Title: Complementary IT resources for enabling technological opportunism

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Highlights

- After testing for measurement invariance, IT use is different for the U.S and Spain
- IT use and the firm's IT human capital are main drivers of TO capability
- The effect of IT vendor support on technological opportunism is country-dependent
- Vertical integration is preferred when a firm uses ITs intensively
- IT vendor support has positive effects on technological opportunism if the firm invests in IT human capital

Complementary IT resources for enabling technological opportunism

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Complementary IT resources for enabling technological opportunism

Abstract

This study examines the use of Information Technologies (ITs), IT human capital, the level of IT vendor support, and their joint effects on firm's sensing and responding to IT changes (technological opportunism). Using data from the U.S. and Spain, the results suggest, that IT use and the firm's IT human capital are the main drivers of technological opportunism. The effect of IT vendor support on technological opportunism is country-dependent, with a U-effect in the U.S. and no effect in Spain. IT vendor support can have positive effects on technological opportunism if the firm invests in IT human capital.

Keywords: technological opportunism, IT vendor support, Information Technologies, firm's IT human capital, measurement invariance

1. INTRODUCTION

Today's business environment is characterized by turbulence, increasing competition and technological advances that threaten to disrupt established products and markets. Previous research claims that demonstrating the value of investing in Information Technology (IT) is fundamental in the fields not only of Information Systems but also of management disciplines (Agarwal and Lucas, 2005; Melville et al., 2004). However, it has been found that the direct effect of IT investment on performance is not as important as its indirect effect through the creation of capabilities (Roberts and Grover, 2012). Sensing and responding to the technological context are two capabilities to which researchers have paid more attention in recent years because it increases firm performance (Sarkees, 2011; Voola et al., 2012; Chen and Lien, 2013; Lucia-Palacios et al., 2014a). This capability has been defined as technological opportunism (TO) capability (Srinivasan et al., 2002). However, relatively little research (Srinivasan et al., 2002; Garrison, 2009) has focused on the resources that enhance this capability.

Following the resource-based view (RBV) and knowledge-based view (KBV), this study fills a gap in the literature concerning the antecedents of technological opportunism by focusing on the use and knowledge of Information Technologies (Lee et al., 1995; Sambamurthy et al., 2003). Recent streams of RBV research have focused on the analysis of complementarities among firm resources to enhance capabilities (Melville et al., 2004, Weigelt, 2009; Triguero and Corcoles, 2013). This paper also investigates the joint effect of IT use and the specific knowledge involved in these technologies on technological opportunism. This knowledge is part of the firm's resources or is added through the recruitment of specific services offered by other firms.

According to the literature, the IT adoption strategy used by small firms is different from that of large companies, and it also differs depending on the level of knowledge and the technological intensity of the sector (Barthélemy and Geyer, 2004). For example, Oliveria and Martins (2010) analyzed e-business adoption and found differences in the relative importance of almost all the independent variables analyzed (technology readiness, trading partner collaboration, technology integration and perceived benefits) between the telecommunication industry and the tourism industry. Competitive pressure is the only variable for which they did not find differences between the two industries. The main barrier to IT adoption for SMEs is the lack of IT knowledge and the cost of the technology (Premkumar and Roberts,1999; Thong et al., 1996; Thong 2001), while for large firms the main problems are bureaucracy and the time necessary to take decisions (Buonano et al 2005). In typical SMEs, a dependence on outsourcing compared to larger firms has been shown. Further, this finding has also been more frequent in less IT- intensive sectors (Barthélemy and Geyer, 2004). In addition, SMEs have fewer resources than large firms to invest in managing IT activities. In this context, outsourcing is mainly referred as IT consultants or IT vendor support (Thong, 1996). The focus of this research is on the effect of a high level of use of IT vendor support in a sector with low IT-intensity.

Previous research suggests that the type of organization is more important than the industry to explain the need for IT innovations and their adoption (Lee and Xia, 2006). Not all businesses benefit in the same way from using ITs. The benefits are enhanced when there is competition between one group of firms and another Franchising is an example of these networks and is of increasing importance in the economy (Perrigot et al., 2012; Perrigot and Penard, 2013). Franchising represents a

network of semi-autonomous operators with a central headquarters. Thus, the implementation of IT and its related capabilities, such as technological opportunism, can benefit not only a single store, but the whole network. Franchising is mainly applied in services and retailing, which are considered less IT-intensive sectors. Hence, franchising is an interesting context for examining the effect of IT vendor support on the development of IT capabilities as it represents a strong contrast to the conventional setting of IT-related studies. Articles can be found that analyze the implementation of ITs in the franchising context (Rao and Frazer, 2005; Perrigot et al., 2012; Lucia et al., 2014a; 2014b) but, to our knowledge, little research has studied the development of IT knowledge capabilities (Paswan et al., 2009) and none has analyzed the IT vendor support decision and its interaction with other resources of the firm.

The primary objective of this study is to focus on the complementarities of IT resources to generate IT capabilities. Previous research has analyzed the joint effect of both internal and external knowledge and capabilities on IT-enabled processes (Weigelt, 2009; Yam et al., 2011) and performance (Nevo et al., 2007), but little is known about their effect on enhancing technological opportunism capabilities. We focus on the influences of internal and external sources of knowledge and the use of ITs to help firms increase their capability of sensing and responding to radical or incremental technological developments. This allows us to contribute to the management discipline by examining the influence of IT vendor support on technological opportunism (TO) capabilities and how this effect is influenced by the intensity of IT use and the firm's human capital. Furthermore, we contribute by providing evidence of the complementarities between these resources. Finally, this study investigates the franchising sector in two different countries, the U.S. and Spain, providing evidence of

the levels of IT use and excessive IT outsourcing in each country. The two countries use different levels of IT systems and applications (Fundación Orange, 2011; Savitskie et al., 2007), which is confirmed through the analysis of measurement invariance, so we carry out a country-by-country analysis.

Our results suggest that IT use and the level of the firm's IT human capital increase the level of technological opportunism. Additionally, this research provides evidence of the circumstances in which a high level of IT vendor support can develop the firm's capabilities. Internal IT knowledge and the intensity of IT use are proposed as moderating variables on the relationship between IT vendor support and the firm's level of technological opportunism. Results are country- dependent.

This paper is organized as follows. Section 2 outlines the literature framework on which the paper is based, the resource-based view, and develops the hypotheses. Section 3 explains the context of study and describes the methodology used. In Section 4, the results are presented. Section 5 provides a discussion of the results, the limitations of the paper, and recommendations for future lines of research. A Conclusions section completes the paper.

2. LITERATURE FRAMEWORK AND HYPOTHESES DEVELOPMENT

A suitable theoretical framework for studying e-business capabilities is the resource-based view (RBV) that links organizational resources and capabilities with competitive advantages (Barney, 1991; Melville et al., 2004). The RBV suggests that firms can achieve positive outcomes as long as they possess rare, valuable and appropriate capabilities. If the firm's capabilities resist imitation and substitution, these gains can be sustained. Researchers have analyzed how firms create value from IT

assets and the importance of complementary resources for understanding IT payoffs. In sum, how firms create IT capabilities determines their competitive advantages. In Information Systems research, different resources have been shown to be relevant for leveraging IT investments, but there is a consensus about the importance of IT knowledge (Broadbent and Weill, 1997; Byrd and Turner, 2001). As part of the RBV, the Knowledge-Based View (KBV) posits that firm performance depends on the level of knowledge exploitation (Zahra and George, 2002; Weigelt, 2009). De Clercq and Dimov (2008) outlined that knowledge provides a more comprehensive understanding of new information and helps firms to identify valuable knowledge. Deeper knowledge enhances the ability to incorporate additional knowledge and exploit it over time. Knowledge is considered a key valuable resource that, combined with other resources, provides competitive advantages.

Different studies support that intangible firm's resources, such as the firm's human capital, or tangible resources, such as financial resources, are the key to success (Siegel and Renko, 2012). But, complementary external resources or capabilities are also factors that increase a firm's probability of success (Ostgaard and Birley, 1996; Belso-Martínez et al., 2013). External sources may help firms to acquire abilities or resources they lack about entrepreneurial learning (Politis, 2005). In the following sections, we will develop hypotheses about how the firm's human capital, IT vendor support and the level of use of ITs determine its technological opportunism capabilities.

2.1. Relationship between use of ITs and technological opportunism in retailing.

ITs include the hardware, operating software, communications, other equipment and support required to enable business applications (Ross et al., 1996; Bharadwaj, 2000)

that are combined to create useful IT services (Kayworth et al., 2001). Previous studies have analyzed ITs related to enterprise resource planning (ERP), supply chain management (SCM), customer relationship management (CRM), and e-commerce operations (McAfee, 2003) and, in the last decade, increasing attention has been paid to ITs such as intranet, extranet, Internet, and EDI (Ellram and Zsidisin 2002, Wagner, Chung and Baratz, 2002; Gunasekaran and Ngai 2003; Moon and Norris, 2005; Chen et al., 2006; Neill and Richard, 2012; Park et al., 2014; Lucia-Palacios et al., 2014a).

