.g., Wimmer, 2002, Lenk, 2002, Dutta and Pinder, 2010, Simons, 2002). When viewed within the context of the 'disruption' caused by the 'You era' (Governor et al., 2009), the need for a suitable multi-channel strategy becomes even more apparent for effective communication, as does the multi-language aspect. The latter can be described as the 'Long Tail of MT' (see figure 1 below). It involves a need to translate content to reach more customers, via more channels, in more languages. 'Millennials' is the term used to describe the generation of young adults that are today between the ages of 18 and 29 and are the first generation to always be 'wired' and, as a result, expect effortless self-service via all channels (Viswanathan, 2010).
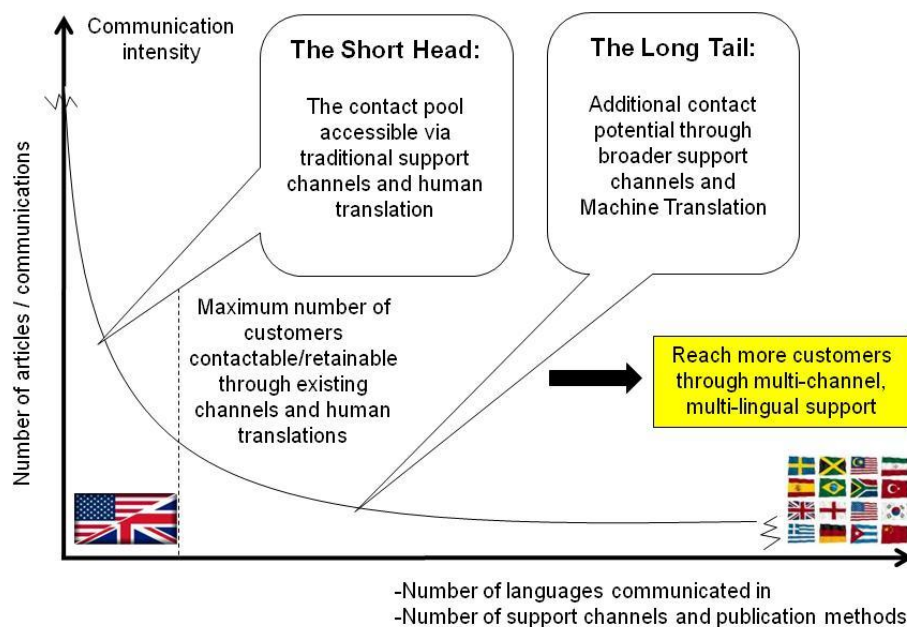

Figure 1: The 'long tail' of MT (adapted from Anderson 2006 and Enders et al 2008)

The choice of CS channel is closely linked to the company's sales channel (Loomba, 1996) and can vary greatly depending on the industry (Goffin, 1999). Loomba's (1996) categorisation of channels appears to be limited to CS delivered by people and does not consider other modes such as self-service and community support through electronic means. Dutta and Pinder (2010) identify a more comprehensive list of channels, while Oxton (2009) adds some order to the myriad of CS channels available today and identifies three high-level categories of CS: 1) Assisted (A-CS); 2) Self-service (SS-CS); and 3) Communities (C-CS). Best-in-class organisations are interested in providing customers with the right level of effective service information

via the channels most preferred by customers, thus balancing the pressures of cost and customer satisfaction (Dutta and Pinder, 2010).

3.3 Multi-lingual Customer Support Drivers

Customers are usually less concerned about spare-part prices than about speed of delivery and availability of service know-how, whether on-site or via telephone (Knecht et al., 1993a). There is a customer demand for faster service resolution (improved time to repair and first-call resolution). First call or contact resolution is difficult if you don't speak the language, so multi-language staff will need to be employed unless customers can be directed to more cost-effective service channels. As there is a need to control and reduce service-related costs, as well as a need to drive productivity/utilisation across the entire service organisation, there is an opportunity to achieve just this through the use of MT and allow fewer agents (without language skills) to handle more support requests (Dutta and Pinder, 2010). However, companies have also identified a need to drive revenue opportunities. MT in the area of CS enables companies to address new business and customer relations opportunities, where MT is better than '*no translation at all*' (TAUS, 2007).

