

How Formal Governance Affects Multisourcing Success: A Multi-level Perspective

Completed Research Paper

Oliver Krancher

IT University of Copenhagen
Rued Langgaards Vej 7
2300 Copenhagen S, Denmark
olik@itu.dk

Ilan Oshri

The University of Auckland
12 Grafton Road, Auckland 1010,
New Zealand
ilan.oshri@auckland.ac.nz

Julia Kotlarsky

The University of Auckland
12 Grafton Road, Auckland 1010,
New Zealand
j.kotlarsky@auckland.ac.nz

Jens Dibbern

University of Bern
Engenhaldenstr. 8
3012 Bern, Switzerland
jens.dibbern@iwi.unibe.ch

Abstract

Multisourcing has become a common sourcing model in recent outsourcing practice. Yet, the extant and relevant IS literature has so far offered limited insight into how to stipulate both individual (i.e., individual vendor) and joint (the entire vendor network) performance while ensuring governance efficiency. Our study set about addressing this gap by examining how these three dimensions of multisourcing success can be achieved through formal governance. Specifically, we considered bilateral formal control, collective formal control and conflict arbitration (among vendors) as key formal governance elements. Results from a pan-European survey of client firms pursuing multisourcing projects show that bilateral formal control sets the stage to achieve both individual and joint performance, while conflict arbitration strengthens individual performance, and collective formal control strengthens joint performance. Governance efficiency is improved when both collective formal control and conflict arbitration are high. We also found that conflict arbitration strengthens the positive effect of collective formal control on both individual and joint performance. Our findings highlight the importance of governing inter-vendor relationships in multisourcing arrangements as opposed to relying solely on bilateral governance. Our study extends the limited literature on IS multisourcing, and assists managers in considering the strategies they wish to pursue when choosing appropriate governance mechanisms.

Keywords: Multisourcing, formal governance, collective governance, bilateral governance, conflict arbitration, multisourcing success, joint performance, governance efficiency

Introduction

Outsourcing practitioners and researchers alike are paying increasing attention to information systems (IS) multisourcing—the practice of contracting *interdependent* IS services to two or more vendors (Bapna et al. 2010; Wiener and Saunders 2014). Unlike multi-vendor outsourcing (Angst et al. 2017; Koo et al. 2016;

Levina and Su 2008; Su and Levina 2011), where multiple vendors are contracted to provide different independent services, multisourcing requires vendors to interact due to interdependencies between the services each of them delivers as part of a larger integrated service to a client (Bapna et al. 2010). Given these interdependencies, clients pursue at least three objectives in multisourcing. First, clients need to ensure that each vendor, individually, delivers its respective service to the client's satisfaction (individual performance). Second, clients need to ensure that the overall larger service meets their expectations, which implies that interdependencies and conflicts between vendors are effectively addressed (joint performance). Third, despite the complexity inherent to the management of interdependencies among multiple vendors, clients may also want to keep their governance efforts within reasonable limits (governance efficiency). In this paper, we examine the formal governance strategies clients can use to achieve these objectives.

Although the existing outsourcing and control literatures provide useful foundations for investigating the relationship between formal governance and success in outsourcing, we note three important gaps in the context of multisourcing. First, while the literature focuses on success in dyadic outsourcing relationships (Gopal and Gosain 2010; Tiwana and Keil 2009), multisourcing arrangements present a more complex setting in which both dyadic relationships (between the client and each vendor) and collective relationships (between the client and the set of vendors) exist (see also Figure 1). In such a setting, clients exercise governance to not only ensure high individual performance from each vendor, but also to achieve high levels of joint performance (implying that the individual services integrate smoothly into a coherent whole) and governance efficiency. However, there is little empirical research that focuses on these three distinct dimensions of multisourcing success. Second, while the existing literature examines the role of formal control (i.e., the client's efforts to formally specify and monitor outcomes and procedures) (Choudhury and Sabherwal 2003; Rustagi et al. 2008), formal control can be of two different types in multisourcing: *bilateral formal control* and *collective formal control*. In *bilateral formal control*, clients specify and monitor outcomes to be achieved and procedures to be followed by each vendor individually. In contrast, in *collective formal control*, the client specifies and monitors the outcomes to be jointly achieved and procedures to be jointly followed by the vendors. Although Bapna et al. (2010) introduce this distinction, there is little empirical evidence that shows how these two types of formal governance, and their interaction, affect success. Third, multisourcing has been portrayed as potentially leading to a blame-game between vendors (Bapna et al. 2010). Thus, conflict resolution *between vendors* is imperative to achieving desired outcomes. Given this unique threat of between-vendor conflict in multisourcing, Bapna et al. (2010) suggest that *conflict arbitration* procedures (often specified through operational-level agreements) can help vendors resolve conflicts themselves. Yet empirical research on the effect of between-vendor conflict arbitration characters on multisourcing success is lacking.

In the light of these gaps, our research aims to address the following question: *How do bilateral formal control, collective formal control, and conflict arbitration affect success in multisourcing arrangements?*

To address this question, we develop a conceptual model that distinguishes between the two levels on which interactions take place in multisourcing settings: the dyadic client-vendor level and the triadic client-vendors level, as shown in Figure 1. We develop hypotheses and test them using survey data from 189 multisourcing arrangements. The results provide novel insights into how formal governance strategies and the interactions between them affect different dimensions of success in multisourcing arrangements.

Theoretical Background and Hypotheses

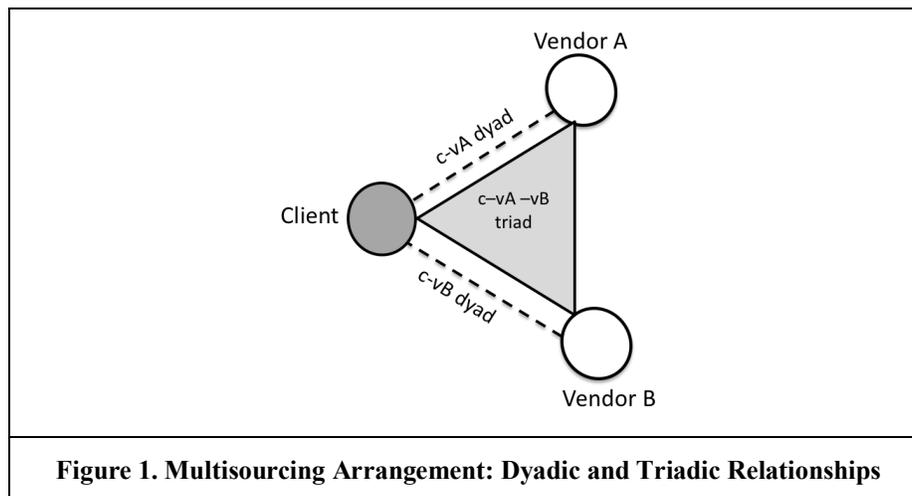
Multisourcing: background

The key characteristic that distinguishes multisourcing arrangements from other settings that involve multiple vendors is the existence of *interdependencies* between services provided by different vendors (Bapna et al. 2010; Wiener and Saunders 2014). For instance, a major logistics service provider delegated the development of state-of-the-art software for its letter carriers' mobile devices to a team of six vendors. While each of the vendors developed a set of modules for the software, it was essential that the modules fitted together to form an integrated, coherent software application. To deal with these interdependencies, the client urged the vendors to help each other, to exchange information on a regular basis, and to accommodate unforeseen changes (Hurni et al. 2015; Tomczak 2015).

