

An assessment of the use of Transaction Cost Theory in information technology outsourcing

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ABSTRACT

Transaction Cost Theory (TCT) has been widely used in information technology outsourcing (ITO) research to explain and predict outsourcing decisions and outsourcing-related outcomes. This research, however, has led to mixed and unexpected results in terms of the effects of transaction attributes on outsourcing decisions and outcomes. This study assesses the empirical literature employing TCT-based ITO models in terms of its faithfulness to the precepts of TCT, and argues that one possible explanation for the mixed results is that the extant models do not capture all the essential elements of TCT. First, there are core TCT constructs that the extant models do not take into account; second, the linkages among constructs that the IT outsourcing models have hypothesized are not always in line with TCT precepts; and third, the normative nature of the theory is not always captured by the extant models. This paper, therefore, aims to provide one possible answer to the question: “Why have the appropriations made of TCT to study IT outsourcing produced mixed results?”

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1. Introduction

Whether to make or buy is a fundamental issue that organizations must address with regards to a variety of products and services. When the issue concerns the firm's information technology (IT) services, several organizations opt for outsourcing, or a “situation in which part or all of the IT activities an organization needs are performed by one or more external suppliers” (De Looff, 1995, p. 282). Over the years, two main IT outsourcing (ITO) research streams have formed. The first examines the potential determinants or antecedents that can be used to explain and predict the IT outsourcing decision and/or outcome (e.g. Dedrick and Kraemer, 2010; Nam et al., 1996; Thouin et al., 2009), and the second studies the post-outsourcing phase, examining how the outsourcing relationship is managed (e.g. Choudhury and Sabherwal, 2003; Ho et al., 2003; Kern and Willcocks, 2000). This study falls into the first stream of research, as it is concerned with the antecedents and consequences of the IT outsourcing decision.

One of the key theoretical foundations for explaining ITO decisions and outcomes is Transaction Cost Theory (TCT) (Whitten and Wakefield, 2006). Several conceptual and empirical IT outsourcing studies have used TCT as their theoretical foundation, either alone or in combination with other theories. This is because TCT explicitly addresses boundary decisions and is “based on an economic rationale” that provides an alternate view to that of social, political and institutional theories (Lacity and Hirschheim, 1993). In its essence, TCT posits that there are several characteristics of a given transaction – or

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activity – that determine the appropriate type of governance structure for the transaction (Williamson, 1979, 1981). These characteristics are asset specificity (second-best use of a transaction), frequency (repetitiveness of a transaction) and uncertainty surrounding the transaction. These characteristics impact the total transaction and production costs attributable to an activity (transaction) and these costs, in turn, determine the governance structure (e.g. outsourcing or internal organization) that is the most efficient for the activity. If the right decision is made based on the transaction characteristics, then the transaction is likely to be conducted in a cost-efficient manner.

The TCT-based IT outsourcing research has led to contradictory results across studies and unexpected results within studies. For example, Aubert et al. (2004) found a positive influence of asset specificity on the IT outsourcing decision, while Poppo and Zenger (2002) found a negative influence. Miranda and Kim (2006) hypothesized a negative influence of uncertainty on the proportion of the IT budget being outsourced, but, contrary to their TCT-based hypothesis, they found a positive link.

Several explanations have been proposed for such mixed results. In a review of the TCT-based ITO research, Lacity et al. (2011) offer four categories of explanations that authors provide for the anomalies in their research results: research methods, boundary conditions, TCE assumption violation explanations, and alternate theory explanations. Studies of the first category mainly attribute the lack of support for TCT to “measurement problems” or the “inherent difficulty of measuring core TCT constructs” (p. 9). Studies in this category also attribute the mixed results to how the models are tested and argue that, most of the time, one of the independent variables captures most of the variance. Studies in the second category, boundary conditions, attribute the mixed results to the “distinctive context of ITO,” “distinctive research settings” or the “distinctive attributes of the collected data” (p. 10). Studies of the third group either found evidence that some TCT behavioral assumptions – e.g., bounded rationality, opportunism, or the transaction as the unit of analysis – were violated in some IT outsourcing contexts. Finally, studies in the fourth category argue that alternate theories may have assumptions that better fit the IT outsourcing context, or have more power than TCT to explain ITO results.

From these explanations, Lacity et al. (2011) argue that researchers have to depart from TCT and build a theory that is endogenous to ITO, the foundations of which they lay in their article. Although the call by Lacity et al. (2011) for endogenous ITO theories is appealing, we argue that for these foundations to be stable, they need to rest on firm ground. Pursuing the building analogy, we suggest that until we have evidence that entirely faithful appropriations of TCT in the context of ITO lead to results in directions opposite to those hypothesized by TCT, the foundations of a new model risk being set on unstable ground. We will illustrate this with an example from Lacity et al.'s (2011) framework, which is based on a review of the empirical ITO research from 1992 to 2010 (Lacity et al., 2010). As mentioned by Lacity et al. (2011), because ITO researchers have appropriated theories from reference disciplines, theoretical constructs from several reference disciplines are evident in the framework they propose. Because a number of the empirical studies from which the framework was built were TCT-based, the framework does indeed include TCT components – uncertainty and transaction costs under transaction attributes, in particular. We presume that these two components were included in the framework because they had received support from the reviewed studies, and that transaction attributes such as specificity and frequency were left aside because they had not been supported by empirical studies.

We argue here that it is possible that specificity – or frequency – should indeed be part of the framework rather than being abandoned for lack of empirical support. We posit that the reason ITO research has not produced consistent results for specificity may lie in its misappropriation of TCT. In sum, our position is that until we ensure that ITO studies that are completely faithful to TCT do indeed fail to find support for TCT hypotheses, our endogenous theories risk being laid on shaky ground.

We are not suggesting that research should wait for another round of TCT empirical tests that would be more faithful to TCT before undertaking to build an endogenous ITO theory. We would nevertheless suggest that TCT remains relevant to the study of ITO decisions and outcomes, whether we call this a real test of TCT or we select some of its constructs to build other theories. We believe that the assessment presented in this paper could contribute to this endeavor.

We therefore seek to answer the question “Why have the appropriations made of TCT to study IT outsourcing produced mixed results?” by referring to the fundamental concepts and precepts of TCT as defined and conceptualized by Oliver Williamson and examining how TCT has been used to develop ITO models.

The next section reviews the key concepts and basic precepts of TCT. An assessment of the extant TCT-based IT outsourcing models will be presented, followed by the implications for research and practice.

