

Combining transaction cost and resource-based insights to explain IT implementation outsourcing

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Abstract This empirical work aims to shed some light on the governance choice for information technology (IT) outsourcing decisions. By combining transaction cost and resource-based arguments, we explain the role that some economic and strategic factors as well as their relationships may play. Hypotheses are tested for the implementation of an HR software application with primary data collected from large Spanish firms. Findings seem to provide more support for resource-based arguments than for transaction-cost propositions. Thus, our results suggest that cumulative knowledge from either coordination and interaction between internal units or experience in IT outsourcing is not a significant factor unless the organization is able to develop a strategic capability. Unlike for technology specificity, no evidence was found for the significance of behavioral uncertainty and strategic contribution.

Keywords ‘Make or buy’ decisions · Firm boundaries · Transaction cost economics · Resource-based theories · Human resource information systems

1 Introduction

Since the early nineties much attention has been paid to analyzing the outsourcing of information technology (IT) within the literature on firm boundaries. Following Dibbern et al. (2004) and Hirschheim et al. (2006), the main issues

on this topic include the study of the nature of sourcing decisions, the outsourcing relationship, outsourcing from the vendor’s perspective, the implementation phase, and offshoring and global outsourcing. Among these issues, analysis of the motivation underlying this decision and identification of its driving factors have received special attention, as noted by Gonzalez et al. (2006).

Although many other theoretical perspectives have been used to explain this choice, e.g., resource dependence theory, relational exchange theory, social capital theory, institutionalism, power theories, among others (see Lacity and Willcocks 2009 for a recent review), most of the studies published have adopted an economic or strategic approach (Dibbern et al. 2004: 84). Whereas new institutional economists have argued that firms will choose the IT sourcing mode that minimizes transaction costs (TC) by reducing the likelihood of opportunistic behaviors (Lacity and Hirschheim 1993; Aubert et al. 1996a), resource-based approaches have focused on the wider concept of value creation (Madhok 2002). Thus, when determining how to procure an IT function firms will choose the sourcing mode that allows them to obtain a competitive advantage based on the resource endowment they own or control (Roy and Aubert 2002; Alvarez-Suescun 2007).

Empirical studies seem to confirm, to a greater or lesser extent, the insights stemming from both perspectives, as we will explain later. However, there appears to be more consensus on which economic determinants are the most significant, i.e., asset specificity and uncertainty, and how to operationalize them (e.g., Aubert et al. 1996b) than on the strategic factors. As Priem and Butler (2001) argue, the difficulty of their operationalization prevents resource-based (RB) theories from being fully developed.

Although these perspectives adopt different assumptions and criteria, they can be seen as complementary rather than

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competitive, as recent theoretical works argue (e.g., Madhok 2002). Unfortunately, despite the fact that some empirical studies in the IS context have used both perspectives, few have made the additional effort to combine their insights (e.g., Poppo and Zenger 1998; Mayer and Salomon 2006).

This paper provides empirical evidence on the determinants of IT outsourcing decisions by combining the insights of new institutional economics and resource-based theories. Thus, in addition to explaining the individual impact of some determinants from both points of view, we take a step further and analyze the effect of some interactions, particularly, between human specificity and strategic capability and between behavioral uncertainty and outsourcing experience.

Unlike other studies in this area, we adopt a function-level approach, which is consistent with the differences that maybe found in firms' outsourcing behavior depending on the IT function studied (Teng et al. 1995; Dibbern and Heinzl 2006) and the multidimensional nature of information systems (IS) (De Looff 1995). De Looff holds that outsourcing is defined based on the three IS dimensions, namely, components, activities and functional areas. Thus, firms have to determine which IT functions are accomplished by which components (hardware, software, etc.) and in which organizational areas.

In so doing, this paper expands IT outsourcing research beyond the more commonly studied functions, e.g., development (Nelson et al. 1996), data processing (Ang and Cummings 1997) or maintenance (Aydin and Bakker 2008), to include implementation. Most works consider the sourcing choice of IT development and implementation as only one decision, implicitly assuming that those who design the application also implement it. But the increasing number of highly flexible software packages and ERPs as well as the greater complexity that implementation involves (e.g., Flynn 1994) make this activity more critical than IT design. Some of the main risk factors in software projects identified by Schmidt et al. (2001), such as project team responsiveness and user involvement, lack of required knowledge and skills of project personnel or excessive use of outside consultants, are mainly associated with the decision on who performs the implementation.

Moreover, our methodological approach allows us to customize the items of the questionnaire for a specific IT function in an organizational area, which improves the validity of the measurements and implies a step forward from other studies that use the same measurement items for all the functions analyzed (e.g., Nam et al. 1996; Poppo and Zenger 1998). In a similar vein, we also contribute to the existing literature by developing multi-item scales of such an intangible concepts as IT human specificity and IT capability. Unlike most previous literature, which use input

measures as proxies of the latter (e.g., Nam et al. 1996), we follow suggestions from Armstrong and Shimizu (2007) and operationalize capabilities as an output variable.

The paper is organized as follows. The next section summarizes the two main theoretical perspectives that have been applied to the study of IT sourcing decisions, namely, new institutional economics and resource-based theories. Then, taking these insights into account, we explain how some key economic and strategic factors as well as their interrelationships affect IT implementation outsourcing. In the forth section we describe the data collection process and justify how dependent and explanatory variables are measured. After presenting the results of the logistic regression models used to test the hypotheses, they are discussed. The last section presents the main contributions and limitations of this study.

2 Theoretical background on IT boundary decisions

This section summarizes the core insights of the main theoretical approaches that have been put forth to explain 'make or buy' decisions for IT. On the one hand, transaction cost economics and agency theory have their roots in organization economics, and state that firms choose the sourcing mode that minimizes the threat of opportunism. On the other hand, within strategic management, resource-based view and knowledge theory focus on the resource-based competitive advantage as the main driving force of the governance choice.

