Management Theory Based Critical Success Factors in Enterprise Resource Planning Systems Implementation

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ABSTRACT

This study proposes to identify critical success factors in Enterprise Resource Planning Systems implementation. ERP systems promise to provide an off-the-shelf solution to the information needs of organizations. Despite this promise, implementation projects are plagued with much publicized failures and abandoned projects. These software products require most organizations to change existing business processes to adopt the standardized process provided by the ERP systems. As economic resources and management time are scarce in most organizations, the results of this study should aid management in controlling those factors that are most important to project success.

The current study utilizes a framework developed by Sneller (1986) in the study of critical success factors in MRP implementation. Various proposed CSFs will be subjected to a factor study to identify variables relevant to ERP outcomes.

INTRODUCTION

ERP systems promise to meet the information needs of organizations with an off-the-shelf solution for replacing legacy information systems. Worldwide annual expenditures on ERP systems in the late 1990s are estimated at $10 billion for software and another $10 billion for consultants to install the software. (Davenport, 1998) A survey conducted by AMR Research confirmed that ERP will remain the biggest segment of large and mid-sized company IT applications budgets through 2004 (Seewald, 2002). Despite these huge expenditures by firms adopting ERP, implementation projects are plagued with much publicized failures, abandoned projects, and general dissatisfaction. Upon completion, this research will determine the management-based critical success factors leading to successful implementation of ERP systems.

This study examines the critical success factors (CSFs) (Bullen & Rockart, 1981; Drucker, 1973) for implementing enterprise resource planning systems in the framework of classical management theory. An earlier study (Sneller, 1986), identified management based critical success factors in the implementation of materials requirements planning systems (MRP). Since Sneller's study, software vendors enhanced the functionality of MRP systems, first by developing manufacturing resource planning systems (MRP II) and subsequently by developing enterprise resource planning systems (ERP). As a result of expanded functionality, implementation of such systems affects a wider portion of the business enterprise than the operations and logistics functions affected by MRP.

Prior studies of CSFs in ERP implementations are largely based on anecdotal practitioner observations or case studies of a few implementations. A recent summary of ERP literature states that while ERP implementation difficulties and failures are widely cited, "research of critical success factors (CSFs) in ERP implementation is rare and fragmented" (Nah, Lau, & Kuang, 2001). More rigorous academic studies were directed to CIOs. The present study partially replicates and expands Sneller's work to determine the critical success factors for ERP systems. Sneller surveyed material managers, as MRP dealt with their functional areas. This study surveys functional managers to reflect the wider organizational impact of ERP functionality. Questionnaires will be directed to CEOs, CFOs, COOs, CIOs and other functional managers.

RESEARCH PROBLEM

This research seeks to discover the critical success factors for ERP. The study will follow Sneller's (1986) methodology for determining CSFs in MRP implementation and determine whether his methodology works on larger, more complex implementation projects. Sneller's study combined the identification of proposed CSFs from a literature review with a factor study to determine variables relevant to ERP implementation outcomes.

LITERATURE

ERP and IS literature were reviewed using the lens of the five functions of management theory. Possible critical success factors were identified in the areas of planning, organizing, staffing, leading, and controlling.

Planning. The integration of business planning and IS planning is one of the top problems reported by executives and IS systems managers (Reich & Benbasat, 1996). An A.T. Kearney study demonstrates that firms that integrate business plans with IS plans outperform other firms (Das, Zahra, & Warkentin, 1991). This literature suggests that the higher the level of integration of ERP planning with business planning the more likely the implementation will be successful.

H1. The level of integration of ERP planning and business planning is related to implementation project success.

Organizing. Organizations must deploy resources to attain goals. A common view is that a user must head up the project team and that it must be a full time job (Wight, 1974). Another view is that systems knowledge is the least important skill of a PM (Flosi, 1980).

H2. Organizing the ERP implementation project under the direction of a project manager whose sole responsibilities are the project is related to implementation project success.

H3. An organizational structure in which the project manager reports to the business unit's senior manager is related to implementation project success.

Staffing. Recruitment, selection, placement, appraisal, and development of appropriate employees affect the firm's ability to perform any tasks including the implementation of ERP systems. The perception of the importance of the consultant is demonstrated by expenditures of $10 billion per year (Davenport, 1998). One practitioner states "the success of the project depends strongly on the capabilities of the consultants…" (Welti, 1999). Yet, Sneller (1986) found no significant relationship between the use of consultants and MRP project success.