Furthermore, with the growing number of distribution channels, companies are also looking to ensure accuracy and consistency of information across all points of customer interaction. This eliminates inconsistent experiences and unnecessary follow-up requirements, which is very important if you have a vast partner network across countries.

4 Customer Satisfaction, Customer Loyalty and Shareholder Value

Various researchers have suggested that customer satisfaction, customer loyalty and profitability are closely related (e.g. Heskett et al (1994), Hallowell (1996), Nelson et al (1992), Rust et al (1995)). Shareholder value, or wealth, has become a widely used indicator for a company's success (Matzler et al., 2005). It can be defined as the idea that all business activity should be directed towards maximising the value of shareholders' equity in a company (EIU, 2003). Milton Friedman argued that the purpose of companies is to maximise shareholder returns (Friedman, 1970). Value-based management is a managerial approach in which the primary purpose is long-run shareholder wealth maximisation (Arnold, 2007). Rappaport (1998) developed the

simplified 'shareholder value analysis' to calculate shareholder value based on discounted future cash flows. Fundamental to the analysis are the identification of the values for his seven so-called 'value drivers': 1) sales growth rate, 2) operating profit margin, 3) tax rate, 4) fixed capital investment, 5) working capital investment, 6) the planning horizon (forecast period), and 7) the required rate of return.

Because shareholder value is composed of the net present value of: 1) cash flows during the value growth period and; 2) the long-term, residual value of the product/business at the end of the value growth period (Day and Fahey, 1988), the value of any strategy is inherently driven by the following (Srivastava et al., 1998):

- An increase in the level of cash flows (e.g., higher revenues and/or lower costs, working capital, and fixed investments)
- An acceleration of cash flows (earlier cash flows are preferred because risk and time adjustments reduce the value of later cash flows)
- A reduction in risk associated with cash (lows (e.g., through reduction in both volatility and vulnerability of future cash flows) and hence, indirectly, the firm's cost of capital
- The residual value of the business (long-term value can be enhanced, for example, by increasing the size of the customer base).

Below we will discuss the potential impact of using MT in CS on these aspects of shareholder value creation.

4.1   MT influence on increasing Cash Flows

The amount of cash flow generated by a customer relationship depends on sales volume, price and cost (Stahl et al., 2003). Growth potential can enhance cash flow in two ways (Stahl et al., 2003): 1) As customer relationships already exist, acquisition, relationship and retention costs will be lower; 2) Additional sales may lead to economies of scale and scope.

Customer satisfaction leads to cross-selling (e.g. Reichheld and Sasser, 1990) and to referrals, add-on sales and a positive brand reputation (Tapling, 2009). Satisfied customers are less price sensitive (Reichheld and Sasser, 1990). The lower price-sensibility increases the willingness of the customers to pay for the benefits they receive. The total sales of the company grow and markets can be penetrated faster because customers who have become loyal are responding better to a firm's marketing

efforts (e.g. Srivastava et al., (1998), Keller, (1993)), so the cost of acquiring favourably disposed customers will be lower. A higher level of customer retention also leads to an increase in customer spend (Dutta and Pinder (2010)). Furthermore, satisfied customers are more tolerant to price increases.

Multi-lingual CS through the use of MT can help to increase customer satisfaction and thus to increasing cash flow. In addition, relationship costs – that accrue in servicing a customer over time and are required to safeguard customer satisfaction (Stahl et al., 2003) – can be reduced by the information economics (Simons, 2002). These are channel economics that can be achieved through web-based self-service, which can cost-effectively be expanded through the use of MT to cover multiple languages. The experience curve effect also allows for relationship costs to be reduced in the area of CS through the effective capturing of issues and resolutions, and disseminating this to the multi-lingual user base.

The networking potential of referrals and reputation (e.g. for strong, multi-lingual support) may also lead to additional sales (Stahl et al., 2003). Information generated by a customer relationship can boost product and process improvements and innovations, and therefore increase efficiency and quality; it reduces uncertainty so that resources can be allocated more efficiently and effectively with a positive effect on cash flow (Stahl et al., 2003). This process can be enhanced through the knowledge generated by the ability to communicate bi-directionally with more customers through MT in the CS process (e.g. community-assisted). Making all content available (for publishing on demand) through MT also reduces the volume of print, thereby positively impacting the environment, eliminating waste and reducing the cost of distribution (Viswanathan, 2010).

