Information Systems Development
Outsourcing: The Role of Control Configurations

Research-in-Progress

Introduction

In recent years there has been a substantial interest in information systems development outsourcing (ISD-outsourcing) (Rustagi et al. 2008; Wanjin et al. 2007). According to recently published reports on IT outsourcing trends (Economics 2012; Europe 2012), ISD-outsourcing continues to remain the most popular type of outsourcing. In a similar vein, recent years have witnessed a continuous growth in ISD-outsourcing as a viable method for software development (Remus and Wiener 2012; Willmott 2012). However, more often than not, several outsourced software development projects have failed to deliver the projected paybacks, primarily due to the lack of coordination amongst the comprising entities with partially congruent objectives (Nakatsu and Iacovou 2009; Tiwana and Keil 2009). Most firms outsourcing their ISD, attempt to minimize these issues by experimenting with coordination and control mechanisms between the client and the vendor (Choudhury and Sabherwal 2003; McBride 2008).

Control theory (Eisenhardt 1989a; Kirsch 1996; Ouchi 1979) has often been invoked to explain the coordination between client and vendor in ISD-outsourcing (Kirsch et al. 2002; Narayanaswamy and Henry 2005). Prior control literature discusses factors such as outcome measurability (Eisenhardt 1989a), behavior measurability (Kirsch 1997), explaining the choice of control modes or examining the specific control modes (e.g., outcome, behavior, clan, and self-control modes) used for a project (Srivastava and Teo 2012b; Tiwana and Keil 2009). Moreover, recent literature explains how the control mechanisms can be utilized to improve the performance of ISD-outsourcing projects (Gopal and Gosain 2010; Srivastava and Teo 2012b). Srivastava and Teo (2012b) suggest that the control mechanisms can be broadly divided into two categories; the structural control and process control. While the structural control mechanism is about “what” operates the control mode or the structure of the control mode, the process control mechanism explains “how”, or the process through which the control mode is enacted. Past research also shows that ISD-outsourcing projects were unable to deliver the expected results due to inappropriate control mechanisms (Benko and McFarlan 2003; Tiwana and Keil 2009). Although the control literature discusses structural and process control mechanisms, it does not describe the configurations in which the structure and process mechanisms can combine. These combinative configurations of structural and process control mechanisms in a client-vendor relationship can be described as control configurations. We argue that in order to better leverage the control perspective, control configurations should be monitored so as to govern the client-vendor coordination efficiently, resulting in better project outcomes in terms of cost and quality (Gopal and Gosain 2010; Srivastava and Teo 2012a; Srivastava and Teo 2012b). Monitoring control configurations provides an early clue to the condition of projects that can help companies minimize ISD-outsourcing project failures.

In recent times, multiple levels of outsourcing partners have added an additional layer of complexity to the ISD-outsourcing projects (Nuwangi et al. 2013; Olsson et al. 2008), where outsourcing partners now re-outsource components of software development to other outsourcing companies. We posit that such growing complexities require greater attention in monitoring control configurations to foster project success. In general, companies are not able to observe the control configurations until the project “goes live”. In most cases, such observations are too late to solve problems and can only be a learning for future work. A proactive approach where the ISD-outsourcing partners implement the appropriate control configuration will enhance the likelihood of project success.

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1 Go-live is when the software product is implemented after the completion of software development.
Thus, the two main objectives of our study are: (1) to identify the control configurations through which the control mechanisms manifest in client-vendor relationships; and (2) to identify the relationship between control configurations and ISD-outsourcing project success. This research-in-progress paper conceptualizes and reports our early observations on control configurations. We also identify the relationships between control configurations and ISD-outsourcing project success. The preliminary analysis and recommendations presented in this paper are aimed at providing insights into the landscape of control configurations in ISD-outsourcing projects.