2.1 Transaction cost logic

Coase (1937) proposed a new logic, which Williamson (1975, 1985), Jensen and Meckling (1976) and other organizational economists later developed, to analyze firm boundaries. Assuming similar production costs among firms, managers will choose the governance structure that minimizes transaction costs, that is, those costs derived from negotiating, executing and enforcing the contracts. When information asymmetry among parties is high, some may act in a self-interested manner to the detriment of others. In these situations, internalizing the activity maybe less costly than adopting various market monitoring mechanisms because hierarchy enhances managerial over-sights and allows better aligned incentives to motivate desired behavior (Williamson 1985).

Consequently, the hazard of opportunism has been considered the main determinant of transaction costs, and thus of boundary decisions. Whereas TC economists have focused on explaining how the risk of hold up, when undertaking important investments specific to a frequent transaction in an uncertain environment, influences the

mode of organizing a transaction, positive agency theorists study the effect that measurement problems derived from moral hazard and adverse selection cause (Mahoney 1992).

In IT outsourcing decisions, empirical evidence seems to confirm the insights stemming from these perspectives on the whole, as shown in Table 1. Studies have focused on analyzing the impact of transaction dimensions on the sourcing decision, so we have identified only two works that have tested the direct effect of perceived transaction costs (Ang and Straub 1998, 2006) and opportunistic behavior of providers (Nam et al. 1996), being only the former significant. Despite the fact that asset specificity has been traditionally deemed to be particularly important (Schelanski and Klein 1999), only Nelson et al. (1996) and Poppo and Zenger (1998) and, to a lesser extent, Saarinen and Vepsäläinen (1994) and Grover et al. (1996) have empirically confirmed its importance in the expected direction. There is stronger support for uncertainty, tested either as a whole (Saarinen and Vepsäläinen 1994; Nam et al. 1996) or in particular, as technological and behavioral uncertainty (Poppo and Zenger 1998; Dibbern and Heinzl 2006). These findings are consistent with those obtained by Geyskens et al. (2006) in other areas.

2.2 Resource-based reasoning

The resource-based view of the firm (RBV) (Wernerfelt 1984; Barney 1991; Grant 1991; Peteraf 1993) has also been applied to study ‘make or buy’ decisions, shifting the attention from transaction costs and opportunism to value creation and competitive advantage. Unlike new institutional economics, it does not assume long-lasting homogeneity among firms (Barney 1991). Therefore, organizations differ in their endowment of resources and capabilities, which in turn affects their efficiency (Madhok 2002).

Applying these insights, Prahalad and Hamel (1990), Quinn and Hilmer (1994) and Argyres (1996) argue that firms should perform in-house all those activities for which they possess strategic resources and capabilities because this strategy will enable them to outperform competitors, and thus obtain greater rents. Alternatively, functions should be outsourced when firms lack the resources and capabilities needed to obtain the expected performance.

An outgrowth of RBV, knowledge theory (Grant 1996; Conner and Prahalad 1996), helps explain why the internal organization is the most efficient governance structure in some circumstances. Efficiency tends to be associated with the maximization of the use of rules, routines and other integration mechanisms that economize on communication and knowledge transfer, whereas problem solving and decision making by teams is reserved for unusual, complex and important tasks (Grant 1996). On the other hand,

according to Conner and Prahalad (1996), the higher efficiency of hierarchy in knowledge transfer is explained by the “knowledge-substitution effect”, for which an employee can use the knowledge of another before the former fully understands or agrees with it.

Although, as we mentioned in the introduction, less consensus exists on which RB determinants are the most significant, since similar concepts are usually coined and measured differently (Armstrong and Shimizu 2007), empirical evidence on IT outsourcing decisions seems to provide support for RB arguments (Table 1). Results mostly confirm that IT outsourcing is negatively associated with those assets that allow firms to improve their efficiency in performing an IT activity (Teng et al. 1995; Nam et al. 1996; Nelson et al. 1996; Ang and Straub 1998, 2006; Poppo and Zenger 1998; Dibbern and Heinzl 2006; Mayer and Salomon 2006), and positively related to the skill set required to perform the IS service (Poppo and Zenger 1998). No significant relationships were found for the mere availability of resources (Ang and Straub 1998), except for some IT functions (Dibbern and Heinzl 2006).

3 Determinants of IT implementation outsourcing decisions: Integrating opportunism- and resource-based explanations

By combining insights that stem from the above-mentioned theoretical frameworks we analyze the impact of the main transaction- and firm- related determinants, as well as their interaction, on the choice of the sourcing mode for IT implementation decisions.

3.1 Specificity

In our context, asset specificity refers to those durable investments in physical and human assets undertaken in support of the implementation of a technological application with a significantly lower productive value for other functions, areas or organizations. When this specificity increases, investing parties find themselves locked into the transaction because they have to preserve the value of investments, which have little or no value outside that relationship (Klein et al. 1978; Williamson 1985).

For example, firms could need to invest in software development in order to fulfill some technical requirements only useful for implementation of a particular application, or they could even find it necessary to develop some specific skills and know-how or hire new technically skilled workers to carry it out. Nowadays, hardware and telecommunication devices are less likely to be specific due to the use of widespread standards for both equipment and

Table 1 Empirical evidence on the determinants of IT outsourcing decisions from a TC and RB approach

