Managing risk in enterprise resource planning projects

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Abstract

Enterprise Resource Planning (ERP) projects are strategic and capital intensive, so failure may be costly and even cause bankruptcy of companies. Previous studies have proposed ways for improving implementation, but they are mostly generic and follow standardized project management practices as specified in various standards (e.g. the "project management body of knowledge" of the Project Management Institute). Because ERP is interdisciplinary (involving change management, project management and information technology management), it warrants a customized approach to managing risks throughout the life cycle of implementation and operation. Through a practical case study, this paper demonstrates a qualitative, user friendly approach to ERP project risk management. Firstly, through a literature review it identifies various risk factors in ERP implementation. Secondly, the risk management practices of a UK-based multinational consulting company in one of its clients are evaluated. The risk factors from the case study organization and literature are then compared and discussed.

Keywords: ERP, Risk Management, Project Processes.

Introduction

Globalization has made today's business more challenging with growing competition, increasing customer expectations and expanding markets. This places pressure on companies to have more effective logistics operations by cutting cost across the supply chain, optimizing inventory, expanding product variety, improving delivery schedules, increasing quality and reducing material flow time. Companies have come to realize that these challenges can only be met, and the necessary changes made, when they share information among their suppliers, distributors, and customers. In order to remain competitive, organizations are increasingly developing collaborative and/or strategic partnerships with their suppliers to share a common goal for the business. To accomplish these objectives, many companies are adopting Enterprise Resource Planning (ERP) systems. ERP systems are designed to provide seamless integration of processes across functional areas with improved workflow, standardization of business practice, and access to real-time, up-to-date data. As a consequence ERP systems are complex and implementing them can be a challenging, time consuming and expensive activity for any organization (Davenport, 1998).

The potential benefits of ERP include significant reductions in operating costs through lower inventories and working capital requirements, extensive information about customers' wants and needs, along with an encompassing view of the extended enterprise of suppliers, alliances and customers as an integrated whole (Chen, 2001; Binder and Clegg, 2007; Clegg 2008). This is a result of an ERP system's abilities to automate and integrate business processes across organizational functions and locations, to share common data and practices across the entire enterprise in order to reduce errors, and to produce and access information in a real-time environment to facilitate rapid and better decisions and cost reductions (Davenport, 1998; Soh et al. 2000).

Although ERP systems can bring competitive advantage to organizations, there have been a number of prominent failures. For instance, Allied Waste Industries Inc decided to discontinue a USD 130 million system built around SAP R/3, while Waste Management Inc called off an SAP installation after spending about USD 45 million of an expected USD 250 million on the project. Hershey Food Corp has also held SAP accountable for order processing problems that hampered its ability to ship confectionery and other products to retailers around the peak Halloween season (Bailey, 1999; Boudette, 1999)

Even after an ERP system has been implemented, there is a variety of ways in which organizational processes may still underperform. For example, they may generate an unacceptable level of errors, they may be unstable and have performance that is difficult to predict, or processes may fail in unpredictable ways and be difficult to diagnose and correct. Also, forecasts made with the sales planning component of the ERP system (the representation of the sales planning process) may be incorrect if the past is not representative of the future. For example, in the case of FoxMeyer a failed ERP system created incorrect orders that resulted in excess shipments costing the company millions of dollars (Aladwani, 2001) and Whirlpool experienced delays in shipments of appliances to many distributors and retailers. Other cases of ERP failure have been reported at Boeing, Dow Chemical, Mobil Europe, Applied Materials, Kellogg, and Hershey (Chen, 2001). One study indicates that 40 percent of all ERP installations achieve only partial implementation while 20 percent of attempted ERP adoptions are scrapped as complete failures (Trunick, 1999). Another study reports that between 60 and 90 percent of ERP implementations do not achieve the return on investment identified in the project approval phase (Ptak, 1999).

Given that the technical capabilities of ERP systems are relatively well proven, the consensus is that planning issues constitute a major barrier to extracting their full benefits. Therefore, the justification of ERP systems needs to encompass not only economic and strategic benefits but also the enhanced organizational capabilities. The complexity of ERP implementation should also be considered (Kumar and Hillegersberg, 2000); for example, the upgrading process from SAP R/2 to R/3 is a costly, time-consuming process (Davenport, 1998). In other words the implementation of ERP software packages can disrupt organizations (Soh et al. 2000; Kumar and Hillegersberg, 2000).

