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December 2004

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ABSTRACT

Information systems (IS) projects are ubiquitous in today's business environment. IS projects vary in size, scope, difficulty and risk-level and combined, these attributes represent a project's complexity. Previous research has found that most IS projects do not meet budget, schedule and/or quality expectations. In the past, organizations have utilized a variety of project management practices in attempts to better control IS projects. This research-in-progress explores project complexity and project management practices and their fit related to IS project performance. A web-based survey of professional IS project managers is underway and it is anticipated that the respondent data will provide insights into current successful and unsuccessful IS project management practices. It is expected that a framework will be established to identify successful project management techniques for projects of varying complexity.

Keywords

Project management, project characteristics, project performance, fit, structural contingency theory.

INTRODUCTION

The implementation of IS is commonplace in today's business environment. The rapid advancement of technology and globalization of many organizations has increased the size, complexity and variety of IS being implemented. Today's competitive, global business environment creates the need for organizations to develop flexible, cross-functional, global software solutions that can be deployed quickly. The importance of implementing quality systems on budget and on time is crucial. Previous research suggests that most IS project problems are related to management, organizational and cultural issues, not technical problems (Hartman and Ashrafi, 2002). This finding implies that project management is a critical component of IS project success.

A variety of project management practices have been used by many organizations to control IS projects. However, most research in this area is based on older "in-house" systems or on end-user computing applications. Today, fewer large in-house applications are being developed as firms move toward deploying a wide range of diverse applications, many of which are Internet and intranet based and may be developed internally or outsourced. Therefore, it is important to consider how project management practices are changing to reflect the rapidly advancing and global requirements of IS.

This research is an exploration of current IS project management practices. It will consider project complexity and project management practices and their combined effect on IS project performance. It is expected that a framework will be established that will integrate levels of project size and complexity and associate specific project management practices to the various categories of projects.

PROJECT PERFORMANCE

IS project performance has been established as a multidimensional construct. Researchers have utilized many measures of project success which can be summarized into six categories: system quality, information quality, system use, user satisfaction, individual impact of the IS and organizational impact of the IS (DeLone and McLean, 1992). Other IS researchers have suggested that, in addition to budget and schedule, project performance measurement should include project team member satisfaction, stakeholder satisfaction with the project team and the added business value of the IS project (Aladwani, 2002, Kirsch, 2000).

PROJECT COMPLEXITY

IS project complexity, often based on the size of the project, has been found to have a significant negative relationship with project completion (Yetton, Martin, Sharma and Johnston, 2000). Project size may be based on the dollar value of the project, the number of people on the project team or the number of components comprising the final system. For example, a large IS project might consist of numerous interrelated parts that must function together, but may be physically dispersed around the globe. In general, the more costly the project, the larger the project team and the more distributed the IS, the greater the complexity.

Project complexity can also be impacted by the variety of solutions available to the project team. There is no longer one obvious solution, but choices of many. Today's environment may require rapid deployment of software solutions running on distributed platforms, web-based applications, user-friendly interfaces to legacy systems, purchased application packages or a combination of these and other solutions (Rockart, Earl and Ross, 1996).

The wide variety of technological options available increases the possibility that an organization lacks knowledge of and expertise with a chosen solution. Research has established that lack of experience with a technology and low project-specific knowledge in an organization are associated with a higher risk of project failure (McFarlan, 1981). Other research has confirmed that lack of experience with a technology has a direct effect on project completion and an indirect effect on budget variances (Yetton *et al.*, 2000). Moreover, when a technology is new to an organization, it is more likely that external vendors and/or consultants will participate in the IS project. Researchers have suggested that because of new development technologies, integrated package suites and exploding technology innovations, information technology departments must interface with as many as 50 to 100 suppliers to meet organizational needs (Rockart *et al.*, 1996). This addition of multiple constituents to a project team also increases IS project complexity.

IS complexity has been widely discussed in IS literature; however, little research has attempted to classify IS projects based on complexity. Some researchers have created IS related frameworks for classifying IS development methodologies (Iivari, Hirschheim and Klein, 2000) or knowledge-based systems (Meyer and Curley, 1991). Industrial projects have been categorized according to level of technological uncertainty and system complexity, but IS projects were only a small subset of the framework (Shenhar, 2001).