Variables	Relationship with IT outsourcing		
	Significant	Partially significant	No significant
<i>From a TC approach:</i>			
Perceived opportunistic behavior (of providers)			Nam et al. (1996)
Perceived transaction costs	Ang and Straub (1998, 2006)		
Asset specificity	Grover et al. (1996) ^a Nelson et al. (1996) Poppo and Zenger (1998) Aubert et al. (2004) Ang and Straub (2006) ^b	Saarinen and Vepsäläinen (1994)	Nam et al. (1996) Dibbern and Heinzl (2006)
Uncertainty:	Nam et al. (1996) Aubert et al. (2004)	Saarinen and Vepsäläinen (1994) Dibbern and Heinzl (2006) ^c	
—Technological uncertainty		Poppo and Zenger (1998)	
—Behavioral uncertainty		Poppo and Zenger (1998) ^d Dibbern and Heinzl (2006) ^c	
Number of providers			Nam et al. (1996) Ang and Straub (2006)
<i>From a RB approach:</i>			
Strategic role of IT	Teng et al. (1995)		Dibbern and Heinzl (2006) ^c
Strategic characteristics of applications		Nelson et al. (1996)	
Capabilities	Nam et al. (1996) Mayer and Salomon (2006)		
Providers' advantage	Ang and Straub (1998, 2006)		Nam et al. (1996)
Performance of IS resources		Teng et al. (1995)	
Available resources		Dibbern and Heinzl (2006) ^c	Ang and Straub (1998)
Scale economies	Poppo and Zenger (1998)		
Skill set		Poppo and Zenger (1998) Aubert et al. (2004) ^e	

^a They do not test the direct effect, but they found that only less specific functions are associated with outsourcing success

^b They do not test the direct effect, but the positive influence of specificity on transaction costs

^c Significance varies depending on the IT function studied. When a determinant is found significant or non-significant for at least four out of five functions, it is classified as significant or non-significant, respectively. Otherwise, I include it as partially significant

^d Significance varies depending on the measurement of the dependent variable considered

^e Whereas the relative importance of technical skills was found significant, the relative importance of business skills was not

operating systems, which could be used for other functions or by other users, as argued by Aubert et al. (1996a: 57).

By contrast, human IT assets may significantly differ in their level of specificity (Dibbern and Heinzl 2006: 60). Specificity of skills, knowledge or experience of trading partners, be it internal or external to the organization, increases as they invest in adapting their systems, procedures, etc. to each other and in developing long-lasting experiences working together in order to perform a particular IT function (Dyer 1996; Aubert et al. 1996b).

While investments in physical and human assets specific to the IT implementation increase, the risk that one party attempts to appropriate quasi-rents will be much higher, so additional safeguards should be established leading to increased transaction costs. In the presence of hold-up problems, in-house implementation enjoys a progressive governance cost advantage over outsourcing since it reduces the motivation to expropriate the value of those investments through monitoring and fiat, makes it easier to accomplish adaptive, sequential

adjustments to disturbances and suffers lower efficiency losses (Lyons 1995).

Apart from the transaction costs that it arises, from a resource-based approach, specificity is a source of imperfect mobility (Grant 1991; Peteraf 1993).¹ As the value of specific assets may fall on transfer and cannot be easily reproduced outside of the organization that currently possesses them, they remain bound to the firm and can be used to obtain a sustainable competitive advantage.

We, therefore, hypothesize:

H_{1a}: The greater the investments in physical assets specific to the IT implementation the lower the likelihood of outsourcing.

H_{1b}: The greater the investments in human assets specific to the IT implementation the lower the likelihood of outsourcing.

Within specific human assets, IT capabilities play a key role in determining firm boundaries (Mayer and Salomon 2006; Alvarez-Suescun 2007). In our context, IT implementation capabilities can be defined as those socially complex organizational abilities which enable a firm to coordinate and exploit its IT human resources in such a way that they are able to implement the application more efficiently. To develop this capability, firm's technological skills should be embedded in the organization, which requires that IT employees possess a deep knowledge of organizational characteristics and needs as well as have developed work routines and a strong relationship with the IT architecture (Barney 1991; Powell and Dent-Micallef 1997).

As Bhatt and Grover (2005) note, whereas many firms can possess a capability, few are able to develop a strategic capability, that is, a capability which allows a firm to achieve an advantage over other firms. As a tacit knowledge that has been developed over a long period of time through a cumulative, socially complex learning process and that is embedded in organizational routines, these capabilities cannot be codified and can only be observed through their application and acquired through practice. This makes them heterogeneous and imperfectly mobile, and thus a source of sustainable competitive advantage (Pralhalad and Hamel 1990; Collis 1994; Madhok 2002).

Consequently, only when a firm develops a strategic IT implementation capability, internal organization is the most efficient governance structure for that function (Alvarez-Suescun 2007). This firm would benefit from economies on

communication and knowledge transfer through the maximization of the use of rules, routines and other integration mechanisms and the “knowledge-substitution effect” (Conner and Prahalad 1996; Grant 1996), which would enable it to perform that function faster and at a lower cost while obtaining a technology better adapted to and more useful for organizational needs.

Therefore, we can hypothesize:

H₂: The more efficient an IT implementation capability allows a firm to be, the lower the likelihood of outsourcing.

3.2 Uncertainty

The information asymmetry between the organization on behalf of which the implementation is performed (the principal) and the organization which performs that function (the agent) is caused basically by measurement problems, i.e., the difficulty of observing *ex ante* the provider's behavior and measuring *ex post* the performance of that function (Alchian and Demsetz 1972). This behavioral uncertainty increases the likelihood of opportunism because the principal cannot completely verify whether the agent does indeed put forth the agreed-upon effort—moral hazard—or whether the agent has the knowledge and abilities that it claims to possess—adverse selection—(Eisenhardt 1989).

The client will attempt to avoid or mitigate this risk by monitoring and assessing provider's behavior, for instance, through testing the performance of a software program being developed or registering and reporting all errors that occur during the implementation process. On the other hand, the provider will seek to reassure the client by revealing internal information to the client regarding the qualifications of its personnel, its prior experience and so on. These actions will lead to increased transaction costs.

When measurement problems exist, firms tend to insource the IT implementation. Hierarchy allows them to reduce the threat of opportunism because the client can reward behavior better than outcome as well as use hierarchical control to establish work procedures and rules, and sanction any deviation in the provider's behavior. Furthermore, the client usually has the residual rights over the assets the provider needs to perform the task (Holmström and Milgrom 1994).

