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Client control over the vendor has been identified as a critical factor in successfully managing information technology outsourcing relationships. Though prior studies have suggested that "how much" control is exercised has significant ramifications for individuals and firms, relatively few studies have operationalized and studied this important concept. In this study, we define the *amount of formal control* as the variety of mechanisms used by a client to exercise control over a vendor and the extent to which the mechanisms are used. We use literature on transaction cost economics and organizational control to build a model of the antecedents of the amount of formal control. The study uses data from 138 client-vendor matched pairs working in eight large, long-term, ongoing outsourcing arrangements to test specific hypotheses. The results suggest that clients who have technical or relationship management knowledge, or have high levels of trust in their vendors, use formal control mechanisms to a lesser extent. On the other hand, task uncertainty was found to be positively associated with the amount of formal control, and the degree of core competency involved in the outsourced activity was not found to be related to the amount of formal control. These results are discussed, and implications for research and practice are drawn.

Key words: outsourcing; control; information systems management; client-vendor relationship
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Introduction

Information technology (IT) outsourcing is among the most discussed topics in both the academic and practitioner media. Global spending on business process outsourcing reached $64 billion in 2003 (Levina and Ross 2003) and is expected to reach $161 billion by 2007 (Gartner Research 2007). As the quantity of outsourcing increases, so do outsourcing failures. In one study, 75% of managers reported that outsourcing outcomes did not meet their expectations (Bryce and Useem 1998). One reason may be the lack of contract management skills on the part of the clients (King 2004). Seventy-six percent of the clients of the top ten outsourcing vendors have not provided any formal training to their employees for managing vendor relationships (Violino and Caldwell 1998), yet effectively managing the client-vendor relationship has been identified as a key determinant of outsourcing success (Lacity and Willcocks 2000, Dibbern et al. 2004).

Research on IT outsourcing has therefore increasingly come to focus on the client-vendor relationship (Klepper 1995, Lee and Kim 1999, Lacity and Willcocks 2000, Goles 2001). One important aspect of this relationship is the client's control over the vendor (Choudhury and Sabherwal 2003, Kern and Willcocks 2000, Lacity et al. 1995). Indeed, Kern and Willcocks (2000) argue that the greatest challenge clients face in an outsourcing arrangement is making sure the vendors deliver as promised, and that *control* is an important vehicle for ensuring such compliance.

Control refers to attempts by one individual or organization to motivate another to act in a manner consistent with specific expectations and objectives (Ouchi 1979). Most prior studies of control in the information systems (IS) domain have focused

on internal systems development projects, investigating control across employees of a single organization (e.g., Kirsch et al. 2002, Kirsch 1996, Henderson and Lee 1992). Only a few studies have systematically examined the exercise of control in an outsourcing arrangement in which clients and vendors are often not colocated and are usually employed by different organizations. An exception is the study by Choudhury and Sabherwal (2003) in which some evidence is provided about control choices and how controls change over time in the context of outsourced projects. Given the paucity of research, though, Choudhury and Sabherwal (2003) call for additional work in this area.

This study addresses the outsourcing client-vendor relationship from the perspective of control. It examines the combination of formal control mechanisms used by a client to control the behavior of a vendor. IS and business managers have been found to structure *portfolios* of control mechanisms that include project plans, time lines, meetings, peer pressure, conference calls, methodologies, and testing procedures to achieve specific project objectives (Choudhury and Sabherwal 2003, Kirsch 1997). However, unlike prior studies, which have primarily focused on the various *types* of control mechanisms used, this study focuses on the *amount of formal control*, which we define as the extent to which the client uses various mechanisms to exercise control over a vendor. The study adopts a dual-stakeholder perspective, focusing on the perceptions of both clients and vendors. In particular, we use transaction cost economics (TCE) and the organizational control literature to build a model that predicts the amount of formal control a client uses to motivate vendor behavior. We test our model with survey data collected from clients and vendors in outsourcing arrangements.

Literature Review of Control

This study adopts a behavioral view of control consistent with other research that has examined control in the context of both in-house and outsourced IS projects (Choudhury and Sabherwal 2003, Kirsch 1997, Henderson and Lee 1992). Based on the definitions from Flamholtz et al. (1985) and Ouchi (1979), we define control as attempts by individuals or organizations to influence the actions and behaviors of other individuals or organizations by using certain mechanisms to better achieve organizational objectives.

Researchers have identified several types, or modes, of control; two that are commonly studied are behavior and outcome control (Ouchi 1979, Eisenhardt 1985). Behavior control is exercised when behaviors are prespecified and rewards are based on the extent to which controllees exhibit those behaviors (Kirsch 1996, Eisenhardt 1985). When targets, rather than behaviors, are prespecified and rewards are based on whether the targets are achieved, outcome control is exercised (Henderson and Lee 1992, Ouchi 1979).

Much empirical work on control has investigated the antecedents of the various modes. For example, researchers have established that outcome measurability, behavior observability, and knowledge of the transformation process are important predictors of individual control modes (Eisenhardt 1985, Henderson and Lee 1992, Kirsch 1996, Kirsch et al. 2002). Some scholars have also studied the impacts of control, providing evidence about the relationship between various control modes and performance outcomes (e.g., Henderson and Lee 1992).

A few studies have attempted to quantify the amount of control exercised across relationships. For example, Tannenbaum (1962, 1968) conceptualized total amount of control as the collective influence of one individual or group over another individual or group to affect what the latter does. He proposed that an increased total amount of control in an organization is associated with increased organizational effectiveness. Bartolke et al. (1982) and Kavčič and Tannenbaum (1981) provide empirical support for this proposition, adding the values for different modes of control to arrive at a total value for the level of control. Thus, this body of work suggests that control types are not mutually exclusive, that their levels are quantifiable, and that they can be summed up to one aggregate level.

Henderson and Lee (1992) followed a conceptual model similar to Tannenbaum (1968) and performed an exploratory analysis to examine the total amount of control on IS design teams. They studied individual effects of managerial and team member controls and explored the addition of these values to arrive at an aggregate for the total amount of control.

Among other findings, they report that high managerial behavior control coupled with high team member outcome control is associated with high performing teams.

Portfolios of Control Mechanisms

As implied by our definition, a control mode is exercised through a variety of specific *mechanisms* such as project plans, meetings, peer pressure, financial incentives, and formalized job descriptions (Cardinal et al. 2004, Choudhury and Sabherwal 2003, Kirsch 1997). Recently, researchers have argued for investigating control at a more granular level because of overlaps and inconsistencies in conceptualizations of control modes (Kirsch 2004) and the need for a better understanding of how individual mechanisms operate together (Cardinal et al. 2004). In line with this, we focus on the portfolio of mechanisms used by a client to exercise control over a vendor. This focus affords a deeper understanding of the way control is exercised because it provides evidence about the variety and level of individual mechanisms used within the context of an outsourcing relationship.