2. Transaction cost theory

Because most of the IT outsourcing studies that have employed TCT are based on Williamson's work (Williamson, 1979, 1981, 1985, 1996, 1998), the theoretical foundations reviewed in this section are also mainly based on this work. Williamson's seminal work on TCT is based on the fundamental premise that the “transaction cost approach... regards the transaction as the basic unit of analysis... transaction cost economizing is central to the study of organizations” (Williamson, 1981, p. 548). In other words, TCT is aimed at identifying the governance structures of different types of exchanges between parties in order to maximize the economies for a given organization. Williamson (1981) originally focused on transactions between the firm and the market. Completing a transaction usually involves a series of activities, such as searching for suppliers, negotiating contracts, monitoring and evaluating performance, and adjusting a contract by re-arranging transaction items.

TCT is also based on two important behavioral premises: bounded rationality and the opportunism of human agents. The former states that people are intendedly rational, but their rationality is limited by their capacity to “formulate and solve complex problems and to process information” (Williamson, 1981, p. 553). Opportunism is defined as “self-interest seeking with guile” (Williamson, 1981, p. 554), meaning that the parties are willing to provide false or incomplete information in order to complete a transaction that will provide them with an advantage.

It is also important to note the normative nature of TCT. For Williamson, TCT both explains the choices that firms make – “describes what has been observed,” in Williamson’s (1981, p. 560) terms – and prescribes the choices that firms should make given a set of transaction characteristics: “the transaction cost arguments... are of a normative kind: what governance structure *should* be chosen” (Williamson, 1981, p. 560). That is, the theory posits that the organization has to align “transactions with governance structure so as to support a high performance result” (Williamson, 1998, p. 40).

At the heart of TCT are three key dimensions on which transactions differ: asset specificity, uncertainty and frequency. Although asset specificity is deemed the most important dimension, the other two dimensions also play significant roles (Williamson, 1985, p. 52). According to TCT, the effect of a dimension on the cost of conducting a given transaction has to be assessed in light of bounded rationality and opportunism. In essence, TCT posits that decision makers need to “align transactions (which differ in their attributes) with governance structures (the costs and competencies of which differ) in a discriminating (mainly, transaction cost economizing) way” (Williamson and Winter, 1993, p. 95). Each of these elements is presented in more detail below.

2.1. Asset specificity

Asset specificity is defined as the “degree to which the assets used to conduct an activity can be redeployed to alternative uses and by alternative users without sacrifice of productive value” (Williamson, 1996, p. 105). A non-specific asset is one that can be easily re-used in other types of activity.

The term “specificity” is used in reference to three major categories of assets (Williamson, 1981): *site specificity*, which is related to the geographical location of an investment (Williamson, 1979); *physical asset specificity*, which is related to specialized equipment and tools (Williamson, 1979); and *human asset specificity*, which is associated with employees’ knowledge, expertise and learning by doing (Williamson, 1979, 1981).

Opportunism plays a particularly important role in situations involving highly specific assets. In such cases, the supplier that invests in assets such as a unique location, proprietary technical and managerial procedures, or specific labor skills will have a cost advantage over other potential bidders at contract renewal time. The lock-in problem results from opportunism (Williamson 1985).

2.2. Uncertainty

Williamson acknowledges the existence of two key types of uncertainty: behavioral and environmental. For Williamson, behavioral uncertainty is paramount. It is defined as “strategic non-disclosure, disguise or distortion of information” (Williamson, 1985, p. 57) and is attributable to opportunism (Williamson, 1985, p. 58).

Environmental uncertainty refers to the fact that the “environment is characterized by uncertainty with respect to technology, demand, local factor supply conditions, inflation, and the like” (Williamson, 1985, p. 336). It may arise “from random acts of nature and unpredictable changes in consumers’ preferences” (Koopmans, 1957, p. 162). Williamson also relates environmental uncertainty to bounded rationality when he explains the non-feasibility of creating strategies for all possibilities in advance (Williamson, 1985) and the “computational inability to ascertain the structure of the environment” (Williamson, 1975, p. 23).

2.3. Frequency

Frequency is defined by Williamson as “the buyer activity in the market” (Williamson, 1979, p. 247): in other words, the level of recurrence of the activities needed by the firm for the transaction. Transactions can be one-time, occasional or recurrent. However, since few transactions have such a completely isolated and discrete character that they can be considered one-time transactions, no significant distinction is made between one-time and occasional transactions (Williamson, 1979).

2.4. Cost analysis

Based on the premises identified in the previous section, Williamson describes the outsourcing decision as follows. There are two types of costs: production costs and governance costs. Production costs (C) are the costs of making a product – or rendering a service – internally, or the price of acquiring the product or service in the market. Governance costs (G) are the costs of planning, negotiating, monitoring, and adjusting the transaction. Williamson uses the terms “governance costs” and “transaction costs” as synonyms. It follows that:

$$\Delta C: \text{ Production cost difference (internal cost-market cost)} \quad (1)$$

ΔG : Governance cost difference (internal cost-market cost) (2)

Therefore:

If $\Delta C + \Delta G > 0$, then use market activities (this means that the total production cost and governance cost of internal organization is greater than the total production cost and governance cost of sourcing through the market). (3)

If $\Delta C + \Delta G = 0$, then there is indifference between market and internal organization (this means that the total production cost and governance cost of internal organization is equal to the total production cost and governance cost of sourcing through the market). (4)

If $\Delta C + \Delta G < 0$, then use internal organization (this means that the total production cost and governance cost of internal organization is less than the total production cost and governance cost of sourcing through the market). (5)

2.5. Theoretical associations between TCT attributes and costs

2.5.1. Asset specificity and costs

Williamson's work (1981) addresses the relationship between asset specificity and costs. Asset specificity affects both the production cost difference, ΔC (internal vs. market), and the governance cost difference, ΔG (internal vs. market). As asset specificity increases, each cost difference decreases (ΔC and ΔG), and the total cost difference ($\Delta C + \Delta G$) will also decrease. This suggests an integrated curve, combining both costs (production and governance) in one line (see Fig. 1).

As the transaction's asset specificity increases, two things will happen. First, the cost of conducting the transaction internally falls relative to that of using the market. This is because economies of scale are lost when a specific asset needs to be produced and it cannot be standardized and used by many firms. The market option therefore presents higher production costs as compared to internal organization (lower ΔC). Second, conducting a more specific transaction through the market requires a more thorough selection and negotiation process and a more detailed and elaborate contract, such that the market presents higher transaction costs than internal organization (lower ΔG). In sum, as the asset specificity of a transaction increases, $\Delta C + \Delta G$ will decrease. This makes internal organization more efficient than the market.

On the other hand, as the level of asset specificity decreases, the market can gain economies of scale by offering the same service to many clients, thereby gaining a cost advantage over internal organization (higher ΔC). In addition, non-specific activities can easily be arranged through the market without negotiating and drafting an elaborate and costly contract. This makes for lower governance costs for the market option (higher ΔG). In conclusion, an increase in the level of asset specificity results in an increase in overall costs ($\Delta C + \Delta G$).

