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Managing ERP Implementation Failure: A Project Management Perspective

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Abstract

Information technology (IT) projects are susceptible to changes in the business environment, and the increasing velocity of change in global business is challenging the management of enterprise systems such as enterprise resource planning (ERP). At the same time, system success depends on the rigor of the project management processes. Scope creep, poor risk management, in- adequate allocation of human resources over time, and vendor management are some common problems associated with the implementation of an enterprise system. These issues pose threats to the success of a large-scale software project such as ERP. This re- search adopts a case study approach to examine how poor project management can imperil the implementation of an ERP system. Having learned the lessons from the failure of its first ERP implementation, the company in this case reengineered its project management practices to successfully carry out its second ERP implementation. Many critical project management factors contributed to the failure and success of this company's ERP system. This study explores and identifies critical elements of project management that contributed to the success of the second ERP implementation. For those organizations adopting ERP, the findings provide a roadmap to follow in order to avoid making critical, but often underestimated, project management mistakes.

Index Terms—**Enterprise resource planning (ERP) system development life cycle (SDLC), information system (IS) management, project management, stage model.**

I. INTRODUCTION

A N ENTERPRISE resource planning (ERP) system is an information system (IS) that supports and integrates many facets of a business, including planning, manufacturing, sales, and marketing [23]. An enterprise system such as ERP often requires years of implementation and post implementation; it becomes part of the business and supports its tactical movements and strategic direction. A successfully integrated ERP system can enhance operational efficiency by supporting a firm's business processes as well as create competitive advantages by enabling innovative practices [1]. Indeed, the adoption of 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 [48].

Despite the popularity of ERP, the failure rate of ERP implementation remains high. According to a survey of 117 organizations conducted by the Conference Board, 40% of ERP projects failed to meet the business case [12]. This result is corroborated by another study done by information technology (IT) management consultancy Robbins-Gioia LLC, which found that 51% of companies across a wide range of industries stated that their ERP implementations were unsuccessful [50]. Thus, it is critical for executives and managers to fully understand and manage project management issues so that effective approaches can be devised to address project management problems, mitigate interruptions to daily operations, extend the life of an ERP system, and realize the benefits of enormous investments made [41].

A business needs to manage its ERP system as an ongoing project involving requirements and change management, user support, and maintenance and upgrades. As such, managing an ERP project has been described as a "lifelong journey" [2, p. 193]. For several years, a California-based multinational company experienced project management lessons in both failed and successful ERP implementations. These lessons are invaluable to any organization that is planning to adopt and manage an ERP system. Capturing the precious experience of this company and sharing it with newcomers to ERP endeavors could be a significant contribution to the Management Information Sys- tem (MIS) discipline; such a contribution might include helping organizations to avoid mistakes and adopt proper project management strategies and practices.

In order to shed light on project management strategies, challenges, and practices in ERP implementation, this research carries out a case study of a multinational company and approaches the issue of ERP implementation from a project management perspective. Accordingly, the study is structured as follows: we provide a review of the literature on contemporary project management challenges and best practices in the management of large-scale IT and non-IT projects, but with focus on ERP systems. Nolan's [42] stage model is used to present the results of the case study of this company's ERP implementation experiences with a particular emphasis on project management activities. Successful and failed project lessons are explained within each stage of the stage model, and successful project lessons are further discussed using the IT engagement model. In the context of ERP implementation, these lessons derive important project management themes based on the process-oriented, project management knowledge areas. The findings are expected to have theoretical and practical implications for academics and practitioners.

II. BACKGROUND

A. Contemporary IT Project Management Challenges

The estimate is that about 74% of IT projects cannot deliver the promised functionality on time and on budget [27].

An ERP implementation is considered a failure if it does not achieve a substantial proportion of its potential organizational benefits [13], [61]. This definition is applicable to this study because an ERP system is meant to be used throughout an organization. This organizational perspective is also consistent with the terminal-dependent variable of the "organizational impact" construct in DeLone and McLean [14], who proposed the construct since "some I/S researchers, and to a large extent I/S practitioners, have been concerned with the effect of the information product on organizational performance" [14, p. 62]. There are numerous reasons that contribute to an IT project failure. Some of them are highly correlated with poor project management practices. A project life cycle typically comprises five process phases: initiation, planning, execution, controlling, and closing. At the *initiation* and *planning* phases, IT management may poorly define goals, have an overly simplistic project plan, use unrealistic deadlines and budgets, and fail to set and manage expectations on the product (the software being developed) and the project (the development process) to gain support from users, developers, and functional managers [24].

During the *execution* and *controlling* phases, many project management issues can surface, such as maintaining clear communication among project participants [35], poor team, management and consultant participation [17], and creeping requirements due to internal and external environmental changes. Poor measurement of project performance is another prevalent issue at the controlling stage. Ongoing evaluation of an IT project can be problematic given that different project participants may have different vested interests [49]. In addition, organizational diversity [17] and inadequate cross-functional coordination [28] can further complicate project execution and control. The activities during the *closing* phase include integrating the completed system into daily operations, transferring responsibility to users, releasing resources, rewarding people, and conducting reviews. However, the high turnover rate of skilled professionals and globalization of the IT field can further aggravate problems at this stage.

B. Literature Review

While the failure rate of ERP projects in particular has been high [12], [50], Robbins-Gioia [50] found that only 56% of survey respondents have a formal program management office (PMO) in place; out of this subset of respondents, only 36% reported that their ERP implementation was unsuccessful. This result underscores the importance of project management in ERP implementation. However, given the importance of project management in ERP implementation, there is surprisingly little research in the literature on project management as specifically related to ERP. A search of abstracts of scholarly articles using the keywords of project management and ERP on the following databases, namely: ABI/INFORM, ACM Digital Library, IEEE Explore, Science Direct, and Emerald Fulltext yielded only 22 articles. Out of these 22 articles, 14 articles are more closely related to the implementation of ERP systems, while the rest mention ERP but are concerned with other software- or business-process-related topics. Out of the

14 extracted articles, 9 deals with success factors, models, or best practices contributing to positive outcomes of ERP implementations [11], [17], [19], [28], [32], [39], [40], [59], [61] with project management as one of the factors. There are two conceptual articles that offer a normative project management methodology [38] and a project model [31] in ERP implementations. The remaining three articles all mention project management as important in ERP implementations but are mainly concerned with a variety of issues in ERP, including an agent-based approach to ERP deployments [20], technological discourse in organizations while undertaking an ERP project [54], and ERP system value as a function of a firm's strategies and integration mechanisms [57].

