

Chapter 59

Risk Analysis of ERP Projects in the Manufacturing SMES: Case Study

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Abstract This chapter introduces two risk management tools targeted for SMEs in their Enterprise Resource Planning (ERP) adoption projects. The purpose is to identify and assess the main risks in the ERP projects through the case study of two manufacturing SMEs. By using company-specific risk analysis method (RAM), the critical risks of the ERP projects are identified and assessed. Then, by using characteristics analysis method (CAM), the recommendations of how to divide the ERP projects into manageable sub projects are given.

Keywords Enterprise resource planning · ERP · SME · risk analysis method · characteristics analysis method

59.1 Introduction

The business environment is dramatically changing. Enterprises today face the challenges of globalization, international competition, technological complexity, and increasing customer orientation. To fulfil market demands, companies have to increase product portfolio, reduce time-to-market, shorten product-life cycles, and produce high quality products with quick response, lower costs, and greater customization [1]. Collaboration has become a common trend and success factor in today's business and industry practice and companies focus on their core competences and collaborate with other organisations with complementary knowledge and resources [2, 3]. Companies that move closer to a completely collaborative model must improve their own business practices and procedures [4]. Companies must also share with their suppliers, distributors, and customers the critical in-house information they previous aggressively protected [5]. Also, functions within the company

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must upgrade their capability to generate and communicate timely and accurate information [4]. To accomplish these objectives, companies are increasingly turning to Enterprise Resource planning (ERP) systems.

ERP systems, when successfully implemented, links all functions of an enterprise including order management, manufacturing, human resources, financial systems, and distribution with external suppliers and customers into a tightly integrated system with shared data and visibility [6]. ERP systems promise seamless integration of information flowing through an organization [7, 8]. They fulfill this promise by integrating information and information-based processes within and across the functional areas in an organization, and further, by enabling the integration of information beyond the organizational boundaries.

The effective implementation of such a system can bring about many benefits, beginning with the most general, such as cost reduction, productivity improvement, and quality improvement, but also customer service improvement, better resource management, improved decision-making and planning, and organizational empowerment [7]. Consequently, improvement of economic indicators is achievable, which finally leads to an increase in enterprise profitability [9].

Despite the significant benefits of ERP systems, the Statistics show that only 30% of previous ERP implementations have been successful [10]. Many ERP implementations are difficult, lengthy and over budget, are terminated before completion, or failed to achieve their business objectives even a year after implementation [7, 11]. To achieve the desired benefits, the ERP project must be carefully managed [12–14] and the risks involved the projects must be properly assessed [15, 16]. Management of an ERP project is a challenging task for any company [7], but especially challenging it is for SMEs, which have sufficient resources, capabilities and ERP project experience. Even with significant investments in time and resources, there is no guarantee of a successful outcome [17].

Several standardized tools, methods and techniques are developed to help enterprises to better manage their IT projects, though they are often too general for ERP applications [18]. Also, consulting, project management, change management and risk management methods are normally specified for large enterprises [19]. The needs, operating requirements, logistics fulfillment and financial capabilities of SMEs are vastly different from that of large enterprises. In order to support SMEs in their ERP project, targeted risk management processes are needed in this context.

This chapter introduces two risk management tools targeted for SMEs in their ERP adoption projects. The purpose is to identify and assess the main risks in the ERP projects through the case study of two manufacturing SMEs. By using company-specific risk analysis method (RAM), the critical risks of the ERP projects have been identified and assessed. Then, by using characteristics analysis method (CAM), the recommendations of how to divide the ERP projects into manageable sub projects have been given.

59.2 Risks in ERP Systems

59.2.1 Main Characteristics of ERP Projects

There is a substantial difference between an ERP project and a simple software project [7, 18]. Most software projects focus on developing a software system. But an ERP project consists of tightly linked interdependencies of software systems, business processes, and process reengineering [16]. A major difference between ERP projects and traditional IT projects comes from the integrated nature of ERP software applications. The implementation of an ERP software package involves a mix of business process change and software configuration to align the software with the business processes. In an ERP implementation, the key focus has shifted from a heavy emphasis on technical analysis and programming towards business process design, business-focused software configuration, and legacy data clean-up [20].

ERP project can also be viewed as an organizational change project, due to the large number of changes it brings to an organization [12, 21]. Many enterprises install their ERP systems without fully understanding the implications for their business or the need for compatibility with overall organizational goals and strategies [22]. The result of this hasty approach is failed projects or weak systems whose logic conflicts with organizational goals. Usually enterprises also do not realise the full benefits that the ERP system offers because they are not organised in the correct fashion to achieve the benefits. Many companies that attempt to implement ERP system run into difficulty because the organisation is not ready for integration and the various departments within it have their own agendas and objectives that conflict with each other [23].