4.2   MT influence on accelerating cash flows

The faster the receipt of cash flows, the higher their net present value. Cash flow can be accelerated by: 1) faster product development, 2) a more efficient supply chain management and (3) a quicker diffusion of new products in the marketplace (Srivastava et al., 1998). By involving its most demanding and knowledgeable customers in product development companies can achieve a better understanding of customer requirements. By using MT translation in these interactions, time-to-market for product releases can be improved and market acceptance of new products

increased. Note the link between customer support and new product development. This also allows for future market needs to be identified earlier and more accurately.

Cash flows can also be accelerated by targeting innovators and early adopters (Rogers, 1995), e.g, through social media. Market penetration will be accelerated as well through referrals and reputation based on a positive support experience. As a consequence, potential customers will test and adopt new products at a faster rate in the knowledge that strong support is available in their language. Robertson (1993) points out that few firms have the capability to penetrate all markets around the world before a new product loses its innovative advantage. MT can bridge this gap through its capability to deliver content more quickly. Furthermore, customers may contribute to an acceleration of cash flow if and when they are integrated in supply chain management (Stahl et al., 2003).

4.3   MT influence on reducing cash flow volatility and vulnerability

Stable and satisfying relationships will produce customers who are more committed to the supplier and less vulnerable to competitors' efforts (Stahl et al., 2003, Srivastava et al., 1998), reducing the vulnerability of cash. Customer switching behaviour is attributable more often to inadequate and indifferent customer service than to better products or prices (Reichheld and Sasser Jr, 1990). Effective CS will also result in a reduction of post-purchase cognitive dissonances since it helps to ensure that the user can maximise the use of the product and confirm or even reinforce a purchase decision. Customers will therefore be less vulnerable to competitive actions and their share of wallet will be more stable.

An effective CS process, providing a rich picture of multi-lingual markets (market intelligence (Stahl et al., 2003)) allows more appropriate responses to changing needs, competitors' strategies, and environmental conditions. This will make forecasts and plans more reliable, thereby decreasing cash flow vulnerability and volatility.

4.4   MT influence on increasing the residual value of the business

The residual value of a firm is the expected present value of cash flows that are generated after the end of a certain planning period (Rappaport, 1998). The sustainability of the size, quality, trust, commitment and reputation of the customer base plays an important role here (Stahl et al., 2003). According to the resource-based

view of the firm, resources and capabilities are a source of sustainable economic rent when 1) they are difficult to buy, sell, imitate or find a substitute for, 2) when they prove complementary in deployment or application and 3) when they are firm specific, durable and scarce (Amit and Schoemaker, 1993). An effective CS process satisfies these requirements. In particular, the networking potential of a firm's customer base and its ability to fulfil community support can become an intangible asset that evolves slowly over time. The networking potential cannot be traded or easily replicated by competitors (barriers to competition); it is complementary in the sense that it makes marketing efforts more effective. The more sophisticated and intimate the firm's relationships with customer are, the more knowledge it can acquire to develop longer-term business strategies. As long-term intangible assets, the CS process, networking potential, and customer relationships contribute to the residual value of the firm. Finally, sustained, long-term customer loyalty results in more stable businesses and therefore a lower cost of capital, contributing to the residual value.