Formal and Informal Controls

Scholars investigating control often make a distinction between formal and informal controls, noting that mechanisms used to exercise formal control are documented, while mechanisms of informal control are generally implicit (Kirsch 2004). Thus, written project plans, testing procedures, and job descriptions are mechanisms of formal control, whereas peer pressure, influence, and social events constitute informal control mechanisms.

Prior research has established the prevalence of formal control mechanisms in IS development projects (Kirsch 1997, Henderson and Lee 1992), as well as in other organizational settings such as sales (Eisenhardt 1985) and research and development (Cardinal 2001). This prevalence of formal mechanisms can be attributed to many factors: the important role that structure and formality play in work settings (Adler and Borys 1996), the beneficial effects of bureaucracy (Adler and Borys 1996), and the inevitable use of formal controls in large organizations (Cardinal 2001). Moreover, a recent study of outsourced projects revealed that a greater number of formal control mechanisms than informal mechanisms were used (Choudhury and Sabherwal 2003), in part because of the difficulty of forging the shared beliefs, values, and rituals, which underlie informal controls when the stakeholders are members of different firms (Lacity and Willcocks 2001), and because of the reliance on formal contracts in governing client-vendor relationships (Kern and Willcocks 2000). Not only are formal controls prevalent in outsourced projects, but it is also likely that they will be manifested in much more complex ways: Within a single organization, formal control is often exercised via direct report relationships (Kirsch et al. 2002), but, in an outsourcing context, direct reporting relationships across the firms rarely exist. There is relatively little evidence about precisely how formal control is exercised in such a setting. Therefore, given the prevalence, importance, and utility of formal controls in organizations, in general, and in outsourcing, in particular, in this study, we focus on mechanisms used to exercise formal control.

Amount of Formal Control

Some studies have focused on the structure and composition of control portfolios noting the combinations of mechanisms found in portfolios (e.g., Choudhury and Sabherwal 2003, Kirsch 1997). Though these studies have emphasized the range of mechanisms used to exercise control, little attempt has been made to quantify how much control is exercised via these portfolios. Yet understanding the antecedents and consequences of how much control is important because empirical evidence suggests that the total amount of control is positively associated with performance (Henderson and Lee 1992, Bartolke et al. 1982, Kavčič and Tannenbaum 1981). Despite this evidence, few studies have examined this phenomenon, and those who have studied it have examined the additive effects of *modes* (the broader categories) of control, but not the cumulative effects of specific *mechanisms* of control.

This suggests a need for additional systematic examinations of how much control is exercised by a controller over a controllee. This study focuses on the use of formal control mechanisms by a client to motivate specific behaviors by a vendor. To study this phenomenon, we introduce the notion of the

amount of formal control, which we define as the variety of mechanisms used by a client to exercise control over a vendor *and* the extent to which each of those mechanisms is used. The amount of formal control used can vary considerably. There could be just a few control mechanisms used infrequently by a controller. For example, a controller who assesses progress by attending one status meeting over the course of an IS project is exercising control with relatively few mechanisms (i.e., a lesser amount of formal control). In contrast, a controller may use a large number of mechanisms in an intense manner, such as when she assesses progress by attending weekly status meetings, in addition to viewing demonstrations of the product, reviewing status reports, and informally meeting with individuals.

Research Model and Hypotheses

The research model for this study is shown in Figure 1. Each of the five specific antecedents emanates from TCE. TCE "…asks which activities should be performed within the firm, which outside it, and why" (Williamson 1985, p. 549). The best-known branch of TCE focuses on governance, predicting and understanding boundary choices of markets and hierarchies. Here, though, we focus on the measurement branch of TCE, which is concerned with "…the ways by which better to assure a closer correspondence between deed and awards" (Williamson 1985, pp. 80–81).[1] The measurement branch of TCE is closely related to the governance branch as difficulties in measurement, and opportunities for shirking and cheating, have consequences for boundary choices (Poppo and Zenger 1998, Madhok 1996). The amount of formal control, our dependent variable, can be conceptualized as consisting of measurement efforts to curb opportunistic behavior and minimize postcontractual transaction costs. According to TCE, the extent of these formal controls should be a function of asset specificity, uncertainty, bounded rationality, and the potential level of opportunism in the outsourced function (Williamson 1985). Because the overall goal of TCE is cost minimization (Chiles and

[1] We thank an anonymous reviewer for pointing out the saliency of the measurement branch of TCE to our study.

Figure 1   Research Model
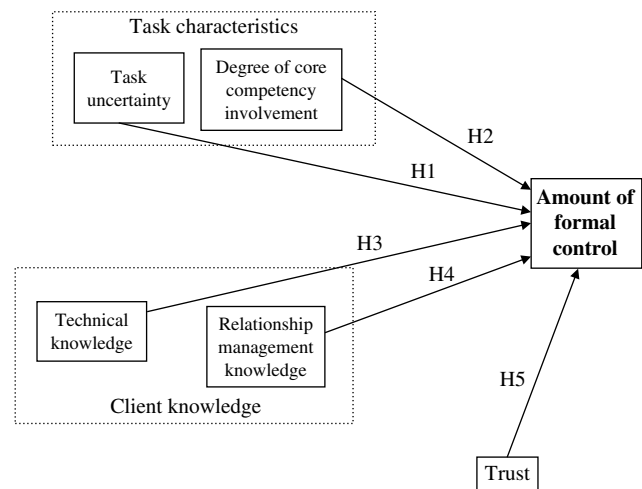
McMackin 1996), our hypotheses focus on the efficiency of the amount of formal control. A relatively more efficient portfolio is one that uses fewer control mechanisms and/or uses some mechanisms less intensively.

In the following sections, literature from TCE and organizational control is used to motivate the specific relationships shown in Figure 1. In this way, as suggested by others (Ang and Cummings 1997, Poppo and Zenger 1998), we augment TCE with other theoretical perspectives, including research on formal controls that is derived from organizational and economic theories (Eisenhardt 1985). In addition, we use empirical results from the outsourcing literature to help motivate specific hypotheses.

Task Characteristics

The task characteristics constructs in the research model—task uncertainty and degree of core competency involvement—reflect TCE's uncertainty and asset specificity dimensions, respectively. Uncertainty at the task level refers to the unpredictability of the activity. In TCE, asset specificity refers to specialized and unique assets that are valuable to the specific relationship (Williamson 1985). In our research, asset specificity is reflected in the degree of the organization's core competence that is involved in the outsourced task—i.e., the greater the degree of core competence, the more organization specific is the activity. This is consistent with Williamson's (1985) description of "core technology as one of the ways

in which asset specificity can arise" (p. 556). These concepts, and their relationships with the amount of formal control, are explored in more detail in the following sections.