PROJECT MANAGEMENT PRACTICES

Project management in IS can be defined as the application of formal and informal knowledge, skills, tools and techniques to develop an acceptable system on time and within budget. Formal project management practices include setting goals, creating plans and providing documented rules, standards and procedures to the project team. Project planning was consistently associated with favorable project outcomes in terms of schedule and budget (Deephouse, Mukhopadhyay, Goldenson and Kellner, 1995). The need for effective plans and procedures as well as the setting of clear goals and milestones were also found to be critical to project success (Guinan, Cooprider and Faraj, 1998).

Project manager performance is positively linked to project success. Specific practices of the successful project manager include planning and documenting the project charter, policies and tasks; team development; frequent and personal internal team communication; gaining senior management and key personnel support; focusing on conflict avoidance and monitoring changes in team performance (Jiang, Klein and Shepherd, 2001).

IS researchers have suggested a contingent approach in applying project management practices based upon the type of IS project being implemented. It has been proposed that the established set of general purpose project management tools (e.g. planning, controlling, etc.) may contribute to project success in varying degrees based on particular project characteristics, such as the level of structure and the familiarity of the technology involved (McFarlan, 1981). Additionally, practitioners have recommended adjusting project management practices based on the phase of the project (Wiecking, 1998). Projects in the initiation phase may require different project management practices than projects in the planning or execution phases.

While a great deal of literature has addressed IS project management, no known research has attempted to categorize IS projects by complexity and relate specific project management practices to each category. The current study will add to the IS project management literature through the creation of project management profiles based on project complexity.

RESEARCH MODEL

Today's technological and organizational environment requires a new examination of the project management practices employed in IS projects. As IS projects become more complex, established project management practices may or may not be as effective as they were when most projects were in-house or domestic in nature. Furthermore, the addition of multiple

vendors adds difficulty to managing the project. The primary objective of this study is to explore the relationship between project complexity, current project management practices and project performance. The research model below reflects the relationships under scrutiny.
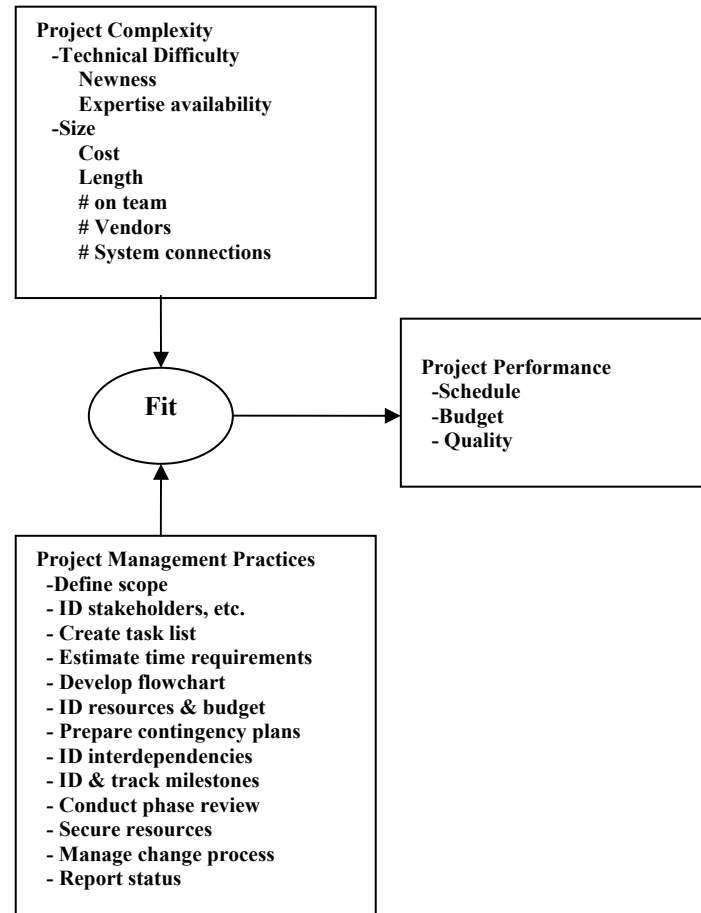
Figure 1: IS Project Management Research Model

The dependent variable in the research model is project performance. For this study, IS project performance is considered to be a multidimensional construct measured in terms of meeting budgets, schedules and quality objectives.