An ERP system as such seldom totally fits the existing business processes of an enterprise. In order to have efficient business processes with the new ERP system, an enterprise has either to change its business processes to fit the ERP system or modify the ERP system to fit its business processes [24]. For SMEs, a good fit between company business processes and the ERP system functionality is the most important selection criteria [25]. Further, SMEs, with their sufficient resources, have to focus on only the most critical business needs.

To implement an ERP system successfully, the way organizations do business will need to change and the ways people do their jobs will need to change too [13]. Almost half of ERP projects fail to achieve expected benefits because companies underestimate the efforts involved change management [20]. Thus, change management is essential for preparing an organization to the introduction of an ERP system, and its successful implementation.

59.2.2 Risk Factors

The enterprise-wide ERP projects represent a new type of management challenge. The management approaches for these projects may be altogether different from

the managerial approaches for traditional IT projects [26]. An ERP project is a major and risky exercise for any size of enterprise, however, risks are higher for SMEs as the cost overruns during implementation may put financial strain on the firm and thus substantially impact firm performance [27]. Further, SMEs have less of a chance of recovering from a failed ERP implementation attempt than large enterprises [28].

The main reason for any IT project failure is that managers do not properly assess and manage the risks involved their projects [15]. Also, most project managers perceive risk management processes as extra work and expense, thus, risk management processes are often expunged if a project schedule slips. The main risk effects for SMEs can be summarized [18]: budget exceed, time exceed, project stop, poor business performances, inadequate system reliability and stability, low organisational process fitting, low user friendliness, low degree of integration and flexibility, low strategic goals fitting and bad financial/economic performances.

ERP risks can be classified in various ways (e.g. [16, 26, 29]). Popa-Nzaou et al. [30] identifies six main dimensions of risks in ERP implementation: organisational; business-related; technological; entrepreneurial; contractual; and financial risks. Organisational risk derives from the environment in which the system is adopted. Business-related risk derives from the enterprise's post-implementation models, artefacts, and processes with respect to their internal and external consistency. Technological risk is related to the information processing technologies required to operate the ERP system – for example the operating system, database management system, client/server technology and network. Entrepreneurial or managerial risk is related to the attitude of the owner-manager or management team, while contractual risk derives from relations with partners and financial risk from cash-flow difficulties, resulting in an inability to pay license fees or upgrading costs, for example [30].

According to Sumner [26], ERP project-specific risks, in contrast to IT project risks are failure to redesign business projects, failure to follow enterprise-wide design that supports data integration, insufficient training and reskilling, insufficient internal expertise, lack of business analysts with business and technology knowledge, failure to mix internal and external expertise effectively, failure to adhere to standardized specifications which the software supports, lack of integration, and attempting to build bridges to legacy applications. Somers and Nelson [11] summarizes the critical success factors for ERP implementations, in which eight of the top ten are related to human factors: top management support, project team competence, interdepartmental cooperation, clear goals and objectives, project management, interdepartmental communication, management of expectations, and careful system selection. Finally, based on the previous research, Finally, Aloini et al. [18] summarizes the ERP risk factors: inadequate ERP selection, poor project team skills, low top management involvement, ineffective communication system, low key user involvement, inadequate training and instruction, complex architecture and high numbers of modules, inadequate business processes, bad managerial conduction, ineffective project management techniques, inadequate change management, inadequate legacy system management, ineffective consulting services experiences,

poor leadership, inadequate IT system issues, inadequate IT system maintainability, inadequate IT supplier stability and performances, ineffective strategic thinking and planning, and inadequate financial management.

To minimize the risk of the ERP project, Markus and Tanis [8] recommend the application of a risk management plan at different ERP implementation project stages: selection, implementation, and usage. A planned and systematically adopted risk management procedure throughout the ERP project reduces the possibility to risks occurring. Consequently, according to Soja [9], major mistakes are made in the early stages of the ERP project, even prior to the implementation process. However, Kliem [31] emphasizes the efficiency of risk management when it is introduced at the earliest possible opportunity in the life cycle of the system in question, when planning issues are most important and the criteria for system selection are determined. Instead of using abovementioned ready-made risk lists, a company might consider identifying their own, company-specific ERP implementation risk list. These risks could be complemented by common risk lists, such as Sumner [26].

59.3 Risk Management Tools

59.3.1 Risk Analysis Method

Risk analysis method (RAM) identifies the most essential risks and their probability in the company context. In this study, the risk list has been formed based on the risk list of Vilpola [32]. The risk list is formed out of 63 questions or statements dealing with the ERP selection, implementation, and usage. The basic aim is to identify the ERP risks arising from the company's reality and therefore the employees from various levels of organisation have been interviewed and observed. The company-specific risk list has been filled in close interaction with company personnel. Risk assessment is done by evaluating each risk's probability and effect in a scale from one to five. The number one means very small probability and effect, and number five means high probability and catastrophic effect. Then, the risk multiplication as an indicator of risk significance has been used. It is calculated as multiplying the value of the probability by the value of the effect. Range of this value is from 1 to 21 [32].