Task Uncertainty. In the context of outsourcing, task uncertainty can be defined as the degree to which the specific requirements or intermediate outcomes associated with a task or activity cannot be anticipated or forecast. For example, if the activity has not been completely prespecified or if the quality of a module is assessed to be erratic and inconsistent across various phases of the project, uncertainty at the task level would be created for the client. To alleviate and mitigate this uncertainty, the client may adopt more control over the vendor. Thus the client may achieve a higher level of control by using a greater number of control mechanisms or by using some more intensely—assigning more skilled resources, holding more frequent meetings, or strengthening the quality assurance process for that module. In contrast, when an activity is relatively structured or routine, a client may rely on fewer controls or less intensity, or both; for example, meeting with the vendor less frequently or not assigning more resources.

Research on TCE provides some insight into the relationship between uncertainty and controls. Cheon et al. (1995) proposed that in situations of high task uncertainty, clients tend to mitigate uncertainty through an intensive and complex set of controls. Poppo and Zenger (1998) argue that a high level of change and uncertainty result in costly contract renegotiations and updates. Similarly, Kern and Willcocks (2000) suggested that as uncertainty increases in an outsourcing relationship, clients would seek more controls over the vendor through the contract. Control theorists have also noted that a variety of controls are used to compensate for different types of task characteristics, including task uncertainty (Eisenhardt 1985, Kirsch 1997). All of this suggests that, faced with higher uncertainty at the task level, clients should tend to implement a greater amount of control, i.e., a portfolio that consists of many mechanisms that are used to a great extent. Thus we posit:

Hypothesis 1. *Task uncertainty will be positively associated with the amount of formal control.*

Degree of Core Competency Involvement in Outsourced Task. TCE suggests that a greater involvement of the organization's core competence in the outsourced activity makes the transaction more organization specific (Williamson 1985). A number of early studies in outsourcing operationalized this concept by distinguishing between core and noncore activities, suggesting that organizations should retain their core competencies internally and may outsource noncore or "commodity" activities (King 2001, Hancox and Hackney 2000).

Quinn and Hilmer (1994) pointed out that much of the description of core competencies in the outsourcing literature is tautological because core is defined as key or fundamental, usually without illustrating essential traits or characteristics of core competencies. Using the theoretical groundings of a resource-based view of organizations, King (2001) outlined a set of such characteristics by suggesting that the core competency of an organization is a capability that creates a strategic advantage, has evolved through collective learning and information sharing, cannot be easily duplicated by others, and cannot be easily transferred to others. Similarly, Barthelemy (2003) pointed out that ingredients of core competencies are the resources and capabilities of the organization that are valuable, difficult to imitate, and difficult to substitute.

However, today's information technologies are so integrated that it may not be possible to clearly distinguish, a priori, between what is core and what is not (Earl 1996). Most IS functions have some elements that belong to the core of the enterprise and some that do not (Barthelemy 2003). Thus it may not be a simple exercise to separate core from noncore activities when deciding about the outsourcability of an IS activity. Because of this difficulty, at times organizations may outsource complex IT activities, or perhaps the entire IT function, part of which may be a core competency (Hancox and Hackney 2000, McLellan et al. 1995).

Saunders et al. (1997) proposed that when organizations outsourced a part of their core competencies because of their inseparability from the commodity activities, setting up a tighter contract (which implies a larger amount of control) enhanced the potential for success of the outsourcing arrangement. This is intuitively appealing because, in the early days of

IT outsourcing, it was assumed that only commodity activities such as data centers could be safely outsourced (King 2001). However, as outsourcing vendors have developed more sophisticated capabilities, and as more complex and important activities are outsourced, this premise has been relaxed; activities are no longer viewed to be either commodity or core, but often as some mix of the two. This would suggest that clients tend to seek a higher level of formal control over vendor activities and performance if the outsourced function includes a greater degree of the client's core competencies. TCE theorists also argue that contracts and other formal controls are required to safeguard specific organizational assets in market exchanges (Poppo and Zenger 1998). This suggests:

HYPOTHESIS 2. *The degree of core competency in an IS outsourced activity will be positively associated with the amount of formal control.*

Client Knowledge
A few studies in the outsourcing literature have established a relationship between client knowledge and client-vendor relationships. Goles (2001) suggests that client characteristics, such as the client's IS capabilities, have a significant impact on the quality of a client-vendor relationship. Willcocks and Kern (1998) suggest that the clients' business-related IT experience is associated with risk mitigation in IS outsourcing. These studies suggest that, in the outsourcing context, two knowledge components are relevant: technical and relationship management. The knowledge construct maps nicely onto TCE's bounded rationality. In general, greater client knowledge enables the client to better understand technical issues and vendor processes, as well as to more effectively communicate with and motivate appropriate vendor behavior.

Technical Knowledge. Strong client technical knowledge in an outsourcing relationship should significantly enhance the level of success (Willcocks and Kern 1998, Lacity et al. 1995). A technically competent client is likely to provide higher quality requirements as well as more pertinent feedback to the vendor at all stages of the relationship. Such a client can also more efficiently monitor and coordinate the work steps, activities, and deliverables from the vendor. TCE suggests that technical knowledge compensates

for bounded rationality in the sense that clients with greater technical expertise are better able to understand and react to vendor activities than clients who are less knowledgeable; when comprehensive information is exchanged between client and vendor in a timely manner, the need for formal mechanisms to coordinate and control transactions is reduced (Chiles and McMackin 1996). Thus it is likely that a technically competent client may rely on fewer mechanisms and/or less intensity of formal control than a less technically competent client.

Control theorists have also examined the relationship between knowledge and control. In particular, prior research has suggested that increased technical knowledge on the part of the controller in development projects is associated with increased use of formal behavior control (Kirsch et al. 2002). Our hypothesis extends these findings by suggesting that increased client technical knowledge leads to more *efficient* use of formal controls by the client over the vendor in an outsourcing relationship in the sense that fewer mechanisms and less intensity of control will be required to achieve organizational objectives. Therefore we predict:

HYPOTHESIS 3. *The technical knowledge of the client will be inversely associated with the amount of formal control.*

Relationship Management Knowledge. Working in an outsourcing relationship requires knowledge about relationship management, including expertise in contract negotiation, performance monitoring, and vendor communication (Lacity et al. 1995, Goles 2001). In an outsourcing arrangement, individuals who were once responsible for designing and building information systems may now find the need to communicate requirements to a vendor and participate in contract negotiation. One of the key client responsibilities in an outsourcing relationship is to assess vendor progress and performance to ensure that the vendor is delivering as promised (Kern and Willcocks 2000, Lacity and Willcocks 2000).