Although multisourcing arrangements, as in the above example, involve multiple vendors and rely on collaboration between vendors, the arrangements are based on a set of dyadic contracts between the client and

each individual vendor. Figure 1 illustrates this by showing a multisourcing arrangement that involves two vendors. The arrangement encompasses two dyadic relationships, c-vA and c-vB, where each relationship is based on a separate contract. However, reducing the arrangement to these two dyads would create an incomplete representation of multisourcing by overlooking the interdependencies between the services provided by Vendor A and Vendor B. These interdependencies come into the picture only if the arrangement is conceptualized as a triad that involves the Client, Vendor A, and Vendor B. Multisourcing arrangements present a multi-level phenomenon (Klein and Kozlowski 2000), where the multisourcing arrangement (such as the triad in Figure 1) is at the higher level of analysis (level 2) and the client-vendor dyads that are part of the multisourcing arrangement are at the lower level of analysis (level 1).

Acknowledging the multi-level nature of multisourcing is important for at least two reasons. First, clients make formal governance decisions both at the level of the dyad and at the level of the multisourcing arrangement. Second, success may be measured on both these levels. We next elaborate on clients' formal governance choices and on success dimensions at these two levels.



Formal governance in multisourcing

In line with the outsourcing and control literatures, we use the term *formal governance* to refer to the client's use of document-based mechanisms to regulate the behavior of vendors (Goo et al. 2009; Poppo and Zenger 2002). Formal governance contrasts with relational governance, which denotes governance based on shared norms that result from social processes (Poppo and Zenger 2002). In this paper, we focus on formal governance. Although relational governance in multisourcing may also merit attention, formal governance is of particular importance, given that "relational governance ... models might not be feasible for multiple vendors" (Bapna et al. 2010, p. 789).

While most IS research on outsourcing governance refers to single-sourcing arrangements, Bapna et al. (2010) sketch three forms of formal governance in multisourcing, which we refer to as bilateral formal control, collective formal control, and conflict arbitration (see also the left-hand side of our research model in Figure 2). Following the control literature, we use the term *formal control* to refer to the extent to which a client attempts to regulate vendor behavior by specifying and monitoring procedures or outcomes (Keil et al. 2013; Kirsch 1996; Rustagi et al. 2008). According to Bapna et al. (2010), an important peculiarity of multisourcing arrangements is that clients have a choice between bilateral and collective formal control. In *bilateral formal control*, the client specifies and monitors outcomes to be achieved and procedures to be followed by each vendor individually. In contrast, in *collective formal control*, the client specifies and monitors the outcomes to be jointly achieved and procedures to be jointly followed by the vendors.

To illustrate the difference between bilateral and collective formal control, consider the multisourcing project of the logistics service provider mentioned above. Recall that the project involved the development of several application modules by different vendors. In this project, the client could specify and test outcomes related to a single module, such as what output data the module should produce based on choice of input data, or by when the development of the module should be completed. Moreover, the client could prescribe

particular development, test, or documentation procedures for the module. Since these examples refer to outcomes and procedures relevant to a particular vendor, they are instances of bilateral formal control. The client could also specify and test the end-to-end business process enabled by the collective of modules, or response times that resulted from the interaction of modules assigned to different vendors. Moreover, the client could specify that code contributions by individual vendors be integrated into a shared code system and jointly deployed several times a day (Humble and Molesky 2011). These latter two examples are instances of collective formal control, since they refer to joint procedures (procedures that all vendors take part in) and joint outcomes (outcomes to be jointly produced by the vendors). The examples also illustrate that bilateral formal control may vary for different dyads within a multisourcing arrangement, whereas collective formal control does not. A client may tightly specify and monitor the outcomes of vendor A but not of vendor B (different levels of bilateral formal control for each dyad), while the extent to which the client specifies and monitors joint outcomes and procedures is a property of the multisourcing arrangement.

Bapna et al. (2010) also allude to a third type of formal governance in multisourcing. Clients may define operational-level agreements (OLAs) that specify how vendors sort out conflict between them, a mechanism that others have termed a *conflict arbitration charter* (Goo et al. 2009) (henceforth in brief: *conflict arbitration*). Conflict arbitration carries the attractive promise that vendors can resolve conflict themselves, without the client's involvement (Bapna et al. 2010). Since conflict arbitration refers to the interaction between vendors, it is a property of multisourcing arrangements, rather than of a particular client-vendor dyad.

Multisourcing success

The vast majority of IS outsourcing studies have examined success in a dyadic relationship with a single vendor. Indicators of success, examined from the client firm's perspective, highlight the financial performance of the client firm (Wang et al. 1997), improved service levels (Dibbern et al. 2004), and the quality of the relationship with the vendor (Grover et al. 1996). These studies focus on what we term *individual performance*, i.e., the degree to which the services rendered by an individual vendor meet the client's expectations. Individual performance is a property of the client-vendor dyad.

Contrary to a dyadic setting, the multisourcing setting requires interaction between the vendors in order to accommodate interdependencies between services outsourced to different vendors (Wiener and Saunders 2014). To resolve interdependencies, vendors need to coordinate their actions and/or information to ensure that their interdependent services can be successfully integrated in a coherent whole IT service for their client. Therefore, high levels of individual performance by each vendor are not sufficient to guarantee a high level of *joint performance*, i.e., the degree to which the combined performance of interdependent vendors meets the client's expectations, including costs savings, and provides satisfaction (Grover et al. 1996; Lee and Kim 1999; Tiwana 2008). For instance, in a multi-module software development project, vendor A may deliver software module A as per the contract (high individual performance) but fail to help vendor B, who is supposed to develop module B, which depends on the functionality of module A. Although vendor B also fulfills all contractual obligations (high individual performance), the client is unable to perform the end-to-end business process because module B does not integrate well with module A (low joint performance). Achieving high joint performance is particularly demanding, because outsourcing contracts are signed with each vendor individually and there is no legally binding document that allows the client to legally enforce a particular level of joint performance.

A third important dimension of success is governance efficiency, i.e., the degree to which coordinating, guiding, and monitoring interdependent vendors is free of effort for the client (Dibbern et al. 2012). Even in single-sourcing relationships, the client's unplanned efforts in governing vendors may often exceed the cost savings expected from outsourcing (Dibbern et al. 2008). In multisourcing, governance efforts may further increase, due to the time needed to interact with multiple vendors and the coordination demands and opportunistic threats that result from interdependencies (Alchian and Demsetz 1972; Dekker 2004). Hence, governance efficiency is a primary challenge in multisourcing. Since governance efficiency includes efforts for inter-vendor coordination, it is a property of multisourcing arrangements, rather than client-vendor dyads.

Development of hypotheses

Figure 2 depicts our research model. The model includes five hypothesized relationships between the three types of formal governance (bilateral formal control, collective formal control, and conflict arbitration) and three dimensions of multisourcing success (individual performance, joint performance, governance efficiency). Two constructs, bilateral and formal control, are at the level of the client-vendor dyad (level 1), while the remaining four constructs are at the level of the multisourcing arrangement (level 2).

