

Risks in ERP Project – Case Study of IS/ICT Management Capability Maturity Level and Risk Assessment

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Abstract — Enterprise resource planning (ERP) projects are considered to be expensive, time-consuming, difficult to manage, and extremely risky. ERP projects are risky from the strategic, operational, technical and organisational perspectives. The risks and critical success factors of ERP projects have been widely studied, and the management of risks is crucial to a successful ERP project. Generic risk analyses have faced inflation, and in the worst case companies do not manage risks in their ERP projects at all.

This paper presents the early stage assessment of ERP project risks in three firms' ERP projects. The focus is on company-specific risk identification. Companies of this study have limited maturity in IS/ICT management capabilities. Understanding of capability maturity level is useful to efficient risk management in an ERP project. In this paper we compare the company-specific risks to common risk list found in the literature. Qualitative case study of three firms provides empirical evidence of uncovered ERP risks if only common risk list is used. As a result we claim that in addition to generic project management risks there is also a need to assess company-specific-risks. In fact, company-specific risks are usually critical to company's ERP project success.

Keywords — ERP, ERP project, risk, capability maturity model

I. INTRODUCTION

Nowadays even smaller companies are willing to implement Enterprise resource planning (ERP) systems in order to improve their business operations. In some cases the pressure towards ERP system investment comes from larger co-operation partners. ERP system implementation is a complex project which includes many critical phases, such as ERP system selection and configuration [3], before it is successfully in use. Currently ERP projects, their failures and success factors, are mainly studied in larger companies [6][1]. This is understandable, as in the past mainly large companies were investing in ERP systems. Currently, as small and medium-sized (SME) firms also implement ERP systems, the special characteristics in their case must be understood. In order to support SMEs in their ERP project, targeted risk management processes are needed in this context.

It is a known fact among practitioners and researchers

that many ERP projects are interpreted to be failures. It is even more challenging for smaller companies or business units to implement ERP systems successfully. IT investments, especially those as large as ERP systems, are difficult, as the smaller firms may not have enough resources, capabilities and ERP project experience. Many projects have faced the situation that at least some of the goals in the projects, e.g. schedule or integration, were not met. This stresses the importance of understanding the risks inherent in ERP projects. There is clearly a need for an ERP risk management solution that is dedicated to improve small companies' ERP risk management.

The main goal of the paper is to present a description, assessment and analysis of the early phase risks in three ERP projects. This goal includes several sub-topics to be discussed at least to some extent. Firstly, the special characteristics of smaller firms as ERP buyers are under exploration. We do this by analyzing the cases by IS/ICT management capability maturity levels. Secondly, the actual risks found in the case companies are presented and discussed. We also analyze in more detail how the maturity level has affected the assessed risks. Finally, we compare the company-specific risks, identified in case studies, and common ERP project risk list, adapted from the literature. The result of case studies and the comparison of risk lists' show that IS/ICT management capability maturity level can affect risk assessment. Therefore, this paper enhance the understanding of ERP projects risks end their management especially in companies where IS/ICT management capabilities are maturing.

II. ERP PROJECT RISK THEORY

Various reports about common ERP project risks exist. Sumner in her article studies the experiences of seven enterprise-wide information management system implementation projects.[6] Table 1 shows the risk factors in Sumner's article. The research objects were thorough structured interviews with project managers of companies, all of which are from the fortune 500 list. As a result she lists 20 risk factors divided into 6 risk categories:

TABLE 1
RISK FACTORS IN ERP PROJECTS ACCORDING TO SUMNER [6]

| Risk category | Risk factor |
|-----------------------------------|--|
| Organizational fit | Failure to redesign business process Failure to follow an enterprise-wide design, which supports data integration |
| Skill mix | Insufficient training and re-skilling Insufficient internal expertise Lack of business analysts with business and technology knowledge Failure to mix internal and external expertise effectively Lack of ability to recruit and retain qualified ERP systems developers |
| Management structure and strategy | Lack of senior management support Lack of proper management control structure Lack of a champion Ineffective communications |
| Software systems design | Failure to adhere to standardized specifications which the software supports Lack of integration |
| User involvement and training | Insufficient training of end-users Ineffective communications Lack of full-time commitment of customers to project management and project activities Lack of sensitivity to user resistance Failure to emphasize reporting |
| Technology planning/integration | Inability to avoid technological bottlenecks Attempting to build bridges to legacy applications |

