

2000

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A Model for Enterprise Systems Implementation: Top Management Influences On Implementation Effectiveness

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Abstract

How to minimize risks involved in enterprise systems (ES) implementation while maximizing benefits has become a challenge for top management. This article proposes a conceptual model exploring impacts of top management on ES implementation effectiveness. This paper takes a perspective of innovation implementation because of the fact that ES, per se, is an IT innovation. This paper addresses ES implementation issues through its focus on two research questions: 1) what influences does top management exercises on the ES implementation? and 2) what top management contributes to a successful ES implementation under different implementation modes? Based on Klein and Sorra's (1996) model, this paper develops a research model and identifies three top management influences to explore these research questions. The paper concludes with potential contributions to IS researchers and business practitioners.

Introduction

Enterprise systems (ES) are commercial software packages that manage and integrate business processes across organizational functions and locations. A typical example of ES is enterprise resource planning systems (ERP). An ES, with its seamless integration of all the information flow through a company, promises long-term productivity and relieves managers from incompatible information systems and inconsistent operating practices. As an emerging technology, however, results from ES implementation look quite mixed. On one hand, some typical success stories such as Autodesk, IBM and Fujitsu Microelectronics have exemplified how enterprise systems streamline organizational data flows, reduce operational costs, increase market responsiveness, strengthen management control of business, and thus greatly leverage the competitiveness of the organization (Goodwin, 1998; Davenport, 1998). However, despite strong organizational incentives to adopting ES, implementation success is far from assured. It is reported that some companies were overwhelmed by the changes and thus abandoned their ES, while some went into bankruptcy after implementation of ES (Jesitus, 1997). For example, FoxMeyer Drug argues that its enterprise

systems helped drive it into bankruptcy; Dow Chemical spent seven years and gave up its mainframe-based enterprise systems, which cost about half a billion US dollars.

Risks for implementing ES lie in the nature of enterprise systems, which are generic solutions reflecting a vendor's, rather than customers', assumptions of what the best practices will be. Organizations are "forced to change their way (of) operating rather than being able to adapt software to their needs" (Lozinsky, 1995). It pushes companies toward full integration, and changes various business processes into generic ones even if the companies want to customize some of these business processes.

As a result, implementing an ES spurs disruptive social-technical changes in organizations. The paradox facing organizations is obvious. The major benefits of ES are rooted in the total integration of the system. The fewer changes made to an enterprise system, the greater the enterprise system integration, and the more possible benefits to an organization. However, the greater the enterprise system integration, the more changes will occur in the existing process; thus, greater risks (e.g. business processes redesign, complex interfaces required) will be involved. Consequently, the key problem of ES implementation lies in how to minimize risks involved in changes induced by ES implementation, while maximizing ES benefits. This paradox highlights the role of top management in managing changes involved in the implementation process. The uniqueness of enterprise systems necessitates a better understanding of top management influence on ES implementation.

This demand is intensified by a lack of attention of the current academic research to ES (Gable, 1998). To make up for these gaps, this article intends to study impacts of top management on ES implementation success. In particular, the paper will provide a theoretical framework to explore top management influence under different ES implementation modes. The next part will introduce the theoretical background of this paper and provide a description for the proposed research model.

Theoretical Background and Research Model

Klein and Sorra (1996) model of innovation implementation, based on the social influence theory, describes the determinants of innovation implementation effectiveness. They argue that implementation effectiveness, the quality and consistency of usage of adopted IS, is determined by the climate for implementation and innovation-value fit. Implementation effectiveness is categorized into three behaviors: avoidance of the innovation (nonuse), unenthusiastic use (compliant use), and skilled, enthusiastic and consistent use (committed use). According to Klein and Sorra, the stronger an organizational climate for an innovation implementation is, the more targeted users actively engage in consistent and effective use of an innovation within an organization. However, while an organization climate for innovation implementation provides strong incentives for innovation usage, they point out that users will not reveal committed use of a given innovation unless it is congruent with users' value. Thus, the implementation effectiveness is also a function of the innovation-values fit, ranging from poor fit, through neutral, to good fit. A good innovation-values fit will lead to better implementation effectiveness.