Firms are actively seeking new ways to use IT effectively to support distribution, inventory management, planning and sales functions (Palmer and Markus , 2000). Most ITs are related to the e-business process (Sanders, 2007) or are focused on providing retail channel integration through six activities (Oh et al 2012). These activities are: integrated promotion, transaction information, order fulfillment, integrated pricing and billing, integrated information access and integrated customer services. All these activities can be carried out through the use and implementation of Internet, e-commerce, intranet, extranet, EDI, CRM, SCM and ERP. The use of these ITs allows firms to be connected with suppliers, distributors and other intermediaries, customers and employees (Varadarajan et al., 2010). Intranet, extranet and EDI also allow firms to reduce the cost of order processing and distribution and inventory management (Palmer and Markus, 2000) making logistics and supply chain management more efficient (Angeles, 2000; Calza and Passaro, 1997). CRM allows firms to analyze customer transaction information (Verhoef et al., 2010) and, together with extranets, to provide a better customer service (Baker 1997). SCM allows retailers to plan purchase order and inventory control (Kumar 2012). So, the study of all these technologies allows us to incorporate the most commonly used ITs.

With the proliferation of ITs, it is necessary for firms to anticipate the emergence of new ITs, their benefits for the business, and their likelihood of making current technologies obsolete. The use of ITs develops related capabilities necessary to sense and respond to the opportunities or threats generated by technological changes. This is known as technological opportunism capability. The concept of technological opportunism (TO) capability is measured by two dimensions: "technology-sensing capability" and "technology-responding capability." "Technology-sensing capability" is defined as the extent to which an organization has the capability to acquire knowledge and understand new technological developments. The dimension "technology-responding capability" measures the extent to which an organization is willing and able to respond to new technologies (Srinivasan et al., 2002). Experience in the use of ITs increases the firm's entrepreneurial alertness (Cohen and Levinthal 1990) and its ability to understand and react to new ITs (Sambamurthy et al., 2003). The use of ITs enable firms to increase their learning-by-doing and to obtain insights into the complementarities between ITs and new improvements or changes in related technologies (Duncan 1995; Venkatraman 1991; Sambamurthy et al 2003; Sher and Lee, 2004). For example, firms that sensed the opportunities created by emerging technologies (such as interactive HTML pages and the secure sockets layer protocol) were able to implement electronic commerce strategies before many of their competitors (Overby et al., 2006). Similarly, firms that sensed the opportunities created by intranets were able to implement extranets easily, as the extranet is an extension of the intranet. Some technological changes consist of incremental innovations in the use of incumbent technologies. IT use provides information on customer preferences about the use of some applications to contact the firm or about new ways of searching for

product information. This means that market information obtained through IT use can provide information about new usage of incumbent technologies or about new ITs.

So, the use of ITs allows firms to sense technological changes by providing information about possible new features. An efficient use of ITs requires having the infrastructure (hardware, software, databases and other IT platforms) and the capabilities needed to respond to technological changes. For example, firms may be interested in developing a new order processing system, but this requires the infrastructures for this system, for developing a customer database, and a local area for implementing communication networks (Weill and Broadbent, 1998; Bharadwaj, 2000). Having these IT infrastructures will reduce the time and cost of adopting this new order processing system, which constitutes a response to this technological development. Therefore, the combination and integration of different ITs help firms to sense and respond to possible new technological changes. So, firms with a more intensive use of ITs are in a better position to be more technologically opportunistic. Consequently, we propose that:

H1: The higher the level of IT use, the higher the level of technological opportunism (TO) capability.

2.2. Relationship between technological opportunism and IT knowledge

Technological opportunism is a capability focused on new technologies, so IT knowledge may be needed to sense technological improvements and to know how a firm can leverage them to gain advantage (Overby et al., 2006). Sambamurhty et al (2003) suggested that firms develop foresight in IT through their executives' personal intuition and experiences and through organizational intelligence about emerging information technologies. To be aware of possible improvements, developments or new

ways of using existing ITs, it is necessary for firms to have knowledge about the most commonly used ITs in their business (Bharadwaj, 2000).

Human capital is interpreted as people's knowledge, skills and abilities (Belso-Martínez et al., 2013). According to prior research, the firm's IT human capital includes not only the abilities and technical skills of employees (programming, systems analysis and competencies in technologies), but also the ability of managers to coordinate and provide support for the implementation of ITs (Melville et al., 2004). Managers' and founders' knowledge and skills are important as they influence the level of access and exploitation of other internal and external firm resources (Belso-Martínez et al., 2013). In sum, not only employees' IT skills, but also the CEO's knowledge, skills and support are relevant for developing technological opportunism capabilities (Bharadwaj, 2000).

The knowledge, skills or support that firms exploit may be accumulated internally or provided by external partners (Grant and Baden-Fuller, 2004; Nevo et al., 2007; Yam et al., 2011). The outsourcing strategy can be explained from the RBV or from the Transaction Cost theory (see Espino-Rodriguez and Padrón-Robaina, 2006 for a detailed review). There is a vast literature on the motives and advantages of outsourcing such as cost reduction, access to supplier's knowledge or strategic alliances (Loh and Venkatraman 1992, Willcocks and Fitzgerald, 1993; Lacity et al 2004; Nevo et al., 2007; Fisher et al., 2008; Lacity et al 2009). Based on a review and a meta-analysis of IT outsourcing research, Lacity et al (2009) found that 357 articles were published between 1990 and 2008, in which 17 motives for IT outsourcing were highlighted. Cost reduction is the most important reason followed by a focus on core capabilities. However, for SMEs, the lack of resources and the possibility of accessing the skills and expertise of their suppliers are the most common reasons for relying on

external advice and support (Al-Qirim, 2003; Simpson and Docherty, 2004). External vendor support is the most common use of IT outsourcing among SME (Thong et al 1996).

Conclusions about the effect of IT outsourcing on the firm's capabilities development are diverse. Some findings support a positive effect of IT outsourcing in the development of innovative capabilities (Yam et al., 2011) while others suggest that IT outsourcing reduces a firm's potential to learn about new technologies and to develop new capabilities (Weigelt, 2009). The RBV warns firms against a heavy reliance on outsourcing when they want to foment capabilities that require learning-by-doing and the development of path-dependent knowledge inside the firm (Espino-Rodriguez and Padrón-Robaina, 2006; Weigelt, 2009; Grimpe and Kaiser, 2010). Earl (1996) lists eleven risks involved in IT outsourcing including the loss of organizational learning capability. Firms learn to manage ITs and their usefulness for sensing and responding to opportunities or threats of technological changes through learning-by-doing. Lacity et al (1996) found that companies that outsource all their IT activities have problems because their service level decreases and their IT costs increase, lowering the firm's flexibility. One of the reasons for IT outsourcing is cost reduction. However, if IT vendor skills are not updated, the cost-reduction potential is lost. Furthermore, outsourcing requires attention to achieve efficient management, to select partners and to redeploy internal and external knowledge resources (Grimpe and Kaiser, 2010). These activities will increase if the firm opts for a high level of IT outsourcing.

Therefore, according to previous research, IT outsourcing has some advantages in cost reduction, in accessing IT knowledge and in developing integrative capabilities. However, firms with a high level of IT outsourcing may suffer a dilution of their

capabilities and of their learning-by-doing capacity, and may pay less attention to the outsourced activities, thus increasing costs. So, for SMEs, a high level of use of IT vendor support could harm the firm's capacity to sense and respond to technological changes. Hence, the following hypotheses are proposed:

H2: The firm's IT human capital has a positive impact on its level of technological opportunism (TO) capability.

H3: IT vendor support has an inverted U-shaped relationship with the firm's level of technological opportunism (TO) capability

2.3. Moderating effect of the level of IT use.

As has been argued, relying heavily on IT outsourcing has a negative effect on technological opportunism. However, previous research has also found that some advantages can be obtained from IT outsourcing depending on the importance of the outsourced activities for the firm's success (Lacity et al., 2009). Not all firms use ITs with the same intensity and, therefore, IT use can be considered as a core or as a non-core activity. According to the RBV, an organization should invest in activities that constitute core competences and outsource the rest (Prahalad and Hamel 1990; Quinn and Hilmer 1994; Quinn 1999), because the former provide the organization's growth and direction (Peteraf, 1993). So, vertical integration is preferred to outsourcing (Bahli and Rivard, 2005; Miozzo and Grimshaw, 2005; Varadarajan, 2009; Weigelt, 2009; De Vita et al., 2010; Butler and Callahan, 2014). Some recent research suggests that IT outsourcing has a positive effect on the development of capabilities when non-core activities are outsourced (Weigelt, 2009). We propose that firms that use ITs intensively consider these resources as strategic because they generate tacit knowledge and facilitate competitive moves or the development of firm capabilities (Grimpe and Kaiser, 2010). Firms that consider ITs as a core or strategic activity use ITs more

intensively than firms that consider the ITs as peripheral. As the strategic importance of the use of ITs increases, it is more likely that managers will internalize their use and less likely that they will outsource this activity. Therefore, the effect of IT vendor support on the firm's level of technological opportunism capabilities will depend on the level of use of ITs. We propose that:

H4: The negative effect of a high level of IT vendor support on technological opportunism (TO) capability will be stronger for firms with a higher level of IT use than for firms with a lower level of IT use.

2.4. The moderating role of the firm's IT human capital

Previous research has suggested that there is complementarity between internal and external knowledge in the study of R&D activities (Mol, 2005; Grimpe and Kaiser, 2010). The KBV and the agency theory are the paradigms that have analyzed the complementarity of internal and external knowledge.

