Software Application Outsourcing Contracts: An Agency Theory Perspective

Padmal Vitharana
Syracuse University

Ravi Dharwadkar
Syracuse University

Follow this and additional works at: http://aisel.aisnet.org/icis2002

Recommended Citation
http://aisel.aisnet.org/icis2002/73

This material is brought to you by the International Conference on Information Systems (ICIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICIS 2002 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
SOFTWARE APPLICATION OUTSOURCING CONTRACTS: AN AGENCY THEORY PERSPECTIVE

Padmal Vitharana
School of Management
Syracuse University
Syracuse, NY USA
padmal@syr.edu

Ravi Dharwadkar
School of Management
Syracuse University
Syracuse, NY USA
rdharwad@syr.edu

Abstract

Scholars have proposed agency, game, resource-dependency, and transaction cost theories as a means to study outsourcing. Although risks faced by outsourcing firms and developers (i.e., vendors) and corresponding agency costs have been identified, key agency constructs (e.g., firm competence, risk-neutrality of the developer) and their linkage to outsourcing practice (e.g., monitoring, screening) have not been extensively studied. In this research, we extend the classical agency theory by examining the impact of risk orientation of the outsourcing parties, application features, multi-period attributes and environmental factors on monitoring, bonding, compensation, screening, and signaling. By developing the agency framework, we set the stage for future empirical testing of key outsourcing constructs and their linkages.

1 INTRODUCTION

According to industry reports, global software outsourcing is estimated to grow from $56 billion in 2000 to over $100 billion by 2005 (www.idc.com). Outsourcing is argued to reduce development cost and time, provide access to new technology and improve business performance (Lacity and Willcocks 1998a, 1998b). Scholars have proposed agency, game, resource-dependency, and transaction cost theories as a means to study outsourcing (Ang and Straub 1998; Elitzur and Wensley 1998; Grover et al. 1998; Jurison 1998). Although risks faced by outsourcing firms and developers (i.e., vendors) and corresponding agency costs have been identified (Grover et al. 1998), key agency constructs (e.g., firm competence, risk-neutrality of the developer) and their linkage to outsourcing practice (e.g., monitoring, screening) have not been extensively studied. In this research, we extend the classical agency theory by examining the impact of risk orientation of the outsourcing parties, application features, multi-period attributes, and environmental factors on important outsourcing constructs such as monitoring, bonding, compensation, screening, and signaling.

We suggest that by considering the risk characteristics of firms and developers, in light of the application, time-related, and environmental factors, both practitioners and researchers will better be able to understand the issues relevant to the design of outsourcing contracts. However, unlike the traditional assumptions of agency theory, firms (i.e., principals) tend to be risk-averse, as they have to rely on the developer for application development (Elitzur and Wensley 1998). On the other hand, the developer (i.e., agent) can be risk-averse if it relies on a single firm for a large part of its business or risk-neutral if it has a fairly diverse client base. In this context, we consider how monitoring and incentive alignment may be influenced by both firm and developer characteristics. Furthermore, we consider how application characteristics may affect monitoring or incentive alignment properties of outsourcing contracts. We suggest that the nature of interorganizational relationships will also influence the design of contracts.
and the need for monitoring may decrease over multi-period contracts. In sum, we argue that little attention has been paid to issues mentioned above in outsourcing research. Hence our research goal is to answer the question: *What are the implications of risk characteristics of the firm (principal) and the developer (agent), along with other application, time-related, and environmental factors, for monitoring, bonding, compensation, firm screening, and developer signaling in software outsourcing contracts?*

### 2 CONCEPTUAL FRAMEWORK

In order to answer our research question, we overview the theoretical model in Figure 1, wherein we propose that agency characteristics should interact with application, multi-period, and environmental factors to influence the design of contracts and the related agency costs.

![Figure 1. A Model for Software Application Outsourcing Contracts](image)

#### 2.1 Firm Characteristics

**2.1.1 Risk Orientation**

As the degree of risk-aversion increases, firms are more likely to be concerned about the information asymmetry due to the potential losses associated with opportunism and moral hazard. To mitigate this information asymmetry inherent in agency contracts, firms need to invest in various monitoring procedures and tools (Jacobides and Croson 2001). The monitoring systems could be broadly classified into two categories. First, principals could use qualitative assessments of the agents’ performance based on their objectives (operational). Alternatively, principals could use output-based control systems that rely on financial controls to document and evaluate the agent (financial). Hence,

**Proposition 1a:** The risk-aversion of the firm is positively related to operational and financial monitoring.

**2.1.2 Number of Developers**

When there are many developers, the firm cannot afford to extensively monitor all of the developers using operational and financial audits. As operational audits are more likely to incur higher costs due to the use of expert consultants or firm employees and tend to provide imperfect information, firms are more likely to resort to financial monitoring in the face of an increased number of developers. Therefore,
Proposition 1b: For a given risk-aversion level of the firm, the number of developers it employs in various software application outsourcing contracts is negatively related to operational monitoring and positively related to financial monitoring.