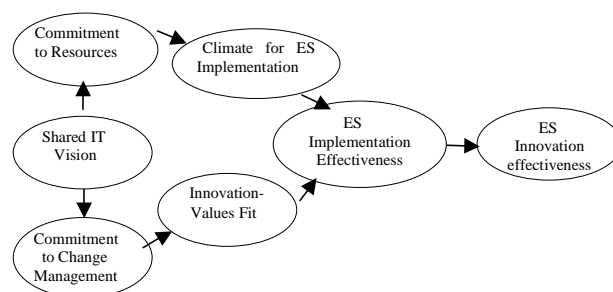
In their model, Klein and Sorra differentiate implementation effectiveness (i.e. the degree of the consistency and quality of system usage after the innovation implementation) from innovation effectiveness (i.e. the benefits an organization receives as a result of its implementation of a given innovation (e.g. improvements in profitability, customer service, and employee moral)). They suggest that innovation implementation effectiveness is positively related to innovation effectiveness.

Klein and Sorra (1996) theory of innovation implementation provides a theoretical understanding of innovation implementation, and clarifies confusion about how to evaluate innovation implementation. They indicate the usefulness of their model by analyzing various implementation studies being conducted. The model they provide is testable and can be extended to further examine top management influence. Thus, this paper believes that their model is an appropriate lens based on which to better understand implementation process, to identify the effect of top management influence on the successful implementation, and to provide effective strategies for successful innovation implementation.

Among IS implementation studies, top management commitment is one of the most-studied factors in successful IS innovation implementation. A literature review has found that top management commitment to resources is what most studies focus on (Newman and Sabherwal, 1996). However, the lack of commitment to

change management has recently been recognized as the most severe source of difficulty in IT implementation, especially in the IT implementation that involves fundamental organizational changes (Grover, 1999; Stoddard and Jarvenpaa, 1995). In addition, lack of shared IT vision, shared understanding between senior business officers and senior information systems officers about IT innovation and its contributions to organizational competitive advantage (Reich and Benbasat, 1996), also contributes to the most severe problems in innovation implementation (Grover et al., 1995). Thus, this paper extends Klein and Sorra's model (see Figure 1) to particularly address these three top management influences on the implementation effectiveness.

Figure 1. Conceptual Model of Top Management Influence on Implementation Effectiveness



Top management commitment to resources (TMCR) describes the extent to which top management is determined to provide enough financial and technological resources to ensure smooth completion of innovation implementation. Top management commitment to resources influences organizational climate for innovation implementation in that it is a kind of higher-level management support that promotes IT innovation implementation activities among targeted users. TMCR, by showing top management's determination to fully support innovation implementation, encourages targeted users' acceptance of new systems within an organization (Igbaria and Guimaraes, 1994). Lack of commitment to resources could lead to indifference or deliberate organizational resistance to system implementation (Grover et al., 1995), and may even cause abandonment of implementation (Ewusi-Mensah and Przasnyski, 1991). Case studies on enterprise systems suggest that the commitment of top management to resources is key to facilitating implementation processes (Hirt and Swanson, 1998).

Proposition 1: Top management commitment to resources (TMCR) is positively related to the organizational climate for ES implementation effectiveness.

Top management commitment to change management (TMCC) depicts the extent to which top management engages in promoting organizational

receptivity of IT innovation by training, by formal presentation, and by establishing communication channel (e.g. Lotus Notes) between top management and targeted users (Champy, 1995; Davidson, 1993). By informing targeted users about characteristics of innovation and their impact on organization and targeted users, TMCC reduces uncertainties around technical changes and organizational transformation. As well it promotes the fit between innovation and targeted users' values, and eventually alleviates misuse and resistance to innovation usage within an organization. In addition, it is believed that efforts devoted to solving difficult change management problems would pay off in terms of implementation success, whereas inability to manage organizational change would most likely lead to implementation failure (Grover et al., 1995). In summary, TMCC expedites organizational learning, facilitates targeted users' receptivity of an innovation, and eventually leads to implementation and innovation effectiveness.