**Theoretical Background: Exploring Control Configurations**

Given the unique characteristics of ISD-outsourcing, the selection of the appropriate control mechanisms is crucial for project success (Maruping et al. 2009). ISD-outsourcing projects are inherently complex as they involve multiple parties from multiple companies working on a single project. Most projects involve several iterations of software deliveries, over several months. In this lengthy software development process, multiple versions of contracts need to be managed carefully and diligently, controlling volatility of client requirements. Moreover, a SD-outsourcing project will be governed by multiple contracts, developed by each SD-outsourcing partner, thus information in one contract may not be fully understood by the other party. According to Poppo and Zenger (2002), ISD-outsourcing contracts tend to be incomplete due to the asymmetric information amongst the different partners. Hence, monitoring the control mechanisms is crucial for the success of the ISD-outsourcing projects. For example, in ISD-outsourcing projects, even with a contract with high contract-specificity, partnering vendors may not be able to understand all the client requirements without specifically dedicated knowledge transfer sessions.

As per control theory (Kirsch 1996; Ouchi 1979), the term ‘control’ in ISD-outsourcing, refers to the mechanisms that govern the actions of the outsourceree firm (vendor or controllee) in a manner that furthers the interests of the outsourcing firm (client or controller) (Kirsch 1996). According to Srivastava and Teo (2012b), the control mechanisms can be broadly divided into two categories of structural and process control mechanisms. While the structural control mechanism is about “what” operates the control mode or the structure of the control mechanism, the process control mechanism explains “how”, or the process through which the control mode is enacted.

In relation to control theorists, structural control mechanisms can be broadly divided into two categories of formal and informal controls (Kirsch 1996). The formal mode involves controlling the employees through performance evaluation, while the informal mode uses social or people strategies (Jaworski 1988; Kirsch et al. 2002). The formal control mode can be further subdivided into outcome-based and behavior-based modes. The outcome-based mode includes the mechanisms that specify the expected outcomes (Eisenhardt 1989a), whereas the behavior-based mode is implemented through the mechanisms of appropriate behaviors (Kirsch 1997). The informal mode consists of clan and self-control modes. Ouchi (1978) describes clan control as a group of individuals who have common values and beliefs. In contrast, self-control occurs when the employees of the company control their own actions (Manz and Angle 1986).

Srivastava and Teo (2012b) illustrate that the process control mechanism includes three governance mechanisms: 1) mechanistic governance, 2) relational governance, and 3) self-governance. Mechanistic governance describes the coordination between the client and the vendor by strict adherence to the specific contract, whereas relational governance focuses on the shared values, beliefs, rituals and the ongoing relationship between the two parties. Self-governance occurs when there is no coordination between the client and the vendor as the task is self-monitored by the vendor. As discussed in the previous section, in addition to acknowledging the presence of structural and process control mechanisms, it is important to understand the “control configurations” in which the structural and process control mechanisms combine. We believe that identifying and examining the nature of control configurations will assist in a better appreciation of ISD outsourcing project success (See further discussion and illustration in (Srivastava and Teo 2012b, p. 123)).

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2 We consider documents or software systems that include the client requirements as the contracts between the outsourcing partners.
Research Method

The case study method is particularly appropriate for the purpose of this study, as our research encompasses “how” questions (Yin 2003) that delve into identifying and examining the control configurations governing the process of ISD-outsourcing. Specifically, the main objectives of this case study are: (1) to identify the control configurations; and (2) to examine the relationship between control configurations and ISD-outsourcing project success.

Case Context

Three conditions described the benchmarking criteria for the selection of the case organization. First, the case organization should have been involved in ISD-outsourcing for at least five years, to have mature and stable control structures. Second, the organization must be sufficiently large in ISD-outsourcing, with a standard hierarchy of employment. Third, the case organization must be involved in executing multiple ISD-outsourcing projects. The chosen case organization, Company-A, was a large ISD-outsourcing company, engaging in stock market-related software application development. Company-A has been in the business for over 10 years, employing over 300 staff. The aforementioned characteristics convinced the selection of Company-A as our target case. Moreover, Company-A regularly re-outsources its software quality assurance functions to another global ISD-outsourcing company, Company-B, which makes the outsourcing process more complex, involving multiple levels of outsourcing partners, thus demonstrating the current environment of software outsourcing.

