GLOBAL ERP PROJECT MANAGEMENT: A CASE STUDY

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ABSTRACT

The velocity of global business change is challenging the management of enterprise resource planning (ERP) systems. The growing speed of business changes mandates that software be managed with flexibility and agility. At the same time, system implementation success depends on an effective project management (PM) process. Notable problems associated with the implementation of an enterprise system include scope creep, poor risk management, inconsistent measurement of project performance over time, and vendor management. These issues together pose threats to the success of a large-scale software project. This research used a case study approach to examine how poor PM can imperil the normal operation of a business.

INTRODUCTION

Adopting Enterprise Resource Planning (ERP) systems has become a global phenomenon. The market for ERP grew at a rate of 14% in 2004 to become a $23.6 billion market globally (AMR Research, 2005). Despite the popularity of ERP, the failure rate of ERP implementation remains high. As such, in deploying an ERP system, it is critical for executives and managers to fully understand and manage the project management (PM) issues so as to address PM problems, mitigate interruptions to daily operations, and extend the life and benefits of the enormous investments made in such as system (Ng, 2001).

In order to shed lights on PM strategies, challenges and practices in ERP implementation, this research conducts a case study of a multinational company and approaches ERP implementation from a PM perspective. Accordingly, the study is structured as follows. We provide a review of the literature on contemporary PM challenges and best practices to manage large-scaled IT and non-IT projects, but with a focus on enterprise systems or ERP. Nolan's (1973) stage model is used to present the results of the case study of this multinational company during their years of ERP implementation. Successful and failed project lessons are explained within each stage of the stage model. These lessons identify important PM knowledge areas to manage during an ERP system implementation. It is expected that the findings have theoretical and practical implications to both the academic and practitioner.

CONCEPTUAL FOUNDATIONS

Existing literature cites PM as one of the critical factors of ERP implementation and encourages management to undertake good PM practices. However, previous studies do not shed much light on the specific processes of PM needed within the context of ERP. As such, this study seeks to address the gap in the literature by obtaining a deeper understanding of the practices and problems of ERP implementation through a detailed case study of a multinational company.

To provide a richer understanding of ERP implementation, this study adopts three conceptual models used in the literature to triangulate on the results obtained from the case study. First, the widely adopted PM areas of expertise (Project Management Institute, 2000) are used to assess the PM processes used at the organization in both the first and the second implementations. Second, the data collected from the case site is presented using a stage model of organizational computing (Nolan, 1973). Finally, the second phase of the ERP implementation at the case site is further explored using the IT engagement model (Fonstad and Robertson, 2006) which explains the mechanisms contributing to the successful second implementation.

Global PM Challenges

All projects, large and small, IT or non-IT, have limits on three constituents: schedule, quality, and budget. A poor control of any of these three constituents poses threats to the success of a project. Although some may argue that a large budget can meet any challenge, a 2004 Government Accountability Office report on 199 data mining projects shows that the magnitude of those constituents has little to do with the success of a project. Instead, lack of oversight on any of these constituents is the major cause of project failures (Worthen, 2006).

Five important challenges for IT PM in 2006 are global teams, management of large-scale software project, agile development techniques, vendor partners and project portfolios (Brandel, 2006). Each challenge poses varying difficulties to an IT manager. For instance, outsourcing requires global teams. This disruption of internal processes has made 24/7 IT management a scheduling problem. Local nomenclature (e.g., culture and language differences) creates cross-cultural communication problems. High turnover rates of 25-30% annually in the IT field can reduce the effectiveness of knowledge transfers, a human resource management problem. A 2005 survey by the Society of Information Management (SIM) found that "attracting, developing and retaining IT professionals" was ranked as the second highest concern of CIOs (Luftman, Kempaiah and Nash, 2006, p. 81).

A large-scale project managed at different locations, in different time zones, and by different users, creates multifaceted and multilayer managerial difficulty. Multifaceted projects can lead to creeping requirements. Multilayer projects can result in scheduling, budgeting and requirements uncertainty. Decoupling the large-scale software project into flexible and managerial modules can be a challenge, and excellence in scope, time, cost, risk and communication management is essential to cope with this challenge.