Proposition 2: Top management commitment to change management (TMCC) is positively related to the innovation-values fit.

This paper argues that both TMCC and TMCR are determined by shared IT vision. Organizations that adopt innovations without a clear shared IT vision may find the technological choices unsuitable for its business processes and organizational resources will be wasted. Specifically, for companies that have installed ES, the biggest problems are not just cost and complexity of an ES, but management incentives to implementing ES without considering its business implications (Davenport, 1998). Without shared IT vision, an adoption and implementation to solve current problems will not gain commitment from top management, and is the very factor that creates even larger problems in the future.

Proposition 3: ES implementation with shared IT vision will lead to top management commitment to resources and change, and will eventually result in positive implementation effectiveness.

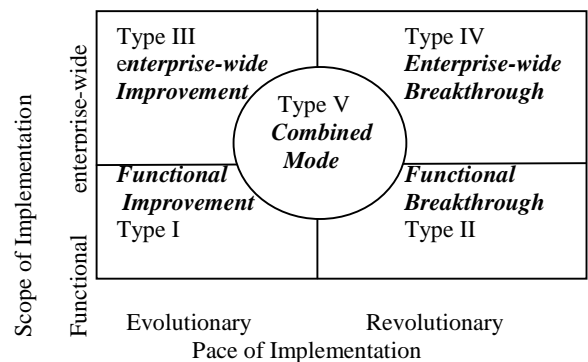
Top Management Influences Under Implementation Mode

Although Klein and Sorra's model provides a very useful lens to examine and evaluate the innovation implementation, it does not particularly address top management influences under implementation modes. Since different implementation modes represent different degrees of organizational change, top management influence on IT innovation implementation should adjust to the changes evoked by the implementation processes. Two dimensions -- pace and scope—are used to capture changes induced by IT innovation implementation (Lee and Kim, 1998).

The pace of new IT implementation is characterized as evolutionary versus revolutionary (Gallivan et al., 1994; Stoddard and Jarvenpaa, 1995). The evolutionary pace of the innovation process suggests a gradual, staged approach, while the revolutionary pace is all-at-once in a short period (i.e. "big-bang"). The typical notion of the scope of implementation is functional/local or enterprise-wide. The scope of implementation denotes the location of IT innovation, for example, whether it will be installed within one function, or enterprise-wide.

To clearly understand top management's role under different implementation modes, this paper proposes five types of ES implementation, as presented in Figure 2, based on the contingency model of Lee and Kim (1998).

Figure 2. Types of ES Implementation Modes



Type I—functional improvement. The scope of implementation is functional and the pace of implementation is evolutionary. It is supposed to be the least disruptive option, because enterprise systems will be installed in a phased process within a limited part of an organization. Implementing one or more modules in several departments of an organization is a typical example of this form of implementation. Under this implementation mode, requirements for TMCC and resources are usually low. However, if targeted users do not feel the implemented innovation congruent with their values, managers need strong commitment to the change management. Innovation effectiveness will be achieved when ES implementation is supported by shared IT vision.

Type II—functional breakthrough. The scope of implementation is functional, while the pace of implementation is revolutionary. ES implementation takes a revolutionary approach within a function. Since this mode is suitable for promptly addressing functional problems, financial and technical resources must be ensured to guarantee smooth ES implementation. At the same time, radical changes in functional practices warrant top management commitment to change management. However, since its scope is within a function or among a

few departments, demands for TMCC and TMCR are not as high as those in enterprise-wide implementation.