Company-A developed capital market automation software including the functionalities of multiple trading methods (such as auctions, continuous matching), multiple asset classes (such as equity, fixed income, commodities and derivatives) and multiple market structures (such as regulated exchange, the Over-the-Counter-market). Moreover, the company developed post-trade applications, wherein the settlement of the trade was automated. Post-trade applications provided the central clearing and settlement for the trades. Company-A was involved in developing the clients’ requested functionalities (onwards and upwards) of software projects even after the project goes live. Company-B was involved in conducting the quality assurance function of the software products developed by Company-A.

Data Collection and Analysis

Twenty (20) semi-structured interviews each lasting between 40-50 minutes were conducted at Company-A and Company-B. Participants were selected from eight (8) ISD-outsourcing projects executed jointly by the two companies. From each project, two members were selected: the lead project manager from Company-A (denoted as PM1 - PM8) and one quality assurance staff from Company-B (denoted as QA1 - QA8). The selection of the lead project manager (from Company-A) is appropriate to understand the overall outcomes of the project and to understand the controlling structures of the entire project. The quality assurance staff was selected to better understand the configuration mechanisms. Our interviews also included four project managers (denoted as PM9 - PM12) who were working in more than one (of the 8) project.

The sampling technique is non-probability, purposive and employed the ‘snowball technique’, where the interview participants were appropriate opinion leaders with well-developed views on the research topic (Minichiello et al. 1995). At the beginning of the meeting, the participants were briefed about the objective of the study. All the interviews were recorded and transcribed, with additional notes taken whenever necessary. In total, the interviews approximately totaled 14 hours and 15 minutes, and were later transcribed to about 150 pages. The interview data was supplemented with the business requirement specifications and other internal documents.

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4 To maintain confidentiality, the names of the company, all projects and personnel were disguised.
5 Auction trading involves calculating the opening and closing prices of a security at the opening and closing of the trading hours whereas continuous matching operates during the regular trading sessions.
6 The business requirement specification is considered as the contract, which specifies all the client requirements of the software development outsourcing projects.
Following the guidelines of Eisenhardt (1989b), data analysis was performed in tandem with the data collection to take advantage of the flexibility that the case study affords. The emergent concepts in one interview were verified in the subsequent interview until the state of theoretical saturation was reached, which is the point where it is possible to comprehensively explain the findings of the case study (Eisenhardt 1989b). The structural and process control mechanisms formed the initial set of themes through which we analyzed the interview data. In addition, a systematic verification procedure was established to ensure that each finding was supported by at least two sources of data (Klein and Myers 1999). Data analysis is reported under two headings: 1) identifying the control configurations and 2) examining the impact of the control configurations on ISD-outsourcing project success.

Identifying Control Configurations

From the case study data, three control configurations were identified, which we label as: 1) the **aligned** configuration, 2) the **negotiated** configuration, and 3) the **self-managed** configuration.

1. **Aligned Configuration**

An aligned configuration is observed when the structural and process control mechanism combinations with the vendors and the clients are aligned within the corresponding control mode. Herein, the client always follows formal structural mechanisms (outcome/behavior) with mechanistic governance. When the client follows clan control they utilize relational governance as the process control mechanism. Self-control is always combined with the self-governance mechanism. In an aligned configuration, **locus of control** is with the client.

The client utilization of the formal structural control with mechanistic governance is observed in most ISD-outsourcing projects. The client maintains the detailed requirement documents (e.g., business requirement documents, change request documents) and wants the vendor to follow the documents very closely. Examples of this approach were reported in the interviews. For example, according to QA1, “until all the outsourcing companies signoff the documents, we are not supposed to start testing”. In those projects, the change request documents are utilized to manage the changes to the initial client requirements. Frequently, after the project goes live, clients request additional functionalities (onwards and upwards) of the software product. These requests will also be managed through the change request documents. According to PM9, “If there is some functionality that developers can’t provide as it is, we tell the developers not to develop it. It should come as a change request document”. PM8 highlighted that the formal controlling will be aligned only if they follow mechanistic governance to manage the ISD-outsourcing process. He stated: “We have to go with the exact documents to provide the actual client requirements”.