Huang et al. [2] used the Delphi method to extract 28 risk factors within 6 categories adapted from Sumner. The risks were first identified by seven experts, each of them with experience of at least two ERP projects. Wright and Wright interviewed 30 experienced IS auditors from the Big 5 firms specialized in ERP evaluation and testing [10]. The interviews were conducted in a semi-structured manner. The study resulted in both qualitative and quantitative analysis of ERP problems, ERP application risks, ERP vendor risk comparison, and ERP effectiveness measurement. The eight most common ERP problems included:

- Inadequate user involvement
- Inadequate user training
- Process reengineering
- Lack of controls in ERP system
- ERP system does not match the required processes
- Poor implementation of systems
- Poor task-technology fit
- Poor data conversion

The problems can be transformed into risks, but they are on a very abstract level and thus applicable in any ERP system implementation. However, they do not encourage any specific risk management action as they are too general, and actually not in a risk list or check list form.

Instead, the ERP project risks most often reported are the critical success factors (CSFs). The experiences are usually collected in the post-implementation phase, and most often from large companies. For example, Somers proposes 22 factors recommended in the earlier literature produced by practitioners and academics [5]. Then the list was ranked by senior level IS executives of companies from fortune 500 list and companies from *Directory of Top Computer*

Executives. Top five of the ranked critical success factors list is:

1. Top management support
2. Project team competence
3. Interdepartmental cooperation
4. Clear goals and objectives
5. Project management

These critical success factors can more easily be turned as a risk list than problems discussed above. Still the factors are so common that they apply as a risk for every company despite the company's size or business. The self-evidence of these factors makes them easy to ignore as non-special risk, which does not need an extra attention and activities in order to be reduced or avoided.

The earlier research on ERP project risks is based on checklists and weighting of large companies. Those in fortune 500 lists especially are expected to have structured ICT organization and enterprise-wide ICT strategy. Renken has developed a capability maturity model (CMM) for assessing the IS/ICT management of a company [4]. The final model includes seven IS/ICT management capability maturity indicators refined from the original 15 by eliminating non-critical and duplicate indicators. Elimination was based on prototype modeling of the relationship between indicators and semi-structured interviews of five South African IT professionals.

The seven indicators are:

- IS/ICT applications i.e. how they are utilized
- Business-IT relationship i.e. inter-organizational relationship
- IS/ICT strategy alignment, meaning if IT strategy exists and whether it is aligned with business strategy
- IS/ICT user profile i.e. the IT skills of the personnel of a company
- IS/ICT managerial paradigm i.e. focus of ICT management
- IS/ICT governance i.e. if a predefined IT management process exists and how well it is established
- IS/ICT organization i.e. IT organization form and IT management level.

Each indicator has three to five maturity stages. The model can be used in comparative analysis on the IS/ICT management capability of different companies [4].

There are several other papers also dealing this topical research area of risks in ERP projects. Taylor [7] studied 22 project managers from different vendor IT firms in Hong Kong and the point of view is, in contrast to traditional ERP project risk papers, the IT resource provider's perspective. Amoako-Gyampah **Error! Reference source not found.** presents the ERP implementation factors, both managerial and end-user perspectives, and states that managers have different perceptions than end-users. Tatsiopoulos et al. [8] presented a paper, which stresses the strategic nature of the ERP implementation and especially the strategic issues in the early phase of the project and increasing the importance of operational issues in latter phases. Zafiroopoulos et al. [12] created an application for risk management in ERP

project and Yang et al. [11] applied the ideology of FMEA in risk management of ERP introduction.

III. RESEARCH METHOD & CASE COMPANY INTRODUCTION

The risk analysis is a part of the *C-CEI method* introduced by Vilpolo et al. [9]. The method includes *operational* and *contextual* analyses in which the company-specific risks for *risk analysis* are identified. In this section the risk analysis methods are described and the resulting risks presented and discussed.