In the past, several methods have been proposed to manage risk in ERP projects (Aloini et al. 2007). They are mostly characterized by standardized project management practices as specified in various standards (e.g. PMI, 2004). Although there are few frameworks of ERP project risk management using mathematical modeling such as the analytic hierarchy process, fuzzy theory, Delphi technique, 0 – 1 goal programming, analytic network process

and hybrid methods etc. (Huang et al., 2004; Teltumbde, 2000; Wei et al.,2005; Wei, 2004; Lee and Kim, 2001). They are mainly integrated with ERP project evaluation and system selection. Hence, they cannot be used for independent analysis of risk in ERP projects. Additionally, although there are studies on implementation issues of ERP projects along with the description of the risks that are quite common (Aloini et al. 2007), there is scant of knowledge in the area of risk management practices by the organizations. Therefore, there is strong requirement of a practical approach to ERP project risk management.

The objective of this paper is to demonstrate a practical risk management approach to successful implementation of ERP projects. The paper has been organized as follows: first, using a literature review the generic risk factors for ERP projects have been identified, and second, through a case study a risk management framework has been introduced and its application demonstrated.

Risks factors in ERP implementation projects

In recent years, several researchers have tried to identify the critical success factors for ERP implementation (Mabert et al. 2003; Al-Mashari et al. 2003; Mandal and Gunasekaran, 2003; Umble et al. 2003). From the results of their studies, the risk factors during the various phases of ERP implementations can be summarized as shown in Table 1.

These risk factors can be further categorized into project management processes, organizational transformation and information technology in order to suggest mitigating measures for each category.

Table 1 - Generic risk factors by project phase and risk category

Project phases	Risk Categories		
	Project management processes	Organizational transformation	Information technology
Planning	Inaccurate business case. Unclear objectives. Weak implementation team.	Lack of management/executive commitments and leadership. Lack of synergy between IT strategy and organizational competitive strategy. Unclear change strategy.	Lack of communication with the end users. Inadequate training plan for the users.
Implementation	Inappropriate management of scope. Lack of communication between ERP implementation team, ERP provider and ERP users. Poor contract management.	Inappropriate change management. Inappropriate management of culture and structure.	Business process reengineering incompetence. ERP installation incompetence Inappropriate selection of ERP software. Inappropriate system integration. Inaccurate performance data. Inappropriate users

			training.
Hand-over, evaluation and operations	Inappropriate contract closeout.	Inadequate organizational readiness. Resistance to change. Lack of user training.	Inappropriate system testing and commissioning. Multi-site issues. Lack of clarity on inspection and maintenance. Inaccurate performance measurement and management framework.

Successful implementation of ERP systems can result from effective management of these generic risks, which have been collated from a high number and wide variety of ERP projects across industries.

Case study on risk management for ERP implementation

The following case study illustrates the use of a customized project risk management framework by a UK-based multinational consulting company and has successfully supported the implementation of an ERP project in one of its clients, a UK-based energy service group (hereafter referred to as "The Group"). The Group was formed following the privatization of the gas energy market in the UK and a subsequent de-merger of part of the business in 1997. It has since developed into an international business with a total turnover of GBP13.4bn. The Group employs over 30,000 people and has expanded globally through a strategy of acquisitions and partnerships in both Canada and the United States. More recently The Group has focused on entrance into the deregulating European markets.

As The Group had grown by acquisition and mergers, it now possesses an IT landscape consisting of disparate IT systems and disconnected processes. Accordingly, it has embarked on an ERP implementation and re-implementation strategy with SAP as the chosen ERP solution. The Group already had a sub-optimal SAP implementation in parts of the business.

The project that is the subject of this case study was a 10-month business transformation initiative consisting of the implementation of a SAP ERP platform for finance, procurement and HR processes with 1,500 system users and 35,000 payroll records involved. To support its vision, The Group undertook this business transformation project to radically overhaul its back office systems and to reduce cost. The objectives were to achieve simplification, automation, standardization and integration across the three functions. To have the three back office functions working in a fully integrated and largely automated way would provide an invaluable platform upon which the group could begin to develop much wider improvements based on a common and flexible backbone.