2.1.3 Technical Competence of the Firm

Possessing technical competence enables the firm to monitor the developer to uncover instances of opportunism and moral hazard. It could be argued that a firm that is more technically competent would know the type of information that makes the developer work in its best interest better than a firm that is less technically competent. Nonetheless, because monitoring is expensive, the firm has to determine the optimal level of monitoring that generates the greatest benefit. Therefore,

Proposition 1c: Technical competency of the firm is positively related to the effectiveness of monitoring by the firm.

2.2 Developer Characteristics

2.2.1 Risk Orientation

Developers are vulnerable to uncertain futures of firms (e.g., risk of bankruptcy). Tasks for which behaviors cannot be precisely defined in advance (i.e., non-programmable tasks) and outcomes that are only partly the result of effort relay additional risks to the agent (Eisenhardt 1989). To safeguard against inherent contractual risks, developers would generally demand a premium (Whang 1992). However, when the developer builds applications for a large number of firms, it could share potential risks among those firms. Moreover, by diversifying application development among a large number of firms, the risk-neutral developer is able to achieve significant economies of scale (Lacity et al. 1996). Hence,

Proposition 2a: Risk-neutrality of developer is negatively related to bonding efforts and compensation demands of the developer.

2.2.2 Technical Competence of the Developer

Key application development tasks such as analysis and design demand considerable developer expertise (Wallnau et al. 2002). To secure technical know-how, application developers often invest heavily in relevant technologies and human capital. A developer who has the expertise germane to application development faces significantly less risk of project cancellation and consequently will incur lower bonding costs (Lacity and Hirschheim 1993; Whang 1992). Moreover, as the agency theory highlights the importance of incentive alignment in drafting compensation schemes (Williamson 1988), a developer who has made considerable investment in acquiring relevant technical competency has the incentive to recoup that investment. Hence,

Proposition 2b: Technical competency of the developer is negatively related to bonding efforts and positively related to the compensation demands of the developer.

2.3 Application Features

2.3.1 Application Specificity

When the developer is not entirely knowledgeable in the business domain for which applications are sought, it needs to first understand the “specifics” of the problem in order to develop applications. An application that is unique to a particular organization (e.g., NASA space program) has greater specificity than a one that could be used in many organizations (e.g., consumer banking). Hence, when the application specificity is relatively high, the developer has to expend considerable resources to achieve a greater understanding of the problem domain during application development (Nam et al. 1996).

Consequently, as the specificity increases, the firm is more likely to invest in monitoring schemes due to the highly contingent nature of the application specific to its own context. At the same time, the developer is likely to incur higher bonding costs in order to convince the firm that it is capable of developing specific applications. Moreover, to offset the increased effort in developing such applications, the developer is likely to demand greater compensation from the firm. Therefore,
Proposition 3a: Increases in the firm’s risk-aversion in conjunction with increases in application specificity are associated with increases in the firm’s monitoring efforts.

Proposition 3b: Decreases in the developer’s risk-neutrality in conjunction with increases in application specificity are associated with increases in the developer’s bonding efforts and compensation demands.

2.3.2 Strategic Importance

Strategic importance of information systems to effectively carry out critical business processes is well documented (Sabherwal and King 1995). As a result, when the application outsourced is strategically important, the firm has to diligently monitor the actions of the developer to guarantee that the application is developed as intended. Hence,

Proposition 3c: Increases in the firm’s risk-aversion in conjunction with increases in the strategic importance of the application being outsourced are associated with increases in the firm’s monitoring efforts.

2.3.3 Design Characteristics

In software design, the contracting firm expects the applications being developed to hold certain design features that would play a pivotal role in their subsequent use. An examination of the relevant literature reveals some of the key design attributes as reliability and ease of use. Developing applications that possess desired design characteristics incurs considerable cost to the developer. Hence,

Proposition 3d: Decreases in the developer’s risk-neutrality in conjunction with increases in the value the firm places on preferred application design characteristics are associated with increases in the developer’s compensation demands.

