Critical Success Factors

in

ERP Implementation

Paper within IT and Business Renewal

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Summary

ERP systems link together an organization’s strategy, structure, and business processes with the IT system. The different way of handling the process of ERP implementation brings about many success and failure stories. By doing research on 1) what are the critical success factors in the implementation of ERP 2) why are these factors critical 3) what is the criticality degree of each factor 4) how important are these factors for customers, consultants, and vendors, the report aims to to identify the critical success factors in ERP implementation and understand the criticality degree of each factor from the perspectives of three parties (companies, consultants & vendors).

The research is proceeded with combined methods of qualitative and quantitative. The qualitative method for the interviews was chosen in order to get the information in depth. A semi-structured interview helps to provide some basic questions as guideline. Furthermore, the quantitative approach contributes to manipulating the data for a more comprehensive analysis of empirical findings.

This report states 11 CSFs (Critical Success Factors) from three points of view: strategic, tactical, and cultural. They are: Top management support and ERP strategy, Business Process Reengineering, Project team & change management, Retain the experienced employee, Consultant and vendor support, Monitoring and evaluation of performance, Problems anticipation (troubleshooting, bugs, etc.), Organizational culture, Effective communication, and Cultural diversity.

By testing the perceived CSFs in six respondents (VSM Group, Scania, Sogeti, SYsteam, Oracle, and SAP), this report puts the 11 factors into three overall ranks (most critical, medium critical, and less critical), gains 3 other new critical factors (testing, business model, and client’s resources), and clarifies the diverse opinions about CSFs from customers/companies, consultants, and vendors. The most critical factors are Top management support, BPR, Project team & change management, and Effective communication. The medium critical factors go to ERP strategy, Consultant and vendor support, and Organizational culture. And the remaining 4 factors belong to less critical category. For the differences, their agreement comes into the 4 most critical factors. In monitoring and evaluation of performance they agree on its less criticality. All customers, consultants and vendors have quite different opinions about the remaining 6 factors.

Reviewing the research questions, this report has fulfilled the main objectives and purpose. With better understanding of the comprehensive identification of CSFs and criticality rank of each factor, management will be able to judge and allocate essential resources that are required to bring ERP implementation into success.
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1 Introduction

This chapter aims to introduce the background of this report, explain the research questions, and clarify the research purpose. It functions as the basis to why this topic was chosen and what kind of purpose should be performed in the following chapters.

1.1 Background

An ERP system is a packaged business software system that allows a company to automate & integrate the majority of its business processes, and share common data and practices across the entire enterprise (Seddon, Shanks & Willcocks, 2003). ERP also produces and accesses information in a real-time environment. Many companies use ERP software to integrate the enterprise-wide information and process for example their financial, human resources, manufacturing, logistics, sales and marketing functions. ERP was designed mainly to provide a total, integrated company’s resource to manage the business process efficiently and effectively.

The popularity of ERP software began to rise in the early 1990s and has grown to become one of the most widespread software applications used in managing enterprise-wide business processes (Holland, Kawalek & Light, 1999a). One of the dominant features of the ERP market is that enthusiasm for ERP systems in the industrial area such as chemicals, IT, electronics, textiles, and even in the public sector (Holland et al., 1999a; Chang & Gable, 2001). Today’s ERP system is an outgrowth of Materials Requirement Planning (MRP) systems. As MRP evolved to MRP II, it began to incorporate financial control and the measurement, master production scheduling, and capacity planning. Now, ERP has been extended not only to capture entire functions in the enterprise but also to be integrated with additional functions such as business intelligence and Decision Support Systems (Mabert, Soni & Venkataramanan, 2000).

When companies come to ERP implementation, they share the common goals, a quick and smooth implementation that does not disrupt business process with implementation system glitches (Doyle, 2000). However, ERP systems can’t promise to live up to companies’ expectations in all cases. As Darke, Parr, and Shanks (1999) mentioned that ERP systems were widely recognized as both problematic and likely to overrun time and budget allocations. ERP system delivery and implementation is generally considered to be complex, costly, and highly problematic (Doyle, 2000). It can deliver great rewards and opportunities, but the risks embedded are equally great.