Drawing on prior research, this study defines project complexity in terms of technical difficulty and size. Technical difficulty is comprised of two factors: newness of the technology to the organization and whether the appropriate technological expertise was available within the organization. Project size is measured in terms of cost, size of project team, number of vendors, number of system connections and length of the project.

Specific project management practices will likely be utilized based on varying levels of project complexity. Projects which are highly complex are expected to require different project management practices than projects which are simple or less complex in design. The combination of chosen project management practices and project complexity will likely influence IS project performance. This study focuses on 13 formal project management practices which are widely accepted as job functions of an IS project manager (Schwalbe, 2004). The practices include:

1. Define project scope,

2. Identify stakeholders, decision-makers and escalation procedures,

3. Develop detailed task list/work breakdown structures,

4. Estimate time requirements,

5.   Develop project management flowchart,

6.   Identify required resources and budget,

7.   Prepare contingency plans,

8.   Identify system interdependencies,

9.   Identify and track critical milestones,

10. Conduct project phase review,

11. Secure needed resources,

12. Manage the change control process, and

13. Report project status.

Fit

Structural contingency theory has been widely used in IS research. This perspective suggests that organizational performance results from the proper fit between specific organizational variables and the organization's structure (Lawrence and Lorsch, 1967, Thompson, 1967). For the current study, this theoretical perspective would suggest that the proper fit between project management practices and project complexity would result in more successful IS project performance. Fit has been further defined as having multiple interpretations (Venkatraman, 1989). In the current IS project research, the most appropriate interpretation is "fit as a profile deviation" which considers the degree of adherence to a specified profile. To make use of this conceptualization of fit, an ideal pattern or profile of project management practices can be developed empirically (Venkatraman, 1989). In the past, IS researchers have used this approach in matching IS project risk exposure to a risk management profile (Barki, Rivard and Talbot, 2001).

METHODOLOGY

Data for this study is being collected through a web-based survey of IS project managers. The survey is designed to collect both quantitative and qualitative data about respondent demographics, project performance, project characteristics, project team and project management practices. The survey was pre-tested on six IS project managers and project team members in three different organizations. The test group provided feedback regarding survey content and wording which was integrated into the final survey. The web-based survey was then tested for usability by several Ph.D. students and experienced project managers.

The targeted participants for this study are two thousand professional IS project managers who were identified from a mailing list supplied by the Project Management Institute. Invitations to participate in the survey were mailed to the project managers and follow-up invitations were mailed two weeks later. The online survey was available to the project managers for a period of eight weeks.

The dependent variables for schedule and budget performance are measured as either met or not met. Project quality is measured in terms of the percentage of quality objectives met. Technical complexity is measured from two questions which inquire about the newness of the technology to the organization and if the required expertise was available within the organization. The project size factors (cost, length and numbers of team, vendors and connections) were measured as continuous variables. The 13 project management practices, if utilized, were measured on a five point Likert-type scale ranging from very ineffective to very effective.

The respondent data will be examined to create a taxonomy of IS technical complexity and size. Specific project management practices will be identified for each category of project complexity. The various levels of complexity will then be analyzed in terms of project performance. Top performing projects will be used to create ideal project management profiles for each level of IS project complexity. Finally, deviations from the ideal profile will be calculated for each project in the sample as recommended when using fit as a profile deviation (Venkatraman, 1989).

CONCLUSION

This research is expected to provide a current view of IS project management practices relative to more complex systems and globalized organizations. From the data obtained, a taxonomy of IS projects based on complexity will be established and a profile of best project management practices will be developed for each category. The resulting framework will aid researchers and practitioners in establishing which project management practices best fit which type of project.

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