A. Research method

In our research we made an in-depth case study in three companies. Table 2 shows the phases in the research as well as the number of people involved in different phases. Due to a limited number of cases in this research, the results may not be generalized, but on the other hand we can evince a profound understanding of the cases studied.

TABLE 2

RESEARCH ACCOMPLISHMENT IN CASE FIRMS. PERSONS INVOLVED IN DIFFERENT PHASES (* IN THE FIRM C THE RISK ISSUES WERE COVERED IN FIRST ROUND INTERVIEWS)

| | Company A | Company B | Company C |
|---------------------------------|-----------|-----------|-----------|
| First round interviews | 12 | 8 | 15 |
| Observations | 6 | 5 | 8 |
| Risk interviews | 2 | 2 | 0* |
| Risk assessment WS | 4 | 5 | 7 |
| Ways of managing risks workshop | 5 | 5 | 7 |

The basic idea was to identify the ERP risks arising from the company reality and therefore employees of various levels of organization were interviewed and observed. The goal throughout the whole project, in which the risk analysis was part of, was to help the company in creating a realistic requirements specification and analysis of the company's context. By understanding the business requirements and the limiting factors of the context it is possible to gain a realistic list of potential problems i.e. risks in the ERP project. This is a good starting point in project risk management.

In risk assessment we did not use any previous general list of ERP project risks. Instead, the risk list was formed during the firm interaction and divided by the project phases; *selection*, *implementation* and *use & maintenance*. The risk list was filled with issues emerging in close interaction with companies personnel.

Risk assessment for the risk list was done by evaluating each risk's probability and effect in a scale from one to five. The number one meant very small probability and effect. 5 meant high probability and catastrophic effect. In the appendix we have used risk multiplication as an indicator of risk significance. It is calculated as multiplying probability and effect. Range of this value is from 1 to 25.

B. Analysis of IS/ICT management capability maturity levels of the case companies

IS/ICT management capability maturity framework [4] is used for analyzing the maturity levels of the three case

companies. The case companies were not actually measured for the maturity estimation, rather the levels of indicators were revealed during the interviews and observations. The framework used includes seven indicators each with levels from 1-3 to 1-5. Table 3 shows the levels of the indicators for every company. Below the table the case companies are analyzed in more detail.

TABLE 3.

ESTIMATED MATURITY STAGE OF EACH IS/ICT MANAGEMENT CAPABILITY MATURITY INDICATOR IN CASE COMPANIES A, B AND C.

| Company/ Indicator | Company A | Company B | Company C |
|--------------------------|-----------|-----------|-----------|
| Applications | 1 of 3 | 1 of 3 | 2 of 3 |
| Business-IT relationship | 2 of 5 | 1 of 5 | 3 of 5 |
| Strategy alignment | 1 of 4 | 1 of 4 | 3 of 4 |
| User profile | 1 of 3 | 1 of 3 | 2 of 3 |
| Managerial paradigm | 2 of 4 | 1 of 4 | 3 of 4 |
| Governance | 3 of 5 | 1 of 5 | 4 of 5 |
| Organization | 2 of 4 | 1 of 4 | 3 of 4 |

All three companies have in common a need to renew their information system in order to better accomplish their operations now and especially in the future. The need for the new system has grown internally in the companies because of the problems in the current system(s) and, for example, poor usability of systems and complex historically developed system structure. Overall the levels of company B are lower than levels in company A and C (Figure 1), but first each company and its levels of capability maturity factors are described in detail.

Company A is a manufacturer of a complex chemical product (turnover about 14M€ and number of personnel approximately 150). Many of the operations are supported by Microsoft Excel and paper and pencil notes. Strict quality and traceability requirements for the product have forced the company to establish their performance and policies. Company A has a long history and the volume of the business has remained fairly stable. IS/ICT technology investments have not directly related to its business strategy. Rather the aim has been to automate and to improve the efficiency of operations. In fact, not all of the users are computer literate. However the maturity of IS/ICT management is higher than that of the users. The organizational issues have been considered and the focus is on information rather than data. Furthermore the matured governance includes defined, documented and trained procedures. The studied business unit is a part of a larger international group, but this capability maturity analysis concerns only the local site. In this case the IS organization is formalized but flat and the manager reports for the steering committee of company A.

