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Active ERP implementation management: A Real Options perspective

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Abstract

Although enterprise resources planning (ERP) implementation has been one of the most significant challenges of the last decade, it comes with a surprisingly high failure rate due to its high risk nature. The risks of ERP implementation, which involve both technical and social uncertainties, must to be effectively managed. Traditional ERP practices address the implementation of ERP as a static process. Such practices focus on structure, not on ERP as something that will meet the needs of a changing organization. As a result, many relevant uncertainties that cannot be predefined are not accommodated, and cause the implementation fail in the form of project delay and cost overruns. The objective of this paper is to propose an active ERP implementation management perspective to manage ERP risks based on the Real Options (RO) theory, which addresses uncertainties over time, resolves uncertainties in changing environments that cannot be predefined. By actively managing ERP implementation, managers can improve their flexibility, take appropriate action to respond to the often-changing ERP environment, and achieve a more successful ERP implementation.

Keywords: Active management; ERP implementation; Real Options; Uncertainty

1. Introduction

Investment in enterprise resource planning (ERP) systems is an important strategy that enables businesses to achieve competitive advantages and provide good quality of service. An ERP system streamlines business processes by creating an enterprise-wide transaction structure that integrates the key functions of different departments within an integrated information system platform. Through the integration of these diverse systems, organizations can gain a competitive advantage in the rapidly changing digital age. ERP is therefore a key part of the information infrastructure of modern businesses. Recent research has shown that ERP projects have grown to become the largest information system project investment in companies worldwide. Furthermore, this trend is expected to continue for years to come (Gattiker and Goodhue, 2005; Sumner, 2000; Wang et al., 2006).

However, if ERP projects are not implemented properly, the results can be disastrous, since the rate at which ERP projects fail is surprisingly high, with serious consequences including failure to fulfill anticipated functions and cost/schedule overruns (Benaroch and Kauffman, 2000; Bingi et al., 1999; Chen, 2001; Griffith et al., 1999). Many companies have seen no alternative but to terminate their ERP projects during the implementation phase once their resources have become depleted because of mismanagement. For instance, Dell Incorporated abandoned its ERP project after committing two-years and expending US$200 million. Waste Management Incorporated aborted its ERP implementation after spending $45 million of an estimated $250 million budget (Abdinnour-Helm et al., 2003). Failed ERP projects have even led to problems as serious as bankruptcy (Davenport, 1998; Markus et al., 2000). Given the significant risks inherent in ERP projects, it is vital that they are actively managed during the

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implementation phase (Gefen, 2004; Ko et al., 2005). Active management of ERP implementation refers to the management's ability to react to the changing environment in the long implementation process, and take appropriate action to manage the inherent risks.

Several streams of study have proposed foundational theories on ERP implementation. One such stream focuses on the interaction between ERP and organizations (Gattiker and Goodhue, 2004; Soh et al., 2000; Somers and Nelson, 2004), and makes the observation that ERP implementation is closely intertwined with complex organizational factors. Take organization's culture for example, organizational culture affects an organization's shared beliefs, ideologies, and norms that influence organizational behavior (Pfeffer, 1981; Schein, 1996), and therefore plays a critical part in ERP implementing (Jones et al., 2006; Laudon and Laudon, 2007). Besides, ERP requires high computer self-efficacy among employees because organizational changes resulted by the ERP implementation require a large-scale use of computers (Sheng et al., 2003), which presents different learning process for different types of organizations. Therefore, different types of organization experience different organizational fitting process (Markus et al., 2000), which makes ERP implementation face both technical and social uncertainties that cannot be predefined in full, and must, of necessity, be actively managed. Another stream concentrates on risk factors in ERP implementation. Such studies point out explicit key risk factors, such as process fit and user fit, which contribute to the failure of ERP implementation if left unchecked (Amoako-Gyampah and Salam, 2004; Hong and Kim, 2002; Mandal and Gunasekaran, 2003; Scheer and Habermann, 2000; Sumner, 2000). Other studies investigate risk factors in different ERP implementation phases and note that by actively managing problems that evolve over time, better ERP implementation can be achieved (Kumar et al., 2003; Loh and Koh, 2004; Markus et al., 2000; Rajagopal, 2002; Ross and Vitale, 2000).

Studies have widely been aware that risks affect the success of software projects (Barros et al., 2004; Costa et al., 2007; Han and Huang, 2007; Houston et al., 2001; Na et al., 2007), and the value of the role that management may play during ERP implementation has been recognized and many risk factors that affect successful ERP implementation have been identified. Even so, active management is, by and large, still an implicit concept in the literature, which does not address how active management can improve ERP implementation. Traditionally, ERP implementation has been regulated by net present value (NPV) rules, which assume that the process is static, and thus does not take into account the value that active management may add to ERP implementation.

In this paper, we consider the ERP implementation process from the perspective of Real Options theory, which addresses uncertainties over time and thereby facilitates adaptation to dynamic environments. Options are contracts that give the holder the right, but not the obligation, to buy a particular security at a fixed exercise price before a predetermined expiration date. A call option gives the option holder the right to buy stock at the exercise price when the price is favorable, but does not compel him to buy the stock at an unfavorable price. If exercised, the benefit to a buyer is the current stock price, less the exercise price and any premium paid for the option. The concept of "Real Options" was first discussed by Myers (1974). The author indicated that discretionary investment opportunities such as growth options capture the real project value. As Real Options are derived from financial options, by making a primitive phase investment, a project is implicitly equivalent to buying an option.

In addition, we provide a practical example in which Real Options are used to achieve active ERP implementation management. Our goal is to enable active management of ERP implementation. Active management permits the reshaping of strategies and allows rapid reaction to risks. We demonstrate that it can increase the probability of success for ERP implementations.

The remainder of this paper is organized as follows. In Section 2, we review the theoretical background of ERP implementation, including the unique features and difficulties it involves. In Section 3, ERP implementation is explored from the Real Options perspective. In Section 4, we demonstrate how active ERP implementation management can be achieved with Real Options theory and discuss the results. Finally, in Section 5, we present our conclusions and consider future research. The managerial implications of the present study for both researchers and practitioners are also discussed.

2. Theoretical background

Although ERP systems are multifunctional in scope, their integration depends on the nature of the organization (Botta-Genouloz et al., 2005). They enable companies to shift from traditional modes of operation where information systems function independently of business objectives. Since an ERP system intertwines technology, tasks, people, and an organization's structure and culture, it must be implemented in the technical subsystem as well as in the social-subsystem (Davis and Olson, 1985; Koh and Saad, 2003; Markus et al., 2000; Parr and Shanks, 2000). ERP systems are technological tools that provide a way to coordinate many facets of a company, enabling resources to be allocated more efficiently than by traditional business practices.

When a business implements ERP in its drive to become more efficiently interconnected, risks arise from the new technology, which is loaded with uncertainties that evolve over time and cannot be fully known when making decisions. For example, customization of ERP is a crucial, lengthy, costly aspect of the implementation of ERP systems (Gefen, 2002). Studies have shown that many organizations exceed their budgets due to the need for more customization than they originally planned (Markus