Conversely, when the appropriate behavior can be specified in advance (observability) and/or its performance can be easily measured (verifiability), outsourcing the IT implementation will be the most efficient alternative, since the market could deliver high-powered incentives, maintaining the hazard of opportunism inside the firm. In fact, the hierarchy will face a loss of efficiency due to the

¹ Resource-based proponents refer to assets which are specific to a particular firm rather than to a particular transaction as transaction cost advocates do.

activities that agents carry out to influence decision makers for their benefit (Milgrom and Roberts 1988).

Hence, the following hypothesis is drawn:

- H₃: The higher the behavioral uncertainty associated with the IT implementation the lower the likelihood of outsourcing.

3.3 Previous experience in external sourcing

A firm's pattern of technology procurement may influence its future sourcing decisions through path dependence and capability development. On the one hand, successful and unsuccessful experiences in external technology implementation are expected to respectively encourage or deter a firm from choosing that governance choice in the present, no matter how efficient it is (Steensma and Fairbank 1999).

On the other hand, experience in external procurement may improve firms' performance. Routines generated through a repeated cooperation with providers may lead these firms to be more efficient in organizing the IT implementation activity. Experienced firms may develop overlapping knowledge bases and routines that maximize the number and quality of interactions (Dyer and Singh 1998). This enables them to exploit others' knowledge base (Cohen and Levinthal 1990) by facilitating the recognition and assimilation of existing, and the creation of new, critical knowledge. Additionally, experience may enhance the efficiency of the IT implementation outsourcing relationship through a better ability to write more complete contracts that anticipate and respond to future contingencies (Argyres and Mayer 2007).

Consequently,

- H₄: The higher the firm's prior experience in outsourcing IT implementation the higher the likelihood of outsourcing.

Cumulative knowledge in external procurement may also help firms to reduce transaction costs by mitigating the hazard of an opportunistic behavior derived from behavior uncertainty. As mentioned earlier, that uncertainty results from the inability of the client firm to measure and reward provider's performance in an accurate form (Alchian and Demsetz 1972). By repetitively interacting with IT providers firms gain information about one another's behavior, and in stable environments that learning attenuates moral hazard problems through the evolution of norms of reciprocity and cooperation and the routinization of behaviors (Langlois 1992). As parties engage in new agreements with providers, their understanding of each other's beliefs, managerial systems, capabilities, and so on, is also boosted (Zollo et al. 2002).

This cumulative knowledge not only enables more effective monitoring since firms may more clearly define

the roles and the responsibilities of each party, better specify the knowledge to be exchanged, design more accurate assessment mechanisms, identify more appropriate milestones and introduce more complex pecuniary incentives, but it also helps them to better verify in advance a partner's resources and capabilities (Leiblein and Miller 2003; Mayer and Salomon 2006).

Therefore,

- H₅: The higher the firm's prior experience in outsourcing IT implementation, the higher the likelihood that behavioral uncertainty associated with the implementation will lead to outsourcing.

3.4 Strategic nature of IT

Lacity et al. (1996) and Insinga and Werle (2000) identified another key determinant of IT outsourcing decisions, the strategic contribution of IT. A technology is strategic when the firm can use it to obtain an advantage over its competitors through altering industry conditions, lowering production costs and/or creating product differentiation (Parsons 1983; Porter and Millar 1985; Mata et al. 1995; Zhang and Lado 2001).

It is expected that firms *perceiving* their IT as strategic, either currently or in the future, show a greater tendency to insource the implementation of applications. While organizations with superior IT capabilities will carry out the implementation in-house under tight control, firms possessing moderate or weak capabilities relative to IT vendors will have to invest more in strengthening their internal resources (Insinga and Werle 2000).

According to Quinn and Hilmer (1994) and Roy and Aubert (2002), insourcing allows the firm to avoid the loss of critical skills or the development of the wrong ones as well as appropriate the higher rents, safeguard key process confidentiality and minimize the risks of developing dependencies towards an external supplier. On the contrary, opting for internal implementation if the system is not critical to business positioning would monopolize resources that could be put to better use elsewhere.

Consequently,

- H₆: The higher the strategic contribution of IT the lower the likelihood of outsourcing its implementation.

4 Methodology

4.1 Sample and data collection

As mentioned in the introduction, we chose the implementation of a particular technology—software application for

the HR department— as the unit of analysis of this study, which is consistent with the multidimensional nature of IS (De Looff 1995). We opted for analyzing the sourcing decisions in the case of an HR information system due to the growing importance of these technologies (Sadri and Chatterjee 2003; Weatherly 2005; CedarCrestone 2008) and the strategic importance of how to procure them (CedarCrestone 2007). In a survey among 466 firms carried out in 2007, this consulting, technology and managed services provider noted that outsourcing is on the rise for functions such as succession management, work force analytics, time and attendance and HR record keeping (CedarCrestone 2007).

Accordingly, our sample was necessarily composed of those for-profit firms that had implemented this technology, or were engaged in that process. Moreover, we focused on the largest companies —those with more than 1,000 employees— with headquarters in Madrid, Spain, which facilitated direct contact with them. Following Ang and Cummings (1997), firms that relied on their parent company or another firm within the corporate group to decide how to govern this function were discarded in order to increase the rationality of the decision-making process and avoid biases in our research. The identification of potential targeted firms was based upon the *DUNS 50,000*, *Main Spanish Companies* and the *Iberian Balance Sheet Analysis Systems (SABI)* databases. After contacting all the identified firms by telephone to verify that they fulfilled our requirements, 111 firms comprised the population of our research.