4.5   Strategy map of the contribution of MT to shareholder value

The links and relationships between the above operational and financial concepts can be visually depicted in a 'strategy map' (Kaplan & Norton, 2004) as shown in figure 2 below. This demonstrates how Oxton's (2009) approaches to MT in customer support (Assisted, Self-Service and Communities, see Section 3.2) can help to achieve improvements in different performance areas and thus improve overall outcomes for an organisation.
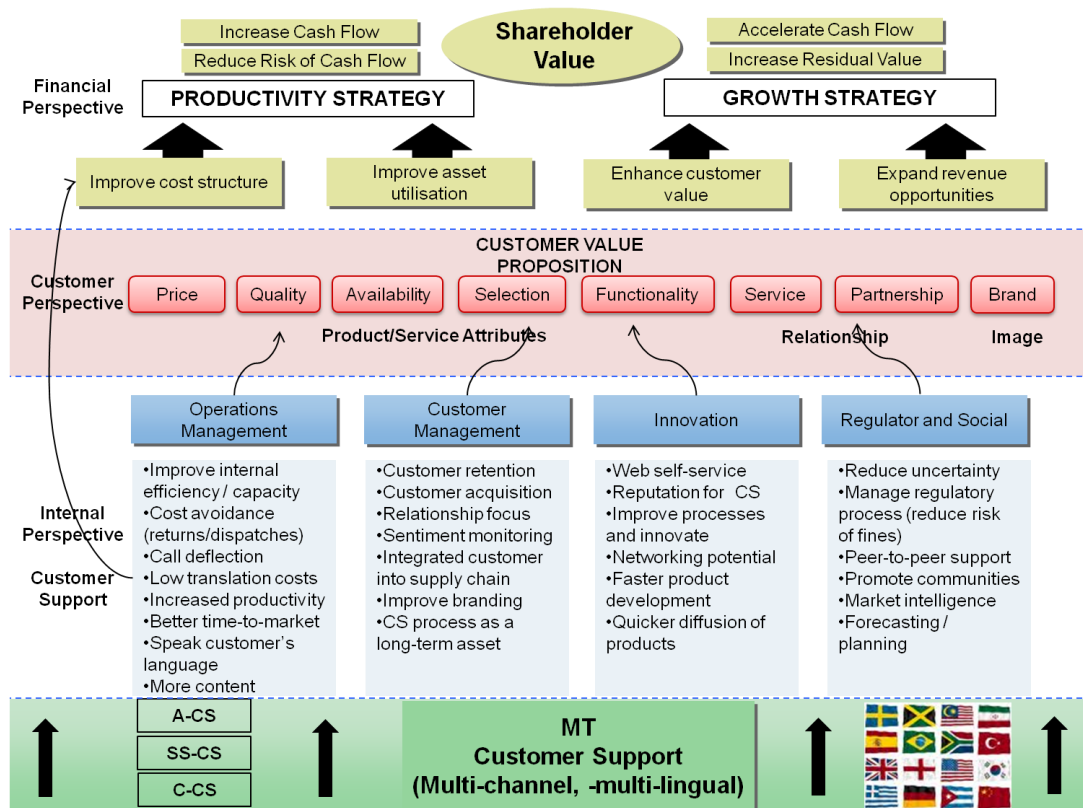
Figure 2: Strategy map linking MT, CS and shareholder value (adapted from Kaplan and Norton, 2004)

5 Empirical study

The main data collection for this research was performed through face-to-face and telephone interviews during September and October 2010. The companies were selected based on the following criteria: 1) Demonstrable international sales and operations outside their home market (a minimum of 30% of annual turnover); 2) The existence of a customer support function; 3) Being a current buyer of translations to access foreign markets. In total 20 people were interviewed from 12 organisations (5 software, 2 automotive, 3 telecommunications, 1 travel and 1 pharmaceutical companies). Where possible, interviews with multiple personnel from various departments – typically customer support and translation – allowed a comprehensive picture to be obtained for each case organisation. The interviews were based on a questionnaire covering current Customer Support (CS) strategy, current MT strategy (if applicable), current broader multi-lingual strategy including plans to adopt MT, link between MT, CS and shareholder value and the integration of MT within CS. The questions were used as prompts to guide the interview process where necessary.

All respondents saw a link between MT within the CS process and enhanced shareholder value. The interviews show that the results, benefits and advantages achieved by SoftwareA, AutomotiveA, TelcoA, TraveA, using MT within CS, are believed to have a positive impact on shareholder value. Some respondents commented that MT would need to become more widely used in order for the connection to be intuitively stronger and more visible to senior management.