59.3.2 Characteristics Analysis Method

Characteristics analysis method (CAM) ensures that an IT project is manageable and consistent by its different goals content and development approaches. The result of the CAM is a recommendation of how to divide a large and complex IT project, such as an ERP project, into manageable sub projects. Further, the CAM

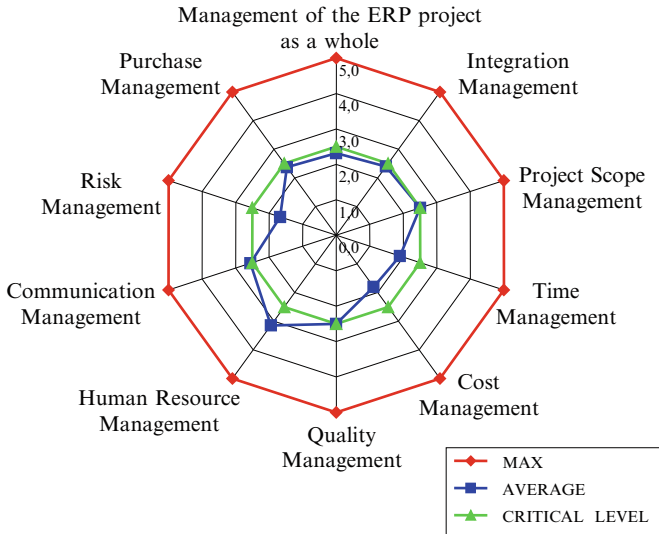


Fig. 59.1 CAM diagram of the company A

provides the project proposition documents, the knowledge and experience from prior development projects, and the requirements of the of the project portfolio [33].

In this paper, the CAM analysis is formed out of 90 questions dealing with the ERP project management factors. The basic aim is to find out the manageable size of the ERP project of the case companies. Also, CAM provides recommendations what management aspects should be put more attention to successfully manage the ERP projects (management of a project as a whole, management of integration, project scope management, time management, cost management, quality management, human resource management, management of communication, risk management, management of purchase). The questions are either positive or negative statements for which their applicability to the project will be evaluated (0 = fault, not true, 5 = exactly right; N/A = don't know). The tool has been implemented as an MS Excel worksheet with automatic tabulation based on decision rule sets. The result is can also be illustrated graphically (see Figs. 59.1 and 59.2) [33].

59.4 Case Study

This study has been carried out through the case study of two manufacturing SMEs. The case SMEs are in different phases of the ERP project. Company A is still contemplating the ERP implementation, Company B is in the selection phase, and Company C is already in the usage phase. In practice, this study has been carried out during January 1 to December 12, 2008.

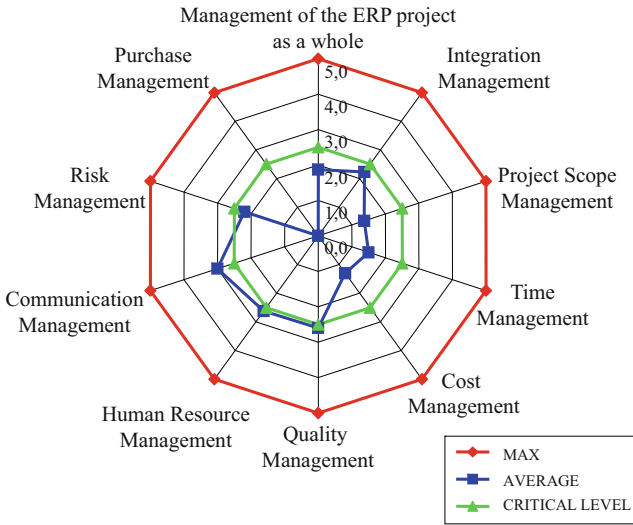


Fig. 59.2 CAM diagram of the company B

59.4.1 Company A

Company A develops blast cleaning technology and manufactures automated blast cleaning machines and robots (turnover about 1 2 M€ and number of personnel about 20). Company A has not an ERP system, but is contemplating the ERP implementation in near future. The need for the new ERP system has grown internally because of the problems in the current IT system. Today, the company is using an Excel-based IT system, which includes e.g. customer relationship management (CRM), product data management (PDM), purchase and order management, and product lifespan management. The problem of the current system is how to manage hundreds of different versions and variations of Excel, Word, and AutoCAD documents. The purpose of company A is to adopt an ERP system, which helps production capacity planning and control so that the scheduling and resource allocation for different projects can be planned in detail before the project is started. Furthermore, the new system should include warehouse and stock management functions and it have to support purchase process.

