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Influence of managerial control on performance in medical information system projects: The moderating role of organizational environment and team risks

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Abstract

The relationship between managerial control and performance has been extensively investigated in literature. However, in the context of medical information systems (IS) projects, this topic has received little attention. Furthermore, the integrated effects of organizational environment and team risks, as well as managerial controls on the performance of medical IS projects have never been examined. The present study attempts to bridge these gaps using data on 195 medical IS projects from 160 hospitals. Our empirical results demonstrate that behavior, outcome, and clan controls positively affect the performance of medical IS projects. By contrast, self-control is insignificantly related to performance. This finding reveals that in medical IS projects, the effectiveness of managerial controls varies. Not all control modes significantly influence the performance of medical IS projects. Effective control modes should therefore be prioritized over ineffective control modes for such complex projects. Moreover, organizational environment and team risks diminish the effects of behavior, outcome and clan controls on performance in medical IS projects, which implies that project performance relies on the integrative influence of controls and risks, and the exercise of control should consider the mitigation of risks from both client and development team sides in medical IS projects.

Keywords: Managerial control; Medical information system; Project performance; Risk management

1. Introduction

Medical information systems (IS) can enhance the working efficiency of physicians and enable them to provide high quality service for patients (Nirel et al., 2010; Petter and Fruhling, 2011). However, medical IS projects have shown a low success rate over the last few decades: approximately 70% of all medical IS either failed to deliver a satisfying outcome or failed entirely (Heeks, 2006). Although many healthcare institutions have made considerable investments for the development of IS projects, most healthcare professionals have experienced more than one system failures (Lorenzi and Riley, 2003). Overall, previous medical IS projects exhibit low performance, and poor risk management and control.

Two research branches have emerged to enhance the performance of IS projects. One branch focuses on managerial control based on control theory (Tiwana and Keil, 2010; Robert et al., 2013), whereas the other stresses the need to manage key risks from the risk-based view, particularly those with organizational environment and teams (Wallace et al., 2004; Krysiak, 2009). These research branches, however, have overlooked the type and context of IS projects, and have received little attention in medical IS projects. At least three gaps on managerial control of medical IS projects can be found in previous studies.

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First, despite the researchers' examination of the linkage between managerial control and performance, little research has explored the influences of managerial control in medical IS projects. For instance, Henderson and Lee (1992) examined the control–performance relationship from the perspective of project managers. Liu (2015) provided arguments and empirical evidence to support the assumption that each control mode was positively related to the performance of IS projects. However, the development of medical IS projects significantly differs from that of other IS projects (Braa et al., 2007). Medical IS should process high-volume data and handle complex medical information (Meslin et al., 2013; Kersten, 2013). Although extensive sharing of information is required in medical IS, security and privacy are likewise significant (Kushniruk et al., 2013). Therefore, medical IS projects often demonstrate great technological complexity, long duration and high difficulty of development, which result in different control strategies and effects (Tiwana and Keil, 2007; Tiwana, 2008). Prior literature also indicates that some managerial controls are ineffective under high-complex environment (Liu, 2015). Thus, some controls may also be ineffective in medical IS projects, which is highly complex. Although performance can be improved by exercising various managerial control modes (i.e., self-, clan, outcome, and behavior controls), the control–performance correlation has been found to be contradictory. For example, behavior and clan controls positively affect performance in several studies (Henderson and Lee, 1992), whereas in other research, their effects on performance were insignificant (Tiwana and Keil, 2010). Hence, further empirical evidence is needed to determine whether each of these types of managerial control can improve performance in medical IS projects.

Second, a handful of studies related to medical IS project management claims that control activities can enhance project success and minimize the implementation failure because such strategy can increase the visibility and calculability of clinical and technical activities (Doolin, 2004; Ludwick and Doucette, 2009). However, other researchers argue that only managerial control modes that balance both control and autonomy can significantly improve the performance of medical IS projects (Kimaro et al., 2008). Given that not all managerial control modes (e.g., self-control) can fairly balance control and autonomy, understanding how each managerial control mode influences the performance of medical IS projects is significant.

Third, although previous studies have integrated the joint effects of control and risk on IS project performance (Tiwana and Keil, 2010; Keil et al., 2013), their effectiveness was never examined in the context of medical IS projects. Investigating this issue is necessary, considering the number of differences between medical IS and other types of projects. In addition, previous findings on the collective effect of control and risk are contradictory. For example, user and requirement risks were found to negatively influence the control–performance correlation in IS projects (Keil et al., 2013). In contrast, risks such as environment risk can intensify control effectiveness, as some control modes are more appropriate and effective in uncertain environments (Rustagi, 2004; Harris et al., 2009). Therefore, a clear understanding of how risks modify the control–performance correlation is essential. Furthermore, the moderating effect of several risks has already been widely examined, but the integrated influence of control and certain types of risks (e.g., organizational environment and team risks) remains unexplored. High team risk can diminish the effect of several managerial control modes (e.g., clan control), but may intensify the effect of others (e.g., self-control). This gap is highlighted by Keil et al.'s (2013) study. Therefore, how risks, particularly organizational environment and team risks, alter the relationship between managerial controls and performance in medical IS projects requires further examination.

Considering that some risks and managerial control modes may affect performance significantly while others may be insignificant, these problems have to be addressed further. A comprehensive understanding of this issue can prevent project managers, client liaisons and other stakeholders in medical IS projects from investing in unnecessary costs and resources. We attempt to bridge these gaps through the guidance of the following research questions:

- How do managerial controls affect performance in medical IS projects?
- How do organizational environment and team risks modify the linkage between managerial control and performance in medical IS projects?

This paper is divided into eight sections. The next section provides relevant literature and theoretical background. The third section elaborates the research model and the development of hypotheses. The fourth section presents the methodology in our study. Hierarchical regression analysis is used for hypothesis testing on the basis of the survey data obtained from 195 medical IS projects. The subsequent two sections discuss the results of the hypothesis testing and the implications drawn from the research findings. The final two sections summarize the limitations, future research, and our conclusions.

2. Theoretical background and literature Review

2.1. Managerial control mechanisms

In the present study, managerial control is defined as an attempt to induce participators in medical IS projects to act based on agreeable strategies in order to achieve the desired goals (Kirsch, 1997; Tiwana and Keil, 2010). The process of exercising managerial controls involves two significant roles. The first one is the role of the controller, who is responsible for designing and implementing specific control modes (Kirsch et al., 2002). The second one is that of the controlee, who is influenced by the control exerted by the controller and whose behavior and activities are changed by the control process (Kirsch et al., 2010). In our research, we select the client liaison as the controller that provides oversights on the medical IS