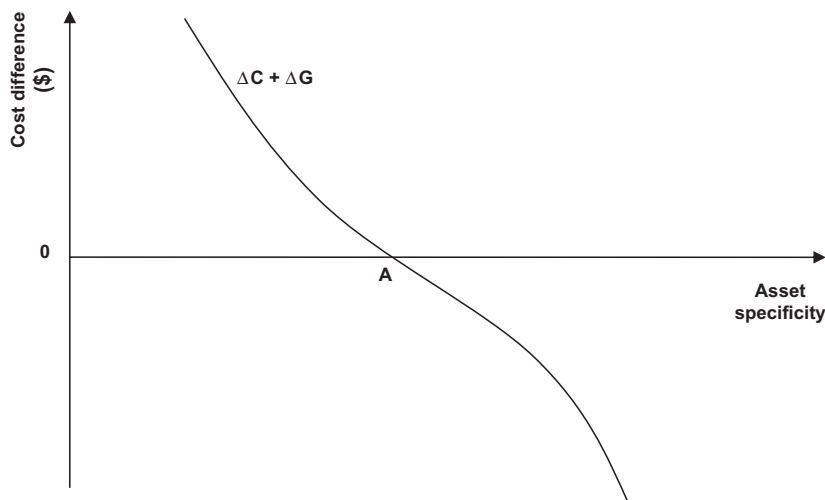


Fig. 1. Relationship between asset specificity and cost difference (adapted from Williamson (1981, p. 560)).

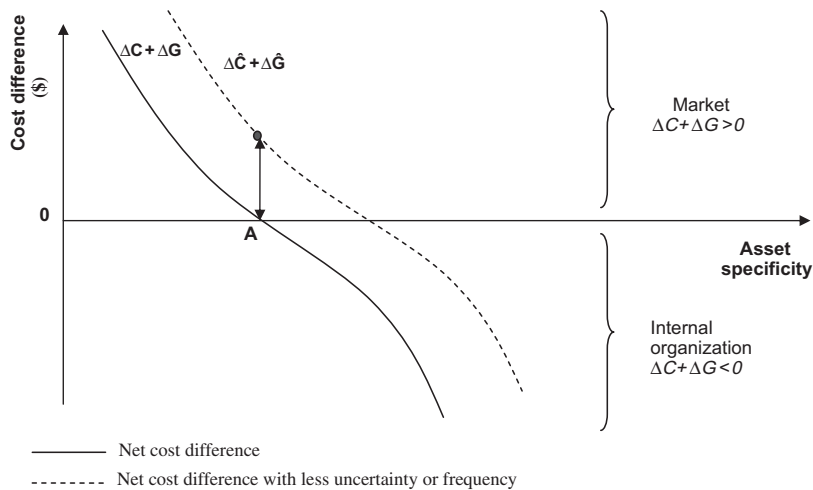


Fig. 2. Moderating effects of uncertainty/frequency.

2.5.2. Uncertainty/frequency and costs

According to TCT, in the presence of a certain degree of asset specificity, greater uncertainty will reduce the cost difference ($\Delta C + \Delta G$). Uncertainty has an impact on the cost of conducting a transaction only in the presence of asset specificity; i.e. uncertainty has a moderating effect on the relationship between asset specificity and cost difference. Uncertainty does not affect the transaction costs of assets with low levels of specificity, but with higher levels of asset specificity, uncertainty will increase the transaction costs associated with turning to the market and decrease the transaction costs associated with internal organization. This means that ΔG will decrease, making the total cost difference ($\Delta C + \Delta G$) decrease as well.

Frequency could be analyzed similarly. However, frequency can only affect the choice of governance mode when uncertainty is low to medium. In highly uncertain situations, the combination of specificity and uncertainty makes frequency irrelevant. Fig. 2 illustrates the moderating effects of uncertainty and frequency, with the asset specificity and cost relationship curves shifting to the right as the level of uncertainty and/or frequency of the transaction decreases (see the broken curve in Fig. 2).

In other words, at the same level of asset specificity (point A), the solid curve shows indifference between the market option and internal organization. Whether the level of uncertainty or the frequency of the transaction decreases, the curve will shift to the right (as shown by the broken curve) and make the market option preferable to internal organization at the same level of asset specificity. Equally, whether the level of uncertainty or the frequency of the transaction increases, the curve will shift to the left, and make internal organization preferable to the market option at the same level of asset specificity.

2.6. Theoretical associations between TCT attributes and governance modes

Although asset specificity is the most important dimension of a transaction, “it only takes on importance in conjunction with bounded rationality/opportunism and in the presence of uncertainty” (Williamson, 1985, p. 56). Indeed, as shown in Fig. 3, non-specific assets call for the same governance mode – market, irrespective of the level of frequency and uncertainty. This is because “without asset specificity, the rationale for vertical integration [internal organization] would simply not exist, as there would be no assets at risk and therefore in need of protection (by means of vertical integration) from possible opportunism” (Sutcliffe and Zaheer, 1998, p. 5). Moreover, when asset specificity is low, the provider’s standard contracts can be used (i.e. purchasing from the market), since the assets are not at risk and therefore do not need to be protected through the use of elaborate, customized contracts.

On the other hand, for mixed assets – “incorporating standardized and customized elements” (McIvor 2009, p. 47) – and highly specific assets (i.e. idiosyncratic assets), levels of uncertainty and frequency matter. In a situation with a high level of uncertainty, the appropriate governance choice for an idiosyncratic asset is “internal organization,” irrespective of the frequency level. The same is true for mixed assets. Due to the opportunism assumption, with mixed and highly specific assets “both the cost and the possibilities of hold-up from opportunistic behavior are higher” (Sutcliffe and Zaheer, 1998, p. 5). “The joining of opportunism with transaction-specific investments is a leading factor in explaining decisions to vertically integrate” (Williamson, 1979, p. 234). Thus, keeping the transaction inside the organization will protect it from the related risks. Moreover, because of the bounded rationality of decision makers, it is impossible to predict all the demand or technological changes of an uncertain environment in advance. This requires flexibility on the part of the provider. Therefore, for highly

		Asset Specificity			Asset Specificity		
		Non-specific	Mixed	Idiosyncratic	Non-specific	Mixed	Idiosyncratic
Frequency	Occasional	Market (standard contracting)	Market (customized contracting)	Market (customized contracting)	Market (standard contracting)	Internal organization	Internal organization
	Recurrent	Market (standard contracting)	Market (customized contracting)	Internal organization	Market (standard contracting)	Internal organization	Internal organization
(With low or medium uncertainty)				(With high uncertainty)			

Fig. 3. Governance choice (adapted from Williamson (1979, p. 253)).

specific assets and an uncertain environment, internal organization would be the appropriate governance mode. In a situation of low uncertainty and mixed assets, the transaction can also be carried out through the market, irrespective of its frequency level (Fig. 3). Indeed, in situations characterized by low uncertainty, the opportunism of providers and the bounded rationality of decision makers can be mitigated by using detailed, elaborate and customized contracts.