The success or failure of ERP implementation is closely related to how the companies handle the process. The ERP implementation process could differ in every company. The differences might concern to the implementation goals, the scope, or the available resources. But among all the differences in the every implementation process there are some general points that are important in the process and would strongly result in the success or failure in the implementation. Those important points were identified as critical success factors (Laudon & Laudon, 1998). Critical success factors are defined as “those few critical areas where things must go right for the business to flourish” (Rockhart, 1979). Understanding the critical success factors in ERP implementation would give some guidelines on what factors that should be given more attention in order to
bring the implementation process into success. The critical success factors (CSFs) could either be a risk or opportunities, depends on how the organizations handle them.

1.2 Problems on discussion

Several authors have written about the success and failure of ERP implementation but they merely focus only on limited area of study, such as in business strategies, technology or organizational fit (Hong & Kim, 2002). CSFs models have been applied to general project management problems (Pinto & Slevin, 1987), manufacturing system implementation (Barrar, Lockett & Polding, 1991) and the area of reengineering (Bashein, Markus & Riley, 1994). The approach is particularly suitable for the analysis of ERP projects because it provides a framework for including the influence of tactical factors such as technical software configuration and project management variables together with broader strategic influences such as overall implementation strategy.

However, we have found an article that we used as a good blueprint to understand critical success factors in broader perspective. Kuang, Lau & Nah (2001) identified eleven key critical factors for ERP implementation success, aiming to give practical suggestions to the companies in the process of ERP implementation. These factors were listed randomly, from business strategy to technological issues. Although we found that they had listed many critical success factors but their research was only based on literature review, not examined with empirical studies. Therefore this has motivated us to do a further research on critical success factors in ERP implementation as our (Li Fang & Sylvia) degree project by conducting an empirical study. We further think that the critical success factors should be classified under specific criteria for easier understanding instead of just listing all the factors randomly.

- what are the critical success factors in the implementation of ERP?

We have found many articles about critical success factors that give us a good overview and basic understanding about the critical success factors itself, among them are written by Kuang, Lau & Nah (2001), Holland & Light (1999), and Pinto & Slevin (1987). Further on we have studied and ended up by listing the factors that we think are important and we also have grouped some related factors into one point because several authors have mentioned the same factors but sometimes they phrase them in different way.

Holland and Light have divided the critical success factors under the strategic and tactical headings (Holland & Light, 1999). Their CSFs framework came from expansion of Pinto and Slevin’s framework. Strategic issues specify the need for a project mission, top management support, and a project schedule outlining individual action steps for project implementation. Tactical issues focus on communication with all affected parties, recruitment of necessary personnel for the project team, and obtaining the required technology and expertise for the technical action steps. User acceptance, monitoring, and feedback at each stage, and troubleshooting are also classified as tactical issues (Pinto & Slevin, 1987). Further on, this has stood as our base on doing classification of the critical factors that we have identified from various authors (as we have mentioned previously). We choose their type of classification because we think that classifying those CSFs into strategic and tactical would make it easy to understand and outline the difference.
But we also think that the strategic and tactical have not captured our discussion field of CSFs that we have identified (as we will explain those factors in details in theoretical framework later). We think that there is another point of view from where we should look at the factors, which is cultural. We believe that organizational culture can significantly affect the ERP implementation in a company. It can inhibit or support in ERP implementation and also affect the efficient and effective use of ERP. It can support the success or even lead to the failure of ERP project. Further on, we also think that the culture diversity among customers, consultants, and vendors, consultants can lead to the different results in ERP implementation. Therefore we divided 11 CSFs that we had identified into strategic, tactical and cultural categories.

- **Why are these factors critical?**

Through detailed discussion we will explain why each factor is critical by showing the relationship between the factors and the implementation process. Each factor is critical in some way and it is important to know the appropriate way to handle it to ensure a successful ERP implementation.