The client utilizes relational governance to manage projects which have good team spirit, shared values and norms. QA6 stated: “In our project, we had a good relationship with our client. So, we were able to talk with them and work. Sometimes, all the things were not documented”. Moreover, PM11 explained that “Sometimes, we ask our vendors to test the product without any written document to follow. Then they can find more issues in the system”.

In an aligned configuration, the client combines self-control mechanisms with self-governance. In our study context, the vendor has to provide individual time estimations for software quality assurance. In the situations where the vendor recognizes that they will not be able to meet the deadline, working extra hours are essential as the client will not change previously agreed timelines. QA4 stated: “Most of the time we are working late hours to achieve the targets”. According to QA8, “When we have to finish some work before the deadline, we work till late night”.

QA3 highlighted the importance of aligned configuration for ISD-outsourcing success, stating “For an outsourcing project which is supposed to have a long run, there should be processes. If not, it will be failing at some point”. QA8 discussed the responsibilities of a project manager for the aligned configuration: “If a project manager is really in to processes of client, he will defiantly make the others follow it. But if he is not, the rest of the team will have a hard time”.

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2. Negotiated Configuration

A negotiated configuration occurs when the structural and process control mechanism combinations with the client and the vendor are flexible across the different control modes. For example, the client and the vendor follow any of the structural control mechanism with any of the process control mechanism according to the situation. In a negotiated configuration, the locus of control is with both the client and the vendor.

Most respondents highlighted the importance of a negotiated configuration in ISD-outsourcing projects. PM4 stated: “There are some functional areas that we have to implement somehow. But, we will not be able to implement in the way that the client has mentioned. So, we have to convince the client the best way to do the particular function and get the permission from them”. PM3 explained the negotiated configuration in terms of time management: “We agree upon certain time lines. But, if it is really unfair, either party can speak and get it extended”. According to PM6, “If we can’t complete a task on time, we talk to the client and we are getting more resources”. QA5 explained, negotiated configuration is crucial for the success of an ISD-outsourcing project. QA5 stated: “Sometimes, we don’t know the actual client requirement. We can write testing procedures. But when we start testing on only we know that we can’t do this in this way. We will get it from the maturity in that application”. PM9 highlighted the same idea by stating: “If they are flexible, we can do a better job. Otherwise we have to reduce the quality of work, due to time constraints”. According to QA7, sometimes they experience a high negotiated configuration in ISD-outsourcing projects: “When the time is crunched business analysts say that they don’t have the time to document everything. So, we have to trust them and work ahead”.

3. Self-Managed Configuration

The self-managed configuration can be observed when the vendor is self-disciplined regardless of the control mechanisms of the client. In a self-managed configuration, the locus of control is with the vendor.

Most respondents discussed the self-managed configuration according to the time factors. QA2 explained that they have to work extra hours to meet the deadlines: “We are working in a tight deadline; definitely we have to make some arrangements by working extra hours”. Confirming QA 2 argument, QA8 mentioned; “If we can’t finish the quality product on time, we have to stay till late night and finish our work”. PM4 stated that they have internal software releases before they send the software product to the client. These internal releases represent the self-managed configuration in an ISD-outsourcing project. As PM8 explained, “We have lots of internal releases. Then only we provide the software product to the client side”. PM1 discussed that the vendor should have the discipline to adjust to the changing requirements of the clients: “You should be organized. You should have a proper process to document and you should be disciplined”. According to PM12, self-managed configurations can be adapted by other companies: “There are some companies who are more disciplined than us. We have to adapt. When they are more disciplined, we learn their processes and follow that. If the other party is not disciplined, we have to try to transfer some of those best practices to them”. PM10 highlighted that the self-managed configurations of the vendor company minimize the problems in ISD-outsourcing projects: “Our natural tendency is to adapt to what client says, which not the best thing is always. Sometimes we are getting in to worst situations. So, we should have our own standards to deal with the client”.