Grant (1991) suggests that outsourcing is one way of complementing the firm's resources and capabilities by helping to improve its strategy to make better use of its capabilities when an external opportunity emerges. Therefore, firms should have internal knowledge about the application or process they are going to outsource. This is known as retained in-house capabilities (Feeny and Willcocks, 1998). Firms with in-house capabilities can interpret, digest and assimilate external knowledge and influence the ease with which knowledge can be transferred (Boynton et al., 1994; Feeny and Willcocks, 1998; Park et al., 2011). The success of IT outsourcing depends on the support and commitment of the CEO and the firm's IT personnel skills. Top

management support is needed to determine and value vendor activity. Using external expertise without the involvement of the CEO and firm staff is an error. The CEO and the IS staff of the firm should analyze the options provided by the vendor and check the suitability of the IT devices that are implemented (Nevo et al., 2007). The firm's CEO has to bear in mind that improvements in IT adoption and the assimilation of capabilities occur via organizational learning through feed-backward and feed-forward communication (Wheeler, 2002). Similarly, TO capabilities require fluent communication and shared and integrated knowledge. The benefits and disadvantages of outsourcing are directly linked to the firm's ability to integrate and apply external knowledge (Choudhury and Sabherwal, 2003; Willcocks et al.,2004). Successfully exploiting external knowledge requires the integration of the firm's IT knowledge with the vendor's technical knowledge (Tiwana and Bush, 2007). Having technical knowledge increases the firm's ability specify the terms of the outsourcing contract and to effectively supervise the vendor's activity (Gopal et al., 2003; Gray, 2006). For the development of capabilities, firms and vendors have to integrate and share knowledge, considering this interfirm collaboration as a relational and long-term relationship (Park et al., 2011). The larger the firm's internal stock of knowledge, the greater the likelihood that its combination with external knowledge will be valuable (Tiwana and Keil, 2007; Grimpe and Kaiser, 2010). Therefore, the negative effect of a high use or dependence of IT vendor support on integrative capabilities can be reduced if the firm has the ability to integrate external knowledge (Weigelt, 2009) and if that knowledge and IT-related capabilities are retained in the firm (Fenny and Willcocks, 1998). It is proposed that:

H5: The higher the firm's IT human capital, the lower the negative effects of a *high level of IT vendor support on technological opportunism (TO) capability.*

In order to reap the maximum benefit from the complementarities between internal and external IT knowledge, the firm should use ITs intensively. We propose that firms with a higher level of IT use will be in a better position for learning-by-doing and for getting the most from external knowledge, leveraging the firm's IT investments and generating unique firm-specific and valuable knowledge for integrating capabilities. The negative effects of a high level of use of IT vendor support for firms with a high level of IT use will be lower if the firm has a higher level of IT human capital than if it has a lower level of IT human capital. Therefore, we propose:

H6: The higher the firm's IT human capital, the lower the negative effects of a high level of IT vendor support for firms with high level of IT use on technological opportunism (TO) capability.

Figure 1 shows the conceptual model linking all the hypotheses together.

Figure 1 here

3. METHODOLOGY.

3.1. Sample

ITs are especially important in the retailing sector as a firm may have different stores in different locations. In this sector coordination and communication among all trading partners are key aspects for being competitive. In ITs, retailers with network structures, such as franchise chains, may find a solution for sharing information and emphasizing collaboration among trading partners. ITs could be implemented to

improve financial performance, operational efficiency, coordination in supply chain management and communications with suppliers and franchisees. Few studies have investigated the use of ITs in a franchise context (Grünhagen et al., 2008; Lucia-Palacios et al., 2014b; Rao and Frazer, 2005; Perrigot et al., 2012), but none of them have analysed the IT outsourcing decision.

The adoption and use rates of ITs are different across countries due to the level of development of the country. The U.S. is one of the leading countries in the use of ITs, together with several northern European countries (Finland, Sweden, Denmark and Norway). However, there are other countries with a lower use rate of ITs including the Mediterranean countries (Spain, Italy and Greece) (Fundación Orange, 2011; Savitskie et al., 2007).

We have selected the U.S and Spain to carry out this research. To test the hypotheses proposed, a survey of franchisors was conducted. The Spanish sample was selected from the 'Franchise Yearbook' of Tormo Asociados (2009) and from the information provided by the Franchisors' National Register. This source of information has been used in previous franchise research due to its comprehensive coverage of franchise systems in Spain (Bordonaba-Juste, Lucia-Palacios and Polo-Redondo, 2011; Lucia-Palacios et al., 2014a,, 2014b). Only firms with e-mail addresses were selected. The U.S. sample is taken from the listings of the Franchise Handbook (2009) that has also been frequently used in past studies of U.S. franchise systems (e.g. Grünhagen et al., 2008).

Prior to the formal survey, several pretests were conducted. The pretests involved franchise firms and franchise experts from both the U.S. and Spain. Based on their feedback, items in the questionnaire were reworded and minor layout changes

were made in order to improve clarity and readability. In a cover letter, respondents were assured that any information provided would be kept strictly confidential. Further, it was made clear that respondents would not be identified in any reports pertaining to the study, as only aggregated data would be reported.

The data was collected by means of a survey that was distributed by e-mail. The questionnaires were sent to IT managers or top executives, namely, Managing Directors and CEOs (for firms that did not have IT managers) in 600 Spanish and 1,218 US franchise firms. Often, franchise chains, like most SMEs, are not big enough to have an IT department or a person in charge of IT. The CEO or Managing Director is often the person that makes the decision to adopt an innovation or not. Previous studies that have analyzed the use or adoption of IT in SMEs have used similar informants (Grandon and Pearson, 2004; López-Nicolas and Soto-Acosta, 2010; Voola et al., 2012). These executives were asked to complete the questionnaire or forward it to the appropriate person in charge of IT/Internet applications, thus reaching the most knowledgeable "key informants" (Phillips, 1981) for the purposes of this study. Follow-up phone calls were made to solicit participation in the survey in accordance with Dillman (2000). Following the refining process, a final sample was obtained which consisted of 109 valid cases in the U.S. and 100 in Spain, yielding a response rate of 16.7 percent in Spain and 9 percent in the U.S. These response rates are considered acceptable, taking into account the difficulties which exist in obtaining replies to this type of survey (Hernández et al., 2008), and are comparable to response rates in similar studies with "cold call" solicitations of survey participation (London and Dommeyer, 1990). The characteristics of the persons that answered the questionnaires are presented in Table 1. Most of the informants were in charge of business development or were CEOs.

Table 1 here

A concern with any survey methodology is the adequacy of the response sample. One method to assess non-response bias is to test for significant differences between early and late respondents in the two samples. Comparing the first and second waves of respondents in terms of network size, results suggest that the differences were not significant in the two samples ($t = -1.159$; $p > 0.05$ for the Spanish sample and $t = 0.730$ $p > 0.05$ for the U.S. sample)[1].

3.2. Definition of the variables

The dependent variable was the firm's level of technological opportunism (TO). According to previous research, it is a second order reflective construct with two dimensions: technological-sensing and technological-responding capability. Both dimensions were measured using a five-point Likert-type scale (1= "strongly disagree", 5= "strongly agree"). The scale of Srinivasan et al. (2002) for each dimension was adapted to fit the study context. Based on a pre-test conducted with entrepreneurs and academics about the TO construct, a few items were eliminated from the survey because they created misunderstandings. Accordingly, one item from the technological-sensing scale and two items from the technological-responding scale were eliminated. So, finally, the sensing scale was formed by three items that measure the capability of managers to sense IT changes, and the responding scale was formed by two items that measure the capability to react to IT changes.

The independent variables were the use of Information technologies (IT use), firm's IT human capital (IT human capital) and IT vendor support (IT Vendor). The IT

[1] The dataset used for this study is a subset of the larger dataset used in the authors' recently published paper in the Journal of Business Research.

applications analyzed were: intranet, extranet, e-commerce, Customer Relationship Management, Manufacturing Resource Planning and Electronic Data Interchange. Managers were asked about their level of usage of each of these IT applications. Using the level of use of each IT system on a five-point Likert-type scale (1= "strongly disagree", 5= "strongly agree"), a formative construct was created[2]. So, an index of the level of IT use is created.

A firm's IT human capital is a reflective construct that includes items related to the level of IT knowledge of any kind of employees and partners (employees and franchisees) and items related to the CEO's support for the adoption and implementation of new technologies. In franchising, employees and franchisees coexist, so we have adapted the items related to whether the franchisor provides IT training of employees or franchisees. Items from prior research were used (Premkumar and Roberts, 1999; Lin and Lin, 2008).

There are different ways for measuring IT outsourcing, but consultants and IT vendor support are the two most common alternatives used by SMEs (Thong et al 1996). IT vendors not only provide support for IT implementation, development and training but also advice (Earl, 1996). We asked about the extent a firm uses IT vendor support for managing IT activities. The question is measured on a five-point Likert scale (Kotabe, 1998; Thong, 1999; Kotabe et al., 2008; Lin and Lin, 2008; Kotabe and

[2] Following Jarvis et al's (2003) instructions to identify a formative construct, we suggest that firms may have implemented different ITs in their business activities and to a different extent, so we do not expect the items to correlate with one another. Furthermore, changes in the value of these items will cause changes in the value of the construct. We propose that the construct level of IT use is formative as it is an index of the different extent of use of the ITs adopted.

Mol. 2009). Firms which answered that question with high values (4 or 5) reflect a high level of IT vendor support for dealing with IT activities.

Size was also included as a control variable. It was measured using the total number of outlets (company-owned and franchised outlets) of the network. The Appendix presents a summary of constructs and measures used for this study.

3.3. Common method bias

A common method bias could pose a serious problem for findings when both independent and outcome variables are collected from the same source, as in this study. Harmon's one-factor test was conducted finding that a single factor explained 29 percent of the variance while, when considering the factors of the model, the variance explained increased to 67 percent. So, the data does not have a method variance problem.