Telephone calls were made to explain the purpose of our research and identify potential informants. HR managers or the executives in charge of the HR information system were deemed to be the most informed respondents regarding the decision of implementation. Data were collected through an on-line questionnaire placed in a user-friendly website with concise, clear instructions, although other means —email and mail— were used when required. Taking into account that HR information systems may comprise several applications, different questionnaires were developed whether HR modules had been implemented all at once or gradually. The instrument was previously pre-tested with scholars as well as with providers and users of HR software —who then were omitted from the study— in order to simplify the items and avoid ambiguous terms. To maximize the response rate and obtain missing information, several follow-up interviews were carried out.

As a result of this process, we received 45 usable questionnaires, representing a final response rate of 40.54%. Table 2 shows the main characteristics of the data. A variety of diagnostics were carried out to check for both response —in terms of firm size, type of questionnaire and

means of fulfilling the questionnaire— and non-response bias. These tests yielded non-significant results.²

4.2 Measurements

As mentioned above, hypotheses were tested for the implementation of a particular technology, an HR software application. CedarCrestone (2007) identified over 30 applications, which they classified into four categories: administrative applications —e.g., payroll or benefits administration—, employee and manager productivity applications —e.g., employee self service or HR-oriented help desk—, strategic HCM applications —training enrollment, eLearning, performance management, succession planning, competency management, career planning, etc.—, and business intelligence applications —HRMS warehouse, HR scorecard, push technology, predictive analytics, and so on—. Therefore, participants were asked to refer their responses to the whole HR information system if applications had been implemented at once or to the last HR application if they had been implemented gradually.

To operationalize our dependent variable, several criteria were applied in order to overcome some pitfalls of prior literature. First, using the IT function as the unit of analysis requires clearly identifying who performs the activity, which implies rejecting continuous-like measures, such as the IT outsourcing budget (e.g., Loh and Venkatraman 1992; Teng et al. 1995) or the percentage of activity outsourced (e.g., Nam et al. 1996; Poppo and Zenger 1998). Second, unlike other studies that used make-buy decisions (e.g., Ang and Cummings 1997; Poppo and Zenger 1998), intermediate governance form should be considered as well. Third, following the widely used definition of outsourcing of Loh and Venkatraman (1992: 9), qualitative assessment of the contribution by parties should be included.

Therefore, our dependent variable initially took three values: in-house, joint and outsourcing, according to the qualitatively relevant contribution of corporate employees and outside agents in that activity. However, as Dibbern et al. (2004: 89) noted, further statistical analyses confirmed

² Several one-way analyses of variance were undertaken to determine whether response and non-response biases exist. First, response bias was assessed by the use of publicly available data that permitted the comparison of the respondents and the total sample —including respondents and non-respondents— with respect to firm size. Second, we observed no significant differences with respect to the independent variables of our models and other organizational characteristics —size and industry— between firms that responded through internet and those that used the postal mail, and between firms that had implemented all modules of the HR information system at once and those that had done it gradually. Finally, a test for non-response bias was performed (Armstrong and Overton 1977). This test was conducted by combining the first and last quartile of respondents into an early and late category, no significant differences across the above-mentioned variables were detected either.

Table 2 Sample characteristics

		Frequency	Percentage (%)
Size (Employees)	1,000–1,500	10	22.2
	1,500–3,000	15	33.3
	3,000–5,000	4	8.9
	5,000–10,000	8	17.8
	>10,000	8	17.8
Industry	Mining & extraction	2	4.4
	Manufacturing	14	31.1
	Construction	3	6.7
	Banking/finance/insurance	4	8.9
	Trade	4	8.9
	Transportation & public utilities	8	17.8
	Services	10	22.2
HR software implementation	Internal	17	37.8
	External	28	62.2

that differentiating between market transactions and cooperation agreements is difficult, so the last two categories (outsourcing and joint) had to be pooled.³ The dependent variable eventually took two values: ‘internal’ (no outside agents participate) and ‘external’ (only employees of others firms are involved, or both external and internal employees participate).

Whenever possible, independent variables were operationalized through 7-point Likert scales. To assure content validity of measures, theoretical insights and previous empirical works on firm boundaries, technology sourcing and IT-based competitive advantage (Mahoney 1992; Neumann et al. 1992; Saarinen and Vepsäläinen 1994; Aubert et al. 1996b; Lacity et al. 1996; Poppo and Zenger 1998; among others) were used to develop items. We opted for this approach rather than using readily available measures since many of our variables were inherently unobservable, and developing appropriate measures may contribute to accumulating empirical evidence on constructs and further developing theoretical frameworks, especially for RB theories (Armstrong and Shimizu 2007).

As hardware and telecommunication devices are hardly specific (Aubert et al. 1996a), specific investments in physical IT assets (PHY.SPECIF) refers to the degree to which the software was adapted to firm characteristics. We coded this variable as follows: standard, standard somewhat modified, and customized (Saarinen and Vepsäläinen 1994).

Unlike previous studies, we distinguish between two types of human specificity, depending on whether the team

that performed the implementation was external or internal. On the one hand, external human specificity, HUM.SPECIF (ext), measures the extent to which the firm had to train outside IT workers as well as modify its work procedures and its system so that the provider could implement the HR application. The three items are based on Aubert et al.’s (1996b) work.

On the other hand, following McGrath et al. (1995), Aubert et al. (1996b), Dyer (1996), Poppo and Zenger (1998) and Lee (2001), internal human specificity, HUM.SPECIF (int), was operationalized as the degree of cooperation between the HR department and the technical personnel. Three items were used to measure that interaction: common experiences in implementing applications, efficiency in undertaking joint activities and difficulties in developing a new relationship if workers changed. Both scales of human specificity were reliable since they yielded a Cronbach’s alpha higher than 0.70 (0.77 and 0.84, respectively), as suggested by Greene (2000).