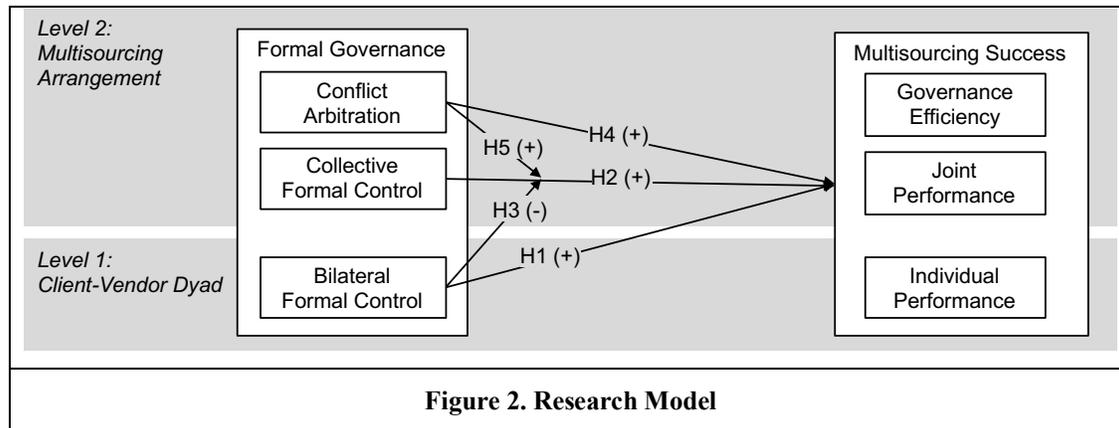


Figure 2. Research Model

Bilateral formal control: A bilateral formal control is a legally binding agreement between the client and the vendor that captures a dyadic dimension in the multisourcing setting. The specification of expected procedures and expected outcomes against prespecified performance benchmarks provides clear guidance to the vendor on how the client firm will evaluate the performance of an individual vendor. High levels of bilateral control may enhance individual performance by conveying useful knowledge about expected outcomes and effective procedures that lead to these outcomes (Henderson and Lee 1992; Krancher and Slaughter 2013). Moreover, given their contractual foundation and their explicit focus on contributions by a particular vendor, bilateral formal controls are likely to be a particularly strong tool for discouraging opportunistic vendor behavior (Alchian and Demsetz 1972; Dekker 2004; Tiwana and Keil 2009), which may further raise individual performance levels. High levels of bilateral control may also raise joint performance. Bilateral formal controls require clients to anticipate interdependencies at the outset of projects and define the outcomes and procedures for each vendor in a way that effectively addresses interdependencies. For instance, clear specification of the inputs and outputs of individual software modules to be developed by individual vendors (a type of bilateral formal control) may be critical for the later smooth integration of the modules into an overall coherent software system. This is in line with the control literature, which suggests that formal control can help achieve coordination (Nidumolu and Subramani 2003). High amounts of bilateral formal control may also have positive effects on governance efficiency. As suggested by contingency theory (Van de Ven et al. 1976), prespecifying goals and procedures for each vendor, and ensuring adherence to them, is likely to require lower governance efforts than the ongoing mutual adjustments across multiple organizational boundaries required in the absence of strong bilateral formal control. The expectation that bilateral formal control enhances governance efficiency is also in line with findings in the control literature on efficiency gains associated with the use of formal control (Gopal and Gosain 2010). We therefore posit:

H1: Higher amounts of bilateral formal control are associated with higher multisourcing success.

Collective formal control: In addition to prescribing prespecified benchmarks for each individual vendor, clients may also specify and monitor the way vendors are expected to collaborate with each other (Wiener and Saunders 2014), and the outcomes that vendors are expected to jointly achieve. Such mechanisms fall under the realm of collective formal control. Collective formal control is likely to be particularly effective for achieving coordination among vendors and, thus, high joint performance. When clients specify and monitor joint procedures, such as frequent code integration and deployment, they are urging vendors to interact, share information, and help each other. This may help address interdependencies. Moreover, when clients specify and monitor joint outcomes, such as by specifying the end-to-end business process that the software under development should enable, they are directing the vendors' attention to the overall

picture, and helping to sensitize them for interdependencies. This is in line with the idea that control involving many parties results in collective sensemaking and improved coordination among these parties (Kirsch 2004). Although, given its nature, collective formal control is particularly likely to increase joint performance, it may also have beneficial effects on individual performance and governance efficiency. Collective formal control grants vendors some discretion in the way they create their individual contributions, as long as these individual contributions integrate well with the contributions of other vendors. This may allow knowledgeable vendors to bring to bear their expertise (Tiwana and Keil 2009), resulting in high individual performance. Collective control may also be a particularly efficient way for clients to manage multisourcing arrangements because this form of control does not involve efforts related to each individual vendor. We therefore argue:

H2: Higher amounts of collective formal control are associated with higher multisourcing success.

Interaction of bilateral and collective formal control: A key tenet of the literatures on governance and control is that mechanisms often do not act in isolation, but rather complement or substitute each other (Poppo and Zenger 2002; Huber et al. 2014). Mechanism A complements (substitutes) mechanism B if the benefits from mechanism A increase (decrease) when mechanism B is used. We expect bilateral and collective formal control to substitute each other for three reasons. First, they are, at least in part, functional equivalents (Huber et al. 2014), meaning that both controls serve the same functions of guiding and coordinating vendors while discouraging opportunism. For instance, if strong bilateral formal control is in place, the need for strong collective formal control should be reduced. In other words, bilateral and collective formal control are to some extent substituting each other, implying clients may typically choose either one or the other. Second, bilateral formal control may undermine the strength of collective formal control. Collective formal control grants vendors discretion in how they create their individual contributions, whereas bilateral formal control eliminates this discretion and prevents vendors from bringing their own expertise to bear. Third, collective formal control may undermine the strength of bilateral formal control. While bilateral formal control offers the strength of being relatively easily enforceable, backed as it is by dyadic contracts, its power may be reduced in situations where bilateral and collective controls contradict each other. In such situations, vendors may opportunistically choose to comply with the control that promises the greater gain for themselves, in the belief that the client's will cannot be enforced because of the ambiguities caused by contradictory controls. We therefore anticipate:

H3: The positive association between collective formal control and multisourcing success is weaker when bilateral formal control is strong.

Conflict arbitration: Multisourcing settings may lead to opportunistic behavior by vendors (Wiener and Saunders 2014). In particular, a high degree of performance ambiguity is likely to encourage 'blame-games' between vendors (Bapna et al. 2010). It is therefore in the client's interest to clarify and govern conflict arbitration between the vendors, beyond the client-vendor arbitration procedure commonly used in outsourcing settings. A common approach to clarifying and governing conflict arbitration is the use of OLAs. These outline the collaboration principles between vendors (Bapna et al. 2010). We expect conflict arbitration to have positive effects on individual performance, collective performance, and governance efficiency. Conflict arbitration can enhance individual performance and governance efficiency because it gives vendors a tool to enforce particular behaviors or outcomes from other vendors, without the involvement of the client (Bapna et al. 2010). For instance, if vendor A does not deliver its individual service, vendor B, who depends on vendor A's contributions, may leverage the conflict arbitration charter to legitimize its efforts to put pressure on vendor A. As a result, the performance of vendor A may increase without the involvement of the client, which suggests high governance efficiency. Conflict arbitration may also enhance joint performance. In cases where cognitive conflicts prevent vendors from effectively addressing interdependencies (Conner and Prahalad 1996; De Dreu and West 2001), conflict arbitration may help promote constructive interaction among vendors to find solutions. As such:

H4: Higher amounts of conflict arbitration are associated with higher multisourcing success.

Collective formal control and conflict arbitration: Following Bapna et al. (2010), we expect that formal control and conflict arbitration complement each other. Collective formal control is imperative for ensuring the delivery of an integrated service, as it decreases the risks involved in ignoring interdependencies. However, as collective formal controls are not legally binding mechanisms, vendors are likely to shirk complying with such guidelines, assuming that they are unlikely to be penalized. Indeed, as multisourcing

is often described as presenting a high degree of performance ambiguity and task interdependency, a vendor may not be penalized by the client and other vendors may not point out the source of a failure as they do not feel legitimized to do so (Alchian and Demsetz 1972; Bapna et al. 2010). Conflict arbitration, particularly in the form of OLAs, legitimizes such inter-vendor management efforts, supporting vendors in their endeavors to enforce the contributions needed from other vendors to achieve joint outcomes. We therefore posit:

H5: The positive association between collective formal control and multisourcing success is stronger when conflict arbitration is strong.