Research in TCE and outsourcing suggests that a client's ability to understand vendor behaviors and coordinate vendor activities is enhanced when his relationship management knowledge is stronger (Koh et al. 2004, Willcocks and Kern 1998,

Chiles and McMackin 1996). Relationship management knowledge counteracts bounded rationality: As the client gains experience in working with vendors and becomes more effective in communicating with the vendor and in understanding and monitoring progress, his ability to recognize and evaluate vendor behavior increases. It seems likely that when the client is more effective in the vendor management process, he will require a lesser amount of formal control to ensure synchronization between the vendor's performance and client objectives. For example, knowledgeable clients are likely to have a deep understanding of vendor behaviors, and thus can efficiently interpret progress reports, observed vendor behaviors, or information garnered from other control mechanisms. On the other hand, clients with little relationship management knowledge may not fully understand vendor activities. Consequently, they may let incorrect or inappropriate activities continue for some time, ultimately, resulting in the increased use of more extensive formal controls to correct or mitigate such behavior. For example, in this case, the client might demand more detailed and frequent demonstrations of the evolving product, system tests, progress reports, and formal status meetings. Thus we argue that clients with less relationship management knowledge will require more mechanisms of formal control to fully understand and motivate appropriate vendor behavior than clients with more relationship management knowledge. This suggests:

HYPOTHESIS 4. *The relationship management knowledge of the client will be inversely associated with the amount of formal control.*

Trust

The trust construct of our research model maps to the TCE dimension of opportunism as trust is viewed as the *opposite* of opportunism (Ghoshal and Moran 1996, Williamson 1985). The threat of opportunism implies a lack of trust and the need to embed costly safeguards into contracts (Chiles and McMackin 1996, Williamson 1985); in the presence of trusting relations, the need for such formal safeguards, including formal control mechanisms, is reduced.

Trust as a key element in an outsourcing relationship has been supported by numerous studies (e.g., Sabherwal 1999, Langfield-Smith and Smith 2003).

Further, the level of trust in a relationship has been shown to influence the choice of controls (Das and Teng 1998). If a client trusts a vendor—that is, if she believes the vendor is honest, capable, and helpful—she will likely rely on fewer mechanisms of formal control. Consistent with a TCE perspective, a trusting client is more inclined to provide greater operational flexibility to the vendor and is thus less likely to exercise intensive formal control over the vendor. Indeed, Das and Teng (2001) examined the relationship between trust and control and suggested that an extensive amount of formal control will undermine trust between two strategic alliance partners. Using a similar rationale, a higher degree of trust between a client and a vendor should help to create an environment in which fewer formal controls are used less frequently.

HYPOTHESIS 5. *Client trust in the vendor will be inversely associated with the amount of formal control.*

Methodology

To test the hypothesized relationships in our model, we used a survey-based methodology, and client-vendor matched-pair dyad as the unit of analysis. Most prior research in outsourcing has collected data from either clients or vendors (e.g., Levina and Ross 2003, Barthelemy 2003). However, Koh et al. (2004) found that various stakeholders have different perspectives on outsourcing arrangements. Consequently, in this study we adopt a more balanced approach by collecting data from both clients and vendors who are participating in large, ongoing outsourcing arrangements. We are studying only arrangements in which both client and vendor employees jointly participate, whether they are colocated. Independent and dependent variables are assessed by different respondents—clients and vendors, respectively—which significantly reduce the risks of common source bias.

We focused only on those outsourcing arrangements that had progressed to a reasonable maturity (more than three months in duration). Establishing this criterion for inclusion in the sample ensures that the client and vendor dyads have had significant opportunities to work with each other and to develop a relationship where they could reasonably assess characteristics such as trust and control.

Data Collection

We approached all potential respondents by clearly specifying the goals of the study and the potential benefits to the participants. A website, www.ISoutsourcing.com, was established to host the survey instrument, accelerate communications to the respondents, and provide higher accuracy and efficiency in data collection and analysis.

Initially, the management executives of vendor firms were contacted through e-mail followed by a personal phone call. We used a convenience sample. The executives at these firms were professional acquaintances of one of the authors, which was a key criterion in selection of these sites because it facilitated our ability to ensure that the ultimate respondents were appropriate for the purpose of this study. If the vendor executives agreed to participate, they were requested to solicit the participation of the executive of their counterpart clients. The client executives and the vendor executives who agreed to participate then forwarded the e-mail with the participation invitation to their team members. That e-mail included detailed information about the purpose of the study, the level of participation required, and the potential benefits. It also stressed the anonymity and confidentiality of the respondents. The e-mail provided the URL address and a link to the website where the survey was available. About one week later, a reminder e-mail was sent, followed by a supporting phone call, to the same executives with a reminder request for participation if they had not already taken action.

Of the fourteen vendor executives who were requested to participate in the study, eight agreed, for a vendor response rate of 57%. Followup communications with the six nonparticipating vendors did not reveal any significant trend or overarching reason(s) that would point toward a nonresponse bias. Furthermore, the wide range of responses to our survey items (as shown in Table 5) suggest a lower risk of non response bias in the study.

Each participating executive identified an outsourcing arrangement focused on one major objective, for example, the implementation of an enterprise resource planning (ERP) system. For each of these eight arrangements, there were multiple client-vendor pairs eligible to participate. The ERP implementation, for example, was divided into a number of distinct activities such as process redesign, new infrastructure implementation, and change management. A team consisting of client and vendor personnel was organized for each activity. In all, 138 client and 147 vendor representatives participated in this study. The nonpaired data were dropped from the analysis, resulting in a sample size of 138 unique matched pairs of clients and vendors.

Instrument Development

Two instruments were developed for this study, one for collecting data about the independent variables from the clients, and one for collecting data from the vendors about the amount of formal control. The approach used in developing these instruments is consistent with generally accepted guidelines (e.g., Sethi and King 1991). All constructs were measured with multiple items.

A pretest was conducted with five IS practitioners and three doctoral students. In addition, the questionnaires were reviewed and analyzed by two IS faculty members who provided feedback and comments for improvement.

Following the pretest, a global multimillion-dollar outsourcing arrangement was selected as the site for the pilot study. This outsourcing arrangement involved an automotive client with more than $15 billion of revenue that has outsourced application development and infrastructure management to a global vendor with a contract value of $500 million over 10 years. A total of 18 respondents participated in the pilot study, 7 client and 11 vendor representatives. The study resulted in clarification of the unit of analysis for the respondents (the client-vendor dyad rather than the overall outsourcing arrangement), minor changes in wording a few items, the addition of a "Don't know" option to some items, and the addition of assurances that a high degree of confidentiality would be maintained. Respondents in the pilot study were not incorporated into the main study.

Operationalization of the Variables

Wherever feasible, existing measures were used. Except for the demographic items, a 7-point Likert scale having "strongly disagree" and "strongly agree" anchors was used. All items are shown in the appendix, along with the source of the items.