Project management has been mentioned as one of the critical factors in ERP implementation [17], [28], [32], [58], [61], and management is encouraged to undertake good project management practices [38], [40]. However, the extant studies do not shed much light on specific project management processes in the particular 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. In particular, the case study provides an opportunity to observe two sequential ERP projects implemented in the same company.

III. CONCEPTUAL FOUNDATIONS

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 company. First, the data collected from the case company are presented using a *stage model of organizational computing* [42]. Second, the widely adopted *project management areas of expertise* [46] are used to assess the project management practices in both the first and second implementations. Finally, the second implementation of ERP at the case company is further articulated using the *IT engagement model* [15], which explains the mechanisms contributing to the successful second implementation.

A. Contemporary Project Management Practices

All projects, large and small, IT or non-IT, have limits on three golden constituents: schedule, quality, and budget. A project manager constantly makes tradeoff decisions among these three constituents. The emphasis of Daniel Goldin, the ex-administrator of National Aeronautical and Space Administration (NASA), on "faster-better-cheaper" [43] underscores the importance of these constituents. A poor control of any of these three constituents poses threats to the success of a project. Although some may argue that longer schedule, more accommodative specification, and larger budget can help meet any challenge, a 2004 Government Accountability Office report on 199 data-mining projects shows that the magnitude of these constituents has little to do with the success of a project. Instead, the lack of oversight on any of these constituents is the major cause of project failures [62].

The Project Management Institute systematizes the body

of knowledge of project management into nine areas: scope, management, human resource (HR) management, risk- management, communications-management, procurement management, and integration management in addition to the three constituents mentioned before [46]. As a project manager becomes more sophisticated in managing these areas, the processes used to manage a project become more consistent and systematic that can contribute to a higher rate of project success.

The different project management areas have presented difficulties to contemporary management of IT projects. A large-scale project managed at different locations, in different time zones, and by different users can create many difficulties. These are also applicable to ERP implementations because an ERP system is typically large-scale, cuts across functional boundaries, and often has heterogeneous stakeholders. This is especially so in a multinational company where business units are on different continents. In these situations, decoupling the large-scale software project into flexible and manageable modules can be a challenge, and cross-functional coordination is one of the most important issues in ERP implementations [28], [33]. Excellence in scope, time, cost, risk, and communication management is essential in meeting this challenge.

Agile development techniques such as rapid application development can induce higher risks and poorer quality than the traditional development method. Quality and risk management of products and processes are crucial to the success of agile development methods. For ERP implementations in particular, in-house expertise is often lacking, and companies often turn to external consultants in implementing the system [45], but the outsourcing of jobs does not transfer the ultimate management responsibility for their successful completion. Poor management of outsourcing responsibilities can increase risks and create integration problems across products and processes. The techniques of procurement and integration management can help IT managers succeed in the outsourcing activity. In addition, an organization needs to avoid project management problems such as "estimate to please" and establishment of subjective and immeasurable objectives. Unrealistic cost estimates and lack of objective benchmarks can contribute to escalating costs, and cost management is an important skill in the face of this challenge.

The importance of project management cannot be emphasized enough, particularly in the development of large-scale software projects. This study adopts the project management areas of expertise [46] to assess the project management practices of the ERP implementation because these areas and practices are widely accepted throughout the project management profession [26]. In fact, these same areas have been codified in the IEEE Standard 1490-2003, which states that the areas and practices are generally accepted, and "generally accepted means that the knowledge and practices described are applicable to most projects most of the time, and that there is widespread consensus about their value and usefulness" [21]. Given that the first three project management areas (i.e., budget, schedule, and quality) already have obvious implications for project success, in examining the case company, this study focuses on six other process-oriented project management knowledge areas: *scope*, *HR*, *risk*, *communications*, *procurement*, and *integration*.

B. Stage Model of Organizational Computing

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 maintenance and support [13]. Therefore, a time-variant view of the ERP project from different stakeholders can help enhance the understanding of the complexity of ERP implementation. For this study, Nolan's [42] stage model of organizational computing evolution is adopted to examine the case firm for several reasons. First, a temporal model that captures the time-varying stages is needed to depict the process that the firm goes through in implementing the ERP system. Second, the stage model 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 [30]. Last, for a medium-size firm (in this case) where there are not many well-defined organizational procedures and processes, it is desirable to adopt a succinct model that can adequately capture different stages of implementation but at the same time is not overly granular. This is so because a parsimonious model with fewer stages can highlight more of the changes that the firm goes through from stage to stage.

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 typically 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 the problems and searches for suitable 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 [30].

Incidentally, these four stages of the stage model also closely parallel the widely cited ERP process model proposed by Markus and Tanis [37], which contains four phases of an ERP life cycle: 1) chartering; 2) project; 3) shakedown; and 4) onward and upward. In the *chartering* phase, the business case for the ERP project is presented and a decision to implement is made. In the *project* phase, the system is developed, configured, and deployed, but many problems related to the implementation surface in this phase. The *shakedown* phase encompasses the time between deployment and normal operation. It is during this time that controls are imposed, the system is stabilized, and staff resources are optimized to address the problems. In the *onward and upward* phase, the system enters normal operation and the organization begins to utilize the system in its day-to-day activities [37], [40].
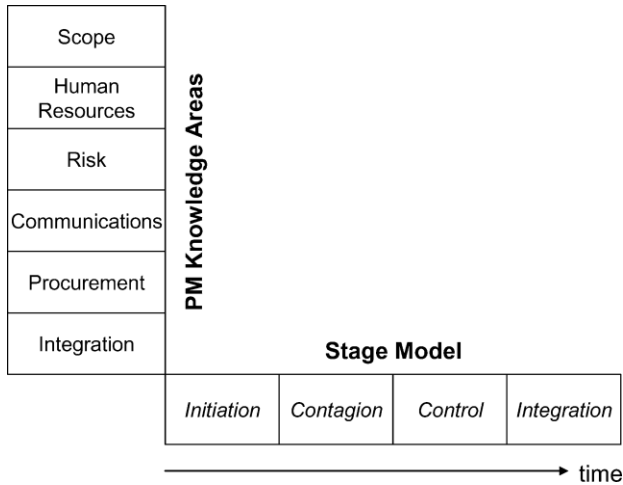
Fig. 1. Project management knowledge areas and stage model.