Methods

Data

In line with past IS outsourcing studies (e.g., Goo et al. 2009), we empirically tested our research model through a key informant survey (Pinsonneault and Kraemer 1993). The questionnaire, developed by three of the authors, was administered to organizations in the UK, Germany, France, Italy, Spain, and the US, spanning a variety of industries. A UK-based market research firm was used to gain access to a panel of managers from these organizations. The original English version of the questionnaire was translated by the market research firm and checked by native speakers familiar with outsourcing. Responses were collected through telephone interviews and an online survey.

The questionnaire was distributed among potential middle- and top-level informants who were familiar with multisourcing arrangements within their firms. To ensure the targeted individuals' familiarity with multisourcing arrangements (thus qualifying them as "key informants"), the respondents needed to answer a set of screening questions and meet the following two criteria: (1) Working for an organization with an outsourcing arrangement(s) in place, where a task or project has been consciously divided and outsourced to different vendors; and (2) Being familiar with the management of such a multisourcing arrangement in their company. The respondents then had to select one particular multisourcing arrangement currently in place in their organization. Within this particular multisourcing arrangement, respondents were asked to select the two vendors contributing the most to the multisourcing arrangement (in terms of amount of work). The questions relevant to testing our model pertained only to this particular multisourcing arrangement with the two chosen vendors, called vendor A and vendor B. Focusing on the two most important vendors, rather than on all vendors, allowed us to keep the size of the survey manageable and the survey identical for all arrangements. We worded the survey questions in such a way to make clear to respondents whether the multisourcing arrangement (level 2) was being referred to, or the relationship with individual vendors (level 1). Questions related to level 1 were asked twice, once with regard to vendor A and once with regard to vendor B.

Before sending out the final questionnaire, the questionnaire items were pilot-tested with 15 international organizations, in order to ensure that all questionnaire items were understandable and could be answered by the intended group of respondents. Each block of questions was followed by an open field for comments, and the respondents pre-testing the survey were asked to note down any thoughts they had on the questions asked in the respective section. These comments were considered in the refinement of the questionnaire. In addition, we tested our model on the pilot data to assess the validity of the constructs. Items that loaded very low were removed from the questionnaire.

The finalized questionnaire was sent out to 2,000 organizations. Overall, 200 usable questionnaires were returned after several follow-ups with the panel of managers. From these 200 cases, we excluded 10 cases after reviewing the descriptions of the outsourced tasks. We excluded cases when the sub-tasks assigned to different vendors were not interdependent (e.g., outsourcing IT procurement to vendor A and sales advice to vendor B), or when the outsourced tasks did not match our target services, which comprised IT services and IT-supported business processes. We also excluded one outlier, which reported a joint performance four standard deviations below the sample mean but above-average individual performance, suggesting an erroneous measurement. Our final sample size was $n_2=189$ multisourcing arrangements, in which $n_1=378$ client-vendor dyads were embedded. Table 1 shows the sample characteristics.

Characteristics of the Sample		[Min; Max]	Mean (Std. Dev.)
Respondent working experience	Number of years working in organization	[.5; 35]	8.6 (6.5)
Age of multisourcing arrangement	Years that have passed since the start of the multisourcing arrangement	[1; 9]	3.7 (2.4)
		Number	Percentage
Client size	1 to 250 employees	7	4%
	251 to 1,000 employees	63	33%
	1,001 to 5,000 employees	61	32%
	5,001 to 50,000 employees	46	24%
	More than 50,000 employees	12	6%
Industry sector	Financial services	34	18%
	Manufacturing	39	21%
	Retail, distribution and transport	25	13%
	Public sector	35	19%
	Other	56	30%

Measures

Each construct was measured based on multiple items. Where possible, we used existing measures that we adapted to the study context. All items were measured on a five-point Likert scale, ranging from “strongly disagree” (=1) to “strongly agree” (=5) with “neither agree nor disagree” (=3) as the mid-point. The items related to our focal constructs are shown in the Appendix. In line with the distinction between collective and bilateral formal control introduced by Bapna et al. (2010), we formulated the items related to *collective formal control* such that they gathered efforts toward specifying and monitoring procedures and outcomes that involved *all vendors at the same time*. Conversely, the items related to *bilateral formal control* focused on efforts that involved *single vendors*. To allow differential interpretation, we used highly similar items for both constructs, expecting the respondents to focus on all vendors versus one vendor at a time. **Error! Reference source not found.** shows how we operationalized our control variables. As indicated in the table, we transformed some of the variables to reduce skew.

Country	Single-item question on the client’s country (United Kingdom, France, Germany, Italy, Spain, USA); incorporated through five dichotomous dummy variables
Sector	Single-item question on the client’s sector (financial services, manufacturing, retail, public sector, other); incorporated through four dichotomous dummy variables
Client size	The client’s number of employees, as measured through a single-item question (transformation: natural logarithm)
Concentration one vendor	The fraction of the overall budget of the multisourcing arrangement that is allotted to this particular vendor, as measured through a single-item question (transformation: square root)
Concentration two vendors	The fraction of the overall budget of the multisourcing arrangement that is assigned to vendor A or B (transformation: square root)
Relationship age	Square root of the number of years since the start of the multisourcing arrangement, as measured through a single-item question
Guardian vendor	Where one of the vendors is responsible for managing all other vendors of the multisourcing arrangement, as measured through a single-item question
Architectural knowledge	Measured with three items (CR = .81), focusing on the client’s knowledge of how the services provided by the vendors are related to each other (based on Henderson and Clark 1990; Takeishi 2002)
Task interdependence	Measured with four items (CR = .77), focusing on the extent to which the tasks of vendor A and B are integrated, tightly coupled, and dependent on each other (based on Tiwana 2008)

Instrument Validation

We validated our instrument through exploratory factor analysis in SPSS and through confirmatory factor analysis methods in AMOS. We used exploratory factor analysis to identify items that had low loadings on their focal construct, or high cross-loadings. We eliminated two items from bilateral formal control, one item from conflict arbitration, and one item from governance efficiency (see Appendix). Moreover, to enable differential analysis of bilateral and collective formal control, we eliminated two items from the collective formal control construct that were analogous to the items eliminated from the bilateral formal control construct. We then conducted confirmatory factor analysis in AMOS to ascertain the convergent and discriminant validity of the resulting model. **Error! Reference source not found.** shows the results. Convergent validity is indicated by factor loadings, composite reliability, average variance extracted (AVE), and model fit (Straub et al. 2004). All factor loadings were above .6, with their average exceeding .7 for all constructs. Composite reliability was above the threshold of .7 for all constructs. AVE was above .5 for all constructs. Model fit indices were within recommended thresholds (MacKenzie et al. 2011) with an RMSEA of .06 (recommended threshold: .06), RMR of .04 (recommended threshold: .08), and CFI of .95 (recommended threshold: .95). Discriminant validity is indicated by model fit (Straub et al. 2004) and by comparing the square root of the AVE to construct correlation (Fornell and Larcker 1981). Construct correlations were below the AVE square roots for all construct pairs with the exception of collective formal control and bilateral formal control, where the square roots of AVE (.72) and construct correlations (.73) were very close. A strong correlation between these two constructs was expected, given that they both measure amounts of formal governance and used nearly identical wordings. We therefore deemed these values tolerable. By and large, the evidence supports convergent and discriminant validity.

Table 3. Validation Results and Construct Correlations

	Composite Reliability	Average Variance Extracted	BFC	CFC	CA	IP	JP	GE
Bilateral formal control	.84	.52	<i>.72</i>					
Collective formal control	.84	.52	<i>.73</i>	<i>.72</i>				
Conflict arbitration	.85	.74	<i>.49</i>	<i>.54</i>	<i>.86</i>			
Individual performance	.87	.68	<i>.66</i>	<i>.50</i>	<i>.46</i>	<i>.83</i>		
Joint performance	.87	.53	<i>.55</i>	<i>.67</i>	<i>.52</i>	<i>.71</i>	<i>.73</i>	
Governance efficiency	.83	.70	<i>.25</i>	<i>.50</i>	<i>.47</i>	<i>.35</i>	<i>.60</i>	<i>.84</i>

Figures in the fourth column to the right show construct correlations, with the exception of the diagonal (see figures in italics), which shows square roots of AVE.