Agile development techniques such as rapid application development can induce higher risks and poorer quality than traditional development methods. Consequently, good quality and risk management of products and processes are crucial to the success of agile development methods.

Outsourcing precipitates the need for vendor teams. Outsourcing jobs differ from outsourcing responsibilities. Poor management of outsourcing responsibilities can increase risks and create integration problems. Effective procurement and integration management can help to make sure the outsourcing activity is a success.

In order to optimize the project portfolio, an organization needs to avoid PM problems, such as over commitment of PM resources to projects, establishment of subjective and immeasurable objectives, and misalignment between strategic objectives and project goals. Cost management and integration management are important cornerstone skills in the face of this challenge.

The importance of PM cannot be emphasized enough, particularly in the development of large-scale software projects. The first three PM areas – budget, schedule, and quality – have obvious implications for project success. In examining the case company this study focuses on the six other process-oriented PM knowledge areas: *scope*, *HR*, *risk*, *communications*, *procurement*, and *integration*.

Stage Model of ERP Implementations

In IT projects, design and implementation decisions made at an early stage can have an impact on activities undertaken at a later stage. For instance, a firm's strategic decision on ERP customization or business process adaptation during planning can have a profound impact on the practices used to support the system during subsequent maintenance and support (Davenport, 1998). Therefore, a time-variant view of the ERP project from different stakeholders can help enhance the understanding of the complexity of ERP maintenance and support. Nolan's (1973) stage model of organizational computing evolution has been a useful descriptive model because it 1) identifies distinct and empirically verifiable characteristics of change, and 2) provides a detailed specification of succession whereby one stage moves on to the next (King and Kraemer, 1984).

The stage model contains four stages: initiation, contagion, control, and integration. At the *initiation* stage, champions initiate a technology project with the financial and resource support of sponsors; there is also minimal planning at this stage. At the *contagion* stage, anxieties, problems, and sometimes crises, emerge to slow the progress of the project. Top management is aware of problems and searches for controls, but there is little improvement in planning. At the *control* stage, management now begins to institute controls, and planning becomes a top priority. Also at this stage, IT management's profile is often raised, priority setting becomes mandatory, and operational procedures become standardized. At the *integration* stage, controls are well established with planning and standardized procedures in place, and the adopting organization accepts the technology and assimilates it into the normal operation (King and Kraemer, 1984).

This study combines the PM knowledge areas and the stage model to provide a time and chronological view of the case study in ERP. In particular, the stage model is used to present the results gathered for the first and second ERP implementations at a multinational company (in the Results section). Then the PM knowledge areas are used to analyze and discuss the results (in the Discussion section). See Figure 1.