With regard to behavioral uncertainty (UNCERTAIN), we based our measurement on Mahoney’s (1992) definition of this construct. Two items assessed the degree of difficulty that HR managers had in learning whether the software implementation was being carried out appropriately (observability) and whether the performance of the application once implemented met their expectations (verifiability). ($\alpha=0.77$)

Relative output results were chosen as the way to operationalize the strategic IT implementation capability (STR.CAPABI) for two reasons. First, Armstrong and Shimizu (2007: 968) suggest that using input measures — e.g., previous experience (Leiblein and Miller 2003) or specific characteristics (Nam et al. 1996) — as proxies of capabilities involves assuming that capabilities are homogenous across firms. Second, the measurement of the

³ Unlike other authors that group values of the dependent variable (e.g., Ang and Cummings 1997), we tested that the new grouping was arbitrary and irrelevant (Cramer and Ridder 1991). As the result of the Cramer and Ridder’s test was not significant at the 0.05 level ($L_R = 18.53 < \chi_{0.95}$), the values ‘outsourcing’ and ‘joint’ could be pooled.

strategic nature of a capability requires assessing the results achieved with that capability relative to those of competitors. Therefore, respondents were asked to assess — through four items— the extent to which, if their firms had to implement internally a new HR software, they could do it cheaper, faster, better adapted to firm's needs, and with a better performance than other firms. ($\alpha=0.76$)

The strategic contribution of an HR software application (STR.CONTRIB) assesses its potential to yield a competitive advantage (Lacity et al. 1996). We estimated, through two items, both the present and the future contribution, as Neumann et al. (1992) did. ($\alpha=0.88$)

As far as the firm's previous experience in HRIS outsourcing (OUT.EXPERI) is concerned, following previous studies (Robertson and Gatignon 1998; Leiblein and Miller 2003), we developed two items (reverse coded) that measured to what extent the firm had externally developed and implemented previous HR technologies. ($\alpha=0.94$)

No control variables were explicitly included in our model in order to avoid an inappropriate low degree of freedom. Nevertheless, we performed several tests (one-way analysis of variance and crosstabs statistics for nominal data) to verify that neither the firm's size —number of employees—, the industry, nor the fact that the HR application was part of an ERP were significantly related to the dependent variable.

5 Results

Table 3 provides the matrix of correlations among the independent variables and also includes basic descriptive statistics about them.

The results of binomial logistic regressions are presented in Table 4. Model 1 estimates the full model. Model 2 includes the interaction between HUM.SPECIF (int) and STR.CAPABI to better understand the relationship between these two variables. Model 3 includes an interactive term between UNCERTAINTY and OUT.EXPERI, which allows us to test Hypothesis 5. All estimated models are statistically significant ($p<0.01$) and show high pseudo R^2 and degree of observations correctly classified (above 80%). However, the introduction of the interaction terms does not seem to significantly enhance the explanatory power of Model 1.

Table 4 suggests that physical specificity negatively influences the HRIS implementation outsourcing decision, which supports Hypothesis 1a. This means that firms are less likely to contract out the implementation of those HR applications that are more adapted to firm's organizational characteristics since they imply a higher degree of opportunism and/or have a higher strategic potential.

The results with regard to human specificity are contradictory and do not support Hypothesis 1b. On the one hand, HUM.SPECIF (int) seems not to affect the HR technology implementation sourcing decision. This may indicate that investments in developing a close relationship between those internal units involved in the implementation are not actually function-specific and/or they do not yield superior rents. On the other hand, the coefficient of HUM.SPECIF (ext) is positive and significant. Outsourcing the HR software implementation is significantly more likely for firms that need to make investments in adapting their work procedures and systems to those of the provider as well as in training outside technical employees. Although Aubert et al. (2004) found a similar result, it contradicts TC proponents' claims regarding specificity.

Hypothesis 2 (STR.CAPABI) is substantiated, suggesting that firms that are able to outperform providers in the implementation of the HR application are more likely to entrust this activity to their technically skilled employees. But then, how are specificity and capabilities related if we take into account that, as Amit and Schoemaker (1993) point out, the former is a basic characteristic of the latter?

To further analyze this relationship we introduced an interaction term (Model 2). Results are similar to those of Model 1, except for the fact that the joint effect has a negative and significant coefficient and the coefficient of HUM.SPECIF (int) becomes significant. This finding may indicate the existence of a non-linear relationship between the two factors (Alvarez-Suescun 2007). Below a certain degree of perceived relative efficiency of the firm in implementing the HR technology, the likelihood of outsourcing that activity increases despite the relationship between the IS and HR teams. On the contrary, above that level, firms are less likely to contract out as the internal organization turns into the preferred alternative.

Hypothesis 3 proposes a negative influence of measurement problems on the IT outsourcing choice. Contrary to expected (Poppo and Zenger 1998; Aubert et al. 2004), we do not find support for this effect, although the coefficient is negative. This means that firms appear not to have problems in determining whether the implementation has been carried out according to the agreed terms or whether the performance of the application meets expectations. As shown in Table 3, the variable behavioral uncertainty has a low mean and standard deviation,⁴ which indicates that most respondents perceive low uncertainty surrounding the decision.

Unlike Leiblein and Miller (2003), we cannot confirm a significant role of the firm's experience in HRIS outsourcing

⁴ A descriptive analysis of the variable behavioral uncertainty shows that more than 60% of respondents gave a rating for this factor lower than 2 on a 7-point Likert scale.

Table 3 Descriptive statistics and correlations

Variables	Means	S.D.	Values		1	2	3	4	5	6
			Min	Max						
1. PHY.SPECIF	3.89	1.98	1.00	7.00						
2. HUM.SPECIF (ext)	2.36	1.59	0.00	6.33	−0.413***					
3. HUM.SPECIF (int)	5.30	1.67	0.00	7.00	0.198	−0.433***				
4. UNCERTAIN	2.33	1.01	1.00	4.50	−0.221	0.399***	−0.225			
5. STR.CAPABI	4.44	1.47	1.50	7.00	0.154	−0.112	0.073	−0.248		
6. STR.CONTRI	4.46	1.64	1.00	7.00	0.222	−0.300**	0.375**	−0.383***	0.252*	
7. OUT.EXPERI	3.75	2.02	1.00	7.00	0.050	−0.046	−0.411***	0.262*	−0.231	−0.180

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

(Hypothesis 4). Nonetheless, the positive sign of the coefficient is as expected. Results do not vary when the interaction between UNCERTAINTY and OUT.EXPERI is introduced to test Hypothesis 5 (Model 3).