Estimation Approach

We used mixed models with random intercepts (Verbeke and Molenberghs 2009; West et al. 2007) in the models predicting individual performance, and OLS regression in the models predicting joint performance or governance efficiency. In the models predicting individual performance, the dependent variable is at level 1 (client-vendor dyad), while some predictors are at level 1 (e.g., bilateral control) and some at level 2 (multisourcing arrangement, e.g., collective control). Such nested data structures violate the assumption of independent observations in ordinary least squares regression, AMOS, or PLS. Mixed models are able to cope with such multi-level data structures. Conversely, in our models predicting joint performance or governance efficiency, the dependent variables are at level 2 (multisourcing arrangement). In these models, we aggregated level-1 predictors (e.g., individual governance) to level 2 by taking the average of both dyads. The resulting data structure is in line with the assumption of independent observations (i.e., independent multisourcing arrangements). We preferred OLS regression to PLS or AMOS in these models for two reasons. First, OLS regression is more similar to mixed models than either PLS or AMOS. This eased the interpretation of differences between models predicting individual performance and models predicting joint performance or governance efficiency. Second, OLS regression has greater power in the analysis of interaction effects than PLS or AMOS (Goodhue et al. 2007). Given the important role of interaction effects in our

model, OLS regression was, therefore, an appropriate choice. In all models we standardized continuous variables to ease interpretation and to avoid multicollinearity issues.

Results

Error! Reference source not found. shows descriptive statistics. **Error! Reference source not found.** contains bi-variate correlations. **Error! Reference source not found.** shows the regression results. Models 1a-1c include controls only, where model 1a predicts individual performance, model 1b joint performance, and model 1c governance efficiency. Models 2a-2c include controls and main effects. We refer to models 2a-2c in testing our main effect hypotheses H1, H2, and H4. Models 3a-3c include controls, main effects, and interaction effects. We rely on models 3a-3c in testing the interaction hypotheses H3 and H5. **Error! Reference source not found.** summarizes the results of hypotheses testing.

	<i>n</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Standard Deviation</i>
Client size	378	250	3,000,000	27,494.00	218,613.32
Concentration one vendor	378	1	90	26.61	18.67
Concentration two vendors	378	3	100	53.21	3.76
Guardian vendor	378	0	1	.70	.46
Relationship age	378	1	9	3.66	2.39
Architectural knowledge	378	1	5	4.08	.73
Task interdependence	378	1	5	3.47	.94
Bilateral formal control	378	1	5	4.01	.75
Collective formal control	378	1	5	4.00	.73
Conflict arbitration	378	1	5	3.67	1.06
Individual performance	378	1	5	4.15	.77
Joint performance	378	1.83	5	4.05	.68
Governance efficiency	378	1	5	4.15	.80
Descriptive statistics show values before transformation (e.g., before standardizing or before drawing square roots)					

H1 predicted a positive relationship of bilateral formal control and multisourcing success. As the results of models 2a-2c show, the relationship was strong, positive, and significant for individual performance ($\beta=.38$, $p < .001$, model 2a) and somewhat weaker but still positive and significant for joint performance ($\beta=.17$, $p < .05$, model 2b). It was negative and insignificant ($\beta=-.14$, $p > .1$, model 2c) for governance efficiency. Thus H1 is supported for individual and joint performance.

H2 predicted a positive relationship of collective formal control and multisourcing success. The relationship was positive and significant for joint performance ($\beta=.24$, $p < .01$, model 2b) and for governance efficiency ($\beta=.30$, $p < .01$, model 2c), while it was insignificant for individual performance ($\beta=.06$, $p > .1$, model 2a). Hence H2 is supported for joint performance and for governance efficiency.

H3 predicted a negative interaction effect between bilateral and collective formal control. The results of models 3a-3c show that this hypothesis is not supported. The interaction effects were insignificant for all dependent variables ($\beta=-.01$ for individual performance in model 3a, $\beta=-.11$ for joint performance in model 3b, and $\beta=.11$ for governance efficiency in model 3c).

Table 5. Regression Results

Predictor / dependent Var.	Models 1a-c: Controls only			Models 2a-c: Controls and main effects			Models 3a-c: Controls, main and interaction effects		
	a: Ind. Per.	b: Jnt. Per.	c: Gov. Eff.	a: Ind. Per.	b: Jnt. Per.	c: Gov. Eff.	a: Ind. Per.	b: Jnt. Per.	c: Gov. Eff.
Intercept	.26 (.25)	.21 (.25)	.46 (.27)	.30 (.21)	.18 (.23)	.51 (.26)	.27 (.21)	.15 (.23)	.36 (.26)
Client size	.03 (.06)	-.08 (.07)	-.01 (.07)	.02 (.05)	-.06 (.06)	.00 (.07)	.03 (.05)	-.06 (.06)	.03 (.07)
Concentration one vendor	.04 (.07)	-.11 (.16)	-.19 (.18)	-.02 (.07)	-.11 (.15)	-.11 (.17)	-.02 (.07)	-.15 (.15)	-.15 (.17)
Concentration two vendors	.01 (.08)	.20 (.16)	.32[†] (.18)	.01 (.07)	.16 (.15)	.20 (.17)	.01 (.07)	.20 (.15)	.25 (.17)
Relationship age	.14* (.06)	.03 (.07)	.02 (.07)	.11* (.05)	.01 (.06)	.00 (.07)	.10[†] (.05)	.01 (.06)	-.02 (.07)
Guardian	.13 (.13)	-.21 (.14)	-.09 (.15)	.08 (.11)	-.20 (.13)	-.09 (.14)	.05 (.11)	-.16 (.13)	-.04 (.14)
Client's architectural knowledge	.42*** (.06)	.52*** (.06)	.35*** (.07)	.13* (.06)	.27*** (.07)	.14[†] (.08)	.11[†] (.06)	.23** (.07)	.12 (.08)
Task interdependence	.01 (.06)	.02 (.07)	-.04 (.07)	-.05 (.05)	-.06 (.06)	-.05 (.07)	-.05 (.05)	-.06 (.06)	-.07 (.07)
Bilateral formal control	-	-	-	.38*** (.06)	.17* (.08)	-.14 (.09)	.39*** (.06)	.17** (.08)	-.15 (.09)
Collective formal control	-	-	-	.06 (.07)	.24** (.09)	.30** (.10)	.10 (.07)	.28** (.09)	.38*** (.10)
Conflict arbitration	-	-	-	.19** (.06)	.13[†] (.07)	.26** (.08)	.18** (.06)	.13[†] (.07)	.26** (.08)
Bilateral formal control × collective formal control	-	-	-	-	-	-	-.01 (.05)	-.11 (.07)	.11 (.08)
Conflict arbitration × collective formal control	-	-	-	-	-	-	.12* (.05)	.19** (.06)	.12 (.07)
Random intercept variance	.32	-	-	.19	-	-	.18	-	-
Sample size	n ₁ = 378, n ₂ = 189	n = 189	n = 189	n ₁ = 378, n ₂ = 189	n = 189	n = 189	n ₁ = 378, n ₂ = 189	n = 189	n = 189
AIC	973.7	-	-	907.9	-	-	910.4	-	-
ΔF	-	5.81***	3.43**	-	12.67***	8.15***	-	4.12*	4.59*
Adjusted R ²	-	.30	.18	-	.42	.27	-	.44	.30

([†] p < .1, * p < .05, ** p < .01, *** p < .001, standard errors in parentheses, dummy control variables for country and sector not shown)

Table 6. Summary of Hypotheses Testing Results			
<i>Hypothesis / Dependent Variable</i>	<i>Individual Performance</i>	<i>Joint Performance</i>	<i>Governance Efficiency</i>
H1: Positive effect of bilateral formal control	√	√	
H2: Positive effect of collective formal control		√	√
H3: Negative interaction effect of bilateral and collective formal control			
H4: Positive effect of conflict arbitration	√	(√)	√
H5: Positive interaction effect of collective formal control and conflict arbitration	√	√	
√: Support, (√): Marginal support			

H4 predicted positive associations of conflict arbitration with multisourcing success. The results of models 2a-2c support this hypothesis, although with marginal significance in the model predicting joint performance. Conflict arbitration had positive and significant relationships with individual performance ($\beta=.19$, $p < .01$, model 2a), joint performance ($\beta=.13$, $p < .1$, model 2b), and governance efficiency ($\beta=.26$, $p < .01$, model 2c).