This study combines the project management knowledge areas and the stage model to provide a spatial and temporal 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 the multinational company (Section V). Then, the project management knowledge areas are used to analyze and discuss the results (see Fig. 1).

C. IT Engagement Model

In addition to the models shown in Fig. 1, this study uses another conceptual model—the IT engagement model [15]—to further articulate how the second ERP implementation project became a success. The IT engagement model is adopted because it is designed to explain the crucial apparatus that links tactical, project-level activities to strategic, corporate-level directives. It emphasizes a system of mechanisms that brings stakeholders together so that local and global objectives may be optimized. Three components of the model are adopted: company-wide IT governance, project management, and linking mechanisms. In *IT governance*, top management makes decisions and allocates decision rights for making company-wide, IT-related decisions. IT governance is a top-down approach. In *project management*, the IT department typically adopts a bottom-up approach and ensures 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 [15].

The term "engagement" in the IT engagement model is used to emphasize that negotiation, socialization, influence, interaction, and training are all required to bring stakeholders together from all parts of the organization. Bringing diverse stakeholders together is required to develop greater coordination and alignment in an organization (see Fig. 2) [15].

IV. RESEARCH METHODOLOGY

A. Method

The "what" and "how" aspects of ERP project failure are the major concerns of this research study. In this study, project fail-
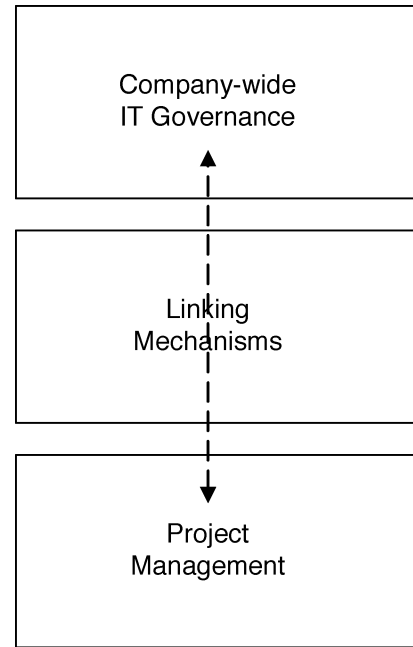

Fig. 2. IT engagement model (adopted from [15]).

ure or success was subjectively assessed by the interviewees. The project is considered a success if participants indicated that the system was satisfactory in meeting its objectives (see interview questions in the Appendix). Because project management is inherently process-oriented, the appropriate methodology determined for investigating project management of ERP is a case study. Case study research is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context" [64, p. 13]. Since the research is more interested in the process aspects of ERP implementation, a case study has the potential of providing an in-depth investigation into these issues in a real- life context [7]. Additionally, the case method has the ability to uncover topics that are yet to be well understood [63].

We use a California-based multinational company as the case of this study. The company provides a total solution (including controls, instrumentation, and software) for the automation needs of industrial and commercial clients. This company was established in 1958 and has strategic business units (SBUs) in California, Australia, China, Hong Kong, Macao, and Taiwan. Although its corporate headquarters is in California, it has a broad customer base in the Southeast Asia region comprising of China, Hong Kong, Macao, and Taiwan.

The decision to use this international company is based on a few important criteria. First of all, this company employs a sizeable workforce (of more than 1000 employees) and has implemented multiple modules of a well-known American ERP package. It is believed that smaller companies may lack the sophistication in their business processes and practices in ERP installations. A medium- or large-scale enterprise is endowed with these processes and practices and can better provide a more realistic picture of ERP project failures. In addition, at this company, the interviewees' positive attitude toward academic research is extremely important for the collection of accurate and reliable information.

Multiple case studies (about four to six case studies) are desirable to generalize research findings [63]. However, the company for this case study has its international operations across countries and continents and can also provide a rich perspective of project experience in ERP implementation. Furthermore, this multinational company had implemented its ERP system with different vendors, over a period of five years, and in two sequential projects. Although the case site consisted of a single multinational firm, the narratives and findings derived from this international case can shed light on major issues related to project failures.

For the interviews, the authors deliberately chose subjects with different backgrounds and adopted consistent interview procedures (semi-structured and open-ended questionnaires, follow-up phone and e-mail interviews, and documentation and triangular validation). For instance, we mixed semi-structured and open-ended questions to capture the interfacing complexity of ERP implementation stages. Open-ended questions can minimize social desirability effects and are a more suitable instrument for this exploratory case study. This design can further engage interviewees and researchers in in-depth discussions on subject matters beyond the level expected. This set of controls al- lowed the authors to mitigate interviewer bias, justify the logical flow between interviewee statements and findings, and validate results with the interviewees.

B. Source of Data

We initially contacted the director of MIS of this multinational company. Two directors (director of MIS and director of supply and customer services) and six employees from MIS and other departments participated in the interviews. We deliberately interviewed non-MIS executives and staff to validate information collected from their MIS counterparts. Our ideal candidates were supply chain executives because their functions span a wide range of operational responsibilities. All chosen participants had extensively used the ERP system to assist their daily operations. Table I lists MIS and non-MIS personnel who participated in this study.

We carried out two company visits. The first visit was the shorter of the two visits. This visit allowed researchers of this study to establish rapport with interviewees and collect basic company information in advance of the actual interviews. Information and documentation collected in this visit include IT strategies, ERP project plans, user request samples, procedures and guidelines, and internal customer satisfaction surveys.