Type III—enterprise-wide improvement. The scope of implementation is enterprise-wide but the pace of implementation is evolutionary. This mode represents a phased and planned approach to installing enterprise systems. Since it is a long term implementation, involving changes within a whole organization, there are usually strong demands for TMCC and TMCR to achieve implementation effectiveness. If targeted users believe the innovation fits their value systems, however, top management does not need to put strong efforts in change management. For the organizations in which targeted users have neutral innovation-values fit, TMCC may not be as effective as TMCR. So it is proposed that strong and persistent TMCR can sufficiently affect targeted users’ use of the innovation for large-scale ES implementation.

Type IV—enterprise-wide breakthrough. The scope of implementation is enterprise-wide and the pace of implementation is revolutionary. This approach will dramatically change organizational fundamental paradigms and may generate enterprise-wide repercussions. Organizations embrace this approach when they believe that a radical improvement can be achieved by rapidly dismantling existing business processes and organizational structures (Orlikowski, 1993). The basic tenet of the approach is that people must qualify for change rather than have change adapt to

people (Stoddard and Jarvenpaa, 1995). Therefore, achieving implementation effectiveness requires strong demands for TMCR but low demands for TMCC.

Type V—combined mode. The scope of implementation is larger than starting focus of ES implementation, while the pace of implementation is a combination of revolutionary and evolutionary. Three case studies of Stoddard and Jarvenpaa (1995) reveal that implementation mode need not be “clean slate” or “green field”. A company may choose a revolutionary approach in its pilot implementation in one of its departments, for example, and adopt evolutionary approach (phased approach) in its enterprise-wide implementation. The underlying aim of this approach is to select the best implementation mode, tailoring various conditions among functions and within an organization. Consequently, both TMCC and TMCR are important to help targeted users accept usage of ES. It is proposed that demands for TMCC and TMCR will be stronger when it is enterprise-wide implementation rather than functional implementation, and even stronger if the targeted users do not like the implemented innovation at all. Table 1 summarizes top management influence under the five implementation modes. It is believed that ES implementation with shared IT vision between top business and IS managers will accomplish better implementation effectiveness than it would without shared IT vision.

Table 1. Top Management Influence On Implementation Effectiveness Under Implementation Mode

Implementation mode	Top Management Influence			Implementation Effectiveness	
	Strong	Medium	Low		
	When Innovation-Values fit is				
	Poor	Neutral	Good		
Type I	TMCC		TMCC, TMCR	Medium/High	Low
Type II	TMCC	TMCC, TMCR	TMCC, TMCR	Medium/High	Low
Type III	TMCC, TMCR	TMCC	TMCC	High	Low
Type IV	TMCR	TMCC	TMCC	High	Low
Type V	TMCC, TMCR	TMCC	TMCC	High	Low

It should be noted that there might be some trade-offs existing between scope and pace. For example, one would argue more management commitment needed for functional breakthrough than for an enterprise-wide improvement due to the more rapid changes involved in the former implementation mode. However, since there are more similarities and/or fewer variations within a department/departments than there are throughout an organization, this paper assumes that the implementation throughout an organization would be more complex than the implementation within a department/departments or a

local area. Thus, this paper proposes that more management commitment would be necessary for the enterprise-wide implementation than for the functional implementation.

Summary and Future Directions

Innovation implementation is the subject of little research, especially on ES implementation. This paper contributes to innovation implementation studies by conceptualizing managerial influences on successful ES

implementation. To academic researchers, the integrative conceptual model proposed in this paper makes up for the scarcity in conceptualizing top management influence on implementation effectiveness. To practitioners, this paper is useful in providing an analytical model for top managers in drawing out strategies for successful ES implementation and identifying latent problems under different implementation modes. Furthermore, differentiation between implementation effectiveness and innovation effectiveness highlights the importance of organizational implementation policies and practices in determining the strength of organizational climate for ES implementation. The next phase of this research project will test the research model and propositions by collecting data from companies that have implemented similar enterprise resource planning systems.

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