Finally, although those firms that perceive their HR technology as having a strategic contribution (STR.CONTRI) seem to be less likely to outsource its implementation, that relationship (Hypothesis 6) is not significant.

6 Discussion

The results of the binomial logistic model provide only partial support for the proposed research model. Generally speaking, clearer support is found for resource-based arguments than for predictions from transaction cost approaches.

Our study finds support for the negative influence of specific investments in HR technology on the outsourcing decisions. To date, few research works have exclusively tested the significance of physical IT specificity. Aubert et al. (1996a) illustrated how in a sample of ten organization those physical IT assets with low specificity were outsourced. Nelson et al. (1996) confirmed a statistical relationship between the firm's custom/package and insource/outsource decisions. And Saarinen and Vepsäläinen (1994) found partial support for this relationship.

The economic logic behind this result is that agreements involving HR software applications that are highly adapted to firms' characteristics are deemed to be more difficult to write, negotiate and monitor, which increases transaction costs (Ang and Straub 2006). Thus, firms tend to rely on their own personnel to undertake the implementation as a means of minimizing these costs. Furthermore, as the resource-based view holds, these specific investments to adapt the IT application to the firm's structure, work procedures and processes, and so on, would allow it to be embedded in the organization's decision-making process,

increasing its strategic value (Barney 1991; Powell and Dent-Micallef 1997). This specificity would strengthen the firm's differentiation strategy (Nam et al. 1996) and reduce the influence of pressures to outsourcing exerted by peers (Ang and Cummings 1997).

As Table 4 shows, outsourcing of the HR application implementation is positively associated with external human specificity and not related to internal human specificity. Although empirical literature on IT outsourcing has more widely studied the role of this factor, findings are not conclusive either. Consistent with TC insights, Poppo and Zenger (1998) corroborated that the presence of firm-specific IT assets discourages outsourcing by diminishing the effectiveness of market governance rather than enhancing internal governance efficiency. Nevertheless, Aubert et al. (2004) also confirmed that the relationship between human IT specificity and outsourcing was significant, but in the opposite direction to that expected; and Nam et al. (1996) and Dibbern and Heinzl (2006) did not find direct impact.

Several explanations may be advanced for our unexpected, positive result regarding the investments in adapting firms' procedures and systems to providers. First, this finding would contradict the TC logic since managers appear not to be concerned about being locked into the relationship even in the presence of specific investments. This would make sense if the quasi-rents (Klein et al. 1978) remain marginal because those investments were not exclusive to a particular IT function, as Aubert et al. (2004) suggest. Also, the hazard of opportunism could be mitigated under high-trust environments based on reputation or previous experiences with providers (Langlois 1992) or by the development of strong technological knowledge (Mayer and Salomon 2006).

Second, from a strategic point of view, this positive relationship may indicate the existence of a capability in managing external relationships that makes outsourcing the most attractive alternative (Dyer and Singh 1998; Leiblein

and Miller 2003). In this sense, Dibbern and Heinzl (2006) found that human specificity had a strong impact on the strategic significance of IS functions. Finally, the mentioned investments maybe the consequence rather than the cause of the governance mode choice (Leiblein and Miller 2003).

On the other hand, investments in developing a close relationship between IS and HR teams in order to implement the HRIS do not seem to be a significant determinant of IT outsourcing decisions. This may indicate that common language, procedures and routines developed to carry out this activity may also be helpful in implementing applications in other areas, without entailing hold-up risks. Besides, Nam et al. (1996) suggested that this result maybe due to the fact that IT specificity is measured without regard to the use of those assets. In a similar way, RB theories hold that cooperation between HR employees and the IT team regarding the implementation of a particular technology, albeit a necessary condition for a capability to arise, does not guarantee by itself the achievement of above-normal returns (Alvarez-Suescun 2007).

Firms are heterogeneous in developing and nurturing capabilities, having different potential in leveraging IT for their competitiveness (Bhatt and Grover 2005). Therefore, only those firms that build up closer cooperative relation-

ships between internal areas will be able to enhance their ability to economize on communication and knowledge transfer in such a way as to implement applications more quickly and cheaply while at the same time obtaining an application better adapted to and more useful for firm's needs than competitors. In this case, they are less likely to outsource this function since hierarchy allows them to obtain a competitive advantage.

Behavioral uncertainty appears not to play a crucial explanatory role either, which maybe explained as follows. First, consistent with Jensen and Meckling (1976), measurement problems may equally damage the performance of both internal and external sourcing modes, which makes the choice irrelevant. Poppo and Zenger (1998) concluded that the effect of behavioral uncertainty on 'make or buy' decisions in information services seemed to depend on which performance dimensions managers emphasized the most, not finding support for its statistical significance.