Identifying the Relationship between Control Configurations and ISD-Outsourcing Project Success

Having identified control configurations, we then explore the relationships between the control configurations and ISD-outsourcing project success. We summarized the comments provided by the respondents regarding different projects and derived the conclusions accordingly (see Table 1). “Project stage” includes the classifications of: development early stage (less than 3 months of development), middle stage (between 3 to 6 months), final stage (more than 6 months till goes-live), completed (after

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7 Internal software releases consist of releasing software for quality assurance before sending the product to the client.
8 Case organization develops the “onwards and upwards” functionalities of completed projects.
“Status” was categorized into three groups: 1) unsuccessful, where the client is unsatisfied with most of the functionalities of the software product; 2) average, where the client is satisfied with the software product as a whole, but there are issues with some functionalities; and 3) successful, where the client is satisfied with almost all of the functionalities of the product. We acknowledge that the level of configuration; ‘high’, ‘medium’ and ‘low’ is a relative indication. In the current context, the level of configuration was determined at post data-collection and analysis, with two researchers going through the comments of all interviewees across the 8 projects. The assertions derived by the researchers were then discussed with a panel that comprised of the two lead researchers, project managers and quality assurance staff. Consensus was derived through discussion.

<table>
<thead>
<tr>
<th>Project</th>
<th>Company</th>
<th>Project Stage</th>
<th>Configuration</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td></td>
<td>Aligned</td>
<td>Negotiated</td>
</tr>
<tr>
<td>1</td>
<td>PM^1</td>
<td>QA*1</td>
<td>Completed</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>PM2</td>
<td>QA2</td>
<td>DM^^</td>
<td>Medium</td>
</tr>
<tr>
<td>3</td>
<td>PM3</td>
<td>QA3</td>
<td>DE^</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>PM4</td>
<td>QA4</td>
<td>DM^^</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td>PM5</td>
<td>QA5</td>
<td>DM^^</td>
<td>Medium</td>
</tr>
<tr>
<td>6</td>
<td>PM6</td>
<td>QA6</td>
<td>Terminated</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>PM7</td>
<td>QA7</td>
<td>Completed</td>
<td>High</td>
</tr>
<tr>
<td>8</td>
<td>PM8</td>
<td>QA8</td>
<td>Completed</td>
<td>High</td>
</tr>
</tbody>
</table>

PM^: Project manager, QA*: Quality Assurance staff, DE^: Development (early stage), DM^^: Development (middle stage).

Observing the relationship between control configurations and the ISD-outsourcing project success or failure, we were able to make a number of observations. ISD-outsourcing projects could have control configurations independent of one another, meaning that high level of one configuration does not ensure or lead to high, medium or low of another. As an example, P3 had a high negotiated configuration with high aligned configuration whereas P4 had high negotiated configuration with low aligned configuration. According to PM1, in project P1 they had high aligned configuration: “Our client wants us to follow the documents as it is. So, most probably we will be providing exactly what the client wants”. PM1 also explained that: “Sometimes, we suggest new ways of doing things. Most of the time client agrees with us and update the documents according to our suggestions”. This indicated that P1 consisted of a high aligned configuration as well as a high negotiated configuration.

The data analysis revealed that all the ISD-outsourcing projects between Company-A and Company-B had high self-managed configuration. This indicated that, regardless of the controlling process, all the employees tended to work extra hours to achieve the targets. According to QA2, “We are working in a tight deadline; definitely we have to make some arrangements by working extra hours”. Most of the projects had standard processes like internal releases for employees’ self-management. According to PM4, “We provide our software to the client after several internal releases”.

According to P3 and P7, high aligned configuration leads to successful projects, regardless of the negotiated configuration. PM3 from project P3 explained: “To be successful, you have to follow the requirement documents as it is”. PM7 from P7 stated: “We should have proper documents and we should follow these. Otherwise project will defiantly fail”.