H5 predicted positive interaction effects of collective formal control and conflict arbitration. Model 3a and 3b show positive and significant interaction effects for individual performance ($\beta=.12$, $p < .05$) and joint performance ($\beta=.18$, $p < .01$). Model 3c shows an insignificant coefficient predicting governance efficiency ($\beta=.11$, $p > .1$). Thus H5 is supported for individual performance and for joint performance.

Discussion

This research was motivated by the lack of studies examining how formal governance strategies specific to multisourcing (bilateral formal control, collective formal control, conflict arbitration between vendors) affect success dimensions relevant for multisourcing (individual performance, joint performance, governance efficiency). In this section we summarize our findings on each success dimension (individual performance, joint performance, and governance efforts), before discussing implications and contributions from our study.

Individual Performance

Although a particular challenge in multisourcing is the coordination between vendors, clients may also strive to obtain high individual performance from each vendor (i.e., the services delivered individually by the vendor fully meet the client's objectives). Our findings show that a key strategy for ensuring high individual performance is bilateral formal control. In model 2a, bilateral formal control is the strongest predictor of individual performance. It appears that the dyadic specification and monitoring of outcomes and procedures inherent to bilateral formal control is most likely to motivate vendors to deliver their individual contributions according to the client's expectations, and deter them from opportunistic behavior. However, our results also indicate that clients seeking to obtain high individual performance should not limit their governance efforts to bilateral formal control. Conflict arbitration is also positively related to individual performance, as it deters vendors from 'blame-game' attitudes and encourages them to pursue a collaborative approach. Moreover, if accompanied by conflict arbitration, collective formal control can also contribute to higher individual performance. Figure 3a illustrates the interaction between collective formal control and conflict arbitration (as per our findings in model 3a). As the interaction plot shows, under weak conflict arbitration (one standard deviation below the sample mean), collective formal control barely contributes to individual performance (see the line marked by squares). Conversely, under strong conflict arbitration (one standard deviation above the sample mean), collective formal control contributes substantially to higher individual performance, as indicated by the positive slope of the line marked by triangles. It seems that the overall goals and procedures specified through collective formal control can cascade down to the level of individual performance only if conflict arbitration provides the infrastructure through which vendors can break down overall goals and procedures to individual contributions and legitimately enforce these contributions from the other vendors.

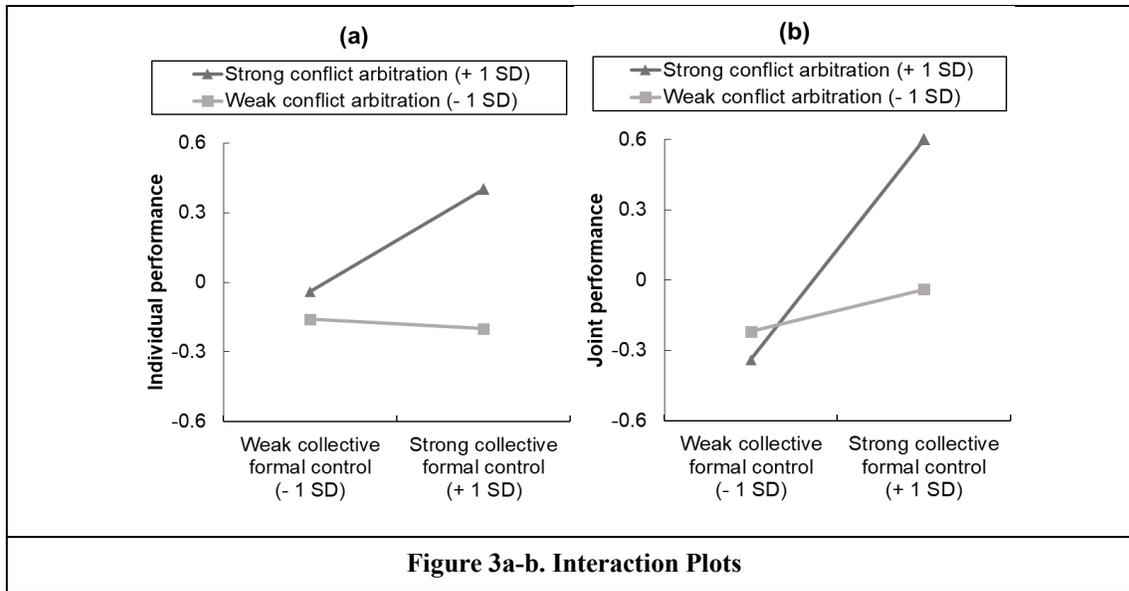


Figure 3a-b. Interaction Plots

Importantly, our results suggest that clients do not have to choose between *either* collective *or* bilateral formal control. The insignificant interaction effect between bilateral and collective formal control (see model 2a) indicates that bilateral and collective formal control (the latter only if accompanied by conflict arbitration) contribute *independently* to high individual performance. Hence, clients who seek high individual performance are best advised to rely on *both* bilateral *and* collective formal control, accompanied by conflict arbitration charters.

Joint Performance

Although clients may strive to ensure high individual performance from each vendor, a key challenge in multisourcing lies in achieving high joint performance, which implies that interdependencies are effectively addressed. The strongest predictor of joint performance in our model is collective formal control. Hence, collective formal control is a key strategy for achieving high joint performance. This may suggest that collective control provides vendors with “the big picture” or the overall desired outcomes and procedures in the arrangement. This, we argue, helps vendors to pursue a collaborative mode to see how their individual contributions should integrate with the contributions of the other vendors.

Although collective formal control is a key strategy for achieving high joint performance, it is not the sole strategy. Bilateral formal control contributes independently to joint performance, as indicated by the significant main effect of bilateral formal control in model 2b, and by the insignificant interaction effect of bilateral and collective formal control in model 3b. Hence, clients do not face a choice in relying on *either* collective *or* bilateral formal control. They should rely on both if their goal is to achieve high joint performance. Although conflict arbitration per se shows a rather weak effect on joint performance, it does strengthen the effect of collective formal control. This interaction is visualized in Figure 3b. The figure shows that without conflict arbitration, collective formal control helps slightly increase joint performance (see the relatively flat line marked by squares). Conversely if accompanied by conflict arbitration, collective formal control has a strong effect on joint performance (see the line marked by triangles). Simply put, it appears that without conflict arbitration, collective formal control is a blunt sword because vendors lack the legitimacy to enforce the individual contributions from other vendors.