Company B is a project-oriented company specialized in industrial assembly operations (turnover about 7M€ and number of personnel approximately 110). The projects are done mainly on the customers' sites. The company also has prefabrication. In order to run the daily business, company B uses operational IS applications for transactions. The IT organization is not explicitly defined and thus the

relationship with business is unclear. The IS investments are driven by other aspects than business strategy. The user profile is very narrow, and besides, as the company is extremely small, the data management is centralized and personalized. The IS management is focused on maintaining the current financial system and its data. The ICT organization is actually one technology-oriented person who has qualified for the current system by actively participating in its engineering process. The business is run mainly out of the ERP system. The current software is more or less an instrument to find out the financial result of a company. The system is not used in project management or financial control during the projects. It is still used for actual cost calculation after the project. This company is also a part of a larger enterprise. This business unit is still run as a separate firm.

Company C is a business unit in a group of total four business units (turnover about 24M€ and number of personnel approximately 250). These businesses are different, varying from contract manufacturing to selling the knowledge and work of design engineers. The different needs of various business units create clear challenges for the ERP project. This particular business unit, company C, mainly earns its revenues by doing projects in planning and installing equipment in its customers' production facilities. IS applications are used for managing off-site assembly projects and for producing information on operations for the group. The relationship between business and IT organization is constructive and organizations have agreed how to manage IT operations. The group has formal ICT strategy and it is known also in company C. The users are competitive and also help the IT organization in specifying the requirements for IS systems. ICT management is actually common to all the business units and well coordinated and integrated. The processes of company C are continuously measured, and improvements are designed and implemented where needed. The ICT organization of the group is the highest level of maturity, but the ICT organization of this business unit lacks specialists, mainly due to a separate ICT department that is common to the group.

In every factor company C has a higher level than companies A and B. The strategy alignment factor especially is more mature than in the other companies. Company B is at the first stage of maturity in every factor and therefore may encounter fundamental difficulties in its ERP project.

IV. CASE STUDY RESULTS

The three case companies represented seem to be rather typical fairly small companies that are planning on making an ERP investment in the near future. The case companies have rather limited resources to put into this project and do not have opportunities and understanding to research all ERP projects' essential issues themselves. External experts are needed in order to support the company capabilities to become more professional system buyers. Still, it must be understood that this kind of firms, too, have individual characteristics that affect the choice of system. Some companies are really technically oriented and have skilled personnel, but others may be like "man-and-a-machine" without any former competence in IT buying, to better specify requirements, engineering, selection and system implementation.

Information technology is one key area when companies are developing their business and search for ways for more efficient operations. ERP solutions often seem to promise a full scale service to answer all possible information needs of a company. The range of systems and their differences are hard to understand even in larger companies, which do have significant amount of knowledge and resources to develop and analyze the information needs and different solutions for them. The case in low IS/ICT management capability maturity level companies, is rather different. They do not usually have large IT departments and many skilled personnel available for the ERP project. Pressure for the information systems may also rise externally from customers or partners rather than internally from the passion to make things work better.

In two case companies a large number of different information systems is a clear challenge. Today one system is used for wages, one for maintenance, one for bookkeeping etc. This system as a whole is complex and there are multiple links between different systems. Data is not easily available and automatically generated from this jungle of systems. In case of system updates or changes it requires a lot of manual work and testing. Links have to be tested to ensure that they work correctly.

Our risk assessment results are presented in the appendix. In fact, this document presents only the top six risks assessed in all three companies. These risks are analyzed in this section. The risks are presented in the same categorization as they were assessed; selection phase, implementation phase and use & maintenance phase.

In the *selection phase* there are many more generic and overall type of risks involved. Companies are concerned if they are able to choose a proper system, a good supplier and a project manager who is capable of this critical job. They were assessed as high risks in all three companies. Firms A and B were also rather worried about their

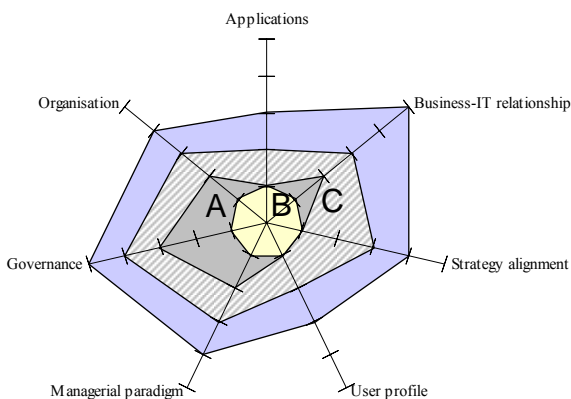


FIGURE 1.