Two new measures were developed for this study: degree of core competency involvement and amount of formal control. Degree of core competency involvement measures the extent to which the outsourced IS activity constitutes a core competency for the client organization. Seven items for this construct were derived from the definitions and discussions of core competency provided in King (2001) and Barthelemy (2003). The items involved the degree to which the outsourced activity creates a competitive advantage, is imitable, transferable, evolved through collective learning and information sharing, and synergistic with the other organizational activities.

Amount of formal control is defined as the variety of mechanisms used by a client to exercise control over a vendor and the extent to which the mechanisms are used. Items were based on findings from a prior study that identified control mechanisms used in the IS project context (Kirsch 1997): meetings or conference calls, project plans, progress reports, requirements documentation, system testing, and situational settings (assessing progress during client-vendor interactions). Each of these mechanisms can be used by the client to control the vendor. During meetings, for example, the client can ascertain and assess the vendor's progress, and suggest needed adjustments to ensure progress. As shown in the appendix, each of the six control mechanisms is operationalized with three items, using the same instructions to the respondents as Henderson and Lee (1992, p. 767): "Please indicate the extent to which you agree or disagree with the following statements." Consistent with prior research (Henderson and Lee 1992, Tannenbaum 1968), scores for individual items are added to arrive at the total amount of formal control used by a client to control a vendor in an outsourcing relationship.

Based on prior studies that noted the influence of size and duration of projects on portfolios of control (Choudhury and Sabherwal 2003, Kirsch 2004), two control variables were used in the study—the cost of the outsourcing arrangement and the current duration of the outsourcing arrangement. Client and vendor respondents provided estimates for the dollar value of the contract of the overall outsourcing arrangement (as opposed to the dollar value of the particular activity they were working on). Scores

Table 1   Cost of the Outsourcing Arrangement

Contract value	Arrangements	%
Less than $1 million	1	12.5
$1 million to less than $10 million	2	25.0
$10 million to less than $100 million	4	50.0
$100 million to less than $1 billion	1	12.5
Total	8	100.0

from clients and vendors associated with a particular outsourcing arrangement were averaged and the average served as a proxy for the cost of the outsourcing arrangement. The current duration of the outsourcing arrangement was measured by asking client and vendor respondents how long this outsourcing arrangement has been operational at the time of the survey. Again, their responses were averaged to arrive at one score. Because the measures for the two control variables were aggregated, interrater agreement (r_{wg}) was assessed for each (James et al. 1984). The r_{wg} scores for cost of the outsourcing arrangement and the current duration of the outsourcing arrangement were 0.76 and 0.71, respectively, which are within acceptable ranges (James et al. 1993).

Analyses and Results

The largest number of respondents from an outsourcing arrangement consisted of 16 client and 23 vendor representatives; the smallest consisted of seven clients and nine vendors. Five of the eight outsourcing arrangements characterized their focus as "applications management," two as "IT support," and one as "business process outsourcing." Three client firms were in the auto industry, two each in health care and manufacturing, and one in retail.

Tables 1–4 present the demographic characteristics of the sample. The cost of the outsourcing arrangement is shown in Table 1 and the current duration of the outsourcing arrangement is presented in Table 2. As seen in Table 1, half of the outsourcing arrangements were between $10 million and

Table 2   Current Duration of the Outsourcing Arrangement

Years	Arrangements	%
Less than 1 year	2	25.0
1–5 years	5	62.5
5–10 years	1	12.5
Total	8	100.0

Table 3   Respondent Profile—Client Experience

Years	Client's involvement with this outsourcing arrangement	%	Client's total experience with outsourcing in general	%	Client's work experience with this company	%
Less than 1 year	27	19.6	9	6.5	14	10.1
1–5 years	98	71.0	62	44.9	37	26.8
5–10 years	13	9.4	49	35.5	39	28.3
More than 10 years	0	0.0	18	13.0	48	34.8
Total	138	100.0	138	100.0	138	100.0

$100 million. Table 2 presents the current duration of the outsourcing arrangement. Of the eight outsourcing arrangements studied, the longest running had been operational for more than six years, while the newest was seven months old. The profile of client representatives in terms of their experience in this arrangement, with outsourcing, in general, and their tenure with their employing companies, is displayed in Table 3. A similar profile of the vendor representatives is shown in Table 4.

Reliability and Validity Analyses
Table 5 displays the descriptive statistics for the independent and dependent variables, after removing the items with low factor loadings (as discussed later). Table 5 also includes Cronbach's alpha for each scale. Initially, Cronbach's alpha for the dependent variable was below 0.7, the conventional standard for acceptable reliability. After dropping two items, as shown in the appendix, the overall Cronbach's alpha improved to 0.71. Cronbach's alpha for all other variables also exceeds 0.70. The last column of Table 5 reports an internal consistency measure (Fornell and

Table 4   Respondent Profile—Vendor Experience

Years	Vendor's involvement with this outsourcing arrangement	%	Vendor's total experience with outsourcing in general	%	Vendor's work experience with this company	%
Less than 1 year	33	23.9	17	12.3	22	15.9
1–5 years	88	63.8	28	20.3	59	42.8
5–10 years	17	12.3	56	40.6	46	33.3
More than 10 years	0	0.0	37	26.8	11	8.0
Total	138	100.0	138	100.0	138	100.0

Table 5   Descriptive Statistics and Reliabilities (After Removing Items with Low Loadings)

Variables	Min.	Max.	Mean	Std. dev.	Cronbach's alpha	Internal consistency
Technical knowledge	1.00	6.67	5.01	1.09	0.93	0.96
Relationship management knowledge	1.33	7.00	5.54	1.10	0.88	0.93
Trust	2.33	7.00	5.84	1.02	0.92	0.94
Task uncertainty	1.00	6.67	2.96	1.28	0.88	0.93
Degree of core competency involvement	1.33	7.00	3.43	1.19	0.81	0.87
Amount of formal control	2.83	6.12	3.87	1.09	0.71	0.83

Note. N = 138.

Larcker 1981), which can be interpreted in a manner similar to Cronbach's alpha. As seen, the internal consistency of each scale is greater than 0.8. These analyses suggest the scales are reliable.

Construct validity was assessed along two dimensions, convergent and discriminant. To begin, we ran several factor analyses. The common rule of thumb is that 10 observations are needed for each item. Given the sample size was not large enough to perform one factor analysis on all variables, we ran separate analyses for the dependent and independent variables, as is done in other studies (e.g., Kirsch et al. 2002).