The only time that frequency should affect the governance choice is when uncertainty is low to medium and assets are idiosyncratic. In such a case, if the transaction is to be conducted only occasionally, then the market (through customized contracting) is the appropriate mode of governance. However, for a recurrent transaction with high level of specificity, internal organization is the appropriate governance choice (Fig. 3). Customized contracting and internal organization are both mechanisms that serve to protect specific assets from potential opportunistic behavior by providers and the inability of decision makers to predict all the contingencies and changes of the environment *ex ante* (due to the bounded rationality assumption).

In the next section we examine the constructs, hypotheses and results of extant TCT-based IT outsourcing research to determine how closely they follow TCT precepts.

3. Research method

We examined extant TCT-based IT outsourcing models in terms of their findings and the extent to which they are faithful applications of TCT. We searched several databases – ABI/INFORM Global, Science Direct and JSTOR – using the keywords “information” OR “information system” OR “information technology” AND “outsourcing” OR “sourcing” AND “transaction cost” OR “TCT” OR “TCE” OR “specificity” OR “uncertainty” in citation and abstract. We then reviewed each article and kept those that met the following criteria: (1) the study proposed an IT outsourcing model, (2) the model was based on TCT and included transaction attributes, and (3) the model was tested empirically. We also searched the references of each article to ensure that no important articles had been missed. This process resulted in a sample of 25 papers spanning the years

Table 1
Empirical findings on applications of TCT in IT outsourcing research.

	Influence on either outsourcing or outsourcing success as per TCT	Number of articles that used the construct ^a	Number of articles that hypothesized in line with TCT	Found support for TCT	Findings were contrary to TCT or not significant
Asset specificity	(–)	23	23	9 (40%)	14 (60%)
Behavioral uncertainty	(–)	9	9	2 (22%)	7 (78%)
Environmental uncertainty	(–)	14	12 ^b	5 (36%)	9 (64%)
Frequency	(–)	4	3 ^c	0 (0%)	4 (100%)
Cost difference (cost advantage of market over internal organization)	(+)	9	9	9 (100%)	0 (0%)

^a The numbers in this column are same as the numerators (construct use) in the last column of Table 2.

^b Two studies hypothesized a positive relationship, which is contrary to TCT.

^c One study hypothesized a positive relationship, which is contrary to TCT.

Table 2

TCT constructs: use and conceptualization in ITO literature.

	TCT definition	IT outsourcing studies definition	Number of studies that used the construct
Asset specificity	Degree to which the assets can be redeployed to alternative uses and by alternative users without sacrificing productive value (Williamson, 1996), including physical, human, site, etc.	Difference between the cost of the asset and the value of its second best use (Aubert et al. 2004; Dibbern and Heinzl, 2009; Kim and Chung, 2003; Mayer and Salomon, 2006; Miranda and Kim, 2006; Nam et al. 1996; Poppo and Zenger, 1998, 2002; Stremersch et al., 2003; Tiwana and Bush, 2007; Wang, 2002), unique value (Ang and Cummings, 1997; Wahrenburg et al., 2006), and customization and dependency (Chen and Bharadwaj, 2009; Diana, 2009; Lacity and Willcocks, 1995; Loebbecke and Huyskens, 2006; Poppo and Zenger, 1998) used but not defined (Goo et al. 2007; Thouin et al. 2009); durable investments (Alvarez- Suescun, 2010); different IS functions have different degrees of specificity (Barthelemy and Geyer, 2005; Oh et al. 2006; Wholey et al., 2001)	23 out of 25
Behavioral uncertainty	"Uncertainty of a strategic kind," which is "attributable to opportunism": impossibility of characterizing "the general propensity of a population to behave opportunistically in advance" (Williamson, 1985, p. 58)	Opportunism (Dibbern and Heinzl, 2009; Miranda and Kim, 2006; Wang, 2002), opportunistic behavior (Goo et al. 2007), <i>lack of observability</i> (Mayer and Salomon, 2006; Alvarez- Suescun, 2010); <i>verifiability</i> (Alvarez- Suescun, 2010). Measurement problems "are the difficulties encountered in the evaluation of an element of the exchange" (Aubert et al., 2004); measurement difficulty (Poppo and Zenger, 2002; Loebbecke and Huyskens, 2006)	9 out of 25
Environmental uncertainty	In chess, uncertainty is: "Computational inability to ascertain the structure of the environment" (Williamson, 1975, p. 23). "...environment is characterized by uncertainty with respect to technology, demand, local factor supply conditions, inflation, and the like..." (Williamson, 1985, p. 336)	Technological uncertainty: rapid and unpredictable changes in technology and technological complexity (Ang and Cummings, 1997; Miranda and Kim, 2006; Poppo and Zenger, 1998, 2002; Stremersch et al., 2003); Demand uncertainty: "when parties do not know ex ante the exact volume of product that will be required or ignore the form the service will take" (Aubert et al., 2004); "uncertainty as computational inability to ascertain the structure of the environment (Miranda and Kim, 2006); requirement uncertainty (Goo et al. 2007); Uncertainty of the external environment: the obstacles that obstruct potential changes (Dibbern and Heinzl, 2009; Nam et al. 1996; Wahrenburg et al., 2006) and the degree of competition (Diana, 2009); Project uncertainty: specificity of requirements (Tiwana and Bush, 2007); Contract uncertainty: difficulties in setting: requirement specifications, delivery dates, costs (Kim and Chung, 2003; Wang, 2002)	14 out of 25
Frequency	The level of recurrence of the activities needed by the firm for the transaction Williamson (1979)	Frequency: the repetitiveness of a certain type of transaction (Miranda and Kim, 2006; Lacity and Willcocks, 1995; Loebbecke and Huyskens, 2006; Wahrenburg et al., 2006)	4 out of 25
Production cost difference (ΔC)	Production cost difference between internal organization and the market (Williamson, 1981)	External production cost advantage: the cost advantage of external IS provider over internal management (Ang and Cummings, 1997; Ang and Strub, 1998; Lacity and Willcocks, 1995; Tiwana and Bush, 2007); Economies of scale (Poppo and Zenger, 1998); IT costs (Wholey et al. 2001)	6 out of 25
Governance cost difference (ΔG)	Governance cost difference between internal organization and the market (Williamson, 1981)	Transaction cost: the effort, time, and costs incurred in searching, creating, negotiating, and enforcing a service contract between buyers and suppliers (Ang and Strub, 1998; Espino-Rodríguez, and Gil-Padilla, 2005); Relative transaction cost: Lacity and Willcocks, 1995	3 out of 25
Cost analysis ($\Delta C + \Delta G$)	Sum of production and governance cost differences (between market and internal organization), which drives governance structure choice (Williamson, 1981)	Partly by Lacity and Willcocks, 1995	1 out of 25

Table 3

Choice of dependent variable: decision vs. outcome of the decision.