4. RESULTS

4.1. Descriptive results

Before the econometric analysis of the model, descriptive results related to some of the variables included in the model are reported. The responding franchise chains exhibited a great range of sizes, with a maximum of 33,000 units in the U.S. and 314 units in Spain. The majority of respondents in the US sample had fewer than 100 units (55% of the sample) whereas, in Spain, the majority of chains had fewer than 25 units (53% of the sample). Looking at the use of outsourcing by country (Table 2), in the US, there is a high use of IT vendor support. In 59.36% of the firms, the level of use is above average, while only 38% of the firms show a high use of IT vendor support in

the Spanish sample. This difference is also found in the comparison between countries (3.43 and 3.1 for the U.S and Spain, respectively) .

Table 2 here

4.2. Validation of the measurement scales

As formative indicators are not expected to correlate with one another and, therefore, traditional measures of validity are not appropriate, Chin (1998) suggests the evaluation of the Variance Inflation Factor to assess multicollinearity together with the significance of the weights based on the bootstrapping technique. The formative items present VIF values lower than the limit specified (Olmo and Jaminela, 2000), indicating the absence of multicollinearity (see Table 3) and the results of the significance of the weights indicate that several indicators were not significant even at the 0.1 level. But given the exploratory nature of the study and following Chin's (1998) recommendation, these items were retained in the model to assess the strength of the construct.

Table 3 here

The measurement model for constructs with reflective measures is assessed by looking at individual item reliability, internal consistency and discriminant validity following the SEM approach. The individual item reliability is evaluated by examining the loadings of the measures with the construct they intend to measure. A reliability test and an exploratory factor analysis using principal component analysis and varimax rotation were first conducted. This analysis corroborates the unidimensionality of IT human capital and the two dimensions of TO construct for each country. All factor loadings exceed the minimum acceptable value of 0.5 on each factor (Carmines and

Zeller, 1979). Table 4 shows the loadings of each item on each construct. Cronbach's alpha exceeds the minimum acceptable value of 0.7 (Nunnally, 1978).

In our model, the composite reliability index for all constructs exceeds the minimum acceptable value of 0.7 (Hair et al., 1998) confirming internal consistency. As a means of evaluating discriminant validity, Fornell and Larcker (1981) suggest the use of the Average Variance Extracted (AVE). Table 4 shows that the Average Variance Extracted of our measures exceed the limit of 0.6 (Hair et al., 1998) and Table 5 compares the square root of the AVE (diagonal values) with the correlations among the reflective constructs and it includes de VIF values. In our model, the assessment of discriminant validity does not indicate any problem.

Tables 4 and 5 here.

4.3. Measurement invariance

Measurement invariance is required in cross-country studies in order to provide unbiased group comparisons (Steenkamp and Baumgartner, 1998). We have to distinguish between measurement invariance of reflective constructs and invariance of formative constructs.

There are three types of measurement invariance to be assessed in reflective constructs: configural, factorial and scalar. To check for measurement invariance, we use STATA 12. This program allows us to check for different types of invariance as proposed by Steenkamp and Baumgartner (1998). The results of measurement invariance are provided in Table 6. The results support configural invariance for all the constructs. Related to factorial invariance, Steenkamp and Baumgartner (1998) suggested that, when some of the factor loadings turn out to be invariant across countries, one can speak of partial invariance when most of the items are invariant. Our

results corroborate factor loadings invariance and scalar invariance for IT human capital and technological-responding capability and partial factor loadings invariance and partial scalar invariance for technological-sensing capability (see Table 7). A more detailed analysis showed that only one of the factor loadings and one of the constants do not support invariance in each of these constructs, so we can conclude that technological-sensing capability is reasonably invariant.

Tables 6 and 7 here.

Because formative constructs are different from reflective constructs, we cannot use the same methodology to test measurement invariance. Diamantopoulos and Papadopoulos (2010) suggested the steps to follow to test measurement invariance, carrying out three types of analysis: structure invariance, slope invariance and residual invariance. Structure invariance refers to the structure of the formative construct. Thus, the same non-zero indicators should be in each construct because the meaning of the formative construct depends on its indicators. This is the weakest form of invariance. Slope invariance is related to the magnitude of each indicator. Finally, residual invariance implies that the same amount of the variance of the formative construct is explained across countries. Looking at the structure of the formative construct and the weights of each indicator (Table 3), there is enough evidence to conclude that measurement invariance is not supported between the U.S and Spain. First, structure invariance is not supported. Therefore, the meaning of the constructs is different and data have to be analyzed separately on a country-by-country basis. The different composition of the formative construct reveals that franchise chains have adopted different technologies depending on the country.

4.4. Structural model analysis and hypotheses testing

Tables 8 and 9 show the results for the U.S and Spain, respectively. We used STATA 12.0 to analyze the hypotheses proposed. Because formative and reflective constructs were involved in the interaction effects, the model was tested in two steps. First, the model was run without the interaction effects to obtain the latent variable scores. Then, the latent variable scores were used in the second step to run the model. Comparing the different models for each country analyzed, the model with the highest level of variance explained is the one that includes the two moderating effects in the Spanish sample and the one with just the moderating effect of the IT use in the U.S. sample. The triple interaction effect does not add significant value in either of the countries analyzed.

Tables 8 and 9 here

The results suggest that a higher level of Information Technologies usage has a positive effect on TO, confirming H1 for both the U.S. and Spain. A firm's IT human capital has a positive and significant effect on TO, confirming H2 for both countries. For the U.S., the quadratic coefficient of IT vendor support was positive and significant while, for the Spanish sample, no quadratic effect was found. Thus, H3 was rejected for both countries.

The next hypothesis, H4, is related to the moderating effect of IT use on the relationship between IT vendor support and the firm's level of technological opportunism capabilities. For a better analysis of the results, Figures 2 and 3 illustrate the moderating effect of the level of IT use. In the Spanish sample, a negative and significant effect of the interaction between IT use and IT vendor support is found. As

was proposed, the effect of a high level of IT vendor support is more negative for firms with a higher level of IT use than for firms with a lower level of IT use, confirming H4. Similarly, in the U.S, a positive and significant interaction between the level of IT use and IT vendor support is obtained. For firms with a high level of IT use, the use of IT vendor support shows a positive quadratic effect, so firms should reach a required level of use of IT vendor support for finding a complementarity between IT use and IT vendor support. However, for U.S firms with a low level of IT use, a negative linear effect is found. Contrary to what we expected, increasing the level of IT vendor support is more positive for firms with a higher level of IT use than for firms with a lower level of IT use. Thus, H4 was rejected.

Figures 2 and 3 here

Analyzing the moderating effect of the firm's IT human capital on IT vendor support, the interaction showed a different pattern for each country and in each model. In Spain, this moderating effect has a positive and significant coefficient, indicating that the two resources are complementary while, for the U.S sample, the quadratic two-way interaction was not significant. The moderating effect of the firm's IT human capital is illustrated graphically in Figures 4 and 5. In these figures, it can be seen that, in Spain, increasing the level of use of IT vendor support is positive for firms with a high level of IT human capital and negative for firms with a low level of IT human capital. In the U.S sample, increasing the level of IT external support has a positive effect, whatever the level of the firm's IT human capital. Therefore, H5 was confirmed for the Spanish sample and rejected for the U.S. sample.

Figures 4 and 5 here

For the triple interaction between the level of IT use, IT vendor support and the firm's IT human capital, the results are illustrated graphically in Figures 6 and 7. In the U.S, a high level of IT vendor support has a more positive effect for firms that have a higher level of human capital than those that have a lower level of human capital when the firm shows a high level of IT use. Similarly, for firms with a low level of IT use, a high level of IT vendor support has a less negative effect if the firm has a higher level of human capital. In the U.S., although the coefficient of the triple interaction was not significant, the graphical illustration suggests that H6 is accepted. In the Spanish sample, for firms with a high level of IT use, the negative effect of a high level of IT vendor support is greater if the firm has a lower level of human capital than if the firm has a higher level of human capital. In the same way, for firms with low IT use, a high level of IT vendor support has a more positive impact if the firm has a higher level of human capital. Although the coefficient of the triple interaction is not significant, the graphical illustration of this effect suggests that there is a different effect of IT vendor support and IT use on TO capabilities as the firm's IT human capital increases. So H6 is confirmed.

Figures 6 and 7 here

Finally, with respect to the control variables, in Spain, size has no significant effect on TO while, in the U.S., it has a significant positive effect, so bigger firms have a higher level of technological opportunism capabilities.

5. DISCUSSION OF FINDINGS

While there is ample theoretical and empirical research on the effect and relevance of firms' IT human capital for developing IT capabilities, little is known

about the impact of external sources of knowledge on capabilities (Yam et al., 2011; Weigelt, 2009) and their combination with internal resources. In this research, using data from two surveys in the U.S. and Spain, the effect of the level of the firm's IT human capital and the level of IT vendor support, on the development of technological opportunism was investigated. Additionally, the complementarities between these two sources of knowledge and abilities and the level of use of ITs were examined. This study provides new insights into the effect of IT outsourcing, more precisely, of IT vendor support, on the firm's capabilities and into how some moderating variables change that effect.