One week after the first visit, we carried out the second visit with the same participants. These subjects participated in the semi-structured interviews that contain open-ended questions. The interview guide questions are included in the Appendix. After the on-site interviews of the second visit, we conducted another follow-up. The follow-up was done using telephone and e-mail communications to clarify unclear answers and solicit other relevant questions. Interviewees reviewed the documented information. We also validated the information by comparing the information collected from the interviewees with documentation reviewed.

TABLE I
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

V. RESULTS

The regional headquarters of this multinational company is located in Hong Kong. It operates in the Southeast Asia region and generates annual revenue of US $250 million. Its major products are industrial and building control systems and spare parts, and it operates by establishing sales forces, joint ventures, and distributors. At this multinational company, the evolution of ERP implementations is analyzed based on the descriptive stage model (consisting of initiation, contagion, control, and integration stages); the analysis is done with an emphasis on project management practices.

A. ERP Implementation Experiences: Phase I

1) Initiation: The management of this international company recognized an urgent need to replace its legacy sales and distribution systems with an ERP system so that the visibility of its business operation can be enhanced. The management as- signed this ERP project to the MIS department. No users were involved in reaching the decision to implement the enterprise system. With insufficient IT resources (personnel and budget) and limited knowledge about ERP, the MIS department decided to outsource, and the project was outsourced to a vendor to de- ploy an American ERP package. The choice of partners was the preference of the management rather than the outcome of a rigorous screening procedure.

In the process, the MIS department faced the challenge of determining the extent of customization. Facing constraints of internal resources, the corporate executives first decided to adopt the "vanilla" ERP, where modifications to the purchased system are kept at the minimum to minimize risks [56]. All SBUs in the Southeast Asia region initially adopted this "vanilla" ERP strategy.

Shortly after the initial deployment of the ERP package, many problems arose in the regional offices of the Southeast Asia region and in the American offices. Though a "vanilla"

implementation was intended, the management also understood that it was politically difficult to enforce the "vanilla" mandate, especially when there are several diverse regions of operations on both sides of the Pacific. Users of SBUs in the United States and other countries often demanded specific functionality beyond the core features. Since scope planning and definition were poorly conducted, additional user requests started to come in after the initial deployment. The management compromised and began to permit customization through adding bolt-on functionality. The process of incorporating add-on features was loosely defined and not systematic, and a flood of user requests came in with poor priority control of user requests. Similar problems also mushroomed in the Southeast Asia region.

To meet its own customization needs, SBU in the United States contracted a consulting partner of the ERP vendor to develop two bolt-on modules. The first module was a back-to-back ordering system. Data integration problems between this new module and the native system soon surfaced and plagued this ordering module. The second module was the interface for a third-party standard project management software that complies with a corporate standard for all SBUs globally. Poor project management practices hindered this project from delivering the interface module on time and within budget.

As a result, the corporate headquarters in the United States terminated a plan to also deploy these two modules in SBUs of the Southeast Asia region. However, taxation requirements in Taiwan are greatly different from those in Hong Kong and China. The original ERP package was not able to meet the country-specific requirements. Mandatory requirements to do business in Taiwan called for the addition of another bolt-on taxation module. Consultants provided advice with respect to required functionalities in this taxation module. These add-on functionalities resulted in some structural changes to the database schema of the original system. The changes included both adding new columns to tables of the existing database and creating new tables.

2) Contagion: SBUs in the Southeast Asia region lacked experience in ERP implementations. Unanticipated problems continued to rise in this region. There was also little involvement of senior management and users from functional areas in project- related activities. Poor project management practices seen in the United States continued in the Southeast Asia region. The steering committee in this region had limited authority to decide on matters concerning business practices and system features. Many committee members expressed no interest and showed little involvement in both implementation and post-implementation processes. Resistance level from all functional areas was high. Business process redesigns necessary to accommodate the new ERP module did not succeed without the cooperation of users from functional areas.

Business processes within the Southeast Asia region were not standardized across Hong Kong, Macau, Taiwan, and China. All countries retained their local business practices. Heavy reliance on print reports in the pre-ERP era further aggravated the localization issue. The combined effects of nonstandard processes, local business practices, and reliance on print reports impeded the attempt of the company to revamp its business practices

and processes. The plan to replace legacy practices and processes with an ERP system that integrates across functions and locations was not carried out.

3) Control: The poor outcomes of implementation and support in the first phase created serious resentment among management, MIS department, and users. The clash triggered the departure of the MIS director and several system analysts. To control this crisis, the company recruited a new MIS director nine months later to rebuild the MIS organization. To overcome the problem of limited HRs, the new director established a organization committee to prioritize the requests for ERP support and enhancements. All functional areas assigned a representative to serve on this committee to help establish priorities for user requests. This committee institutionalized a scope management control policy to prioritize users' problems and needs with maintenance and support. For instance, user requests with lower urgency would be resolved when the system was redeployed. Only urgent requests, such as bug corrections and those with high business impacts, were allowed to be addressed immediately. As the business application manager stated:

> MIS must avoid being seen as shirking its responsibility in managing these difficult tasks. We tried hard to facilitate the process, and offered our clients any assistance needed. This committee is a place where all the voices are heard, and everyone has the chance to understand the needs of the others empathetically in difficult situations.

4) Integration: After the turmoil with maintenance and support was checked and controlled, the redesign of the ERP modules was of high priority. The new MIS director recommended that redesign be undertaken, since business processes and systems were poorly designed and implemented. All IT and organizational resources allocated to the first phase were distributed and assigned to the second phase of implementation. This decision caused the rework or loss of all the customizations that have been done so far. As a result, the new MIS director and the committee officially ended the first phase of loosely and ill- defined "vanilla" ERP implementation and entered the second phase.

B. ERP Implementation Experiences: Phase II

1) Initiation: With lessons learned from the first phase, the new MIS director and the prioritization committee created three milestones to structurally manage the progress of new module additions. The first milestone was to redeploy and replace the installed bolt-on modules. The second and third milestones were to install and add accounting and manufacturing bolt-on modules to the upgraded system (completed in the first milestone). To incorporate these modules into the original ERP system and meet respective requirements of SBUs in different countries, the new MIS director decided to adopt a more strict and well-defined "vanilla" post-implementation strategy. The "vanilla" strategy was twofold: 1) redesigning business processes and 2) minimizing, if not eliminating, all customizations.