2.4 Multi-Period Contract Attributes

Over time, firms have a need for a variety of applications as they continually strive to improve their business processes. In procuring application systems, firms may often rely on certain developers who have developed applications for them in the past. Often trust has been used to explain why a firm and a developer engage in multi-period contracts. Multi-period contracts that enable the formation of trust reduce the information asymmetry within a contracting relationship, which in turn affects monitoring (Lacity and Hirschheim 1993; Sharma 1997). As the firm contracts out multiple application development projects over time to the same developer, it is in a better position to assess developer capability. Therefore,

Proposition 4a: Decreases in the firm’s risk-aversion in conjunction with increases in the firm-developer involvement in multi-period contracts are associated with decreases in the firm’s monitoring efforts.

Generation of reports and documents beyond those requested by the firm consumes a considerable amount of time and effort on the part of the developer (Sharma 1997). However, as a firm and developer engage in multi-period contracts, the developer has a lesser need to convince firms of its non-opportunistic behavior, thereby reducing bonding costs. Moreover, by repeatedly engaging with a firm, the developer is better placed to assess whether the firm behaves opportunistically. When the developer determines that the firm deals fairly, it does not have to charge as a higher premium. Hence,

Proposition 4b: Increases in developer’s risk-neutrality in conjunction with increases in the firm-developer involvement in multi-period contracts are associated with decreases in the developer’s bonding efforts and compensation demands.

2.5 Environmental Factors

2.5.1 Firm Screening

In screening, the goal of the firm is to identify a developer who is best suited for building its applications (Bergen et al. 1992). Because of the number and variety of developers and the nature of the signals they emit, screening plays a crucial role in
identifying the “right” developer. Accordingly, the challenge for the firm is to ascertain the relationship between signals and performance (Spence 1974). Given the information asymmetry in favor of developers prior to entering into outsourcing arrangements with firms (Bergen et al. 1992), screening helps firms to identify private information about developers. More importantly, through screening, firms can reduce the risk of opportunism and adverse selection (Mishra et al. 1998; Wathne and Heide 2000). By investigating developers’ past behaviors, the firm will be in a better position to discover opportunistic developers. As weaker developers might send signals to misrepresent their abilities, screening enables the firm to identify those who are sending “true” signals (Mishra et al. 1998).

When the number of developers offering application development services is relatively low, the pool of developers the firm needs to screen is lessened. Because the number of developer signals and other environmental clues from a smaller pool of developers is markedly less than those from a larger pool, the need for extensive screening is reduced. Conversely,

**Proposition 5a:** Increases in the firm’s risk-aversion in conjunction with increases in the total number of developers offering application outsourcing services are associated with increases in the firm’s screening efforts.

2.5.2 Developer Signaling

In signaling, the developer’s goal is to advertise its credentials in a positive light (Spence 1974). A developer might signal to potential outsourcing firms that it has the best personnel in the industry and employs state-of-the-art technologies in application development. Developers could broadcast their experience to entice potential firms (i.e., future customers) by publicizing prominent customer lists and testimonials of their most successful customers. By offering warranties, the developer is able to signal that it stands behind its products and services (Spence 1974). Moreover, because a firm looking to outsource application development holds considerably less knowledge of the developers than those developers themselves (Sharma 1997), by signaling, a developer could reveal important information that may lead the firm to select it (Mishra et al. 1998).

As the number of firms seeking application development services increases, the demand for developers’ services increases, requiring much less signaling effort on the part of the developer. When a larger pool of firms exist, the developer has the comfort of selectively sending signals to those firms that offer it the best chance of securing a profitable application outsourcing contract. As competition among firms for developers’ services intensifies, the firms will in fact seek out information about developers themselves, requiring less signaling by developers to reveal their information. Hence,

**Proposition 5b:** Increases in the developer’s risk-neutrality in conjunction with increases in the total number of firms seeking application outsourcing services are associated with decreases in the developer’s signaling efforts.

3 RESEARCH IMPLICATIONS

Our research has two important implications. First, we develop empirical operationalization of the key agency constructs (e.g., firm competence, risk-neutrality of the developer) in the software outsourcing domain. Secondly, we examine their linkage to outsourcing practice (e.g., monitoring, screening).

4 PRACTICAL IMPLICATIONS

Our work offers several practical implications as well. First, we identify when firms should monitor and when developers should bond. Second, we reveal the level of compensation a developer could demand from the firm. Third, we show how the firm should monitor (e.g., financial versus operational) the developer. Finally, we disclose the intensity in which the firm should screen and the developer should signal.

5 REFERENCES