Following the RBV, it was found that the use of different technologies enables the development of capabilities to sense and respond to IT changes, regardless of whether they are used by internal or external staff. The use of IT leads to the generation of different types of expertise and tacit knowledge, such as how to use the software and how to extract greater benefits from IT applications. This finding confirms other research that suggests that although IT, per se, does not generate capabilities, its use entails the development of knowledge-based capabilities (Bharadwaj, 2000; Sambamurhty et al., 2003; Melville et al., 2004). This result provides support to the theoretical idea that ITs allow sensing and responding to technological changes as has been suggested in previous research (Overby et al., 2006)

The KBV also suggests that knowledge is a relevant intangible resource that leads to the creation of more complex capabilities. In relation to the firm's internal knowledge, evidence of the positive impact of internal capabilities was found. This supports previous findings that a firm's IT human capital is a key determinant of the technological opportunism capability (Srinivasan et al., 2002). Our study confirms the

importance of investing in in-house retained IT capabilities to enhance the development of sensing and responding to IT changes.

Outsourcing is an instrument to access external knowledge resources that improves the firm's capabilities and that reduces costs. We have argued that relying heavily on IT vendor support might hurt the firm's capabilities development as was found in previous research (Grimpe and Kaiser, 2010). However, our findings have not found an inverted U-shaped relationship between IT vendor support and the firm's TO capability in either of the countries analyzed. In the US sample, the relationship between IT vendor support and technological opportunism (TO) capability was U-shaped, and not inverted U-shaped. So, for the US sample, a high level of IT vendor support has positive effects on the development of TO capability. Results of the Spanish sample suggest that there is neither a curvilinear effect of IT vendor support on TO capability, nor a negative linear effect. So, IT vendor support is not an instrument that helps to create capabilities. In this country, IT vendor support has a non-significant effect by itself.

Although the combination of internal and external sources of knowledge has been analyzed in other decisions, such as R&D outsourcing (Cassiman and Veugelers, 2006, Grimpe and Kaiser, 2010), and although the complementary nature of the two resources has been confirmed (Bharadwaj, 2000; Grant and Baden-Fuller, 2004; Qu et al*.,* 2010), little is known about the effect of an IT vendor support and its combination with the level of IT use and the level of the firm's internal knowledge. Our findings depend on the country analyzed.

In the Spanish sample, internal and external IT knowledge mutually reinforce their effectiveness in the development of TO capability (Tiwana and Keil, 2007). For

having a high level of IT vendor support to be an effective strategy for developing capabilities, a greater level of knowledge sharing and collaboration is required, as established in prior studies (Varadarajan, 2009; De Vita et al., 2010; Stanko and Olleros, 2013; Butler and Callahan, 2014). So, the combination of these knowledge resources will develop tacit and firm-specific knowledge that is valuable for the firm. However, these results should be taken with caution. These findings may also hide the fact that the decision to use external personnel evolves over time (Cullen et al., 2005), that it may depend on some moderating variables such as the level of information asymmetry between the parties (McCarthy et al., 2013) and that the use of external personnel is selective (Lacity and Wilcoks 1998; Nevo et al., 2007).

Our research suggests that the level of use of ITs moderates the effect of IT vendor support. Our results show that the disadvantages of relying heavily on IT vendor support increase when this strategy is applied in firms with an intensive IT use. The level of use of ITs is a proxy for the importance that IT activities have for the firm. According to the RVB and the KBV, core activities are less likely to be outsourced compared to non-core activities (Earl, 1996; Bahli and Rivard, 2005; Miozzo and Grimshaw, 2005; Weigelt, 2009; McLellan et al, 1995; Lacity et al., 2009; McCarthy et al., 2013). Our results for the Spanish sample are in line with previous research. If firms use ITs intensively, vertical integration is preferred for developing the TO capability. However, for the U.S. sample, the contrary effect is found. These results should be taken with caution as this effect is moderated by the firm's IT human capital. The triple interaction of these variables provides more detailed information on the effect of IT vendor support. The combination of the three resources suggests that, in both countries, when ITs are used intensively, a high level of IT vendor support has a positive effect on

TO capability when the firm also has a high level of IT human capital. In this situation, the capacity of the firm for using internal and external knowledge, and putting the use of that knowledge into practice, is essential for building the TO capability.

The results offer contributions to different areas of study. The first contribution is to the area of RBV and KBV literature and new technologies. The findings confirm that the use of technologies generates capabilities that are useful for increasing the level of a firm's technological opportunism capability. Additionally, evidence of the importance of in-house retained capabilities for generating such a complex capability as sensing and responding to IT changes is offered. An important contribution is the impact of IT vendor support on the development of capabilities, an effect that is moderated by the level of IT use and the level of the firm's IT human capital. This paper provides new insights about the three way interaction of these variables in two different countries. However, because a lot of differences are found by country, more research is needed in additional countries and in different sectors to confirm our results and conclude that the effect of an IT vendor support is country-dependent.

This paper also contributes specifically to the franchising literature in several ways. First, it empirically studies the level of use of ITs. Not all ITs are used with the same intensity by franchise chains, confirming previous research (Rao and Frazer, 2005). It is important to point out that Rao and Frazer's research was carried out ten years ago and in Australia. The study analyzes the content of the webs of franchise chains and provides information (mean, standard deviation and proportions) about the use of web-related ITs. Since then, there has been further research about the adoption of ITs, mainly in the U.S. and Australia. Some of these studies addressed the impact and advantages of ITs in franchising from a theoretical point of view (Paswan et al. 2004;

Paswan and Witman 2009). In recent years, research has evolved and used regressions and more advanced statistics to analyze the determinants of e-commerce adoption in the U.S, Australia and some European countries (Perrigot and Penard 2013; Cliquet and Voropanova, 2013; Lucia-Palacios et al., 2014a) and to study social media network adoption (Perrigot et al., 2012). To our knowledge, there is no research in the franchising literature about the influence of IT use on the development of dynamic capabilities. This paper provides evidence of how franchise firms can develop a specific IT capability: technological opportunism. Second, our paper furthers research about IT knowledge management and its relationship with capability development. Knowledge management strategies are essential in franchising because franchisors have to develop IT knowledge not only among their employees, but also among their franchisees. Furthermore, our research contributes by analyzing IT vendor support as a type of IT outsourcing. The paper provides some guidance about when a high level of IT vendor support can develop the firm's capabilities for sensing and responding to technological advances.

Our third contribution to the literature is related to the international context of the analysis. This study is carried out in two different countries, the U.S. and Spain. The results show that Spanish franchisors and American franchisors may benefit from an a high level of IT vendor support in different ways.

Managerial implications

Sensing and responding to technological changes are complex capabilities determined by the in-house retained knowledge of the firm, the use of the new technologies and, in some cases, by IT outsourcing. Our results are relevant for

managers of IT outsourcing processes. Although IT outsourcing is a common strategy in SMEs, managers should be aware that although outsourcing has some advantages, an high dependence on IT vendor support may have some disadvantages depending on the circumstances.

This study's results confirm the idea that, for an effective use of IT vendor support, the firm should have developed adequate in-house knowledge (Tiwana and Keil, 2007; Grimpe and Kaiser, 2010; Stanko and Olleros, 2013; Butler and Callahan, 2014). Franchisors should have a technology-oriented strategy and provide IT training for their employees and franchisees. To generate the technological opportunism capability requires a collaboration between IT vendors and the firm's employees in order to efficiently allocate resources. Additionally, firms have to evaluate the strategic importance of their IT use before deciding whether to outsource.

According to our results, managers should evaluate their in-house IT knowledge to decide whether they can depend on their internal capabilities before deciding to opt for IT vendor support for managing their ITs. Not doing so may negatively affect the generation of capabilities instead of helping to achieve greater success. Our research has also demonstrated the importance of the level of IT use on the effect of IT vendor support. The more intense the IT use, the lower the creation of capabilities when the firm opts for a high level or IT vendor support (in the Spanish case), unless the firm has an internal IT knowledge base. This IT knowledge base allows the integration of external knowledge, creating tacit and valuable knowledge.

Our results also provide some guidance to IT vendors that want to offer their services to U.S. franchise chains and Spanish chains. The differences observed between these countries show how franchise chains approach outsourcing decisions in each

country. IT vendors that want to offer their services to the franchise chains in Spain have to emphasize their technical expertise and the complementarity of their services with the internal IT knowledge more than those in the U.S. IT vendors will be in a better position in the U.S. market where managers obtain benefits as they increase the level of IT activities outsourced.

Limitations and future research

There are, of course, several limitations to our study. First, this study focuses on a specific type of business, franchises, and on only two countries. Our results may be generalized to organizations with similar characteristics to those that responded to the survey. Our findings show that there are differences in the use of IT vendor support across countries. A different industry sector as a basis for a similar study could provide different results. Additionally, IT vendor support has been measured using a single item, so a more developed construct should be considered in future research. The study has not included the quality of the vendor support, its adequacy or its specific use for some ITs and not others. Second, a cross-sectional design is a limitation because results are usually more robust if observations are considered over time, rather than as a snapshot in time. IT vendors and their relationship with firm staff may vary over time and the decision as to what kind of IT services to outsource could be a temporal issue. Additionally, we have used a single informant to answer the questionnaire. Including the perceptions of other IT personnel could improve the results and should be considered in further research. Finally, sample size is another limitation. Although an adequate number of answers were received in Spain, the response rate in the U.S. was relatively low.