AN IS/ICT CAPABILITY MATURITY RADAR CHART WITH FOOTPRINTS OF COMPANIES A, B AND C. THE SOLID BACKGROUND FOOTPRINT DESCRIBES THE MAXIMUM LEVEL OF EACH FACTOR.

competence in making a contract with the supplier. All these mentioned risks are more or less common to all ERP projects and should be tackled. In every company we can still see some risks in the top six lists that are company specific risks.

In company A the product and production system is rather complex and this has caused some special concerns. There was a lot of discussion about how the system could work in this kind of business and at what possible places standard ERP requires modifications. Company A was also in a situation where some significant changes were anticipated in the near future. The coming system should be able to adapt to an increasing number of customers, differing end products and changing raw material supplies.

For companies B and C the characteristics of the business constituted a special risk. Both companies do projects, with workers in different industrial sites. The projects may be rather short or very long. The system should fit into the project type of business and it should be easy to use from different geographical locations. In the case of company C one other special risk was mentioned. This company has different divisions and business units and many of these have rather different businesses. Some are more work intensive, some more capital intensive etc. The company also had a headquarters with certain requirements of the system. The new system should meet the needs of all the different organization units. Some want a really customized system and the business is clearly run with the help of a system. Some units want to keep the system as light as possible. It was seen as a great risk that the system becomes a poor compromise to all parties.

In the implementation phase the greatest concern was the motivation, commitment and education of the personnel. Companies A and B especially were worried about these issues as well as a lack of change management skills. These two companies had a history of not using IT extensively in their business. Similar concerns were mentioned in one unit of company C, but the overall risk estimations of this company were not as high as in other companies. The general risk of going over the budget was recognized by all companies and they were actually fairly realistic about this issue. Project manager choice in this phase was also worrying every firm but surprisingly in only company C was the lack of top management support in the top six list. The list of company C is slightly different from that of other firms. This company is also aware and concerned that the ERP project will disrupt normal business to some extent. Company C also has a problem of multiple systems, which will partly also remain in the future. These systems have to be linked and this may be challenging in the implementation phase. Companies A and B were worried about the ERP project because they do not have much competence and experiences of similar projects. This can be seen in the implementation risk assessment. Company C has had so many projects that there the problem is to convince people that this project has to be taken seriously. Some people were slightly bored with constantly starting IT projects which seem to make no difference.

In the phase of use and maintenance the disciplined use

of the system was a key risk. In these lists the main concern was if the desired benefits are received in the use phase. Are people forced / motivated to use the system, is only parts of the system used etc. All the companies wanted the system to be flexible to business changes. Here a large number of the risks were more or less general risks. Still, the list includes a few company specific issues; like in company C the concern about getting business relying too heavily on ERP, and this has a negative effect on key persons' motivation. To put this more precisely, in this company project managers had a lot of freedom to deal with their projects. This freedom and the project managers' motivation went hand in hand, and cannot be risked.

As a result of the risk assessment we can also made some quantitative findings from our three cases. Table 4 presents the averages and standard deviations in all three cases and in different phases. The overall results show that the greatest averages are assessed in the implementation phase. In all companies the assessments were similar. The smallest averages were seen in the selection phase. This seems to be understandable, because the case companies were currently in the selection phase and the issues in it were seriously under consideration. Standard deviations were similar in different phases in all cases A and C. In case B the selection and implementation phases' standard deviation was slightly smaller than in the use & maintenance phase and also differed slightly compared to cases A and C.