Users from all functional areas had limited knowledge and skills on the original ERP package and new bolt-on modules. With this consideration, the MIS director decided to take advantage of the native ERP functionalities as much as possible

while transforming existing business practices. This strategic "vanilla" decision led to the simplification and standardization of business processes across countries in the Southeast Asia region. The decision was that at least 85% of the business processes of SBUs of Taiwan, Hong Kong, and China would be kept common. This arrangement made it easier to set up and support the ERP instances.

2) Contagion: A truly "vanilla" approach would enable easy upgrades to the most recently released software, making upgrade and maintenance a more manageable job. The major concern at this stage is to manage the customizations required to accommodate the remaining 15% of business processes. Unlike the first phase, the second phase is to support the addition of bolt- on modules. The "vanilla" ERP approach was highly enforced during the second phase of implementation. However, this did not mean that customization was absolutely disallowed. Scope management was strictly exercised to control the extent of customization. Only when the core ERP functionality fails to satisfy critical business requirements can the customization be considered. The prioritization committee would also need to assess the business impacts and risks associated with the customization decision before approving customization. For instance, the MIS team dropped from consideration adding bolt-on modules of both back-to-back ordering and project management systems for the SBU in the United States. The team also turned down an offer from the Australian SBU to share its consultant-developed project accounting system; the native project accounting module was favored for the sake of seamless integration and easy maintenance.

3) Control: The new MIS director negotiated with local vendors in Taiwan to produce and support a special version of the taxation module for local branches. As the Taiwan taxation module was a legitimate product, local vendors of the American ERP package actively provided maintenance and support to local clients. The company had to pay only a portion of the development cost. The resolution entitled the Taiwanese SBU technical support and new releases as long as its subscription to the global support program has not expired.

The users requested that the prioritization committee, primarily made of users and mid-level managers, be the mechanism of managing user requests and providing direction of maintenance and support to the ERP system. Procedures and criteria for prioritization requests and management were systematized and clearly refined.

After receiving requests from users online or offline, the helpdesk would review the requests to determine their critical levels. Those of the highest level of severity/urgency were handled immediately to keep the system and business processes running. These urgent problems included bugs in the ERP software, any problems relating to "stuck" or incomplete transactions, and problems with the technical infrastructure. Other requests were subject to reviews by the prioritization committee, which set the priorities and schedules for the requests. Examples included changes to system messages and user interfaces, development of online and batch reports, enhancements to existing modules to support business changes, and deployment of new modules. The business application manager noted:

A set of clearly defined procedure and guidelines not only helps to ensure the consistency in handling maintenance-related activities, but also to educate the MIS and non-MIS staff about the process of customer support services and priority management. User requests must be carefully assessed for impacts and risks, and these may trigger other related activities.

4) Integration: ERP maintenance and support practices were successfully incorporated into the daily operation to support the functioning of the business. For instance, the helpdesk helped track the status of activities and problem-solving history. The MIS department also regularly offered training courses to managers, users, and IT staff to meet the needs arising from different stages of the project. The MIS staff worked side by side with external consultants to assimilate their skills and knowledge to provide internal maintenance and support. The ERP system generated monthly and quarterly performance analysis reports for review by the MIS team and users of all functional areas. Unlike the prioritization committee in the first phase, the revamped prioritization committee in the second phase played a proactive role in discovering, analyzing, and managing both strategic and operational issues concerning business changes and ERP features. The director of supply and customer services made this comment:

We have to cope with a very dynamic business environment, which would often require changes to business practices and new systems functionality. In the past, the supply management team was disconnected from MIS and other functional areas … [Now] The prioritization committee makes sure that operational and strategic issues are brought up to be reviewed and addressed by all stakeholders.

The MIS director was also satisfied with the integration of the ERP package into the business process:

It took us a while to build up the ability to effectively support the ERP system and get the acceptance from our clients. This requires the development of a new mindset, ERP expertise, and supporting infrastructure. A proper infrastructure should include the proper procedures, helpdesk systems, and the mechanisms to set priorities … It is critical to look ahead of your current needs, and see what are there for the future.

The interviews took place approximately 15 months after the system was commissioned for service. The interviewees praised the system as a significant improvement over the first installation in terms of stability and usability. These subjects were satisfied with the ways that user requests were managed and business processes were transformed. In terms of technical support, the task was much simpler than that during the first installation. As with other ERP projects, the MIS department had to handle a large number of user requests. In the first seven to eight months after each module was introduced, requests from end users alone consumed 70%–80% of the time of the application systems team. The proper scope management helped to reduce gradually the number of user requests. The elimination of unnecessary customizations eased many processes, including tracing system bugs, seeking technical assistance from vendor's global support center, applying software patches (without having to worry about causing new errors or losing customized codes), and upgrading to a newer software release.

TABLE II
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 and organizational resources • Did not consider local taxation requirements in Taiwan	**Scope Management** • Strictly-defined scope management: keep 85% of business processes 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 of 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 of business process to "best practices" embedded in the ERP system • Minimization of customization

The prioritization process of user requests continued as part of the change management practice. The expanded scope of ERP maintenance and support, including both strategic and operational aspects, meant that maintenance and support were repositioned to a more important status. The implemented maintenance and support practices and mechanisms established the bridge for bidirectional communications among senior management, operational staff, and managers.

VI. DISCUSSIONS

Although this study is based on the ERP implementation experience of a single company, the findings are valuable as the case study provided an opportunity to investigate and compare two back-to-back ERP projects in the same company. Table II summarizes this multinational company's experience in its first and second implementations of ERP in SBUs located in the United States, Australia, and the Southeast Asia region.