The dependent variable, amount of formal control, is an aggregate of the measures of six individual formal control mechanisms, as explained earlier. We first factor analyzed the individual scales, and found that all items loaded at 0.57 or higher. We next used partial least squares (PLS) to assess the measurement model. A rule of thumb is that item loadings of 0.7 or above should be retained (Barclay et al. 1995). The PLS loadings of the dependent variable are presented in Table S1 in the online supplement,[2] showing that 14 of the 16 items loaded above 0.7, while two items are slightly below 0.7 (at 0.68 and 0.69). Before conducting additional analyses, we turned our attention to the independent variables.

We first factor analyzed the independent variables. The entire set of items measuring all five independent

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[2] Supplemental tables are contained in an online appendix to this paper that is available on the *Information Systems Research* website (http://isr.pubs.informs.org/ecompanion.html).

Table 6   **Correlations between Constructs**

Variables	Cost of outsourcing arrangement	Current duration of outsourcing arrangement	Technical knowledge	Relationship management knowledge	Trust	Task uncertainty	Degree of core competency involvement	Amount of formal control
Cost of outsourcing arrangement	**1.000**							
Current duration of outsourcing arrangement	−0.088	**1.000**						
Technical knowledge	−0.062	0.078	**0.937**					
Relationship management knowledge	0.095	0.089	0.283*	**0.902**				
Trust	−0.084	0.104	−0.113	0.198*	**0.853**			
Task uncertainty	−0.109	0.088	0.106	−0.088	0.068	**0.901**		
Degree of core competency involvement	0.068	0.087	0.119	0.101	−0.072	−0.113	**0.830**	
Amount of formal control	−0.117	0.091	−0.487**	−0.453**	−0.676**	0.281*	0.203*	**0.823**

Notes. $N = 138$. The boldface diagonal cells are the square root of AVE and the off-diagonal elements are correlations between the constructs.
  *Indicates significance at 0.05 level (two tailed); **indicates significance at 0.01 level (two tailed).

variables was included in a single factor analysis. The number of factors was specified as five, and a direct oblimin rotation method was used. Table S2 in the online supplement displays these factor loadings; a number of items measuring the independent variables were below the 0.4 threshold, prompting additional validity tests.

We next used PLS to assess the measurement model for the independent variables. Item loadings for task uncertainty and degree of core competency involvement generated by the PLS analysis were similar to the item loadings generated by the factor analysis, indicating problems with two task uncertainty items (1 and 5) and four core competency items (2, 3, 4, and 5). Based on results of both analyses, we eliminated these items. Table S3 in the online supplement displays the PLS loadings after removing these items. A factor analysis was again run for the independent variables, specifying five factors. All items loaded highly (above 0.58) on their appropriate factors; cross-loadings less than 0.20 suggested a high degree of discriminant validity. The results of the factor analysis are shown in Table S4 in the online supplement.

Table 6 displays the correlation analysis of the two control variables, the independent variables, and the dependent variables. The boldface diagonal cells are the square root of average variance extracted (AVE), which is a measure of the variance shared between a construct and its indictors. All variables in Table 6 have an AVE of at least 0.5, which establishes convergent validity for all scales (Fornell and Larcker 1981). The off-diagonal cells in Table 6 are the correlations between the constructs. The values in the diagonal cells are higher than all other cells in the same row, indicating discriminant validity for all scales.

Correlations of all items with all constructs are presented in the online supplement (Table S5). As the table shows, the values in boldface cells are higher than the values in the other cells in the same row, indicating that all the items have high correlations with the constructs they are a part of and low correlations with other constructs. Consistent with the other psychometric tests, analyses of data in this table suggests a high level of convergent and discriminant validity for all scales.

Based on these analyses, the original instruments measuring client technical knowledge, relationship management knowledge, and trust, as well as the modified instruments measuring task uncertainty, core competency, and the amount of formal control, were deemed to be reliable and valid. We then tested the structural model.

Analysis of the Structural Model
PLS was used to test the hypotheses. The structural model examines the significance of the relationships among the independent and the dependent variables of the research model. Similar to linear regression,

Figure 2   The Structural Model of the PLS Analysis
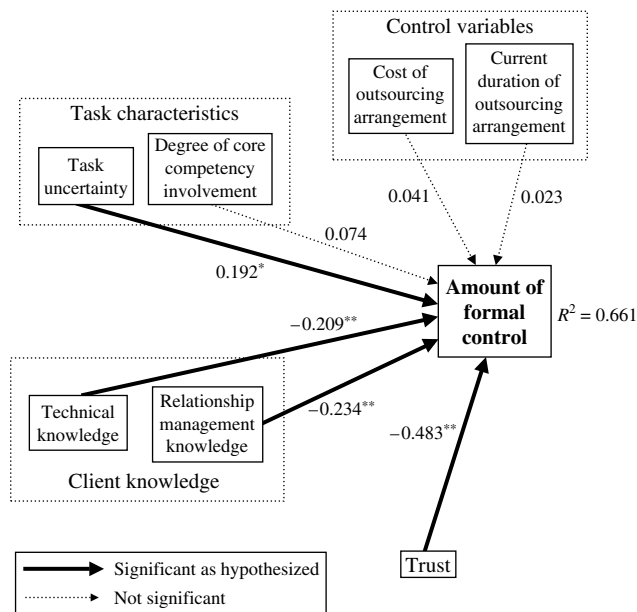
*Significant at 0.05 level; **significant at 0.01 level.

an R^2 in the PLS analysis provides the strength of the overall model. Path coefficients in the structural model specify the strength of each individual relationship. The support, or lack thereof, for the hypotheses is provided by the size and direction of the path coefficients and is reported with the p-value (Bollen 1989). Figure 2 presents the structural model. The overall R^2 is 0.661.

Results of the Hypotheses Tests. Hypotheses 1 and 2 pertain to task characteristics. As shown in Figure 2, task uncertainty has a significant and positive relationship with the amount of formal control; this supports Hypothesis 1 (path coefficient 0.192, p-value <0.05). Hypothesis 2 predicts that the extent to which an outsourced activity constitutes a core competency for the client organization is associated with the amount of formal control in an outsourcing relationship. This relationship is not supported (path coefficient −0.074, ns).

Hypotheses 3 and 4 examine the relationship between knowledge and the amount of formal control. In support of Hypothesis 3, the results indicate a significant negative relationship between the technical knowledge of the client and the amount of formal control (path coefficient −0.209, p-value < 0.01).

Hypothesis 4 is also supported. As seen in Figure 2, there is a significant negative association between relationship management knowledge and the amount of formal control (path coefficient −0.234, p-value < 0.01).