TABLE 4
AVERAGES AND STANDARD DEVIATIONS IN CASE COMPANIES

| | Company A | | Company B | | Company C | | Total | |
|------------------------------|-----------|-----|-----------|-----|-----------|-----|-------|-----|
| | A | STD | A | STD | A | STD | A | STD |
| Selection | 9,3 | 4,6 | 8,7 | 3,8 | 8,5 | 4,4 | 8,8 | 4,2 |
| Implementation | 11,3 | 4,6 | 10,3 | 3,8 | 10 | 4,4 | 10,7 | 4,3 |
| Use & maintenance | 10,4 | 4,4 | 10 | 5,1 | 9,9 | 4,4 | 10,1 | 4,5 |
| Total | 10,6 | 4,5 | 9,8 | 4,1 | 9,7 | 4,4 | 10,0 | 4,4 |

Figure 2 sheds some light on how many serious risks were assessed in the case companies. The total numbers of assessed risks were in three phases in different cases (A,B,C) as follows. In the selection phase (17,17,21), in the implementation phase (33,34,34) and in the use & maintenance phase (15,13,14). As we can see in the statistics below, roughly half of the risks were assessed to be significant, i.e. risk product ≥ 12 , in every phase.

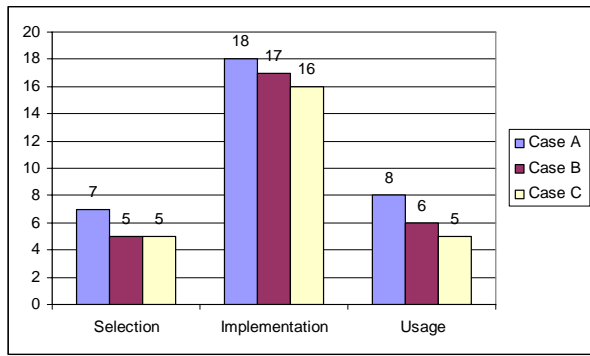


FIGURE 2.

THE NUMBER OF IDENTIFIED SIGNIFICANT RISKS (RISK PRODUCT ≥ 12) IN EACH CASE A, B AND C.

Finally in each case the companies received table of risks that were categorized according to implementation phases. Inside each phase the risks were ranked according the risk product, i.e. value of probability multiplied by value of effect. The purpose for this table was that companies could easily scan through the risks in every ERP project meeting, and address appropriate actions. The relevant actions could be decided based on risk analysis document. The document specifies reason, occurrence and possible preventive or corrective actions for each risk.

V. DISCUSSION

In this section we compare the company specific ERP risks found in the case studies to earlier research of common ERP risks by Sumner [6] and discuss the effects of IS/ICT capability maturity. In a qualitative comparison of case risk lists (risk product ≥ 12) and Sumner's summary of the risk factors we found 8 common risks:

- Failure to redesign business processes
- Failure to follow an enterprise-wide design which supports data integration
- Lack of senior management support
- Lack of proper management control structure
- Lack of integration
- Insufficient training of end-users
- Lack of full-time commitment of customers to project management and project activities
- Attempting to build bridges to legacy applications

The number of common risks in each case was 9/33 in A, only 4/28 in B and 9/26 in C. The share slightly increases as the maturity grows. Sumner's list origin from cases where companies implementing ERP systems are large and the IS management most certainly established. The companies of our case study had fairly low stages of IS management capability maturity indicators. The amount of company-specific risks, which risk production was even or above 12, but not listed in the Sumner's common ERP risks, was big compared to how thorough the common ERP project risks have been studied in previous related research.

VI. CONCLUSION

It is evident that today smaller companies are also interested in ERP solutions. The sourcing of these is still a rather complex issue and involves a multitude of potential problems. One of the key challenges in the ERP-project is the need to critically assess the whole company's operations. The ERP project is a large-scale change in many business processes and affects almost every employee. The company's context sets some crucial limitations and obvious potential problems, which have to be taken into account in the project.

Our suggestion is that the risks should be evaluated right at the beginning throughout the whole ERP project. Identifying and assessing implementation and usage phase risks are essential when considering system choice. The most important issue in a successful ERP project is an understanding of the company's business and context requirements. General risk list may be really useful tool to find out the greatest risks involved in the ERP project. However, these lists *per se* have a risk of omitting some crucial risks in the assessment. It is a generally known fact that a project's success is often decided in the early phases i.e. in goal description and planning. This is also the case in ERP projects. It is crucially important in this phase to seriously consider why the system is needed and what its effects on the organization will be. Our analysis, which starts from the company context and business needs, is one possible way to support project success. We can state that in the selection phase our analysis identified some significant risks that may have been neglected using a general risk list. In implementation and use & maintenance phases the risk lists were more similar. Our analysis presents the risks in a form and language that is understandable for risk assessment group as in the risk identification phase the risks are found in the company context. This is essentially important in low IT/ICT maturity companies, which may have problems of understanding the issues in a general ERP risk lists. As negative aspect of our risk assessment method is that it requires a significant amount of work and perhaps also help from external experts.