A. First Phase of ERP Implementation

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 the need to replace the legacy system with an ERP system, the question of what modules to deploy first was not clearly

discussed between users and the management. To please the management, the MIS department chose back-to-back ordering and project management systems. However, it did not thoroughly analyze whether or not these two systems align with the strategic intent of the business and enhance operational visibility. The misalignment can lead to ERP implementation problems with respect to scope creep and ill-defined interface [53]. 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. headquarters of this multinational company did not take the user requirements into serious consideration. This resulted in an underestimation of corresponding structural changes to the database schema. In addition, the management did not increase the pool of *HR* or retrain users with skills to cope with the challenges of ERP implementation. The lack of in-house skills and knowledge in implementing the ERP system created chaos in the face of technical troubles. The ensuing poor system capability led to low perceived usefulness of the system [9]. At the same time, the company attempted to run the existing legacy systems while implementing an unfamiliar ERP system. Achieving functional interoperability was a considerable challenge for the company because of its lack of knowledge and skills in ERP implementation, and the MIS department did not formulate a *risk* response plan to resolve unanticipated operational risks.

The implementation of ERP modules was the first outsourcing experience for this company. As such, no evaluation criteria (e.g., weighting systems and independent estimates) were used to screen the business proposals of potential vendors. Rather, the management selected a vendor based on its own preference and later informed the MIS department of the decision. This lack of dialogue was just one of the many examples of poor *communication* in the first phase of the project. Since no users were in- volved during vendor selection and ERP implementation, failure was predictable. In terms of *procurement* and partnership management, the success of ERP implementation projects heavily depends on the "'arduousness of the consultant-client relation- ship' and the degree of 'shared understanding'—the similarity in work values, norms, and problem-solving approaches between consultant and client team members" [29, p. 83]. These two important factors were clearly missing in the first phase of ERP implementation. Moreover, top management expected the MIS department to carry out the *integration* of the new ERP system across SBUs in diverse regions and manage the assimilation process. As such, the enforcement of some sort of corporate standard (e.g., customization acceptance criteria) was expected, and an effective conflict management of diverse interests was needed to bring about acceptable project outcome [10]. Yet, the company succumbed to political pressures from different SBUs and allowed bolt-on modules that were not essential to the needs of the enterprise.

Despite the problems encountered in this phase, the company in the first phase nevertheless laid the groundwork for the eventual implementation of the second ERP system. The establishment of the prioritization committee in the control stage turned

out to be a key organizational change, for the prioritization control implemented served a very important purpose—a forum to improve the relationship with various stakeholders by using a mechanism to fairly allocate resources and improve communications among stakeholders of the system. This committee succeeded in resolving crises that occurred in the previous stage, as well as institutionalized the change management process going into the second phase.

B. Major Improvements in the Second Phase of ERP Implementation

The management restructured the MIS department by hiring an outside director and support team based on their previous ERP experiences. This action improved the company's situation of not having enough qualified IS professionals. To ensure system success, an engagement mechanism needed to be in place to involve stakeholders via three components: 1) company-wide governance; 2) project management; and 3) linking mechanisms [15].

In terms of *governance*, whereas in the first phase there was minimal user involvement across functions and SBUs, in the second phase, the prioritization committee made of stakeholders across functions and SBUs was given more authority. The committee adopted a formalized policy to screen user requests based on the urgency and the extent of impacts. This was in contrast to what was done in the first phase where changes to the system were permitted without much evaluation. In addition, the ERP system of the first phase was treated as an IT project and responsibilities were delegated to the director of MIS and his staff, but in the second phase, the entire organization took ownership of the ERP system through the forum of the prioritization commit- tee. While the ERP system was treated as an operational system in the first phase, in the second phase, top management devised three explicit strategic goals for the ERP system to achieve: 1) align with business strategy; 2) streamline business process; and
3) minimize the extent of customization to the native system. Back-to-back ordering and project management systems were replaced with accounting and manufacturing bolt-on modules to achieve the first two strategic goals. To achieve the third goal, 85% of business processes across SBUs were purposely kept common. This way, the corresponding functionalities in the system could be shared, and customizations required to meet individual SBU's unique needs can be minimized. All these measures helped establish the decision-making authorities and accountabilities at all levels of the company.

As for the mechanism of *project management*, scope creep was widespread in the first phase, and each SBU made its own decision regarding changes to the ERP system. In the second phase, the scope planning and defining process were much more clearly defined and helped encourage desirable behavior to man- age user requests in a more systematic manner. There was a set of clearly defined procedures and criteria for assessing user requests. For instance, because Taiwan has a unique taxation requirement, the Taiwan SBU had a clear reason to be exempt from the 85% common business process policy. Thus, in this case, the prioritization committee approved the mandatory change

request to customize the ERP module for the taxation needs of the SBU in Taiwan.

In addition, in the first phase, the MIS department pushed the responsibility for the ERP project out to vendors, and there was minimal knowledge transfer back to the internal MIS staff. In the second phase, the company improved the consultant–client relationship and shared understanding by working with local vendors on customized system modules. In-house employees worked side by side with 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 previously.

The *linking* mechanism can be examined both externally and internally. Externally, there were major differences in how the vendor partnership was managed between the first and second phases. In the first phase, the MIS department simply treated the ERP system as a "turnkey" system with an ongoing "support" contract. In the second phase, the MIS department proactively managed the partnership by requiring vendors to generate monthly and quarterly performance reports of the system. Users and managers further reviewed these reports; then, the MIS department proposed solutions to resolve issues derived from these reports. Internally, there were also major distinctions in how stakeholder interests were managed between the first and second phases. Whereas in the first phase there was a lack of for- mal process and procedure to manage stakeholders' interests, in the second phase, the prioritization committee served as a linking mechanism to connect project-level activities to overall IT governance.

All in all, the project management areas and the IT engagement model provide a perspective of observing two ERP implementation instances in the same organization. In the first phase, mistakes were made by this company in the six project management areas examined. In the second phase, the same company primarily addressed the mistakes by instituting formalized IT governance, adhering to disciplined project management practices, and actively engaging all levels of the organization.

The high user satisfaction of the second ERP system notwithstanding, this research did detect a weakness resulting from the latest ERP implementation. Because in the second phase the company more strictly enforced standardization and prioritization, some innovative processes could not be put into practice via the system right away. For example, orders of highly customized configurations could not be specified and routed via the system when it was precisely these customized orders that were highly profitable and potentially representing future growth for the company. Although the prioritization committee had a process in place to implement changes of a strategic nature, it may be too slow for the company's customers in a competitive environment. Thus, for these customized orders, workarounds such as paper documents were still used. Disseminating customized configurations via paper documents can prevent product sales innovations from being captured by the system, thus negating the benefits afforded by an enterprise system such as ERP.