6. CONCLUSIONS

Several authors have suggested the need to focus on technological opportunism as a capability that increases firm performance (Sarkees, 2011; Voola et al., 2012; Chen and Lien, 2013; Lucia-Palacios et al., 2014a). However, little is known about how firms can increase the level of this important capability or which resources are relevant. The interest of IT outsourcing for management research is rising, but little is known about the impact of a high level of IT outsourcing on the development of capabilities (Weigelt, 2009; Yam et al., 2011). This study contributes to the literature by shedding light on the effect of a high use of IT vendor support and how this effect depends on the level of IT use and the level of the firm's IT human capital. A relevant contribution of this research is to show that country context plays an important role in the generation of firm's capabilities and in the effect of IT outsourcing.

Using data from two surveys in the U.S. and Spain, it was found that IT use increases a firm's TO capability. A high use of IT vendor support also helps to create TO capability if the firm has an intensive use of ITs and IT knowledge. The involvement of the firm's personnel in outsourced activities has a positive effect on the TO capability, which allows firms to increase their in-house retained capabilities and reduce the disadvantages of a high use of IT vendor support. The results contribute with new insights into the complementarity of internal and external resources, focusing on the effect of a high use of IT outsourcing in SMEs in a cross-country study. Results show that U.S. and Spanish companies differ in their management of IT outsourcing although, in both countries, advantages are found when it is combined with IT human capital and IT use.

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Table 1.

Informant characteristics

	%
Knowledge about IT (5-point Likert)	
1	0
2	3.7
3	11.9
4	57.8
5	26.6
Position	
Director Franchise Development /Strategic Business Units	22
CEO/Owner/President	62
Marketing/ Sales Director	15
Director of IT	6
Others (financial, training, recruitment)	1
Years in business	
<4	14.4
4-10	51
+10	36.6

Table 2.
Level of use of IT vendor support by country

Country	1	2	3	4	5
U.S.	4.58%	19.3%	16.5%	47.7%	11.9%
Spain	18%	13%	31%	17%	21%

* measured on a five-point Likert scale

Table 3.
Descriptive statistics, multicollinearity and weights for formative items

	U.S.				SPAIN			
	Mean	S.D	VIF	Weights	Mean	S.D	VIF	Weights
…Extranet	3.90	1.52	1.45	0.291*	1.94	1.53	1.41	0.224 n.s.
…Intranet	2.38	1.70	1.21	0.436***	2.87	1.82	1.43	0.112 n.s.
…E-commerce	3.00	1.67	1.31	0.354***	2.17	1.70	1.28	0.222**
…EDI	2.62	1.77	1.25	0.279*	1.69	1.41	1.17	0.297**
…CRM	3.36	1.75	1.41	0.537***	2.32	1.75	1.50	0.885***
…MRP	1.28	0.94	1.11	0.015 n.s.	1.41	1.19	1.40	0.043 ns.

***significant at p <0.01; ** significant at p <0.05; * significant at p <0.10; n.s.: non significant

Table 4
Reflective constructs for U.S. firms and Spanish firms

	U.S.				Spain			
Items	Loadings	Composite reliability	Alpha Cronbach	AVE	Loadings	Composite reliability	Alpha Cronbach	AVE
TECHNOLOGICAL OPPORTUNISM		**0.931**	**0.913**	**0.712**		**0.928**	**0.920**	**0.849**
Technology-sensing capability	**0.910**	0.891	0.801	0.723	**0.903**	0.9342	0.8945	0.826
SENSING_1	0.840				0.859			
SENSING_2	0.871				0.945			
SENSING_3	0.824				0.921			
Technology-responding capability	**0.908**	0.896	0.772	0.818	**0.922**	0.9025	0.7973	0.823
RESPONSE_1	0.922				0.953			
RESPONSE_2	0.881				0.8227			
IT HUMAN CAPITAL		**0.931**	**0.913**	**0.826**		**0.9365**	**0.9204**	**0.852**
HUMAN_1	0.837				0.772			
HUMAN_2	0.731				0.773			
HUMAN_3	0.726				0.749			
HUMAN_4	0.870				0.884			
HUMAN_5	0.871				0.847			
HUMAN_6	0.854				0.864			
HUMAN_7	0.783				0.899			
IT VENDOR SUPPORT								
VENDOR	1.00				1.00			

Table 5

Discriminant validity*

U.S.	Mean	S.D	1	3	3	4	VIF
IT use	2.75	0.97	**n.a.**				1.18
IT human capital	3.81	0.73	0.402	**0.908**			1.15
IT vendor support	3.43	1.07	0.200	0.229	**1**		1.10
Technological opportunism	3.45	0.78	0.451	0.682	0.143	**0.844**	1.66
SPAIN							
IT use	2.06	0.94	**n.a.**				1.16
IT human capital	3.61	0.98	0.364	**0.923**			1.21
IT vendor support	3.1	1.37	-0.09	0.034	**1**		1.09
Technological opportunism	3.41	1.03	0.503	0.510	0.039	**0.905**	1.39

*Numbers in bold are the square root of the AVE of the reflective constructs.

Table 6.

Results of configural invariance using only reflective measures

	χ^2	Df	CFI	RMSEA	CD
USA	122.87	52	0.91	0.05	0.932
Spain	169.96	52	0.87	0.08	0.94

Table 7.

Results of measurement invariance by construct

		χ^2	Df	$\Delta\chi^2$ test	ΔDf	CFI	RMSEA	CD
IT human capital	Fully constraint	161.7***	40			0.88	0.07	0.94
	Factor loadings constraint			5.57 n.s.	6			
	Scalar constraint			7.28 n.s.	6			
Technological-sensing	Fully constraint	13.18***	4			0.97	0.08	0.89
	Factor loadings constraint			8.40**	2			
	Scalar constraint			5.80*	2			
Technological-responding	Fully constraint	7.02***	2			0.98	0.09	0.84
	Factor loadings constraint			1.19 n.s	1			
	Scalar constraint			2.84 n.s	1			

***significant at p <0.01; ** significant at p <0.05; * significant at p <0.10; n.s.: non significant

Table 8.

Results for the U.S. sample

Technological opportunism	**U.S.**					
	Coeff.	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**
IT use	0.128*	0.118*	0.089	0.131*	0.05	0.051
IT human capital	0.634***	0.642***	0.605***	0.615***	0.635***	0.649***
IT vendor support	-0.018	0.064	0.049	0.065	0.05	0.058
IT vendor support squared		0.138**	0.128*	0.144**	0.125*	0.121*
IT use x IT vendor support			0.08		0.007	0.078
IT use x IT vendor support squared			0.111*		0.104*	0.107*
IT human capital x IT vendor support				-0.02	-0.08	-0.08
IT human capital x IT vendor support squared				0.09	-0.02	-0.03
IT human capital x IT vendor support x IT use						-0.005
IT human capital x IT vendor support squared x IT use						0.007
Size	0.07**	0.07**	0.06*	0.06*	0.058*	0.058*
Constant	-0.02	-0.138	-0.138	-0.143	-0.187	-0.231
R^2	0.483	0.503	0.507	0.503	0.51	0.51
AIC	247.48	245.17	248.0	248.9	251.4	255.4
BIC	260.90	261.32	269.6	270.5	278.3	257.7
F	30.28***	28.08***	21.21***	20.42***	16.76***	15.6***

*** Significant at .01; ** Significant at .05; * Significant at .10

Table 9.
Results for the Spanish sample

Technological opportunism	Spain					
	Coeff.	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**	**Coeff.**
IT use index	0.384***	0.388***	0.38***	0.377***	0.374***	0.366***
IT human capital	0.359***	0.352***	0.356***	0.361***	0.360***	0.361***
IT vendor support	0.002	0.028	0.024	0.016	0.015	-0.02
IT vendor support squared		0.039				
IT use x IT vendor support			-0.125*		-0.128*	-0.146*
IT human capital x IT vendor support				0.178*	0.186**	0.214*
IT human capital x IT vendor support x IT use						0.088
Size	-0.05	-0.05	-0.05	-0.02	-0.02	-0.02
Constant	0.000	-0.03	0.006	0.000	0.001	0.003
R^2	0.389	0.390	0.395	0.411	0.429	0.431
AIC	244.47	246.27	245.7	242.7	242.5	243.4
BIC	257.50	261.90	261.4	258.3	260.7	264.3
F	20.21***	19.8***	15.9***	16.09**	13.7***	12.99***

*** Significant at .01; ** Significant at .05; * Significant at .10

APPENDIX 1

List of measures

Item	
IT human capital	
HUMAN_1	Top management is aware of the benefits of ITs.
HUMAN_2	The owner or manager has allocated resources for IT adoption
HUMAN_3	Top management actively encourages employees to use ITs in their daily tasks.
HUMAN_4	Top management is knowledgeable about ITs.
HUMAN_5	Our company provides staff training courses ITs.
HUMAN_6	Our employees are knowledgeable about the use of ITs.
HUMAN_7	Our franchisees are knowledgeable about the use of ITs.
Level of use of IT vendor support	
VENDOR	Our company uses specialized external IT vendor support.
Technological opportunism	
	Technological-sensing capability
SENSING_1	We are often one of the first in our industry to detect technological developments that may potentially affect our business.
SENSING_2	We actively seek intelligence on technological changes in the environment that are likely to affect our business.
SENSING_3	We periodically review the likely effect of changes in technology on our business.
	Technological-responding capability
RESPONSE_1	We generally respond very quickly to technological changes in the environment.
RESPONSE_2	We tend to resist new technologies that cause our current investments to lose value.
Level of IT use	
IT USE	Our firm uses.....intensively (Extranet/ Intranet/ e-commerce/ EDI/ CRM/ MRP)
Size	
SIZE	Total number of outlets (franchised and company-owned outlets)

FIGURE 1.