The project involved implementing SAP's "mySAP" ERP application suite (to support the HR and Finance), e-Procurement and BW (Business Warehouse). Additionally, the new

solution provided the platform from which the functions would transform their partnership with the rest of The Group's businesses. The overall solution was based on the SAP "Netweaver" open platform, allowing legacy SAP and non-SAP applications to be fully integrated. The consulting company was engaged to plan and implement the project under study. It worked closely with the ERP provider and The Group's project management team from concept to commissioning of the project in order to ensure effective implementation and operations. The Group's project team, the consultant's project team and ERP vendor's project team formed the core ERP implementation team. The Group's project team was formed through careful selection of experienced and capable people from both functional and IT group.

The project resulted in the migration of significant volumes of complex legacy data (250m transactions with a GBP 1.53 trillion value); the solution was successfully implemented and achieved its objectives to provide simplified and standardised processes across the back-office. The SAP ERP suite provided automated and integrated support for these processes.

Risk Management Methodology

The risk management framework has five steps – identifying risk, logging risk, reviewing risk, managing risk and closing risk (Figure 1). The following section describes each step.

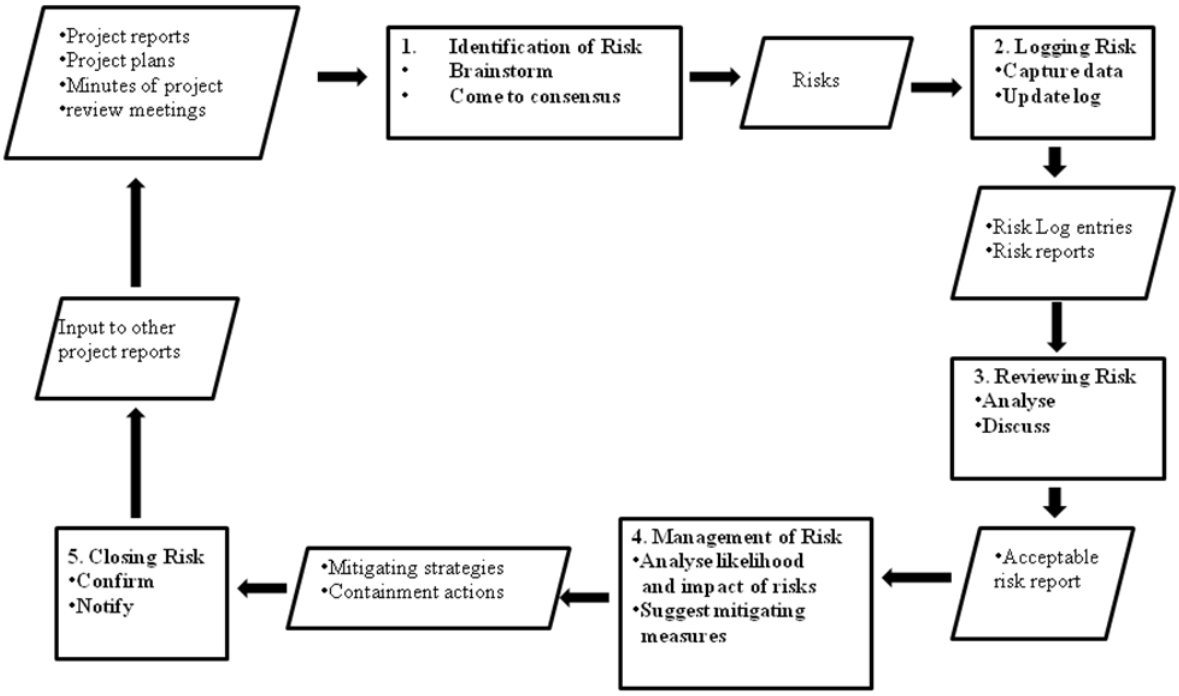

Figure 1 – Risk management framework for The Group's ERP implementation projects

Identifying risks: A formal workshop was held in project planning phase to review risks likely to occur. This involved representatives (middle level management) of The Group's functional team (human resource, finance and information management), representatives of the ERP vendor's project team, three senior members (with more than fifteen years experience) of The Group's project management team and the three senior members (with more than fifteen years of experience) of the consultant's project management team. Project plans, various reports and minutes of the meetings were reviewed by the members prior to the workshop. Additionally, the participants used their experience to identify risks. The representatives of consultant and the ERP vendor using their prior experience developed a check list of project phase wise risks that were expected for the project understudy. These risks were subsequently reviewed by both the functional and IT groups of The Group in order to develop a final list.

Logging risks: All risks were then recorded in the risk log and communicated to the concerned stakeholders. The Group's project management team and the consultant identified the more general project-wide risks and checked specifics for each function with the various functional teams. The functional teams were responsible for the identification of risks specific to their operations. The consultant project management team was responsible for updating the risk.

Reviewing risk: On an ongoing basis, the risk log was updated with the status of key risks documented in weekly functional reports. This was the responsibility of each functional team. The representatives of both The Group's and consultant's project team played active roles in policing this process by attending weekly meetings with functional team to check status, action dates and to review if new risks were being missed.