As predicted by Hypothesis 5, there is a significant negative association between client trust in the vendor and the amount of formal control (path coefficient −0.483, p-value < 0.01). Finally, neither of the control variables (the cost or duration of the outsourcing arrangement) were found to have a significant influence on the amount of formal control.[3]

Discussion and Implications
Before discussing the results, it is appropriate to note the limitations of the study. For our data, we relied on a convenience sample of vendor executives. Because the vendors solicited client participation, they may not have chosen clients with whom they had adverse relationships. Thus the data may be biased and there may have been some range restriction on the trust scale. Another limitation is that the control variables were measured at the level of the outsourcing arrangement ($n = 8$) rather than for individual client-vendor dyads ($n = 138$). Finally, we developed new scales for measuring the amount of formal control and the degree of client core competency in the outsourced activity. These scales can be enhanced and refined in future research. PLS loadings for the dependent variable measure, in particular, (Table S1 in the online supplement) reveal two loadings slightly below the accepted cutoff of 0.70. Despite these limitations, the results of this study shed important insight into the antecedents of how much formal control is exercised in outsourcing arrangements.

The results suggest that clients with more technical or relationship management knowledge, or clients who have high levels of trust in their vendors, use fewer mechanisms of formal control relatively less frequently. This implies that they can motivate vendors to achieve organizational objectives more readily than

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[3] As an additional check of the influence of the eight outsourcing arrangements, we ran a validation regression in which seven dummy variables were added to our model to represent the eight arrangements. The results are consistent with PLS results; none of the dummy variables were significant.

clients who are less capable. The results also suggest that tasks with higher uncertainty call for greater use of more mechanisms of formal control to influence the actions of the vendor in the desired manner.

These findings are important because they provide insight into how much control is used, given the characteristics of the client, or the task, or the level of trust between client and vendor. Thus they complement prior work that focuses on *what type* of control is exercised. Our findings also reinforce the relevance of the measurement branch of TCE to the IT outsourcing domain as, at least, a framework for guiding the thinking concerning the controls that may be applied in this context.

As observed in other research, stakeholder knowledge influences control choices (Choudhury and Sabherwal 2003, Kirsch et al. 2002, Kirsch 1996). In this study, we examined two specific components of knowledge—technical and relationship management. Both were found to be significantly and inversely associated with the amount of formal control in an outsourcing situation. This supports prior research (Barthelemy 2003, Kern and Willcocks 2000, Lacity et al. 1995) that argued that stronger client capabilities lead to more effective and efficient vendor monitoring and evaluation, thus requiring the use of a lesser amount of formal control. A client with stronger technical knowledge is likely to be more proficient in articulating requirements, assessing the vendor's deliverables and offering pertinent feedback, thus facilitating reduced reliance on extensive formal control mechanisms, for example, by requiring fewer rounds of comparing requirements and deliverables.

Prior studies in IS have argued that more technically knowledgeable clients are associated with higher levels of behavior controls (Kirsch et al. 2002, Kirsch 1996). Our findings supplement these results by suggesting that increased technical knowledge of the client team is associated with the use of fewer formal control mechanisms and/or less intensive use of mechanisms by the client over the vendor in an outsourcing relationship.

The client's relationship management knowledge was also found to be significantly and inversely associated with the amount of formal control. This is congruent with prior research that focused on expertise about vendor selection, communication, and contract management as facilitators of enhanced flexibility in vendor management (Barthelemy 2003, Goles 2001, Lacity and Willcocks 2000). Moreover, Lee and Kim (1999) argued that improved relationship management capability such as communication and coordination facilitate a stronger partnership between the client and the vendor, thus reducing the need for extensive controls. Strong client relationship management knowledge of the client can be manifested in a number of ways such as well-organized meetings or clear routine e-mail communication. For instance, a client with strong communication skills can use e-mail efficiently to specify information needed from the vendor, and can readily interpret and understand progress reports from the vendor. Receiving an unambiguous e-mail from the client can help the vendor produce and deliver the information precisely as the client requires. On the other hand, a client who lacks such communication skills may need to use more mechanisms of control more frequently, such as resorting to multiple personal meetings with the vendor to clearly specify informational needs.

Our model also examined the relationship between client trust in the vendor and the amount of formal control. Although trust has been presented as one of the key elements of outsourcing relationships (Sabherwal 1999, Langfield-Smith and Smith 2003), empirical investigation of trust and control in outsourcing relationships has been limited. As hypothesized, our results present a significant and inverse relationship between trust and the amount of formal control. This finding suggests that clients with higher levels of trust will use less formal control to motivate appropriate vendor behavior.

In addition to examining trust and client knowledge, we studied the relationship between task characteristics and the amount of formal control. As hypothesized, task uncertainty was found to be positively associated with the amount of formal client control over the vendor. This is consistent with prior studies in TCE, control, and outsourcing where researchers argued that in situations of high uncertainty, clients tend to establish rigid contracts and other formal control mechanisms to mitigate risk emanating from uncertainty (Kern and Willcocks 2000, Cheon et al. 1995, Eisenhardt 1985).

The degree of core competency involved in the outsourced activity was the other task characteristic examined in this study. It refers to the extent to which an outsourced activity constitutes a core competency for the client organization. Prior studies have argued that whenever clients outsource a part of their core competencies, they tend to use tighter contracts with the vendors (Saunders et al. 1997), though this has been challenged by at least one study (Smith et al. 1998). Our results did not indicate any significant relationship between the degree of core competency involvement and the amount of formal control. One possible explanation is that the scale we developed to measure degree of core competency involvement may have been inadequate. Another explanation is that the increasing complexity and sophistication of tasks that are outsourced have served to outmode the simplistic commodity versus core dichotomy that characterized outsourcing thinking in the past.

Nonetheless, this is a result that is suggestive of the need for future research. It certainly is the conventional wisdom that there should be a strong relationship between core competency and the amount of formal control. According to this logic, with the increasing tendency for more and more sophisticated activities to be outsourced, client-vendor relationships must be designed with the core competency control relationship in mind. If this nonsignificant result does not emanate from measurement issues, it suggests that this is not being done, i.e., that as outsourced activities have become more complex and sophisticated (Kripalani 2006), the control procedures that were in place for simpler activities have merely been continued. Another possibility is that clients do not clearly recognize the degree to which core competencies are being outsourced, and thus rely on traditional controls. There is some evidence that suggests this (McLellan et al. 1995, Earl 1996, Hancox and Hackney 2000).

These results may be suggestive of normative practical principles. Because it is often difficult to untangle commodity versus core activities, task uncertainty may be a pragmatic surrogate that can be used to design the nature and level of formal controls. The implication of assigning technically competent personnel to the outsourcing team and ensuring high levels of relationship management knowledge may also be prescriptively valid.

Conclusions

This study builds on prior research in control (Kirsch 1997, Kirsch et al. 2002, Henderson and Lee 1992) and extends it to the domain of IS outsourcing, thus significantly furthering recent research (Choudhury and Sabherwal 2003, Levina and Ross 2003, King 2001). This research also adds to our understanding of client control over a vendor. Specifically, our findings suggest that outsourced tasks that are high in uncertainty call for a greater amount of formal control. On the other hand, when clients have considerable technical or relationship management knowledge, or when the client trusts the vendor, she may use a lesser amount of formal control.

