The effects of project uncertainty and risk management on IS development project performance: A vendor perspective

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Abstract

The structural contingency perspective has been widely used in information systems development (ISD) project risk management research. This paper develops an integrative model to explore the moderating effects of uncertainty on the relationship between risk management and IS development project performance from a vendor perspective, rather than the client perspective that is mainly employed in the literature. A survey-based research design is used to collect data to test the proposed model. The results reveal that project uncertainty can moderate the effects of project planning and control on process performance and the effects of user participation on product performance. More specifically, the results indicate that project planning and control makes a greater contribution to process performance when there is a low level of inherent uncertainty and that user participation makes a greater contribution to product performance when there is a high level of inherent uncertainty. The results of this study contribute to a more acute understanding of the contingency approach to ISD project risk management.
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1. Introduction

With information technology playing an increasing role in the economy, companies have grown more heavily dependent on the successful delivery of information systems (IS). However, information systems development (ISD) project failures are common. The Standish Group Chaos Report for 2009 indicated that 44% of software projects were unable to be delivered on schedule, within budget, or with the required functions, and that 24% of all software projects were cancelled (Standish Group International, 2009).

Effective ISD project management has received considerable attention from academics and practitioners. A key question for researchers is how to deal with the uncertainties of software development (Zmud, 1980; McFarlan, 1981; Wallace et al., 2004) or, in other words, risk identification and management. One branch of IS research discusses risk management, project success, and the relationships between the two from a contingency perspective (e.g., Nidumolu, 1995; Barki et al., 2001; Jiang et al., 2006). The contingency approach considers project success to be dependent on how well the project as a whole is able to deal with uncertainties in the project environment. With the exception of Barki et al. (2001), contingency studies of software project risk management do not consider uncertainty profiles or risk management profiles from an integrated perspective. Moreover, most of these studies focus on in-house development projects, where developers and users are members of the same organization. However, companies are increasingly outsourcing all or part of their IS activities to external vendors (Lacity and Willcocks, 1998), including IS development. Outsourcing may give rise to additional or different risks from the perspectives of both the client and the vendor (Taylor, 2007). In this situation, client and

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vendor share the responsibilities for managing outsourced IS projects. As system vendors absorb considerable amounts of risk, an integrated framework is needed for managing the risk in software development from a vendor perspective (Dey et al., 2007). However, prior research on risk management in outsourced ISD projects has paid little attention to the vendor's perspective (Taylor, 2007). The two parties involved in outsourcing may have different perceptions of risk, risk management and project success because of the differences in their goals and structures. Accordingly, the contingency relationships found in prior research need to be examined to determine whether they also apply to the study of the outsourced projects from a vendor perspective.

Thus, this paper attempts to develop an integrative contingency framework to describe the effects of project uncertainty, risk management and their interaction on project performance from the vendor's perspective. This paper is expected to advance our understanding of the risk management of outsourced IS development projects and to provide system vendors with a set of guidelines that may be helpful for the effective risk management of outsourced ISD projects.

The remainder of this paper is organized as follows. The next section discusses the theoretical background to ISD project management and reviews the existing literature. Section 3 describes the research model and the resulting hypotheses. The research methodology and the results of our model test are reported in Sections 4 and 5. Section 6 discusses the results and the implications of the study. The final section outlines the limitations to the study and the opportunities for further research.

2. Literature review

IS research employing the contingency approach to software project risk management has been strongly influenced by research in organizational contingency theory. From this perspective, software development projects that are managed with approaches that fit the demands imposed by the degree of risk or uncertainty related to the project environment will be more successful than projects that do not (Barki et al., 2001). Table 1 summarizes the past IS research that has adopted such a contingency approach to software project risk management. In these studies, risk management is not considered to be a separate management

Table 1
Contingency approaches to software project risk management.

Author (year)	Key construct studied	Recommended course of action	Support provided
Zmud (1980)	Project coordination mode	Use impersonal mode of coordination for low project risk or uncertainty, a personal mode of coordination is advocated for moderate uncertainty levels, and use group mode of coordination for high project uncertainty.	Conceptual
McFarlan (1981)	External integration, internal integration, formal planning and formal control	Different types of projects need different management tools and provide the risk management countermeasures given a project's inherent risk influenced by project size, experience with the technology and project structure.	Conceptual
Beath (1987)	Relationship between parties concerned	Use arm's length relationships for low project risk or uncertainty, whereas use clan relationship.	Case study
Nidumolu (1995, 1996a)	Coordination structure	Use vertical coordination for high project uncertainty.	Cross-sectional data from 64 projects
McKeen and Guimaraes (1997)	User participation	Use low levels of user participation when project uncertainty is low, whereas enhance user participation.	Cross-sectional data from 151 projects
Barki et al. (2001)	Formal planning, internal integration, and user participation	When meeting project budgets is the performance criterion, successful high-risk projects have high levels of internal integration, as well as high levels of formal planning. When quality is the performance criterion, successful high-risk projects have high levels of user participation.	Cross-sectional data from 75 projects
Jiang et al.(2006)	User partnering	Apply user partnering techniques for high project user non-support risk.	Cross-sectional data from 170 projects
Sauer et al.(2007)	Project size, process volatility	Project size affects project performance, but risk does not rise smoothly against every dimension of size. Volatility is associated with project variances. In particular, changes in the project manager have shown strongly adverse effects.	Cross-sectional data from 412 projects