CONCEPTUAL MODEL

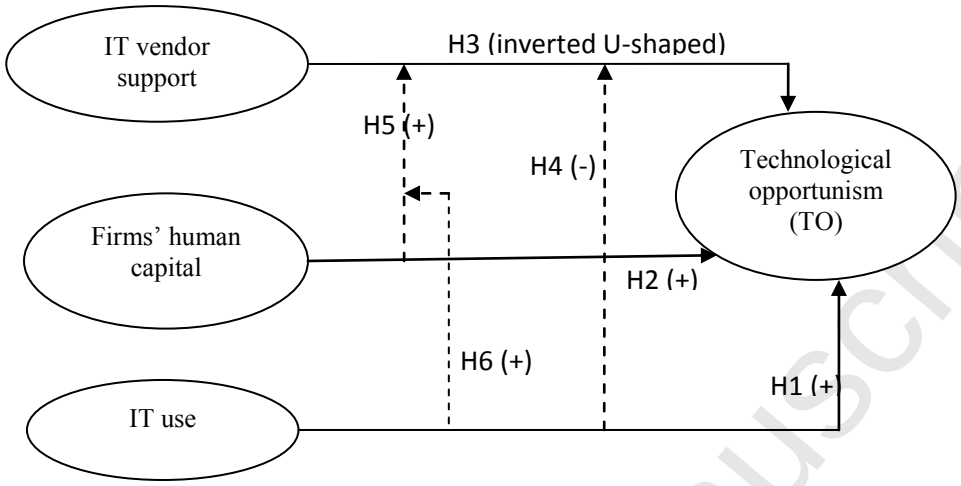
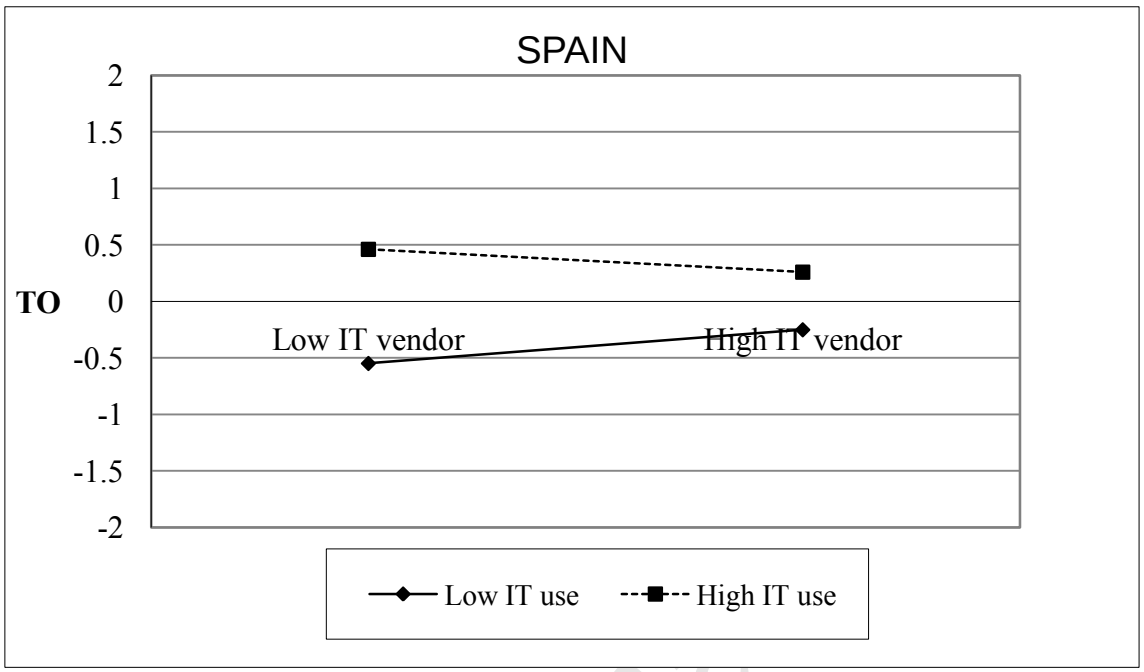


FIGURE 2.

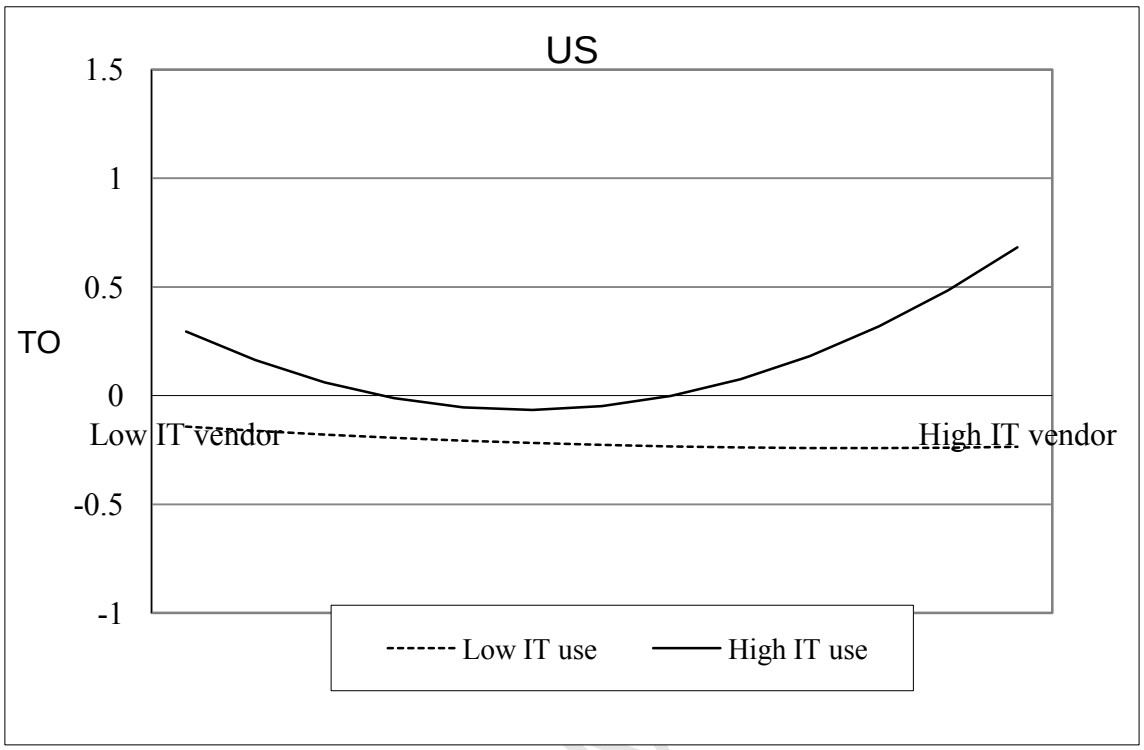
MODERATING EFFECT OF IT USE FOR SPANISH SAMPLE



TO: technological capability

FIGURE 3.

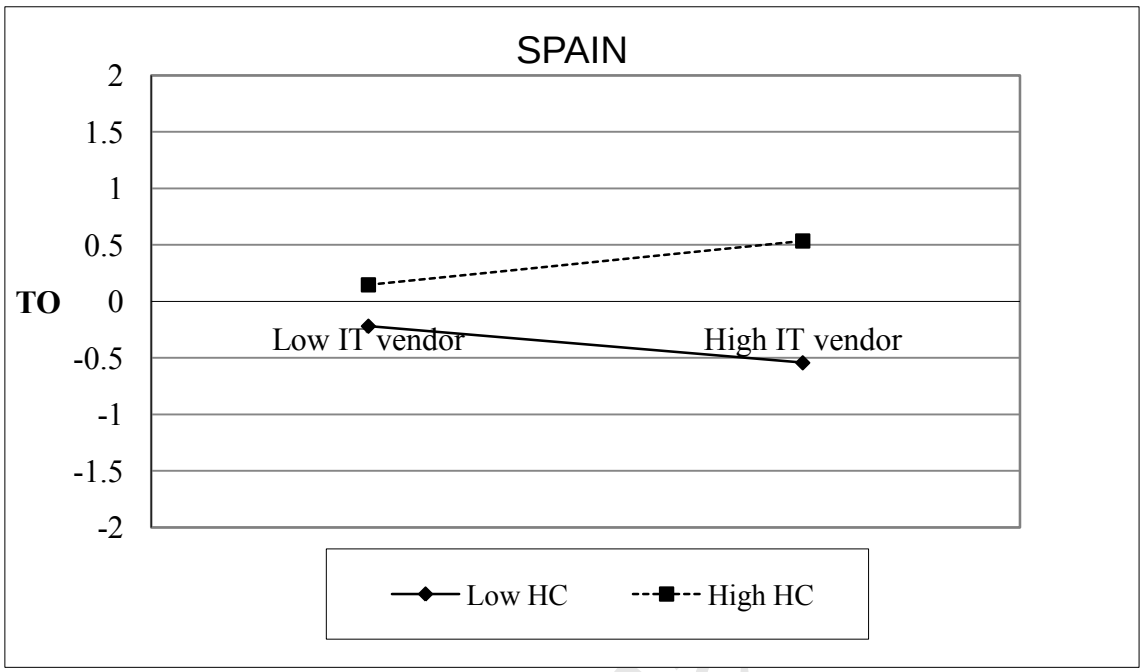
MODERATING EFFECT OF IT USE FOR THE U.S.



TO: technological capability

FIGURE 4.