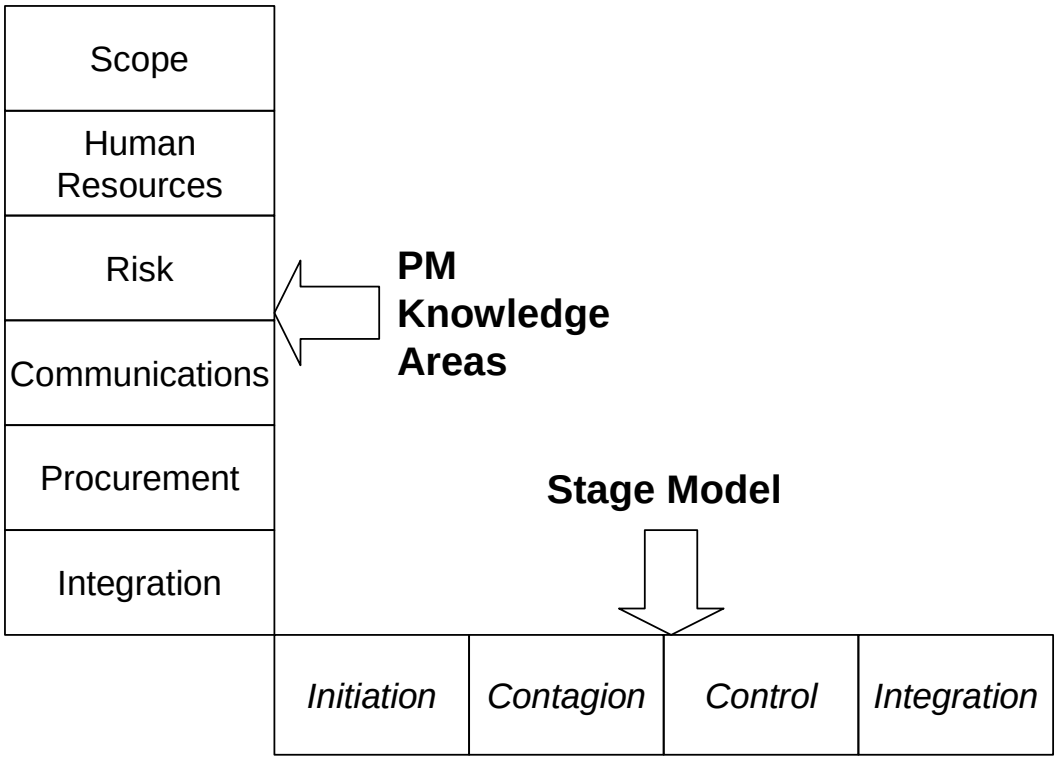

Figure 1. PM Knowledge Areas and Stage Model.

IT Engagement Model

In addition to the conceptual framework shown in Figure 1, this study uses another conceptual model – IT engagement model (Fonstad and Robertson, 2006) –to further explain why the second ERP implementation project was a success. The model emphasizes a system of mechanisms that brings stakeholders together so that they can optimize local and global objectives. The model consists of three components: company-wide IT governance, project management, and link mechanisms. In *IT governance*, top management makes decisions and allocates decision rights to make company-wide IT-related decisions. IT governance is a top-down approach. In *project management*, IT departments typically adopt a bottom-up approach and ensure that projects are coordinated and managed to achieve goals. The *linking mechanisms* refer to processes and decision-making apparatus that connect project activities to overall IT governance (Fonstad and Robertson, 2006).

The term "engagement" in the IT engagement model emphasizes that negotiation, socialization, influence, interaction, and training are required to bring stakeholders together from all parts of the organization. Bringing diverse stakeholders together requires greater than normal coordination and alignment in an organization (Fonstad and Robertson, 2006). Figure 2 shows the IT engagement model.

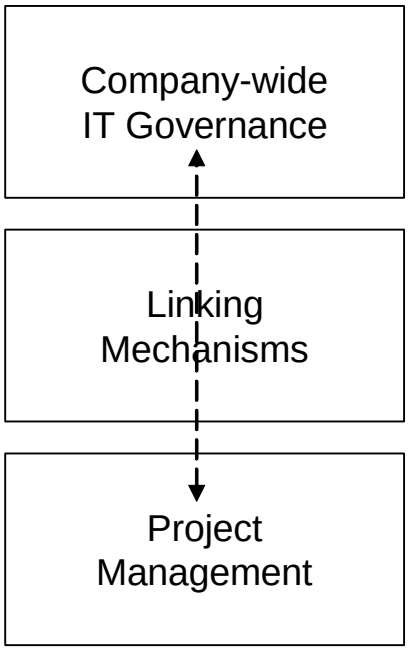

Figure 2. IT Engagement Model adopted from Fonstad and Robertson (2006).

RESEARCH METHODOLOGY

"What" and "how" aspects of ERP project failure are of major concern in this research project. Because PM is inherently process-oriented, it is determined that a case study is an appropriate methodology for investigating the PM process of ERP implementations. Since this research is more interested in the process aspect of ERP implementation, a case study has the potential of providing an in-depth investigation into these issues in a real-life context (Benbasat, Goldstein and Mead, 1987). Additionally, a case method has efficacy in uncovering topics that have yet to be well understood (Yin, 1990).

We used a California-based multinational company as the subject of this study. The company provides a total solution (including controls, instrumentation and software) for the automation needs of industrial and commercial clients. It was established in 1958 and has strategic business units (SBUs) in China, Hong Kong, Macao, Taiwan, Australia, and California. Its corporate headquarters is in California but there is a broad customer base in the Greater China region comprised of China, Hong Kong, Macao, and Taiwan.