According to P2 and P5, when the aligned configuration is medium and the negotiated configuration is high, projects were in average condition. This indicated that an ISD-outsourcing project with less aligned configuration can still be managed in average condition, if it is compensated by high negotiated configuration. According to PM5, “We were managed to execute our project even with less specified documents, because we had a very good relationship with the client company. They were willing to provide the information so quickly”. PM2 stated that: “There were some issues with the documents. The
level of information the client provides were not enough. However, we managed to run our project because we had good relationship with our client”.

When there is low aligned configuration with high negotiated configuration, as in P4, the project was in average condition. Most importantly, project P6, which had low aligned configuration and medium negotiated configuration, was terminated. This indicated that a low aligned configuration leads to unsuccessful projects, unless it is compensated by high negotiated configuration. PM6 noted that: “Sometimes they ask us to follow documents as it is. But they haven’t written all the required information”.

Discussion

The goal of the study is to explore control configurations and to identify the relationship between control configurations and ISD-outsourcing project success. To the best of our knowledge, none of propositions discussed above have been tested in previous information systems studies on ISD-outsourcing projects.

In this research, we introduced the control configurations in which the structure and process control mechanisms combine, thereby offering a more nuanced theoretical understanding of control mechanisms. Grounded in the case study data, three control configurations were identified: 1) aligned configuration, 2) negotiated configuration, and 3) self-managed configuration. An aligned configuration can be observed when the structural and process control mechanism combinations are aligned within the corresponding control mode, whereas a negotiated configuration occurs when the structural and process control mechanism combinations are flexible across the different control modes. A self-managed configuration can be observed when the vendor is self-disciplined regardless of the control mechanisms exercised by the client. More importantly, the data analysis revealed: 1) different projects within the same company could have different control configurations; 2) control configurations are independent of one another; and 3) control configurations have a bearing on the ISD-outsourcing project success. Moreover, we identified: 1) ISD-outsourcing projects have high self-managed configuration, 2) a high aligned configuration leads to successful projects, regardless of the extent of the negotiated configuration, 3) a project with low aligned configuration can still be adequately managed, provided it is compensated with high negotiated configuration; and 4) a low aligned configuration leads to unsuccessful projects, unless compensated by high negotiated configuration.

Our study has the potential to influence the practice of ISD-outsourcing. First, it allows practitioners to understand the control configurations in ISD-outsourcing projects. Revealing the three control configurations namely, 1) the aligned configuration, 2) negotiated configuration, and 3) self-managed configuration shows the impact of different control configurations on the projects. Second, it points out the relationships between the control configurations and ISD-outsourcing project success. It highlights the need for aligned configuration in ISD-outsourcing projects, thereby notifying the project managers to maintain high aligned configuration in their projects. In addition, it shows the importance of the negotiated configuration when the aligned configuration is low in ISD-outsourcing projects. More importantly, our study emphasizes the need to monitor control configurations to minimize ISD-outsourcing project failures.

Our preliminary study results are heartening, and further work is underway to establish our research objectives. In the second phase of the research, we intend to trace the evolution of control configurations over the lifecycle of an ISD-outsourcing project. We noticed that the configurations change over time and some trajectories may be more amenable to ISD outsourcing project success. We observed that the aligned configuration was dominant in the initial stages of the projects; that is, the vendor can be controlled by the client, since the vendor does not have a clear understanding of the project requirements. As the project matures, with the vendor’s familiarization with the project requirements, the middle stages of the project can be best managed by the negotiated configuration. Towards the end of the project, the self-managed configuration dominates the project due to vendor maturity. Further, we also intend to conduct a survey to validate the preliminary findings of the first phase of the research. Although several past studies have observed structural controls (Jaworski 1988; Kirsch et al. 2002) and process controls (Srivastava and Teo 2012b), we are yet to identify any studies on the control configurations of ISD-outsourcing projects.
References