While Choudhury and Sabherwal (2003) studied control in the context of outsourced systems development projects, we included application management, business process outsourcing, and infrastructure management in our target population. Incorporating a wider range of outsourcing activities in the target population strengthens the generalizability of results from this study to the broader IS outsourcing context.

The results of this study suggest a number of avenues for future research. For example, in this study, we did not differentiate between global and domestic outsourcing. Because global outsourcing (i.e., offshoring) entails complex issues of geographical, cultural, and lingual differences, future research could explore the international dimension of outsourcing. We also did not include informal controls in our model because two different organizations are likely to rely primarily on formal controls; however, informal controls are also clearly part of the client-vendor relationship and could be included in future research efforts. Building on the initial research by Tannenbaum (1968) and Henderson and Lee (1992) on the relationship between the amount of control and performance, additional research is needed to investigate the amount of formal control and its influence on the effectiveness or success of outsourcing arrangements. Recent research has shown that portfolios of mechanisms evolve over time in response to changes and problems encountered during IS projects (Kirsch 2004, Choudhury and Sabherwal 2003). We leave this evolutionary question to future research. Finally, it is possible that some of the antecedents have an interaction effect on the amount of formal control. In

the control literature, Kirsch and colleagues (Kirsch 1996, Kirsch et al. 2002) have argued that stakeholder knowledge interacts with task characteristics to influence the type of control used. It is possible that client technical knowledge, coupled with task uncertainty, might similarly influence the amount of control. It would be fruitful to explore these possible interactions in a systematic fashion in future research.

Acknowledgments

Appendix. Constructs and Items

Technical Knowledge
Item 2 is adapted from Xia (1998); items 1 and 3 are new:

With respect to the *client team* in this outsourcing arrangement, please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client team clearly grasps the fundamentals of IT as they relate to its business.

(2) The client team members frequently update their technical skills.

(3) Overall IT capabilities of the client team are excellent.

Relationship Management Knowledge
Items 1 and 3 are adapted from Goles (2001); item 2 is new:

With respect to the *client team* in this outsourcing arrangement, please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client team has strong relationship management capabilities.

(2) The client team has the skill set essential to managing interorganizational relationships.

(3) The client team has the capability to effectively manage this outsourcing arrangement with this vendor.

Trust
Items 1, 2, 3, 5, and 6 are adapted from McKnight et al. (2002); item 4 is adapted from Gefen et al. (2003):

With respect to the *vendor team* in this outsourcing arrangement, please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) If the client team required help, the vendor team would do its best to help.

(2) The vendor team is interested in the client team's well-being, not just their own.

(3) The vendor team is honest and truthful.

(4) This is a trustworthy vendor.

(5) The vendor team is very knowledgeable about information systems and technology.

(6) The vendor team is a capable and proficient provider of IS outsourcing services.

Task Uncertainty
Items 1 and 5 are adapted from Chang et al. (2003); items 2, 3, and 4 are new:

As you indicated earlier, ≪*outsourced activity*≫ is the primary focus of your team in this outsourcing arrangement. With respect to ≪outsourced activity≫, please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) This outsourced IS activity is quite routine and repetitive.*

(2) Business processes that are most closely associated with this outsourced IS activity are likely to remain fairly stable in the short term.

(3) Information technologies that are most closely associated with this outsourced IS activity are likely to remain fairly stable in the short term.

(4) Performing this outsourced IS activity is likely to remain fairly predictable in the short term.

(5) There are established procedures and practices that can be followed to perform this outsourced IS activity.*

Degree of Core Competency Involvement (New Items)
As you indicated earlier, ≪*outsourced activity*≫ is the primary focus of your team in this outsourcing arrangement. With respect to ≪outsourced activity≫, please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) This activity creates a competitive advantage for our organization.

(2) This activity cannot be readily duplicated by other organizations.*

(3) This activity cannot be easily transferred to other organizations.*

(4) This activity has evolved in our organization through collective learning.*

(5) This activity has evolved in our organization through information sharing.*

(6) This activity is synergistic with other capabilities of our organization.

(7) This activity constitutes a core competency for our organization.

Amount of Formal Control (All New Items)

This section pertains to the usage of *meetings or conference calls* in this outsourcing arrangement. Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client initiates frequent meetings or conference calls with the vendor team to discuss the project status, issues, and resolutions.

(2) The client assesses the performance of the vendor team during the meetings or the conference calls.

(3) During the meetings or the conference calls, the client provides significant feedback to the vendor team regarding their performance.

This section pertains to the usage of *project plans* in this outsourcing arrangement. Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client assesses the extent to which the vendor team follows the project plan.

(2) The client provides feedback to the vendor team on the extent to which the vendor team follows the project plan.*

(3) Performance appraisal of the vendor team by the client team is dependent, in part, on the extent to which the vendor team follows the project plan.

This section pertains to the usage of *progress reports* in this outsourcing arrangement. Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client team assesses the extent to which the vendor team achieves the outsourcing goals as indicated by the progress reports.

(2) The client team provides feedback to the vendor team on the extent to which the vendor team achieves the outsourcing goals as indicated by the progress reports.

(3) Performance appraisal of the vendor team by the client team is dependent, in part, on the extent to which the vendor team achieves the outsourcing goals as indicated by the progress reports.

This section pertains to the usage of *requirements documentation* provided by the client in this outsourcing arrangement. Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client assesses the extent to which the vendor team meets the requirements specified by the client.

(2) The client provides feedback to the vendor team on the extent to which the vendor team meets the client requirements as specified in the requirement documentation.

(3) Performance appraisal of the vendor team is dependent, in part, on the extent to which they meet the requirements provided by the client.*

This section pertains to the usage of *system testing* in this outsourcing arrangement. System testing (including system demos) refers to the formal or informal assessment of the quality of the deliverables and adherence to the established technical standards. Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) The client routinely conducts testing on system components delivered by the vendor team.

(2) The client provides feedback to the vendor team on the results of system testing.

(3) Performance appraisal of the vendor team by the client team is dependent, in part, on the extent to which the system testing is successful.

This section pertains to the *situational settings* in this outsourcing arrangement. Please indicate the extent to which you agree or disagree with the following statements using a scale of 1 to 7, where 1 indicates "strongly disagree" and 7 indicates "strongly agree."

(1) Client team members frequently walk around the project sites to informally gather first-hand information about the tasks, activities, progress, and issues in this outsourcing arrangement.

(2) During unscheduled and informal interactions with the vendor team around the office, client team members provide significant feedback to the vendor teams.

(3) Client team members influence the tasks and activities of the vendor team during unscheduled and informal interactions around the office.

Note: * Indicates items that were deleted during instrument validation.

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