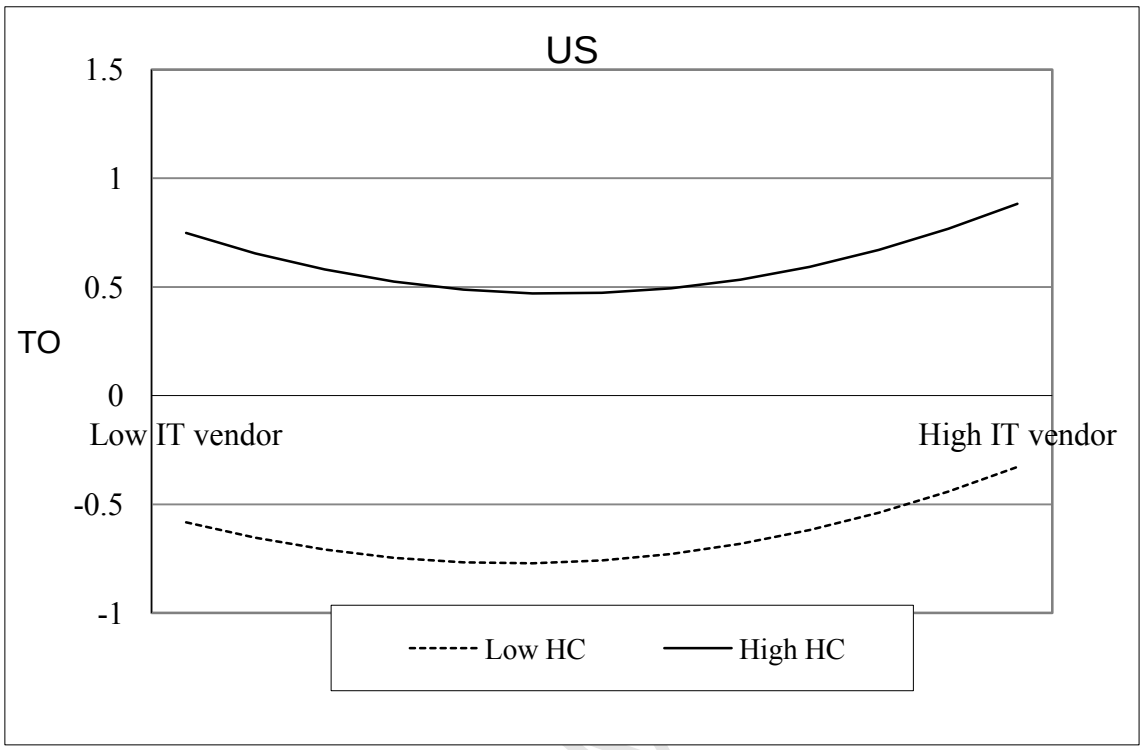
MODERATING EFFECT OF INTERNAL IT KNOWLEDGE FOR THE SPANISH SAMPLE



TO: technological capability ; HC: firm's IT human capital

FIGURE 5.

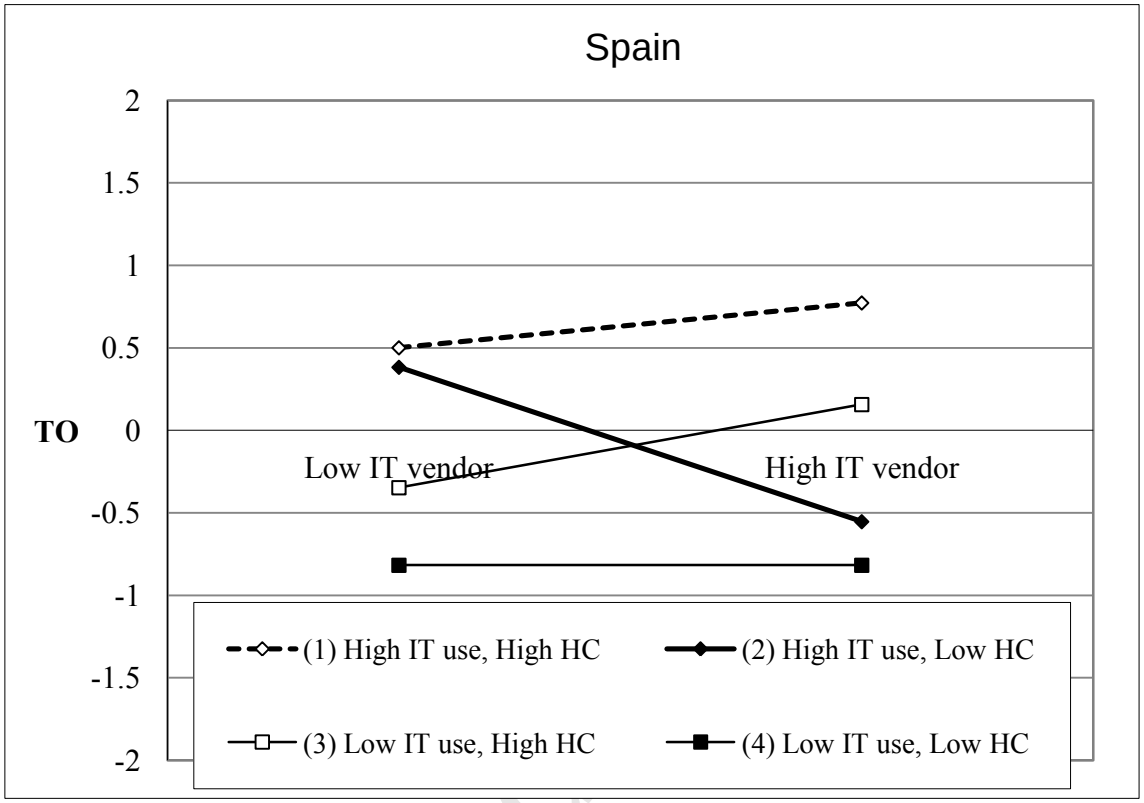
MODERATING EFFECT OF INTERNAL IT KNOWLEDGE FOR THE U.S.



TO: technological capability ; HC: firm's IT human capital

FIGURE 6.

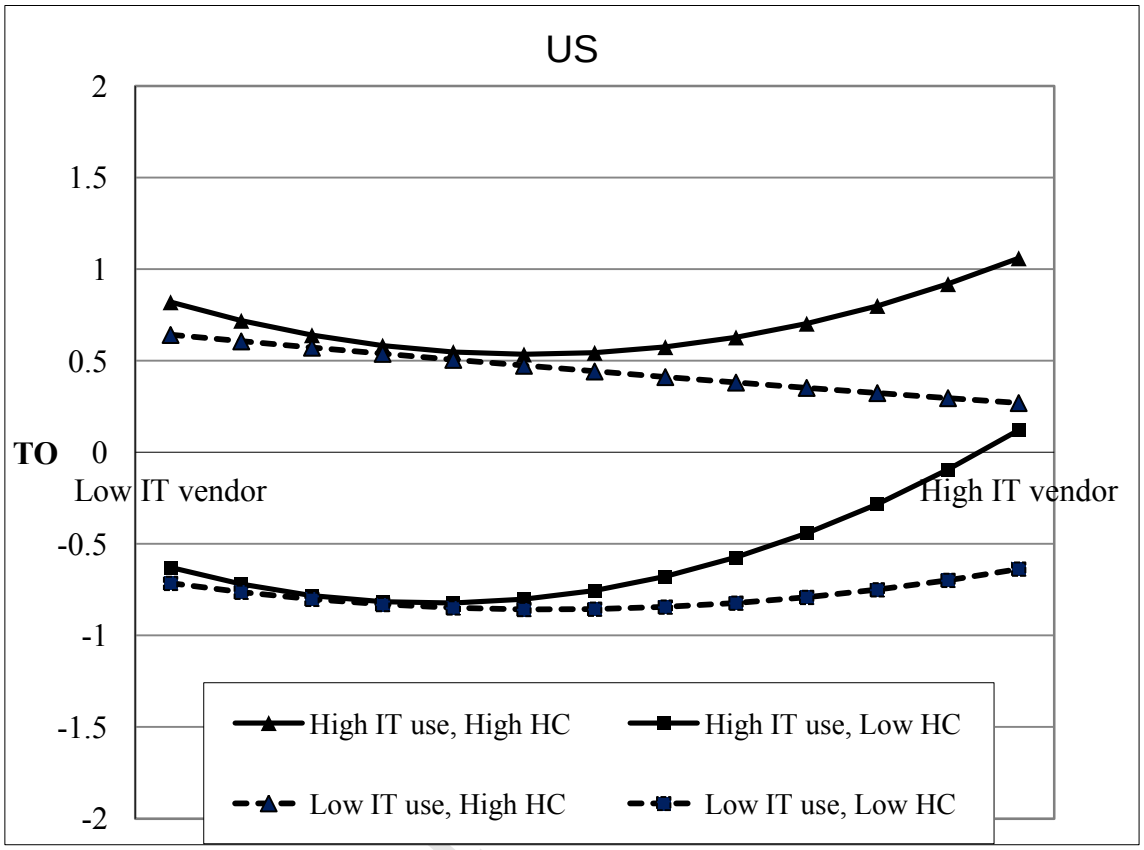
THREE-WAY INTERACTION EFFECTS FOR THE SPANISH SAMPLE



TO: technological capability ; HC: firm's IT human capital

FIGURE 7.

THREE-WAY INTERACTION EFFECTS FOR THE U.S.



TO: technological capability ; HC: firm's IT human capital