We interviewed non-MIS executives and staff to validate information collected from their MIS counterparts. Our ideal candidates were supply chain executives because of their functional span over a wide range of operational responsibilities. All of the chosen participants used the ERP system extensively to assist them in their daily operations. Table 1 lists MIS and non-MIS personnel who participated in this study.

Table 1. List of Participants of this Study

Participant Title	Number of Participants
Director of MIS	1
Director of supply and customer services	1
Business application manager	1
Senior systems analyst	1
Warehouse supervisor	1
Procurement manager	1
Sales and marketing manager	1
Salesperson	1

CASE STUDY RESULTS

The regional headquarters of this multinational company is located in Hong Kong. It operates in the Greater China region and has annual revenue of US $250 million. Major products sold are industrial and building control systems and spare parts. This company operates through its own sales force, joint ventures, and distributors. We analyzed the evolution of ERP implementations with the emphasis on maintenance and support areas at the international company based on the descriptive stage model (consisting of initiation, contagion, control, and integration stages).

Table 2 summarizes the experience of the first and second implementations of ERP in SBUs located in the U.S., Australia, and the Greater China region.

Table 2. Project Management Improvement

FIRST PHASE OF ERP IMPLEMENTATION	SECOND PHASE OF ERP IMPLEMENTATION
Scope Management ● Ill-defined scope planning and definition on the "vanilla" ERP ● Inappropriate allocation of technical & organizational resources ● Did not take into account of local taxation requirements in Taiwan	**Scope Management** ● Strictly-defined scope management: keep 85% of business process in common ● Form prioritization committee to channel limited technical and organizational resources ● Focus on the deployment of accounting and manufacturing modules ● Drop adding previous bolt-on modules (back-to-back ordering and PM systems) ● Control scope change to meet local taxation requirements in Taiwan ● Systematize and clearly define procedures and criteria for request prioritization
HR Management ● Outsource IT human resources to global ERP vendors ● Insufficient internal IT human resource allocation	**HR Management** ● Outsource IT human resources to global ERP vendors ● Outsource IT human resources to local ERP vendors for customization
Risk Management ● Lack of knowledge about the adopted enterprise system	**Risk Management** ● Work side-by-side with vendors to improve knowledge transfer
Communications Management ● Estimate to please ● No user involvement across functions and SBUs	**Communications Management** ● Involve users and middle managers in the prioritization committee to manage user requests
Procurement Management ● First time outsourcing to an ERP vendor ● No experience in partnership relationship management	**Procurement Management** ● Require vendors to generate monthly and quarterly performance analysis reports for review by users of all functional areas ● MIS department takes on proactive roles in discovering, analyzing and managing issues resulting from ERP implementation
Integration Management ● No alignment between business strategy and ERP-enabled IT strategy	**Integration Management** ● Alignment between business strategy and ERP-enabled IT strategy ● Redesign business process to "best practices" embedded in ERP system ● Minimize customization

First Phase Problems

Major problems in the first phase of ERP implementation were scattered in all six of the previously described PM areas: scope, HR, risk, communications, procurement and integration management. In the first phase, project scope was loosely defined and open for interpretations. The ill-defined "vanilla" ERP did not prevent project scope creep from occurring. Although the management felt an urgent need to replace the legacy system with an ERP system, they did not discuss with the users which modules to deploy first. To please the management, the MIS department chose back-to-back ordering and PM systems. However, they did not thoroughly analyze whether these two systems aligned with the strategic intent of the business to enhance operational visibility. Misalignment can lead to ERP implementation problems with respect to scope creep and ill-defined interfaces (Robey et al., 2006). Poor scope management also resulted in the inappropriate allocation of limited MIS resources since no mechanism existed to manage user requests based on legitimate urgency. The SBU in Taiwan had unique requirements in the taxation module, but the U.S. headquarter of this multinational corporation did not seriously consider those requirements. This resulted in the underestimation of corresponding structural changes to database schema. In addition, the management did not increase the pool of human resource talent or retrain users with skills to cope with the challenges of ERP systems implementation. Lack of in-house skills and knowledge to implement an ERP system created chaos in the face of technical troubles. At the same time, the company attempted to run the existing legacy systems while implementing an unfamiliar ERP system. Achieving functional interoperability was a challenge for this company because of the lack of knowledge and skills in ERP implementation, and the MIS department did not formulate a risk response plan to resolve unanticipated operational risks.