H4. Staffing the ERP project manager position with an individual with extensive business experience is related to implementation project success.

H5. Use of an ERP consultant for guidance in the implementation project is related to implementation project success.

H6. The quantity and quality of training are related to implementation project success.

Leading. Executive support is generally been regarded as critical to the implementation of management information systems. Senior management's role in ERP implementation is described as communicating direction, allocating resources, delaying conflicting projects and dealing with organizational resistance (Laughlin, 1999). Executive support consists of both participation and involvement (Jarvenpaa & Ives, 1991). Champions can be critical to new systems by using their abilities to bring about organizational change (Beath, 1991).

H7. CEO involvement in planning and implementing the ERP system is related to implementation project success.

H8. The existence of a champion is related to ERP implementation project success.

H9. Management's effectiveness in reducing user resistance to change is related to implementation project success.

Controlling. Steering committees are a common method of control in IS projects, although the "membership, chairmanship, reporting level, procedure and frequency of meeting" may vary significantly (Gupta & Raghunathan, 1989).

H10. The use of a steering committee that: (a) is headed by the CEO and (b) meets at least every four weeks is related to implementation project success.

Success Measurement. Peter Keen identified the measurement of success as one of the key issues that needed to be resolved to establish coherent research in IS. Subsequently, researchers reviewed 180 articles published between 1981 and 1987 and developed a six dimensional model of IS success-systems quality, information quality, use, user satisfaction, individual impact and organizational impact (DeLone & McLean, 1992). This success model will be used in this research.

METHODOLOGY

This research will use both a questionnaire and case studies. A questionnaire was designed which measures project success and the use of the proposed CSFs in the implementation project. This questionnaire will be sent to functional managers at approximately 1,500 manufacturing companies selected from the Harris Manufacturing database or similar sources. Companies with over $100 million in sales volume will be selected as they are more likely to have implemented ERP than smaller firms.

Respondents will complete thirteen questions to determine the success of the project. Questions have been developed using the DeLone and McLean model assessing systems quality, information quality, use, user satisfaction, individual impact and organizational impact (DeLone & McLean, 1992). The remaining questions concern the project management practices used to operationalize the hypotheses defined above. The respondent's reported success measurements will be used to classify implementation projects at respondent's firm into one of two groups, successful or unsuccessful. Both a continuous composite success variable and nominal success/failure variable will be developed and used in the statistical treatment described below.

Implementation practices used by these firms and based on management theory in the area of planning, organizing, staffing, leading and controlling will be related to project success using regression analysis. Data for testing each hypothesis will be evaluated using the following statistical techniques. First, responses from successful and unsuccessful implementation projects will be compared using the t-test for significance. Next, the data will be subjected to a multivariate regression analysis using a composite success variable as the dependent variable. Finally, a multivariate discriminant analysis will be used to identify the ability of the independent variable to predict membership in the successful or unsuccessful group.

In the management area of planning, survey questions will concentrate on the integration level of ERP planning and business planning. In organizing, the use of a project manager (PM), the time the PM allocates to the project and importance of the project compared with other business objectives will be examined. The organizing area further considers the reporting level of the PM and use of a matrix organization. In staffing, the study examines the business experience and project management experience of the PM as well as how the PM was motivated and rewarded. Staffing investigates the use of consultants and the amount, quality, and timing of training provided in connection with the project. Leading considers the role of the CEO in the project, the effect of a champion, and management's effectiveness in reducing user resistance. Finally, Control examines the use of a steering committee or other means of controlling the implementation project.

The case study part of this research involves interviews with functional managers of two or more firms who implemented ERP systems. These case studies are expected to provide richer and deeper information to supplement the questionnaire findings.

CONCLUSIONS

Upon completion of the survey and case studies, management of firms implementing ERP systems should have a better understanding of the underlying factors leading to successful ERP implementation projects. The earlier Sneller (1986) study concluded that unsuccessful projects failed to follow good management practices. In the seventeen years since Sneller completed his dissertation, the IT community gained experience in implementing complex systems such as ERP. The results of this study should indicate whether organizational learning was offset by the increasing complexity of systems implementation projects.

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