There were clear effects on the four elements (see Section 4) related to shareholder value creation. In terms of **increased cash flows**, respondents reported increased (subscription) revenue, customer satisfaction and word of mouth, increased ROI for every deflected call, broadening market reach, low translation cost through MT being key to getting market exposure and adding support content to the scope of a deal as a 'deal clincher', upsell of new and enhanced products, and keeping a device in customers' hands (as a returned device is big loss of returns). They also see a **reduced risk associated with cash flows** through an ability to weather storm as sales of new products dropped, a steady revenue stream, self-service removing call centre 'clutter' for customers and access rime reduction resulting in increased customer satisfaction and loyalty. One company says that a single unhappy customer will significantly affect share price and affect share holder value. Also, each customer is considered important, especially where one can make up large percentages of revenue, and there is a need for a good market reputation as the community is important. **Accelerated cash flows** are caused by networking effects and the fact that MT can help to speed up the clinical study process (trials can take multiple years). MT will make a difference in emerging markets where no support is currently available. Finally, **increased residual value of business** is achieved by customer loyalty, better company reputation, and brand loyalty building through community forums.

The findings on the relationship between MT as part of a multi-channel, multi-lingual CS strategy, its potential to improve customer satisfaction and loyalty, and the resulting positive impact on shareholder value are represented in table 1 below. This integrated model combines the findings of the literature review with the findings from the case study research to demonstrate that a direct link exists. The categories of assisted CS, self-service CS and community CS are found to be reflected by four MT application types: multi-lingual chat and e-mail, multi-lingual knowledge base, multi-lingual forums and blogs and multi-lingual social media. For each of these, the table

shows direct MT benefits for CS, implications for customer satisfaction and loyalty, and ultimately shareholder value.

	MT application type	CS business benefits (indicative)	Customer satisfaction and loyalty benefit	Shareholder value benefit
AS-CS	**Multi-lingual chat, e-mail** Informants using: AutomotiveA TravelA Similar need: TelcoA TelcoB SoftwareE	* Allow centralised, language-agnostic support in single location *Facilitates call centre scheduling * Easier 24/7 global coverage	* Faster support (access to larger agent pool) *Time/location convenience	* Increased cash flow (Reduce customer service costs, improved productivity, lower overheads)
		* Call deflection (reduce high-volume, low-value calls)	* Faster support for urgent issues (fewer peaks and troughs)	* Increased cash flow (Reduce customer service costs)
		* Mitigate foreign call centre stigma	* Higher perceived quality and customer centricity	* Reduction in risk associated with cash flow
		* Language coverage permits incremental sales (cross-sell, up-sell)	* Customer centricity (MT better than zero translation) * Perception of the enterprise as one that is 'easy to do business with'	* Increased cash flows (Referrals and add-on sales, lower customer acquisition costs) *Increased residual value of business (Increased size of customer base)
SS-CS	**Multi-lingual knowledge base** Informants using: AutomotiveA TravelA TelcoA TravelA TelcoB - B2C AutomotiveB Similar need: SoftwareC SoftwareD SoftwareE TelcoB AutomotiveB PharmaA	* Self-service capability / call deflection	* Immediacy of solution * Time/location convenience * Better SLA performance	* Increased cash flow (Reduce customer service costs, improved productivity, lower overheads) * Reduction in risk associated with cash flow (Re-purchase due to high perceived value)
		* More content available to customers	* Higher perceived customer centricity (more content/languages)	* Increased cash flow (lower translation cost) * Reduction in risk associated with cash flow (Re-purchase due to high perceived value; lower price sensitivity)
		* Shorter translation cycles (fresher content, immediacy)	* Meet customer needs on timely basis (anytime, anywhere)	* Accelerated cash flows (Immediate customer support for product launch) * Increased cash flows (higher revenue due to longer product cycle)
		* Increased internal productivity * Increased relative support capacity	* Free up staff for most pressing issues (ease phone bottlenecks)	* Increased cash flow (Reduce customer service costs, improved productivity)
		* Leaner internal organisation (Possible replacement for staff)		* Increased cash flow (Reduce customer service costs)
		* Access and retention of more knowledge	* Faster support (1st-contact resolution) * Good support increases product adoption	* Increased cash flow (Reduce customer service costs, higher revenue) * Increased residual value of business (increased size of customer base through well-supported product)
		* Free up staff to do more selling * Language coverage permits incremental sales (cross-, up-sell)	* Satisfied customers are less price sensitive / willing to pay more for benefits	* Increased cash flows (higher revenue) * Reduction in risk associated with cash flow (Re-purchase due to high perceived value)
		* Consistency across support chain (partners etc) * Cross-border collaboration	* Avoid unnecessary follow-up requirements * Perception of 'joined-up' CS	* Increased cash flow (Reduce customer service costs, improved productivity)
		* Regulatory and legal compliance		* Reduction in risk associated with cash flows (no fines for lack of language availability)
C-CS	**Multi-lingual forums, blogs** Informants using: None currently Similar need: SoftwareA SoftwareC TelcoA TravelA TelcoB	* Tap into customer product and issue resolution knowledge (organisational learning)	* Improved support for customers	* Increased cash flow (Reduce customer service costs)
		* Monitor customer sentiment / early product issue detection	* Rapid issue resolution * Good support increases product adoption	* Accelerating cash flows (faster product development)
		* Gather ideas for product and service innovation * Improve market intelligence	* Access to more innovative products that meet requirements	* Accelerating cash flows (faster product development; quicker diffusion of products) * Reduction in risk associated with cash flow (more reliable forecast and planning)
		* Peer-to-peer support	* Create brand communities * Faster support	* Reduction in risk associated with cash flow (through loyalty)
	Multi-lingual social media Informants using: None currently Similar need: SoftwareA SoftwareC TelcoA TravelA TelcoB	* Monitor customer sentiment / early product issue detection	* Rapid issue resolution * Good support increases product adoption	*Accelerating cash flows (faster product development)
		* Cost avoidance (e.g. Product returns, unnecessary dispatches)	* Rapid issue resolution	* Increased cash flow (Reduce customer service costs, improved productivity) * Reduction in risk associated with cash flow (avoid refunds)
		* Closer customer relationships	* Create brand communities * Customer centricity leads to loyalty	* Increased cash flow (Referrals, cross-sell and upsell; cost of acquiring customers is lower) * Increased residual value of business (Strong, growing customer base)