Managing risk: The likelihood and impact of each risk on project outcome were then determined with the involvement of the representatives of both The Group's and the consultant's project teams as well as the ERP vendor and functional groups. They devised mitigating strategies for each risk through brainstorming, which was conducted by the project manager of the consultant project team. This procedure was formalised by a weekly review between the project management team of The Group and the consultant. The project manager of the consultant's project team had overall responsibility for managing all risks and discussing closing actions, due dates, priorities and risk impacts with The Group's functional and information technology managers to ensure that risks were being actively managed. High probability and high impact risks were escalated up the governance structure of The Group's management to be analysed and discussed within the weekly management meetings and they would also be detailed on the weekly management reports. Should a risk be out of the control of the ERP project management team, it would be escalated further up the governance structure to the Executive Steering Committee (CEO and the Board of Directors) of The Group that provided the executive sponsorship for the project.

Closing risk: All the risks were monitored closely along with the associated activities. They were closed as soon as the associate activities were accomplished. The occurrences and impacts of these risks were reported and archived for learning for forthcoming projects.

Tables 2 to 4 depict the project phase-wise risks that were actually identified in the first workshop for project risk analysis at the end of the planning stage. The risks were categorized into areas related to information technology (hardware, software, network and security), organizational transformation, and project management processes in order to entrust their mitigation to specific group of expert people in the organization.

Table 2 - Risks for The Group in the implementation phase

Risk Factors	Impact	Likelihood	Category
Project resources required not available e.g. for training	H	M	Project management process
The project execution deviates from design/principles	M	L	
"Quality" at risk due to time/ cost drivers	M	H	
Risk that sponsor cancels the project	H	L	
Other projects that are happening in parallel within the business impact the ERP project	H	H	
Project team 'burns out'	M	M	
Lack of resources available from within the business to fill specific roles	M	H	
Scope creep	H	L	
Delay in hardware procurement	H	M	
Project team turn-over	M	M	
Plan is not achievable because of many concurrent activities	H	L	
Communication risk between the project and the business	M	L	
Inappropriate system testing	L	L	
Business resources required not available - Business resource may 'overlap'	H	H	Organizational transformation
Legacy system change impact interfaces	H	M	
Legacy systems require changes which would be likely to delay the project	H	H	
Business inadequately prepared to take on new solution	M	L	
Fail to transfer knowledge (consultant to the business project resources)	H	M	
The business suffers 'change fatigue'	L	H	
Not meeting IT (hardware, software, network, security system) specification	H	L	Information technology
Mismanagement of overall IT architecture'	H	H	
Lack of resources in new technology areas being implemented due to their specialist nature	H	L	
Insufficient server speed ("lack of horse power")	H	L	
Insufficient data base capacity within SAP for the volume of transactions being migrated across from the legacy systems	H	M	
Data cleansing does not meet the necessary requirements	M	H	
Telecommunication links with outsourcing partners fails, resulting in a lack of access to SAP by the offshore team	H	L	
SAP Profiles do not correspond to organisation roles	H	L	
IT fails to resolve functional issues	H	M	
Decision on system architecture configuration selection was not taken on time	M	L	
The end-user infrastructure fails to support deployment	L	M	
Insufficient training facilities available	M	M	
Failure to move towards Sarbanes-Oxley compliance	H	L	