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APPENDIX. RISK ASSESSMENT RESULTS IN CASE COMPANIES (TOP SIX RISKS IN THREE PROJECT PHASES),

| Assessed risks in the selection phase (top six list of risks) | | |
|--|---|---|
| COMPANY A (17 risks) AVER: 9,29 STDEV: 4,61 | COMPANY B (17 risks) AVER: 8,65 STDEV: 3,84 | COMPANY C (21 risks) AVER: 8,50 STDEV: 4,41 |
| Choosing wrong ERP system (16) | Terms of contract not agreed considering the changes in a system (16) | Misunderstandings between buyer and supplier (16) |
| Choosing poor project manager or project group (16) | Special needs of a company not defined (12) | Concern level goals and business unit goals are not coherent (16) |
| Inadequate competence in making a contract (16) | System does not adapt to future business needs (12) | System is a poor compromise to all parties (16) |
| Choosing wrong ERP supplier (12) | Inadequate competence in making a contract (12) | Poor choice of project manager or project group (15) |
| System not flexible enough under processes' exceptional circumstances (12) | Choosing wrong ERP supplier (12) | System does not support project type of business (12) |
| System does not adapt to future business needs (12) | Efficient use of the system is not possible from working sites (9) | Efficient use of the system is not possible from working sites (10) |

| Assessed risks in the implementation phase (top six list of risks) | | |
|--|--|--|
| COMPANY A (33 risks) AVER: 11,33 STDEV: 4,60 | COMPANY B (34 risks) AVER: 10,30 STDEV: 3,84 | COMPANY C (34 risks) AVER: 10,00 STDEV: 4,39 |
| Personnel don't have commitment to new way of working (20) | Personnel don't have commitment to new way of working (20) | ERP project disturbs 'normal business' (20) |
| There is not enough change management skills and managership (20) | People don't see the benefits of the system in their everyday work (20) | Lack of time to attend to education in implementation (16) |
| Costs rise compared to initial estimations (16) | Costs rise compared to initial estimations (16) | Company's project manager is not a full time PM (16) |
| Personnel is not enough supported in order to use new system properly (16) | Personnel is not enough supported in order to use new system properly (12) | Company is not successful in getting disciplined use of the system in the beginning (16) |
| Poor choices of project management and/or project team (16) | Supplier is not committed enough to system implementation (12) | Top management is not giving enough support / resources to project (16) |
| Disciplined use of the system (data entry) is not achieved (16) | ERP project disturbs 'normal business' (12) | Connecting system to other system creates problems (16) |

| Assessed risks in the use and maintenance phase (top six list of risks) | | |
|--|--|--|
| COMPANY A (15 risks) AVER: 10,40 STDEV: 4,39 | COMPANY B (13 risks) AVER: 10,00 STDEV: 5,13 | COMPANY C (14 risks) AVER: 9,90 STDEV: 4,40 |
| System not used in a disciplined manner (16) | System not used in a disciplined manner (20) | System makes operations too stiff and this weakens key workers motivation (20) |
| System does not support the new ways of working and changes in business (16) | System is not felt as helping the business (16) | Company's operations become too dependent on the system (16) |
| All needed information is not entered into the system (16) | System creates data security risks (15) | System not used in a disciplined manner (12) |
| System not easily developed (12) | Company's operations become too dependent on system (12) | System not easily developed (12) |
| Broad use of the system on the worker level is not started in the beginning (12) | Only part of the system used and benefits not realized (12) | Broad use of the system on the worker level not started in the beginning (12) |
| Only part of the system used and benefits not realized (12) | System does not support new ways of working and changes in business (12) | System not felt as helping the business (9) |