	Found definitive ^a support for TCT	Found either contrary to TCT or insignificant results ^b	Found partial ^c support (some of the hypotheses)	Total
Decision as dependent variable	5 (31%)	8 (50%)	3 (19%)	16 (100%)
Outcome of the decision as dependent variable (e.g. outsourcing success)	4 (45%)	3 (33%)	2 (22%)	9 (100 %)
Total	9 (36%)	11 (44%)	5 (20%)	25 (100%)

^a Definitive support means that study found support for all of its TCT-based hypotheses.^b When study could not find support for any of its TCT-based hypotheses.^c Partial support means that study found support for some of its TCT-based hypotheses.

1995–2011 and published in 19 different journals (listed in [Appendix A](#)). Of this group, 24 articles present quantitative studies with variance models, and one is a qualitative investigation of 40 case studies.

Our list includes 23 articles used in Lacity et al. (2011), but the two lists differ as follows: Lacity et al.'s list includes eight studies that did not meet our criterion of having explicitly formulated and tested TCT-based hypotheses, and our list includes two studies ([Ang and Cummings, 1997](#); [Dibbern and Heinzl, 2009](#)) that are not in their list because of the moderating and mediating effects of other non-TCT variables.

We further analyzed the studies as follows: first, we compared the findings of each study with its hypotheses and with the findings of other studies ([Table 1](#)); second, we compared the conceptualization and operationalization of the TCT constructs of each paper with Williamson's original definitions ([Table 2](#)); and third, we examined the relationships between the constructs of each study to determine whether or not they take into account the normative nature of the theory ([Table 3](#)). The results of this assessment are discussed below.

4. TCT empirical findings in IT outsourcing research

We identified three main types of contradiction in the results of the studies we analyzed. First, some studies do not formulate their hypotheses entirely in line with TCT. Second, some studies could not find support for their TCT-based hypotheses. And third, for some TCT-based hypotheses, different studies produced different results. We call the first two categories within-study contradictions and the third category across-study contradictions. A detailed discussion of each follows.

First, as shown in [Table 1](#), some hypotheses are not completely in line with TCT. For example, while TCT posits that internal organization is a more efficient governance mode under conditions of high uncertainty, [Diana \(2009\)](#) hypothesized the opposite. He conceptualized uncertainty in terms of market competition, arguing that higher competition requires more flexibility, which can be provided by outsourcing. However, he did not find support for this positive link.

Another example is the relationship between frequency and outsourcing. TCT posits that internal organization is a more efficient governance mode for recurrent transactions, since it allows the firm to gain economies of scale that reduce production costs. However, [Miranda and Kim \(2006\)](#) took a different approach, hypothesizing that higher frequency brings economies of scale in contracting costs (governance costs), making the market preferable to internal organization. They found support for this hypothesis.

The second type of within-study contradiction concerns studies that could not find support for their TCT-based hypotheses. For example, [Aubert et al. \(2004\)](#) and [Miranda and Kim \(2006\)](#) hypothesized, as per TCT, that uncertainty and specificity would negatively influence the level of IT outsourcing. However, they found significant positive results for both of the relationships.

The third type of contradiction is related to contradictory results across studies. For example, [Ang and Cummings \(1997\)](#) found that asset specificity has a negative effect, while [Aubert et al. \(2004\)](#) and [Miranda and Kim \(2006\)](#) found a positive effect. In some cases, uncertainty was found to positively influence the IT outsourcing decision ([Aubert et al. 2004](#); [Dibbern and Heinzl 2009](#); [Miranda and Kim 2006](#)), while elsewhere it had no effect ([Wahrenburg et al., 2006](#)). In terms of frequency, only one study found support for its hypothesis – a positive link between frequency and outsourcing ([Miranda and Kim 2006](#)), which, interestingly, is contrary to TCT. Yet other studies found that frequency does not have a significant effect on the outsourcing decision ([Loebbecke and Huyskens 2006](#); [Wahrenburg et al. 2006](#)). [Table 1](#) summarizes these mixed findings on the relationships between TCT attributes and the IT outsourcing decision or success.

These results are similar to those of Lacity et al. (2011). Our sample produced the same pattern for asset specificity, frequency and costs. Less than half of the studies (40%) found support for the hypotheses related to specificity, none found support for frequency, and all found support for costs. However, in terms of uncertainty, our results differ because we accepted two types of behavioral and environmental uncertainty, whereas Lacity et al. (2011) accepted only one.

5. Assessing extant models of IT outsourcing

5.1. Constructs

Although most of the studies define and operationalize asset specificity and uncertainty as per TCT, only four studies take frequency into account, and nine others take cost into account, albeit somewhat differently from TCT's cost difference. Only one study considers all of TCT's constructs.

As shown in Table 2, almost all of the studies define asset specificity as per TCT. The IT outsourcing literature defines asset specificity as: the difference between the cost of the asset and the value of its second best use (e.g. Aubert et al., 2004; Miranda and Kim, 2006), unique value (e.g. Ang and Cummings, 1997), customization and dependency (e.g. Chen and Bharadwaj, 2009; Loebbecke and Huyskens, 2006; Poppo and Zenger, 1998), and durability of investments (Alvarez-Suescun, 2010). Some studies (Barthelemy and Geyer, 2005; Oh et al., 2006; Wholey et al., 2001) adopt a functional approach toward specificity, arguing that some IS functions (e.g. systems integration, new application development) are more specific than others (e.g. telecommunications networks, data center management). We believe that with respect to the specificity construct, the IT outsourcing literature and TCT converge.

The IT outsourcing literature conceptualizes environmental uncertainty in line with TCT as technological uncertainty (e.g. Ang and Cummings, 1997; Poppo and Zenger, 1998), demand uncertainty (Aubert et al., 2004), contract/requirement uncertainty (Kim and Chung, 2003; Wang, 2002), and the overall uncertainty in the external environment (Dibbern and Heinzl, 2009; Wahrenburg et al., 2006). These uncertainties in both the TCT and the IT outsourcing literature refer to unforeseen changes in the environment that require changes in the contract and flexibility from the supplier's side (although this may not always be possible).

Our analysis, however, revealed two main issues regarding the behavioral uncertainty construct. First, only nine studies out of 25 (36%) conceptualize behavioral uncertainty, while most of the studies (14 out of 25, or 56%) conceptualize and operationalize environmental uncertainty, and only four studies (16%) conceptualize both types of uncertainty (Aubert et al., 2004; Lacity and Willcocks, 1995; Miranda and Kim, 2006; Wang, 2002). The omission of behavioral uncertainty is not in line with TCT, under which this type of uncertainty should play a significant role in decisions about the firm's boundary.