H = High, M = Medium, and L = Low

Table 3 - Risks for The Group in the handing-over phase

Risk Factor	Impact	Likelihood	Risk category
Late Decisions/Sign-off	H	H	Project management processes
Organization fails to adopt change	L	L	Organizational transformation
The new system fail to reconcile business information	H	L	Information technology

H = High, M = Medium, and L = Low

Table 4 - Risks for The Group in the operations phase

Risk Factors	Impact	Likelihood	Risk category
Failure to deliver benefits as outlined in the business case	M	L	Organizational transformation
Inadequate Training	H	M	
Solution is not scaleable	M	L	Information technology
No disaster recovery arrangements	M	M	
The new system fails to provide appropriate financial information	H	M	
The information generated by the new system fails to comply with Data Protection Act	H	L	
Systems malfunction after 'going live'	L	L	

The Project Management Body of Knowledge (PMBoK) (Project Management Institute, 2004) proposes a six step project risk management framework in which the steps are risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning, and risk monitoring and control. The Group adopted a customized version of the PMBoK risk management framework for this project which had only five steps, (i.e. identification of risk, logging risk, reviewing risk, managing risk and closing risk). Although planning had been carried out in The Group regarding how to pursue risk management at a high level, until the adoption of this particular framework there had been no *detailed formalized* steps for risk management planning. As this particular project had been a great success the risk management framework is now used across the whole of The Group and its related businesses for other similar projects. All large IT based projects now start with a formal identification of risk, followed by the logging and the reviewing of them (in terms of 'impact' and 'likelihood'). The customized version of the risk management framework comprises only analysis and response development, whereas the PMBoK's framework normally comprises qualitative risk analysis, quantitative risk analysis and risk response development. This change was made because The Group believes that explicit quantitative risk assessment at this relatively immature level of risk assessment would infer artificial accuracy and create suspicion amongst the workforce. However, this lack of quantification would be addressed in the future as risk assessment practices matured and became culturally accepted into the standard operating procedures of The Group. The last step of both the frameworks remains consistent with each other, although they are given different titles.

Summary and conclusion

This paper addresses the implementation issues of ERP projects through a risk management approach. Firstly, by reviewing the literature and identifying generic risk factors of ERP projects and classifying them by project phases as defined by the Project Management Body of Knowledge (PMBoK). Secondly, using a case study, we introduced a five-stepped risk management procedure adapted from the generic framework introduced by the PMBoK. Thirdly, using the adapted risk management framework the risk factors and their likelihood of occurrences and impact were identified.

The literature review revealed that the key success factors for ERP implementation are commitment from top management, selecting the appropriate systems and proper management of its integration with existing business information systems, including the reengineering of the business processes. Additionally, managing ERP project processes, managing information technology and managing organizational transformation all contribute significantly to the successful implementation of ERP projects.

In the case study the risk management framework was used proactively by all participating stakeholders for risk identification and analysis within each phase of the project *before* making decisions on project variables (e.g. resource deployment and allocations, implementation methodology selection, contractors and supplier selection etc.). This made a significant difference to the level of risk experienced later on in the project.

In summary, it is commonly believed that ERP projects are technically complex, multidisciplinary, of long duration and capital intensive. Therefore, they are often considered to be highly risky projects. Whilst it is challenging to develop an accurate project plan at the beginning of any implementation project, because of lack of information dynamic risk analysis should not be neglected and has been demonstrated to improve knowledge dissemination throughout a project and give better project delivery. Risk management practices may increase the project's cost initially in terms of deployment of extra human resources, and additional analytical activities. However, we argue that the cost of these failure prevention activities more than outweighs that of the failure recovery activities, which are far more likely to occur and would have a greater impact on the project if the extra initial risk analyses had not been undertaken.

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