Table 1: How MT improves shareholder value

6 Conclusion and discussion

The purpose of this research was to investigate the use of Machine Translation (MT) within the Customer Support (CS) arena and identify its impact on shareholder value. Oxton's (1999) categories of CS were found to be reflected in four types of MT application. This is potentially a dynamic link as existing sales channels (Dutta & Pinder 2010) will continue to change following technological developments, including those in MT. Currently, the case study organisations benefit most from the use of MT in a multi-lingual knowledge base. This makes sense as it reflects the more traditional application areas of translation where organisations will be most confident and experienced. The respondents clearly acknowledge the wider potential of MT to increase shareholder value in accordance with findings from the literature survey. However, they also report a need for senior management to have a better understanding of MT in CS in order to maximise benefits. There are two sides to this: firstly, many managers have limited knowledge of current developments in MT as such, meaning that certain areas are not considered for automated translation. Secondly, managers may have a limited understanding of modern CS channels (such as Web 2.0, blogs, etc) to begin with, so using MT within these is certainly not on their horizon. Hence the suggestion that the key implication of this research for MT is that there is a strong need to communicate more widely how it has matured and can benefit CS through the various application areas, leading to increased shareholder value through each of the mechanisms recognised by Srivastava et al (1998).

Recommendations for managers include:

- Consider implementing MT as part of a multi-lingual content strategy that can improve the CS experience and, as a result, improve the overall customer experience, and lead to better customer satisfaction, which leads to customer loyalty.
- Deploying MT to support multiple CS channels. Although used most frequently to translate knowledge base content, broader usage across channels and market verticals can be seen as an opportunity.
- Develop a multi-channel, multi-language CS strategy, increasingly leveraging MT to deliver measurable CS and shareholder value.

Finally, academic research into MT could focus on the newer, dynamic application areas in the 'community' bracket of CS, as here many of the recent developments as presented in Section 2.6 come together to greatly influence both the nature of MT in CS and the nature of CS itself. Ultimately, while differences in languages will continue to exist, MT will allow more people from across the globe to communicate and thus collaborate more effectively.

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