Implementation of ERP modules was the first outsourcing experience for this corporation. No evaluation criteria, such as weighting systems and independent estimates, were in place to screen business proposals of potential vendors. Rather, the top management selected a vendor based on its own preference and later informed the MIS department of the decision. Since no users were involved throughout the vendor selection and ERP implementation process, failure was predictable. The success of ERP implementation projects heavily depends on the "'arduousness of the consultant-client relationship' and the degree of 'shared understanding' – the similarity in work values, norms, and problem-solving approaches between consultant and client team members" (King, 2005, p. 83). These two important factors were clearly missing in the first phase of ERP implementation. Because of these problems, the EFP implementation was delayed until corrective actions could be made.

PM-Enabled Improvements in the Second Phase of ERP Implementation

The management restructured the MIS department by hiring an outside director and support team with previous ERP experiences. This action improved the long lasting problem the company had with the shortage of IS professionals.

To ensure system success, an engagement mechanism needs to be in place to involve stakeholders via three components: (1) company-wide governance, (2) project management, and (3) linking mechanisms (Fonstad and Robertson, 2006).

In terms of *governance*, the management formed a prioritization committee made of stakeholders across functions and SBUs. This committee acted as a company-wide governance body to minimize the problem of scope creep. A policy was developed to require the committee to

evaluate user requests based on their urgency and impact on the business. The goal of this committee was to ensure that the success of ERP implementation would help achieve three strategic goals: (1) aligning the ERP system with business strategy, (2) streamlining business processes and (3) minimizing the extent of customization to the native system. Back-to-back ordering and PM systems were replaced with accounting and manufacturing bolt-on modules in order to achieve the first two strategic goals. To achieve the third goal, 85% of business process and system functionalities were deliberately retained to ensure the accomplishment of a strictly "vanilla" ERP system. All these measures helped establish the decision authorities and accountabilities at all levels of the corporation.

As for the mechanism of *project management*, the scope planning and defining process was more clearly defined. This helped to manage user requests in a more systematic manner. For instance, the prioritization committee approved the mandatory change request to customize the ERP module for the taxation needs of SBU in Taiwan, but met the condition of not changing more than 85% of native system functionalities. The MIS department improved the consultant-client relationship and shared understanding by working with local vendors to customize system modules. Local vendors were chosen based on their records of accomplishment of adding the taxation module to enterprise systems. In-house employees worked side-by-side with the vendors to acquire knowledge and skills in implementing the ERP system. The on-the job training and user involvement prepared in-house employees to overcome technical problems (e.g., data incompatibility and system incompatibility) and social problems (e.g., resistance to adoption) that had emerged before.

In terms of *linking*, the MIS department proactively managed the partnership by requiring that vendors generate monthly and quarterly performance reports. Users and managers further reviewed these reports, after which the MIS department proposed solutions to resolve issues derived from these reports. In addition, the prioritization committee served as a linking mechanism to connect project-level activities to overall IT governance.

Nolan's stage model and Fonstad and Robertson's engagement model provide a perspective on observations of two ERP implementation instances in the same organization. Mistakes made by this company in the first phase were corrected. In the second phase, the same company primarily addressed the mistakes in at least six areas of PM: scope, HR, risk, communications, procurement, and integration management.

PRACTICAL IMPLICATIONS

Stakeholders at the project, business unit and corporate levels often are vested with divergent interests. An enterprise system can affect these users in different ways and create conflicts among these stakeholders. It is critical to manage these impacts and conflicts by incorporating PM practices into the implementation process. The presence of conflict and resentment in the first phase of the case created symptoms such as hostility, jealousy (Smith and McKeen, 1992), poor communication (Franz and Robey, 1984), frustration and low morale (Barki and Hartwick, 2001). The lack of an open forum to involve users in the system implementation process can create paralyses in effective communication, goals alignment, trust, and poor system design between management and information systems (Smith and McKeen, 1992). These issues are closely related to *communications* management. Managing the conflict between business and IS throughout a system development cycle is imperative to the successful delivery of an IS project (Robey et al., 1989). User participation has been an effective mechanism to lessen conflict (Barki and Hartwick, 1989), thereby improving the system development outcomes (Robey et al., 1993).