C. Limitations

All research studies have their limitations, and this study is no exception. First, ERP support functions across the firm and allows for enhanced organizational coordination among them. However, in this study, personnel such as those from finance and accounting and HRs were not included. Although it was desirable to gather feedback from all functions, conflicts in schedule and availability prevented the collection of data from functions such as finance and accounting and HRs. The inclusion of these functions would provide additional perspectives of ERP implementations. However, the interviews did capture as much representation from different functions as possible (see Table I).

Second, information collected in case study research through personal interviews may not accurately reflect what happened. The interviewees may have a specific retrospective view of the case; the effects of biased response can be minimized by increasing the number of perspectives [6]. In this case study, the MIS director who was there during the first phase of ERP implementation was no longer there during the second phase. However, the effect of his absence and any biased responses from other respondents should be minimized because we still interviewed key actors in the second phase who were there during the first phase (e.g., the director of supply chain and the supply chain staff). The business applications manager in the MIS department was also present during both the first and the second phases and provided us with good data. Also, even though the new MIS director only came later, he and his staff had a chance to closely examine the first ERP system before the second project began. That examination provided them a chance to assess the first system, make short-term fixes to it, and plan for the second ERP project. Thus, the new MIS director and the MIS staff, working together with users, should clearly understand the problems. In addition, the data provided by the new MIS director and his staff were corroborated by the director of supply chain (who was there during the first phase) and the supply chain staff. Furthermore, explicit evidences such as company documents (e.g., project plan, diagrams, list/statistics of bugs, and memos) were collected about the first ERP system, which further corroborated the interview data.

VII. IMPLICATIONS AND CONCLUSION

The inclusion of project management skills can greatly improve the odds of ERP implementation success. This case study affirms this proposition by presenting evidence for progress from phase 1 to phase 2 where the company leveraged six important project management areas—scope, HR, risk, communications, procurement, and integration management. The importance of these project management skills is often under- estimated as it was in the first phase of ERP implementation at this multinational company.

A. Implications

For practitioners, it is important to recognize that stakeholders at the project, business unit, and corporate levels often have divergent interests. An enterprise system can impact these users

in different ways and create conflicts among these stakeholders. What this study has demonstrated is that it is critical to manage these impacts and conflicts by incorporating project management practices in the implementation process (i.e., communications, scope, risk, HRs, procurement, and integration management). In terms of *communications*, the first phase of the case study showed that the presence of conflict and resentment created symptoms such as hostility, jealousy [55], poor communication [16], frustration, and low morale [4]. 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 IS [55].

Thus, it is important for project managers to manage the communication process and create a forum in which stakeholders can order priorities and discuss issues. Managing the conflict be- tween business and IS throughout a system development cycle is imperative to the successful delivery of an IS project [51]. User participation has been an effective mechanism to lessen conflict [3], thereby improving system development outcomes [52]. In terms of *scope* management, many authors have cautioned that customization would likely increase the cost and risks of ERP implementation and the difficulty for upgrades and migration to future releases [8], [13], [31]. Indeed, unchecked customization contributed to the poor outcome of the first ERP implementation. However, some amount of customization will always be necessary to meet specific business requirements [60], especially, as this case has shown, in a multinational company with different regional requirements. To capitalize on business opportunities, changing system requirements is a viable option from a managerial perspective, but this represents a great economic cost to any company that trades system functionalities for business agility. The conflict between the need to meet business needs and the need to control system complexity causes tension between management and IS professionals, and the pressure to resolve the conflict creates a sense of obligation in the system implementer to change system requirements to meet business needs. This, in turn, reinforces an unspoken commitment to adopt the "change" option, even though there are viable alternatives (e.g., maintenance, off-the-shelf package, or no change). Creeping requirements can be especially destructive because of their implicit nature, which can mean that their negative im- pacts are never fully and explicitly recognized, acknowledged, or addressed. Any changes made to honor creeping requirements will be interpreted as a reinforcement of an earlier promise or commitment—whether or not that is the intent of the MIS department. As a result, MIS can be 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 can affect project outcomes.

Project managers can consider a two-pronged approach to manage scope. First, to avoid entering a competing mode with management, a top-down policy on scope can be put into practice (e.g., keeping 85% of business processes common). Second, to facilitate the implementation of such a policy, a bottom-up process involving SBUs and functional areas can be adopted (e.g., forming a prioritization committee). A prioritization com-

mittee can serve as a successful scope management vehicle because it can lower the extent of user resistance by involving users across different areas. Conflicts of interest are avoided by improving the degree of transparency in the decision-making process. This case affirms the importance of scope management vehicle in the development of an enterprise system, and scope planning and definition skills can minimize scope creep problems and channel-limited resource to key issues.

Risk management is important to an IT project, especially one that spans the enterprise. External (e.g., new business models and entrants) and internal (e.g., project size, duration, structure, complexity, and outsourcing) aspects of task, process, or environment can increase the likelihood of unfavorable project outcome, and these aspects represent risks to the project [36]. Thus, project managers can consider measuring the risk of an ERP project as an important part of risk management, and to the extent possible, a firm should adopt a formal method of assess- ing risks [5]. Once identified, different categories of risks can be managed with specific action strategies [25], and different forms of risk control process can be adopted to tailor risk management to specific contexts [22].

In managing *HRs*, it should be recognized that in-house employees tend to have a lower level of readiness than vendors in implementing an enterprise system. The shortage of critical skills and knowledge in most companies and high turnover rate of IT professionals pose additional challenges. However, these HR issues do not have to be an inhibitor of a successful imple- mentation of an enterprise system. In the second phase of the case, the company pushed internal employees to shadow their vendor consultants. This turned out to be an effective approach. To facilitate knowledge transfer, a company can pair in-house employees with vendors based on similarity in work values, norms, and problem-solving approaches. The idea is to support ERP implementation with a knowledge management mindset that can facilitate the knowledge generation, transfer, and ab- sorption 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 knowledge management system can further the success rate of ERP implementation [34].