Governance Efficiency

The preceding discussion suggests that clients are best to combine bilateral and collective formal control and conflict arbitration. However, such a governance strategy may be costly. Findings on our third dependent variable, governance efficiency, provide some perspective on this trade-off. We find that collective formal control and conflict arbitration are strongly positively related to governance efficiency, while bilateral formal control has a negative, although insignificant, relationship to governance efficiency. This finding shows that it is quite effortful for clients to set up and maintain tight control relationships with individual

vendors. In light of these costs, the most efficient governance approach is to combine collective formal control with conflict arbitration, which may allow a good portion of the coordination and conflict resolution efforts to be delegated to the vendors. While this approach is superior in terms of efficiency, it is unlikely to elicit very strong individual contributions (as discussed in our findings on individual performance).

Implications and Contributions

Our research makes important contributions to the IS outsourcing literature. As multisourcing has become a common sourcing model, understanding the governance mechanisms that lead to better performance is imperative for both client firms and their vendors. So far the limited extant literature has shed little light on what leads to successful multisourcing arrangements. As such, our paper unpacks the contribution of formal governance, studied here as bilateral formal control, collective formal control and conflict arbitration, to multisourcing performance. In doing so, our paper strengthens and further develops several ideas laid out by Bapna et al. (2010). First, we show that the distinction between bilateral control and collective formal control is empirically valid. Second, in line with the emphasis on OLAs that specify collaboration principles (Oshri et al. 2015), our study sheds light on the role of conflict arbitration between vendors as another critical mechanism to improve performance. Third, we find empirical support for Bapna and colleagues' idea that collective formal control and conflict arbitration act as complements to each other.

Our paper also goes beyond ideas laid out by Bapna et al. (2010) and the multisourcing literature in two important regards. First, our paper is the first to provide empirical insights into the relationship between bilateral and collective formal control. Although we had expected a substitutional relationship, arguing that collective and bilateral formal control are functional equivalents and that one impairs the benefits of the other, we found no empirical support for this idea (see the insignificant interaction effects). Instead, our results suggest that the benefits from using the one are independent of the benefits from using the other. Thus, in contrast to our expectations, bilateral and collective formal control are not functional equivalents. They appear to serve different functions. It is possible that bilateral formal control serves primarily to discourage opportunistic behavior from individual vendors, whereas collective formal control serves primarily to achieve coordination among vendors. Future research could test this assertion by measuring opportunistic behavior and coordination problems and by correlating these outcomes with bilateral and collective formal control. From a practical perspective, the lack of a substitutional relationship suggests that clients do not face a choice between *either* bilateral *or* collective formal control. Since these two types of governance contribute independently to joint performance, clients may often be advised to rely on *both* bilateral *and* collective formal control.

Second, our paper is the first to capture the notion of multisourcing success as a three-dimensional construct, with individual performance, joint performance, and governance efficiency all relevant and imperative for the multisourcing setting. We show that each of these performance dimensions is affected by formal governance strategies in different ways, implying that clients should choose their governance strategies based on the performance dimensions they value most. Clients striving for governance efficiency are advised to combine collective governance and conflict arbitration. Clients striving for a high-quality well-coordinated service (i.e., high joint performance) should combine bilateral and collective formal control and conflict arbitration. Finally, clients who value individual performance most (e.g., because interdependencies between vendors are rather weak) should emphasize strong bilateral formal control, although some level of collective formal control paired with conflict arbitration may further increase individual performance.

References

- Alchian, A. A., and Demsetz, H. 1972. "Production, Information Costs, and Economic Organization," *The American Economic Review* (62:5), pp. 777-795.
- Angst, C. M., Wowak, K. D., Handley, S. M., and Kelley, K. 2017. "Antecedents of Information Systems Sourcing Strategies in U.S. Hospitals: A Longitudinal Study," *MIS Quarterly* (41:4), pp. 1129-1152.
- Bapna, R., Barua, A., Mani, D., and Mehra, A. 2010. "Research Commentary: Cooperation, Coordination, and Governance in Multisourcing: An Agenda for Analytical and Empirical Research," *Information Systems Research* (21:4), pp. 785-795.
- Choudhury, V., and Sabherwal, R. 2003. "Portfolios of Control in Outsourced Software Development Projects," *Information Systems Research* (14:3), pp. 291-314.

- Conner, K., and Prahalad, C. 1996. "A Resource-Based Theory of the Firm: Knowledge Versus Opportunism," *Organization Science* (7:5), pp. 477-501.
- De Dreu, C. K., and West, M. A. 2001. "Minority Dissent and Team Innovation: The Importance of Participation in Decision Making," *Journal of applied Psychology* (86:6), p. 1191.
- Dekker, H. C. 2004. "Control of Inter-Organizational Relationships: Evidence on Appropriation Concerns and Coordination Requirements," *Accounting, Organizations and Society* (29:1), pp. 27-49.
- Dibbern, J., Chin, W. W., and Heinzl, A. 2012. "Systemic Determinants of the Information Systems Outsourcing Decision: A Comparative Study of German and United States Firms," *Journal of the Association for Information Systems* (13:6), p. 466.
- Dibbern, J., Goles, T., Hirschheim, R., and Jayatilaka, B. 2004. "Information Systems Outsourcing: A Survey and Analysis of the Literature," *ACM SIGMIS Database* (35:4), pp. 6-102.
- Dibbern, J., Winkler, J., and Heinzl, A. 2008. "Explaining Variations in Client Extra Costs between Software Projects Offshored to India," *MIS Quarterly* (32:2), pp. 333-366.
- Fornell, C., and Larcker, D. F. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, pp. 39-50.
- Goo, J., Kishore, R., Rao, H., and Nam, K. 2009. "The Role of Service Level Agreements in Relational Management of Information Technology Outsourcing: An Empirical Study," *MIS Quarterly* (33:1), pp. 119-146.
- Goodhue, D., Lewis, W., and Thompson, R. 2007. "Research Note: Statistical Power in Analyzing Interaction Effects: Questioning the Advantage of Pls with Product Indicators," *Information Systems Research* (18:2), pp. 211-227.
- Gopal, A., and Gosain, S. 2010. "The Role of Organizational Controls and Boundary Spanning in Software Development Outsourcing: Implications for Project Performance," *Information Systems Research* (21:4), pp. 1-23.
- Grover, V., Cheon, M. J., and Teng, J. T. 1996. "The Effect of Service Quality and Partnership on the Outsourcing of Information Systems Functions," *Journal of Management Information Systems* (12:4), pp. 89-116.
- Henderson, J. C., and Lee, S. 1992. "Managing I/S Design Teams: A Control Theories Perspective," *Management Science* (38:6), pp. 757-777.
- Henderson, R. M., and Clark, K. B. 1990. "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms," *Administrative Science Quarterly*, pp. 9-30.
- Huber, T., Fischer, T., Dibbern, J., and Hirschheim, R. 2014. "A Process Model of Complementarity and Substitution of Contractual and Relational Governance in IS Outsourcing," *Journal of Management Information Systems* (30:3), pp. 81-114.
- Humble, J., and Molesky, J. 2011. "Why Enterprises Must Adopt Devops to Enable Continuous Delivery," *Cutter IT Journal* (24:8), pp. 6-12.
- Hurni, T., Huber, T., and Dibbern, J. 2015. "Coordinating Platform-Based Multi-Sourcing: Introducing the Theory of Conventions," in: *The 36rd International Conference on Information Systems*. Fort Worth, TX, USA.
- Keil, M., Rai, A., and Liu, S. 2013. "How User Risk and Requirements Risk Moderate the Effects of Formal and Informal Control on the Process Performance of IT Projects," *European Journal of Information Systems* (22:6), pp. 650-672.
- Kirsch, L. J. 1996. "The Management of Complex Tasks in Organizations: Controlling the Systems Development Process," *Organization Science* (7:1), pp. 1-21.
- Kirsch, L. J. 2004. "Deploying Common Systems Globally: The Dynamics of Control," *Information Systems Research* (15:4), pp. 374-395.
- Kirsch, L. J., Sambamurthy, V., Ko, D. G., and Purvis, R. L. 2002. "Controlling Information Systems Development Projects: The View from the Client," *Management Science* (48:4), pp. 484-498.
- Klein, K. J., and Kozlowski, S. W. 2000. *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions*. New York: Wiley.
- Koo, Y., Lee, J. N., Heng, C. S., and Park, J. 2017. "Effect of Multi-Vendor Outsourcing on Organizational Learning: A Social Relation Perspective," *Information & Management* (54:3), pp. 396-413.
- Krancher, O., and Slaughter, S. A. 2013. "Governing Individual Learning in the Transition Phase of Software Maintenance Offshoring: A Dynamic Perspective," in: *The 46th Hawaii International Conference on System Sciences*. Maui, HI, USA: pp. 4406-4415.