The second issue is how behavioral uncertainty is conceptualized. Among the nine studies that consider behavioral uncertainty, four conceptualize it in terms of opportunistic behavior on the part of the supplier (Dibbern and Heinzl, 2009; Goo et al., 2007; Miranda and Kim, 2006; Wang, 2002), which is in line with TCT.

The other five studies use measurement problems (Aubert et al., 2004), measurement complexity (Loebbecke and Huyskens, 2006), measurement difficulties (Poppo and Zenger, 2002), and lack of observability (Mayer and Salomon, 2006) or verifiability (Alvarez-Suescun, 2010) as proxies for behavioral uncertainty. Some studies conceptualize uncertainty and measurement problems as two separate constructs. For instance, Poppo and Zenger (1998) use measurement problems as an agency theory construct and technological uncertainty as a TCT construct. Based on the definitions and operationalization provided in studies that used measurement problems, the construct is related to task difficulty/complexity or an inability to measure the performance inherent to the task. Therefore, we argue that although a measurement problem may give way to behavioral uncertainty or exacerbate a situation that includes behavioral uncertainty, the construct differs conceptually from behavioral uncertainty. As Lacity et al. (2011) correctly note, measurement difficulties could be viewed as a fourth transaction attribute. In this paper, however, we only focus on the three key TCT transaction attributes of asset specificity, uncertainty and frequency.

The next construct, frequency, is absent from most of the studies we analyzed. The four studies that included frequency defined it as the repetitiveness or recurrence of the transaction (Lacity and Willcocks, 1995; Loebbecke and Huyskens, 2006; Miranda and Kim, 2006; Wahrenburg et al., 2006). This corresponds to TCT's definition of frequency, since it refers to the level of recurrence of the transaction.

The last TCT construct to be examined is "cost difference." Six studies consider production costs, defined as either an external production cost advantage (production cost advantage of market over internal organization) (Ang and Cummings, 1997; Ang and Straub, 1998; Lacity and Willcocks, 1995; Poppo and Zenger, 1998; Tiwana and Bush, 2007) or overall IT costs (Wholey et al. 2001). This corresponds to TCT's concept of the production cost difference (ΔC). Only three studies include transaction costs, defining it as the cost of conducting a transaction through the market (Ang and Straub, 1998; Espino-Rodríguez and Gil-Padilla, 2005) and comparing the transaction costs of the under-the-market mode with internal organization (Lacity and Willcocks, 1995). This latter conceptualization relates to TCT's notion of transaction cost difference (ΔG).

This analysis shows that only one study (Lacity and Willcocks, 1995) considers both production cost difference and transaction cost difference. In this qualitative work, the notion of costs is employed to explain the unexpected results observed in the cases. For example, the notion of costs was used to explain a situation where outsourcing was expected due to the low specificity of a transaction, but a successful internal organization was nevertheless observed. Here, the firm could also gain economies of scale similar to the vendor (a ΔC of close to zero) but had lower transaction costs ($\Delta G < 0$). This gives a negative value for $\Delta C + \Delta G$, which, based on the formula, should lead to the use of internal organization. The firm made the right choice and succeeded.

Overall, in terms of costs, our analysis of the literature shows that few of the studies address costs. Those studies that do consider costs either use transaction and production costs separately or use them to explain the anomalies, rather than using them from the outset to derive the right decision.

5.2. Hypothesized relationships: interaction effects

As described above, in the foundations of TCT and as illustrated in Fig. 2, uncertainty and frequency both moderate the influence of asset specificity on costs. For example, while a transaction that is highly specific may still take place through the market if uncertainty is low, the same transaction should be kept internal if the uncertainty level is high. And as shown in Fig. 3, for non-specific assets, irrespective of uncertainty and frequency levels, TCT says that the right governance mode is market. In the sample of studies that we analyzed, only two studies (Diana, 2009; Stremersch et al., 2003) consider interaction effects. These two studies hypothesized a negative relationship between the influence of asset specificity and uncertainty on the outsourcing decision, which is in line with TCT. However, neither of these studies found support for their hypotheses. One explanation that we suggest for this result is that costs were not considered. Uncertainty multiplied by specificity will decrease the cost difference ($\Delta C + \Delta G$), but the cost difference may still be greater than zero, which, according to Formula 3, calls for outsourcing.

Wholey et al. (2001) took a different approach to formulating the interactions of specificity and uncertainty. They argued that different types of IS functions (e.g. data center operations, development) are characterized by different amounts of uncertainty. Asset specificity will therefore have a different effect on the outsourcing of different IS functions. However, they did not find support for this interaction effect.

Overall, in terms of interaction effects, ITO research has not completely tested TCT. Indeed, while under TCT uncertainty and frequency play moderating roles, only 12% of our articles considered the moderating role of uncertainty, and none of the studies considered the moderating role of frequency.

5.3. Hypothesized relationships: normative vs. predictive

The normative implications of TCT have been acknowledged in the literature. For instance, it has been argued that “transaction cost economics offers strategy a set of normative rules for choosing among alternative governance arrangements. To the extent that governance choices are an important determinant of firm performance, managers would be well advised to heed those rules and to factor transaction-cost concerns into their decision-making calculus” (Masten, 1993, p. 119). For Williamson, “Efficiency purposes are served by matching governance structures to the attributes of transactions in a discriminating way” (Williamson, 1985, p. 68).

Based on a review of 85 outsourcing contracts, Poppo and Lacity (2006) found that “IT managers enjoy higher performance when they use the prescriptions offered by TCE to determine what to outsource and how to structure the governance of the outsourced activities” (Poppo and Lacity, 2006, p. 280). Moreover, they found that “managers realize higher satisfaction when they apply the TCE principle to measure and benchmark outsourcing activities” (Poppo and Lacity, 2006, p. 280). Furthermore, they found that managers learn from their mistakes, implying that managers do not intuitively apply TCT principles. All these findings emphasize the normative nature of the theory.

However, our analysis shows that the majority of extant models predict IT outsourcing decisions based on transaction attributes (64%), assuming a predictive nature for TCT. This means that the extant models conceptualize transaction characteristics as causal antecedents of the decision to outsource. A generic hypothesis of this conceptualization is that more of one characteristic will lead to more/less of the level/degree/budget for IT outsourcing.

TCT, however, does not posit that the transaction characteristics cause the decision; rather it posits that the transaction characteristics are antecedents of the cost differences. This means that should a transaction have one of these characteristics, or two or three of them in combination, one governance mode will be more efficient than the other in terms of the transaction's production costs and transaction costs.

In our analysis of TCT-based IT outsourcing models, we found few indications of the normative nature of TCT. Although Miranda and Kim (2006) acknowledge that TCT is a normative theory that posits what firms *should* do, they do not incorporate this normative nature into their hypotheses. Tiwana and Bush (2007) also refer to TCT as a normative theory, although they treat it in a predictive way. In another case, Aubert et al. (2004) argue that one reason they did not obtain the expected results in their study is that firms may not always make their decisions as per TCT precepts; firms might make decisions that are different from what TCT suggests.