In *procurement* management, managing partners should be the responsibility of the adopting company, instead of that of the vendor. In the second phase of the case study, the company required the vendors to generate monthly and quarterly performance reports and proactively managed performance issues. What this means is that project managers should develop a list of performance metrics for vendors, work out how to measure them, and obtain regular performance measurements. If there is a deviation from benchmark, project managers should assume a hands-on role to track the issue and bring it to closure, instead of relying on vendors themselves to address the issue. Overall, the adopting company needs to keep track of the progress of the vendor–client relationship and take corrective actions if necessary, and a well-managed partnership can incrementally transfer vendor's knowledge and skills to in-house employees. In addition, the cultural fit between clients and vendors is indispensable for the long-term success of ERP projects [47].

Last, *integration* management is the mechanism that directs all stakeholders at the project, business unit, and corporate levels toward the same direction. In the first phase of the case, although the intent was to implement a "vanilla" system, the reality was that management gave into customization requests from SBUs. In the second phase of the case, the prioritization committee itself became an integration mechanism that translated the top-down corporate policy of 85% of common processes to its actual realization in the system while satisfying the requirements of SBUs and functional areas. What this means was that SBUs had to give up many of their local processes and adopt the "best practice" processes embedded in ERP. As a result, a single ERP system integrating diverse and dispersed SBUs was deployed. Thus, firms contemplating ERP deployments are recommended to have not only a prioritization committee, but also an *empowered* prioritization committee that is authorized to make binding decisions and creates concerted efforts in accomplishing business goals. Setting expectations at the onset of the project would also be useful, i.e., SBUs would be expected to give up some of their local processes in order to conform to the 85% policy. In addition, at the project level, it is suggested that for some time after system deployment, those in-house employees who have worked on development also work side by side with the helpdesk support staff. This way, system knowledge can be transferred to the helpdesk and the eventual integration of the ERP system into the organization can be facilitated.

B. Future Research

For researchers, case study is a useful methodology in investigating the practice of project management in ERP development and implementation because the process that organizations go through is often complex. In these situations, case studies af- ford an opportunity to observe interesting behavioral patterns or correlated phenomena, and these observations may be use- ful in developing yet-to-come models [6] that will guide the practice. Continuing with the case study methodology, future researchers investigating project management in ERP can con- sider several possible research directions. This case study exam- ined six project management areas of expertise in two back-to- back ERP implementations at a multinational firm. For future research, researchers may want to focus on just one particular project management area while expanding the number of case sites. For example, one may want to investigate the process of risk management and compare risk management practices at several firms within the same industry or even across different industries. Such a study can shed light on the factors (if any) that contribute to differences (if any) in risk management practices at different firms and may lead to a generalized model of risk management in ERP projects.

In addition, there has been much research on the factors con- tributing to positive outcomes of entire ERP projects [40], [61]; at a more granular level, future research may want to explore the question of what are the independent and dependent vari- ables of different project management areas. For example, it may be useful to study a case site's ERP implementation pro- cess and specifically ascertain the factors leading to effective scope management or achieving benchmarks of scope management practices. Furthermore, Grant and Penny packer [18] have called for more research on project management maturity [44] and capability given that many projects in organizations today (such as ERP) have strategic importance. For example, one issue that future research can address is to see if there is a relationship between project management maturity and positive outcomes of ERP implementation. A positive confirmation of the relationship can firmly establish the value of project management in ERP implementations and encourage firms to emphasize more on their project management expertise. Overall, it is expected that this research provides a foundation upon which future research can build, and project management and ERP should continue to be a fruitful area of research.

APPENDIX

Interview Questions—MIS

Q1. Based on what you know, what are the objectives for your company to implement the ERP system?

Q2. (a) What is the ERP package adopted by your company? (b) What modules have already been implemented? (c) What modules are planned for implementation in the near future?

Q3. Please discuss your approach to ERP implementation? For instance, how much customization is allowed and under what circumstances is customization allowed?

Q4. Does the ERP system support your business operations efficiently and effectively?

Q5. Is the ERP system well supported and maintained to provide a stable and usable platform for users?

Q6. In your opinion, what are the strengths and weaknesses of the system? Please describe (a) those beneficial functionali- ties that support the business activities, and (b) the symptoms and problems of the system.

Q7. Overall, is the system satisfactory in meeting its business objectives?

Q8*. If the system is satisfactory, what are the reasons or critical success factors leading to such an outcome? Please elaborate on the best practices or measures taken to manage the system, user and business-related issues (a) before implementation, (b) during implementation, and (c) during the operational phase of the system.

Q9*. If the system is unsatisfactory, what are the reasons or malpractices leading to such an outcome? Please elaborate on the malpractices and problems that occurred (a) before implementation, (b) during implementation, and (c) during the operational phase of the system.

*Ask to elaborate on how to handle issues relating to the ERP vendor. For instance, if customization is allowed, how does the company handle vendor's software patches, future release upgrade, and on-going support?

Note: For each question, drill down into issues to get an in-depth understanding.

Interview Questions—Non-MIS

Q1. Based on what you know, what are the objectives for your company to implement an ERP system?

Q2. Does the ERP system support your business operations efficiently and effectively?

Q3. Is the ERP system well supported and maintained to provide a stable and usable system platform to carry out your daily business activities?

Q4. In your opinion, what are the strengths and weaknesses of the system? Please describe (a) those beneficial functionalities that support the business activities, and (b) the symptoms and problems of the system.

Q5. Overall, is the system satisfactory in meeting its business objectives?

Q6*. If the system is satisfactory, what do you think are the reasons or critical success factors leading to such an outcome? Please discuss the best practices or measures taken to manage the system, user and business related issues (a) before implementation, (b) during implementation, and (c) during the operational phase of the system.

Q7*. If the system is unsatisfactory, what do you think are the reasons or malpractices leading to such an outcome? Please discuss the malpractices and problems that occurred (a) before implementation, (b) during implementation, and (c) during the operational phase of the system.

*Be sensitive to the non-MIS interviewee's ability to answer technical or project management related questions. Move on to the next topic if the interviewee is unable or unwilling to respond.

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