- Lee, J., and Kim, Y. 1999. "Effect of Partnership Quality on Is Outsourcing Success: Conceptual Framework and Empirical Validation," *Journal of Management Information Systems* (15:4), pp. 29-61.
- Levina, N., and Su, N. 2008. "Global Multisourcing Strategy: The Emergence of a Supplier Portfolio in Services Offshoring," *Decision Sciences* (39:3), pp. 541-570.
- MacKenzie, S. B., Podsakoff, P. M., and Podsakoff, N. P. 2011. "Construct Measurement and Validation Procedures in MIS and Behavioral Research: Integrating New and Existing Techniques," *MIS Quarterly* (35:2), pp. 293-334.
- Nidumolu, S. R., and Subramani, M. R. 2003. "The Matrix of Control: Combining Process and Structure Approaches to Managing Software Development," *Journal of Management Information Systems* (20:3), pp. 159-196.
- Oshri, I., Kotlarsky, J. and L.P. Willcocks (2015) "The Handbook of Global Outsourcing and Offshoring", Macmillan, London. 3rd edition,
- Pinsonneault, A., and Kraemer, K. 1993. "Survey Research Methodology in Management Information Systems: An Assessment," *Journal of management information systems* (10:2), pp. 75-105.
- Poppo, L., and Zenger, T. 2002. "Do Formal Contracts and Relational Governance Function as Substitutes or Complements?" *Strategic Management Journal* (23:8), pp. 707-725.
- Rustagi, S., King, W. R., and Kirsch, L. J. 2008. "Predictors of Formal Control Usage in It Outsourcing Partnerships," *Information Systems Research* (19:2), pp. 126-143.
- Straub, D., Boudreau, M.-C., and Gefen, D. 2004. "Validation Guidelines for Is Positivist Research," *The Communications of the Association for Information Systems* (13:1), p. 63.
- Su, N., and Levina, N. 2011. "Global Multisourcing Strategy: Integrating Learning from Manufacturing into IT Service Outsourcing," *IEEE Transactions on Engineering Management* (58:4), pp. 717-729.
- Takeishi, A. 2002. "Knowledge Partitioning in the Interfirm Division of Labor: The Case of Automotive Product Development," *Organization Science* (13:3), pp. 321-338.
- Tiwana, A. 2008. "Does Technological Modularity Substitute for Control? A Study of Alliance Performance in Software Outsourcing," *Strategic Management Journal* (29:7), pp. 769-780.
- Tiwana, A., and Keil, M. 2009. "Control in Internal and Outsourced Software Projects," *Journal of Management Information Systems* (26:3), pp. 9-44.
- Tomczak, A. 2015. "Wto-Ausschreibung Für App-Entwicklung, "Agile Beschaffung", Mini-Tender, Agiles Umfeld."
- Van de Ven, A. H., Delbecq, A. L., and Koenig, R. 1976. "Determinants of Coordination Modes within Organizations," *American Sociological Review* (41:2), pp. 322-338.
- Verbeke, G., and Molenberghs, G. 2009. *Linear Mixed Models for Longitudinal Data*. Heidelberg, Germany: Springer.
- Wang, E. T., Barron, T., and Seidmann, A. 1997. "Contracting Structures for Custom Software Development: The Impacts of Informational Rents and Uncertainty on Internal Development and Outsourcing," *Management Science* (43:12), pp. 1726-1744.
- West, B. T., Welch, K. B., and Galecki, A. T. 2007. *Linear Mixed Models: A Practical Guide Using Statistical Software*. Boca Raton, FL: CRC Press.
- Wiener, M., and Saunders, C. 2014. "Forced Coopetition in IT Multi-Sourcing," *The Journal of Strategic Information Systems* (23:3), pp. 210-225.

Appendix: Survey Instrument

Collective Formal Control (based on Kirsch et al. 2002)

To ensure that not the individual performance of vendor A and B, but rather their combined performance (i.e., solutions by vendor A and B in combination as part of the multisourcing arrangement) meet our objectives, we ...

CFC1: ... expect both vendors to follow an understandable written sequence of steps that define interactions between these two vendors.*

CFC2: ... assess the extent to which both vendors interact in accordance to existing written procedures and practices when delivering the outsourced service.

CFC3: ... evaluate the extent to which combined services are delivered as defined in the contract regardless of how this goal is accomplished.

CFC4: ... test intermediary and/or final joint outcomes/deliverables against criteria defined in the contract, regardless of how this goal is achieved.

CFC5: ... have several sources of objective data we can rely on.*

CFC6: ... have defined quantifiable measures depicting the extent to which combined objectives are achieved.

CFC7: ... have defined accurate and reliable measures that indicate the extent to which the delivered services jointly meet our objectives.

Bilateral Formal Control (based on Kirsch et al. 2002)

To ensure that the vendor meets our expected service-level targets/quality we ... (separate columns to be answered for vendor A and vendor B)

BFC1: ... expect the vendor to follow an understandable written sequence of steps in delivering its services.*

BFC2: ... assess the extent to which the vendor is following existing written procedures and practices when delivering the outsourced service.

BFC3: ... evaluate the extent to which services were delivered as defined in the contract regardless of how this goal was accomplished.

BFC4: ... test intermediary and/or final outcomes/deliverables against criteria defined in the contract, regardless of how these outcomes were achieved.

BFC5: ... have several sources of objective data we can rely on.*

BFC6: ... have defined quantifiable measures in place.

BFC7: ...have defined accurate and reliable measures.

Conflict Arbitration (based on Goo et al. 2009)

When it comes to disagreement between vendors A and B ...

CA1: ... we have procedures in place for how to resolve them.

CA2: ... we have process descriptions to determine how the parties should resolve the conflict.

CA3: ... there are operational level agreements between the vendors that determine how to resolve the conflict, without our involvement.*

Individual Performance (based on Grover et al. 1996)

How would you characterize your satisfaction with the performance of each vendor so far? (separate columns to be answered for vendor A and vendor B)

IP1: ...the products/services delivered by the vendor meet our expectations.

IP2: ...we have met our goals with the vendor.

IP3: ...overall, we are satisfied with our relationship with the vendor.

Governance Efficiency (based on Dibbern et al. 2012)

With regard to vendor A and vendor B ...

GE1: ... our overall cost and effort for managing the relationship with them is higher than expected.

GE2: ... we have met our goals with the vendor.*

GE2: ... our overall cost and effort for coordinating and monitoring them are within our expectations.

GE3: ... our overall cost and effort for guiding their performance and service delivery are within our expectations.

Joint Performance (based on Grover et al. 1996; Lee and Kim 1999; Tiwana 2008)

With regard to the combined performance of vendor A and vendor B as part of the multisourcing arrangement so far ...

JP1: ... the products/services delivered meet our expectations.

JP2: ... we have met our goals.

JP3: ... we have completed key milestones in accordance with our objectives.

JP4: ... we have achieved our desired cost savings.

JP5: ... we are satisfied with our overall benefits from outsourcing.

JP6: ... we have so far met project/service requirements.

(*Items with asterisk were removed during analysis)