A number of studies (36% of the studies in our sample) adopt the outsourcing outcome, such as successful outsourcing or firm performance, as the dependent variable of their study. For example, Poppo and Zenger (1998) posit that when the governance mode does not match the transaction attributes, then performance will not be achieved. For example, in terms of asset specificity they hypothesize that “increases in the specificity of an activity may negatively affect the performance of governance through the market” (Poppo and Zenger 1998, p. 857). Although this hypothesis is predictive, it does not predict the decision; rather, it predicts the outcome of the decision. Therefore, by linking the transaction attributes to the performance of a governance mode, they treat TCT normatively.

As shown in the Table 3, better support for TCT is found when outcome is the dependent variable. This finding is similar to that of Lacity et al. (2011), who found that when outcome is considered, slightly better results are obtained.

Although the qualitative study of our sample, [Lacity and Willcocks \(1995\)](#), is not explicit in its proposition, it takes a normative approach to applying TCT. They examined 40 sourcing decisions and compared them with what is suggested by TCT. Where they found fit (between the TCT suggestion and the actual decision), they expected success, and where there was lack of fit they expected failure. Where they did not find the expected pattern, they concluded that this was an anomaly to TCT. They therefore treat TCT in a normative way ([Lacity and Willcocks, 1995](#)).

6. Discussion and conclusion

We set out to review the TCT-based ITO literature to understand why IT outsourcing studies that appropriate TCT have produced mixed results, focusing on how TCT has been used in ITO models. In the course of our study, we observed similar contradictory results in other domains where TCT has been applied and tested. In strategy research, for instance, where TCT has been used to examine the firm's boundary decisions, the results have been mixed, particularly with regards to the role of uncertainty ([Carter and Hodgson, 2006](#)). Indeed, studies found either insignificant relationships or negative relationships between technological uncertainty and vertical integration, which runs counter to TCT. Another study, which reviewed TCT applications across several domains, including marketing, strategy, management science, and economics, shows that uncertainty yields the most inconsistent results, either alone or in interaction with asset specificity ([David and Han, 2004](#)). They also found that frequency is the least used construct, that uncertainty is associated with inconsistent results, and that asset specificity is the most widely used construct. While in both of these reviews, asset specificity yields the most consistent results, our review shows that this construct is most often associated with inconsistent results (40% support for TCT).

Much like the present study, one of these two reviews led its authors to observe that the models proposed and tested in the literature are not always fully consistent with Williamson's framework. [David and Han \(2004\)](#) observe that in their sample of studies, some key propositions have been loosely interpreted and some key variables (e.g. performance) have received little attention. They also observed a significant amount of disagreement in how the constructs are operationalized. Overall, they observed both misappropriation of the theory and methodological issues in their data set of studies. They therefore call for better appropriation of the theory's core constructs and key relationships and suggest paying more attention to operationalization and other methodological issues.

The other review ([Carter and Hodgson, 2006](#)), however, came to another conclusion. They argue that rival theories could better explain boundary decisions. For example, they suggest that even specificity, which yields the most consistent result (they confirmed the pattern found by [David and Han](#)), could also be viewed from a capabilities perspective, especially in the case of human specificity.

Two reviews therefore call for different future steps: while [David and Han \(2004\)](#) call for a better appropriation of TCT in future studies, [Carter and Hodgson \(2006\)](#) call for a joint testing of rival theoretical perspectives.

Our review leads us to conclude that, in addition to explaining mixed results by the fact that some studies used hypotheses that do not follow TCT – mainly by not taking into account some of the constructs (e.g. frequency) or their interaction effects (frequency and asset specificity) or by hypothesizing a relationship in a different direction from that posited by the theory (e.g. a positive effect for uncertainty), another possible reason for such results is that the studies generally did not take the normative nature of the theory into consideration. This argument is similar to the justification for unexpected results provided in [Aubert et al. \(2004\)](#). Firms do not always make the right decision, and when they do make the right decision, they should achieve superior performance (in terms of efficiency). Therefore, in studies where performance is not reported, high performers, low performers, firms that have transaction cost minimizing behaviors and firms that do not are all pooled in the same sample. In such cases, the relationships between transaction characteristics and an appropriate governance mode in the high-performance group will be negated and lost due to the lack of such relationships in the low-performance group. We believe that this is one plausible reason for the mixed results of TCT-based ITO decision models.

Although other explanations provided by [Lacity et al. \(2011\)](#) suggest a departure from TCT, a closer look at these explanations leads us to advocate for more research using TCT. The first category of explanations, research method issues, as [Lacity et al. \(2011\)](#) also corroborate, is not contrary to TCT: "Overall, research method explanations argue that findings are not really counter to TCT logic but instead may be explained by faulty measures or consequences of specific methodological issues" (p. 10). This category of explanations resembles [David and Han's \(2004\)](#) call for closer attention to measurement and methodological issues when using TCT.

The second and third categories, boundary conditions and assumption violation explanations, could serve as guides to carefully choosing study settings and the IT activities to be studied. We believe that IT is too broad a field to be considered a poor fit to TCT assumptions. The context of some IT activities might still be a good fit with TCT assumptions. For example, the assumption of vendor opportunism, which is questioned by some research, is not a constant in all types of IT activities. This is why, instead of keeping opportunism as a constant assumption, some research measures it through the opportunistic behavior of vendors (e.g. [Goo et al., 2007](#); [Miranda and Kim, 2006](#)). Finally, the last category, alternate theory explanations, which is also advocated by [Carter and Hodgson \(2006\)](#), could be even more viable when a rival theory is tested against TCT. To achieve these ends, we still need to be on stable ground and appropriate theories faithfully, both TCT and other rival theories.

Our conclusion and suggestions on the "what next" issue therefore complement the previous reviews and the [Lacity et al. \(2011\)](#) study in the following way. Our conclusion complements [Lacity et al. \(2011\)](#), since we believe that TCT may still

contribute to ITO studies as input to an endogenous ITO theory. Our conclusion complements Carter and Hodgson (2006), since in order to jointly test TCT and rival theories, we need a better appropriation of TCT. Only then will we be certain that the difference in explanations is not due to a misappropriation of the theory but rather to the explanatory power of the theories at hand. Our study converges with the conclusion reached by David and Han (2004), although our review has focused less on methodological issues.

This study has implications for research and the empirical measurement of IT outsourcing decision models. The moderating effects of uncertainty and frequency require paying special attention to how two transaction characteristics (i.e. frequency and uncertainty) are conceptualized and operationalized and how their roles are specified. It is critical that models relate their constructs in ways suggested by the underlying theory. When a model relates some of its constructs in ways that are not supported by the theory, a strong argument and full explanation should be provided (e.g. the context of the study imposes this change, or the theory is being extended). We did not find such explanations for the departures from TCT observed in extant TCT-based models (such as taking uncertainty and frequency as direct antecedents of the IT outsourcing decision rather than as moderators).