The risk list has been filled with the company key persons, and the effects and probability of risks have been assessed. In the *ERP selection phase*, the most critical risks are: misunderstanding between an ERP supplier and a company (12), an ERP system is not flexible enough (12), and the special company-specific ERP needs are not defined (10). In the *ERP installation phase*, the most critical risks are: a company’s project manager is not a full time PM (20), data transfer from old to new ERP system is difficult (16), integration an ERP system with other IT systems creates problems (16), and an ERP supplier is not committed enough to the company’s ERP system implementation (15). In the *ERP usage phase*, the most critical risks

are: An ERP system does not support the company's business (12) and the ERP supplier does not develop the system in the future (10).

In the RAM results, in every phase (selection, implementation, usage), the crucial factors are depended on the decision of what ERP system and ERP supplier the company is choosing. The technical and functional factors related to an ERP system itself, and the factors related the system supplier, are considered the most critical. Even the company A has very few employees, under 20, the lack of resource, skills and expertise, and other factors related personnel have - surprisingly - not aroused as potential risks in this analysis.

According to CAM, 'Human resource management (HRM)' is the management/ leadership field that clearly exceeds the critical level. Company A should direct a special attention to this factor in its ERP project management. In addition, several other management/leadership fields, such as 'Communications management', 'Purchase management', 'The project as a whole', 'Integration management', 'Project scope management' and 'Quality management' are right at the critical level. Only 'Cost management' and 'Time management' and 'Risk management' are clearly under critical level. According to CAM, risk factors related to personnel training and increasing personnel skills and knowledge require more from management, although they are not considered to be amongst the most potential risk factors according to RAM. On the basis of the CAM, it can be deduct that company A has a clear understanding of the costs caused by the ERP project, the time spent for it, as well as the technical and operational risks involved. The results analysed by CAM is presented in Fig. 59.1.

59.4.2 Company B

Company B provides demanding sheet metal work, welding, and heavy metal works, specialising in steel, paper, chemistry, and ship manufacturing related machinery and equipment. In addition, the company manufactures offshore equipment and ship propellers. The company B employs about 150 employees. Company B is in the selection phase of ERP project. The current IT systems are already in the end of their life cycle, and the company has to invest in a new ERP system. The company has interviewed several ERP suppliers. The company has made a preliminary requirement specification, a type of demand list, through which they have been able to limit the potential ERP suppliers into two options. Also, some IT consultants have worked for the company.

The risk list has been filled with company key persons, and the effects and probability of risks have been assessed. In the *ERP selection phase*, the most critical risks are: An ERP system will be a poor compromise for all stakeholders (12), selecting an improper project manager or project team, and misunderstandings between an ERP supplier and a company (10), and selecting an improper ERP system (10). In the *ERP installation phase*, the most critical risks are: normal business disturbs ERP project activities (20), ERP project disturbs normal business (16), an ERP project

will be late (16), software configuration and testing don't function swiftly (16), and an ERP system not used in a disciplined manner (16). In the *ERP usage phase*, the most critical risks are: An ERP system not used in a disciplined manner (12), and only part of the ERP system is used (12).

In the RAM results, the crucial factors are mostly depended on the personnel (including project manager/team and top management level) behaviour, skills, and IT experience. Company B is also worried of the changes what the new ERP system will affect to the company's normal business, and in opposite, how the normal business hinders the ERP project progress.

According to CAM, 'Communications management' is the management/leadership field that clearly exceeds the critical level. Company B should direct special attention to the factor considered people skills, knowledge and expertise. In addition, 'Human resource management' and 'Quality management' are right at the critical level. To manage ERP project successfully, the company should pay attention to these three management/leadership factors. The results analysed by CAM; is presented in the Fig. 59.2.

59.5 Conclusion

This study presents a case study of two SMEs which have analyzed their ERP project risks by the risk analysis method (RAM) and characteristics analysis method (CAM). The RAM presents crucial risks in a form and language that is understandable, because the analysis have been done in the company context. As negative aspect of RAM is that it requires a significant amount of resources and support of external experts. The CAM helps the case companies in dividing their ERP project into manageable entities and provides them recommendations on what leadership or management aspects they should devote special attention to. The CAM also shows inadequacies in the fields of management and leadership that the implementation of ERP system causes in companies.

This study has been done in deep cooperation with researchers and company key persons. Cooperation with the research group has provided companies extra skills and support in their ERP project endeavours. Company A is taking the next step in their ERP project and is in the extensive requirement specification process with the aim of selecting the suitable ERP solution for the company in 2010. Company B have made their decision on which ERP system they will select at the end stage of this study in 2008. Implementation will commence in 2009.

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