Many authors caution that customization would likely increase the cost and risks of ERP implementation and the difficulty for upgrades and migration to future releases (Davenport, 1998). Indeed, unchecked customization contributed to the failure of the first phase of the ERP implementation in this study. However, some customization will always be necessary to meet specific business requirements (Themistocleous et al., 2001), especially in a multinational corporation with different regional requirements as this case has shown. A prioritization committee is a successful *scope* management vehicle because it lowers the user resistance by involving users across functions and SBUs. Companies can avoid conflicts of interest by improving the degree of transparency in the decision-making process.

External (e.g., new business models and entrants) and internal (e.g., project size, duration, structure, complexity, and outsourcing) environmental changes can add uncertainties to the requirements of an enterprise system. The uncertainties are unanticipated *risks* that need to be measured and assessed qualitatively and quantitatively. To capitalize on business opportunities, changing system requirements is a viable option from a managerial perspective, but changing system requirements represents a great economic cost to any company that trades system functionalities for business agility. The implicit nature of disagreement and interference causes management and IS professionals to unknowingly enter a competing mode. This situation can spur a sense of obligation for the MIS department or an outsourcer to change system requirements to meet business needs. This agreement to make changes reinforces an unspoken commitment to adopt the "change" option, even though other alternatives (e.g., maintenance, off-the-shelf package, or no change) are also feasible. Creeping requirements often seem especially binding because of these reinforcing forces. Any changes made to honor creeping requirements will be interpreted as a reinforcement of an earlier promise or commitment – whether that is the intention of the MIS department or not. As a result, MIS is kept from committing their limited resources to what matters most to enterprise projects, such as reliability, functionality and training. The chain effect of disagreement and interference during the system requirements acquisition has engendered many devastating effects on project outcomes. This case study affirms the importance of scope management vehicle in the development of an enterprise system. Scope creep problems are prevalent in ERP implementations. Scope planning and definition skills can minimize scope creep problems and channel limited resource to key issues.

Most in-house employees have a lower level of readiness than vendors in implementing an enterprise system do. The high turnover rate of IT professionals aggravates the problem of the shortage of critical skills and knowledge in most companies. However, these *human resource* issues should not be an inhibitor of a successful implementation of an enterprise system. Rather, a company needs to pair in-house employees with vendors based on similarity in work values, norms and problem-solving approaches. The cultural fit between clients and vendors are indispensable for the long-term success of ERP projects (Ranch, 2006). A well-managed partnership can incrementally transfer vendor's knowledge and skills to in-house employees. The ideal is to support the ERP implementation with a knowledge management mindset that can facilitate the knowledge generation, transfer and absorption process between internal and external stakeholders. In-house employees can solve problems more efficiently and effectively after acquiring system-related skills and knowledge. The complementary support of a KM system can further the success rate of ERP implementation (Li, Liao and Lei., 2006).

In *procurement* management, managing partners should be the responsibility of the adopting company, not the vendor. The adopting company needs to keep track of the progress of the vendor-client relationship and take corrective actions if necessary. In addition, *integration* management skills are the glue that directs all stakeholders at the project-, business unit- and corporate-levels toward the same direction. Staying focused in the same direction can not only

lower the extent of impacts on these stakeholders, but also create concerted efforts in accomplishing business goals.

CONCLUSION

ERP is one of many information systems solutions an international company can use to stay competitive in the face of volatile global business dynamics. However, the implementations of a global ERP project pose many PM challenges, including but not limited to, management of a virtual team, scope management, international vendor management, risk management, cross-cultural communications, and integration management. The inclusion of PM skills to manage these challenges can greatly improve the likelihood of ERP implementation success. This case study affirms this proposition by presenting evidence for progress from the first phase to the second phase where the company leveraged PM skills. This process-based view of ERP implementations shows that the inclusion of PM skills enabled this multinational distributor to transform a failed ERP implementation into a successful one.

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