The normative nature of TCT has important implications for how models are specified. For example, when TCT is used normatively, the endogenous variables will be the cost difference between market and hierarchy and the performance of the ITO decision. In extant models, the endogenous variable is usually the decision to outsource. Like Lacity et al. (2011), we found that the studies that used outcome as the dependent variable obtained slightly better results. However, with few exceptions, the decision itself is implicit in the models of studies using outcome as the dependent variable. For example, studies refer to “outsourcing success.” This means that outsourcing is already implicitly chosen as the governance mode and the transaction attributes are directly linked to the performance of the outsourcing. Although this approach yields better results than linking attributes directly to the decision, as noted by Lacity et al. (2011), the improvement is still piecemeal due to the absence of costs. We believe that if the models had taken a complete path, from attributes to costs to decision to the performance of the decision, then TCT would have yielded more consistent results. However, as Lacity et al. (2011) suggest, “We may be asking too much of TCT” and “the IT phenomenon is more complex than can be accommodated by one decision-making theory” (p. 13).

Our study also has an important implication for practitioners, inasmuch as they could make outsourcing decisions by evaluating the transaction attributes and the difference between the production and governance costs associated with conducting an IT activity (a transaction) internally vs. through the market. This cost comparison may lead decision makers to entirely different conclusions about sourcing decisions. Decision makers may have assumed that outsourcing is more efficient than internal organization even before undertaking a cautious analysis of transaction characteristics and their impact on costs. But a proper cost analysis could have shown that internal organization is more efficient than outsourcing. Decision makers may also decide to re-analyze their already outsourced or in-sourced IT activities, discovering that they have not chosen the most efficient option.

In sum, this study contributes to IT outsourcing research by providing one answer to the question: “Why have the appropriations made of TCT to study IT outsourcing produced mixed results?” Our analysis of the empirical ITO models shows that not all the TCT concepts have been used as conceptualized in TCT (e.g. behavioral uncertainty) and not all the TCT relationships have been taken into account (e.g. the interactions of asset specificity and uncertainty). Most importantly, only a few studies took the normative nature of TCT into consideration. Therefore, we believe that one answer to the above question is suggested by the way that TCT has been used in ITO models. However, as we stated earlier in the paper, this represents only one answer to the question. Other possible explanations have been fully presented elsewhere (Lacity et al. 2011).

Appendix A. Empirical studies included in the review

1. Alvarez-Suescun, E. “Combining Transaction Cost and Resource-Based Insights to Explain IT Implementation Outsourcing.” *Information Systems Frontiers* (12:5) 2010, pp. 631–645.
2. Ang, S., and Cummings, L.L. “Strategic Response to Institutional Influences on Information Systems Outsourcing.” *Organization Science* (8:3) 1997, pp. 235–256.
3. Ang, S., and Straub, D., W. “Production and Transaction Economies and IS Outsourcing: A Study of the U.S. Banking Industry.” *MIS Quarterly* (22:4) 1998, pp. 535–552.
4. Aubert, B.A., Rivard, S., and Patry, M. “A Transaction Cost Model of IT Outsourcing.” *Information & Management* (41:7) 2004, pp. 921–932.
5. Barthelemy, J., and Geyer, D. “An Empirical Investigation of IT Outsourcing versus Quasi-Outsourcing in France and Germany.” *Information & Management* (42:4) 2005, pp. 533–652.
6. Chen, Y., and Bharadwaj, A. “An Empirical Analysis of Contract Structures in IT Outsourcing.” *Information Systems Research* (20:4) 2009, pp. 484–506.
7. Diana, M. “Exploring Information Systems Outsourcing in U.S. Hospital-Based Health Care Delivery Systems.” *Health Care Management Science* (12:4) 2009, pp. 434–450.
8. Dibbern, J., and Heinzl, A. “Outsourcing of Information Systems Functions in Small and Medium Sized Enterprises: A Test of a Multi-Theoretical Model.” *Business & Information Systems Engineering* (51:1) 2009, pp. 101–110.

9. Espino-Rodríguez, T.F., and Gil-Padilla, A.M. "Determinants of Information Systems Outsourcing in Hotels from the Resource-Based View: An Empirical Study." *The International Journal of Tourism Research* (7:1) 2005, pp. 35–47.
10. Goo, J., Kishore, R., Nam, K., Rao, H.R., and Song, Y. "An Investigation of Factors That Influence the Duration of IT Outsourcing Relationships." *Decision Support Systems* (42:4) 2007, pp. 2107–2125.
11. Kim, S., and Chung, Y.-S. "Critical Success Factors for IS Outsourcing Implementation from an Interorganizational Relationship Perspective." *The Journal of Computer Information Systems* (43:4) 2003, pp. 81–90.
12. Lacity, M.C., and Willcocks, L.P. "Interpreting Information Technology Sourcing Decisions from a Transaction Cost Perspective: Findings and Critique." *Accounting, Management and Information Technologies* (5:3–4) 1995, pp. 203–244.
13. Loebbecke, C., and Huyskens, C. "What Drives Netsourcing Decisions? An Empirical Analysis." *European Journal of Information Systems* (15:4) 2006, pp. 415–423.
14. Mayer, K. J., and Salomon, R., M. "Capabilities, Contractual Hazards, and Governance: Integrating Resource-Based and Transaction Cost Perspectives." *Academy of Management Journal* (49:5) 2006, pp. 942–959.
15. Miranda, S.M., and Kim, Y.-M. "Professional versus Political Contexts: Institutional Mitigation and the Transaction Cost Heuristic in Information Systems Outsourcing." *MIS Quarterly* (30:3) 2006, pp. 725–753.
16. Nam, K., Rajagopalan, S., Rao, H.R., and Chaudhury, A. "A Two-Level Investigation of Information Systems Outsourcing." *Association for Computing Machinery. Communications of the ACM* (39:7) 1996, pp. 36–44.
17. Oh, W., Gallivan, M.J., and Kim, J.W. "The Market's Perception of the Transactional Risks of Information Technology Outsourcing Announcements." *Journal of Management Information Systems* (22:4) 2006, pp. 271–303.
18. Poppo, L., and Zenger, T. "Testing Alternative Theories of the Firm: Transaction Cost, Knowledge-Based, and Measurement Explanations for Make-or-Buy Decisions in Information Services." *Strategic Management Journal* (19:9) 1998, pp. 853–877.
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21. Thouin, M., Hoffman, J., and Ford, E. "IT Outsourcing and Firm-Level Performance: A Transaction Cost Perspective." *Information & Management* (46:8) 2009, pp. 463–469.
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