Second, client firms may not have difficulties in verifying whether compliance with established agreements has occurred during or after the implementation process, either because the IT implementation does not involve a high degree of organizational and technological complexity or because the firm has learned to reduce these measurement problems throughout past experiences. Experience in outsourcing agreements could enhance the managers'

Table 4 Binomial logit: parameter estimates for HRIS implementation outsourcing

Variables	Model 1	Model 2	Model 3
Intercept	13.112** (5.940)	4.305 (4.057)	13.576** (5.702)
PHY.SPECIF	-1.011** (0.496)	-0.865** (0.402)	-0.884** (0.419)
HUM.SPECIF (ext)	1.448** (0.685)	1.205** (0.597)	0.984* (0.594)
HUM.SPECIF (int)	0.605 (0.470)	1.856** (0.793)	0.565 (0.423)
STR.CAPABI	-1.934** (0.812)		-1.815** (0.717)
UNCERTAIN	-1.635 (1.004)	-1.335 (0.872)	-1.558* (0.934)
OUT.EXPERI	0.304 (0.339)	0.253 (0.322)	
STR.CONTRI	-0.702 (0.499)	-0.697 (0.482)	-0.734 (0.500)
HUM.SPECIF (int) × STR.CAPABI		-0.302** (0.124)	
UNCERTAIN × OUT.EXPERI			0.108 (0.111)
Chi-square	36.860***	35.647***	37.040***
Pseudo-R ² (Nagelkerke)	0.761	0.745	0.764
Correctly classified (%):	84.4	84.4	86.7

(1) Standard errors are in parentheses

(2) *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

measurement skills (Langlois 1992; Leiblein and Miller 2003). However, Model 3 indicates that the interaction term between behavioral uncertainty and experience is not significant. Based on Robertson and Gatignon's (1998) work, we could interpret this result as follows. Firm's experience in external agreements is not sufficient to decrease the measurement problems associated with outsourcing; only successful prior experiences reduce the risk of opportunistic behaviors.

RB insights may help us to understand this finding. Repetitive interactions with external providers may help the client firms to, on the one hand, better understand their work practices and procedures, culture, management systems, and so on (Zollo et al. 2002), and, on the other hand, learn how to extract and exploit knowledge from external agreements (Steensma and Fairbank 1999).

However, our results indicate that this variable does not affect the outsourcing decision either directly or through the measurement difficulty. From our previous discussion, we know that being efficient in an activity requires not only accumulating knowledge from past experiences but rather developing a capability. Thus, only when a certain degree of cooperation and coordination between partners is achieved through a learning process that involves articulation, codification, sharing and internalization (Kale and Singh 2007), firms will be able to develop a capability to efficiently manage outsourcing relationships.

Finally, the strategic character of the HR technology seems not to be significant when deciding whether or not to outsource its implementation. This finding contradicts theoretical arguments of resource-based approaches (Lacity et al. 1996; Insinga and Werle 2000). Nonetheless, Dibbern and Heinzl (2006) also found that this variable was non-significant, and Nelson et al. (1996) only found partial support. The difficulty that managers may have in estimating the business value of IT, or any organizational resource or capability, may explain this result (Zajac and Bazerman 1991).

7 Conclusions

This study provides empirical evidence on IT outsourcing decisions by combining transaction cost and resource-based explanations. On the whole, while the results appear to provide little support for the predictions of new institutional economics regarding the role that opportunism plays in IT implementation outsourcing, strategic considerations concerning specificity and strategic capabilities turn out to be the driving force. Further, light is shed on the relationship between transaction cost variables (human specificity and uncertainty) and resource-based factors (strategic capabilities and experience).

Our study addresses the lack of empirical research on the role of specific investments in physical IT assets by confirming its negative relationship with the outsourcing decision. Nonetheless, the evidence on the influence of human specificity seems to contradict the insights of transaction cost economics. Whereas investments in developing a close relationship between internal units in order to implement the HRIS are not significant, outsourcing of this function was significantly associated with investments in adapting firm's procedures and systems to providers. Behavioral uncertainty appears not to play a crucial explanatory role.

Clearer support is provided for resource-based arguments. Regardless of the cooperation between units, only those firms that develop a strategic IT implementation capability economize on communication and knowledge transfer, being able to implement the HR software more quickly and cheaply while at the same time obtaining an application which is better adapted to and more useful for the firm's needs than competitors. In this case, they are less likely to outsource this function since it allows them to obtain a competitive advantage. Accordingly, the mere accumulation of knowledge either on internal implementation or on outsourcing agreements does not have a significant impact on IT sourcing decisions.

This argument explains that internal human specificity and strategic capabilities are not linearly related. Unless the specific knowledge that HR and IS units accumulate through cooperation and coordination allows them to achieve a certain degree of efficiency over that of IT providers, the firm should outsource the HR software implementation. It may also explain that the firm's previous experience in outsourcing this activity does not play a significant role either directly or by diminishing the uncertainty caused by measurement problems.

There are several limitations to this research. First, although transaction cost and resource-based determinants explain most of the variance of the dependent variable, further research should include other factors, such as real options (Leiblein and Miller 2003), power influences (Lacity and Hirschheim 1993) and pressures exerted by regulators and other stakeholders (Ang and Cummings 1997).

Second, subsequent research might adopt a dynamic approach to analyzing how the choice of a particular governance form strengthens or weakens an existing capability (Leiblein and Miller 2003). Moreover, the important role that IS may play in enabling firms to develop and leverage capabilities should also be taken into account (Zhang and Lado 2001).

Third, additional research opportunities relate to the specific context of our study. Taking a specific function — implementation — in a particular area — human resources —

as the unit of analysis increases the reliability and validity of our measures, but it also may limit the generalizability of the results. Future studies could extend our model to other organizational areas, e.g., R&D, marketing and so on, and IT functions, especially those deemed to be more technically and organizationally complex, and check whether or not findings vary from one setting to another.

Finally, other limitations are related to methodological issues. Despite the high response rate we achieved, the small sample of this study—as a consequence of the specific unit of analysis chosen and the thorough data collection methodology applied—prevents us from obtaining more statistically robust results and using more sophisticated statistical techniques in order to test both the reliability of the constructs and our hypotheses. Our measurement of the dependent variable also raises some concern. Although it overcomes some drawbacks of previous works by identifying who performs the IT implementation and assessing the relative contribution of the parties involved, it does not allow us to determine the allocation of decision rights. Thus, in addition to determining the parties involved and their relative contribution, future studies should also examine who manage the IT function studied, which would allow researchers, for instance, to differentiate between market transactions and cooperation agreements (Dibbern et al. 2004: 89).

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