- **What is the importance degree of each factor?**

Which factor is more important than the others? We will ask the respondents (customers, consultants, and vendors) to rank the importance of each factor. Ramaprasad and Williams (1996) noted that although CSFs was widely used by academic researchers and practitioners, it is important to discriminate between different levels of criticality. To know which factor is more important than the others will help managers (decision makers) to judge the priority in making decision related to ERP project.

- **How important are these factors for customers, consultants, and vendors?**

We are also interested in studying how the perceived importance of these factors may differ among customers, consultants and vendors. Because companies/users might have different points of view in judging the criticality of each factor compared to the consultants and vendors.

The ERP community is defined as a triadic group composed of an implementing organization, an ERP vendor, and an ERP consultant (Adam & Sammon, 2000). In implementation projects ERP vendors sought to enter into partnerships with ERP consultant to assist in ERP implementation (Knight & Westrup, 2000), which makes consultants and vendors, have similar necessity. The consultants and vendors are referred as the push side and the companies are in the pull side (Collins, 2005). The consultants and vendors are placed in the push side in a sense that they play the same role in proposing the ERP software, and companies are placed in the pull side as the recipient.

By asking customers, consultants, and vendors to rank the importance of each factor will give us the rough source for the analysis. We will further combine and analyze their answers, and draw a conclusion by considering the theory.

### 1.3 Purpose

Our paper is an interpretative research to identify the critical success factors in ERP implementation and understand the criticality degree of each factor from the perspectives
of three parties (companies, consultants & vendors). By doing this, companies can judge and allocate their resources effectively to achieve the success of ERP implementation.
2 Method

This chapter states the main research approach as the combination of qualitative and quantitative. It explains the literature review in doing theoretical framework, the selection of six respondents and interviews in making empirical study, and interpretation of empirical findings in fulfilling analysis work. In the final, method criticism is discussed for this research.

2.1 Research Approach

According to the aim and purpose of the research, different approach alternatives can be tracked down. What is the core knowledge that needs to be focused on and deepened in? As stated in the introduction part, this study calls for a deep understanding of the reality, the factors, the reasons and their relations. In order to fulfill the purpose and gain research credibility, an extensive empirical effort is carried out in the whole research. Obviously, there are different kinds of methods and approaches we can use for empirical study. The two widely used approaches are quantitative and qualitative (Berg, 2001).

Quantitative methods are research methods dealing with numbers and anything that is measurable. While qualitative method deliberately gives up on quantity in order to reach a depth in analysis of the object studied (Berg, 2001).

But according to Trochim (2000) quantitative approach was based upon qualitative judgments; and all qualitative data could be described and manipulated numerically. The researchers who developed such instruments had to make countless judgments in constructing them: how to define them; how to distinguish it from other related concepts; how to word potential scale items; how to make sure the items would be understandable to the intended respondents (Trochim, 2002). On the other hand, all qualitative information can be easily converted into quantitative, and there are many times that by doing so would add considerable value to the research. The simplest way to do this is to divide the qualitative information into units and number them. Simple nominal enumeration can enable you to organize and process qualitative information more efficiently (Trochim, 2002).

2.2 Our research approach:

Given the opinion of Troachim (2002) that sometimes it is hard to distinguish qualitative and quantitative research because they are closely related with each other we intend to do the research in depth and using some measurements to conclude our results. We chose to combine both methods, qualitative and quantitative approach. The qualitative method was chosen because we want to have deepened knowledge about the critical success factors. Furthermore a quantitative approach will help us in manipulating the data for a more comprehensive analysis of our findings.

2.3 Information gathering Techniques

There are two approaches to gather information for the research (Kumar, 1996):

1) information is collected from primary sources through an appropriate method
2) information is already available and only needs to be extracted (secondary sources).
Due to limited resources this report is partly based on primary sources and partly based on second-hand information.

Qualitative approach is extremely varied in nature. It includes virtually any information that can be captured that is not numerical in nature. Here are some methods of data collection (Mark, 1996):

- **In-depth interviews**
  In-depth interviews include both individual interviews (e.g., one-to-one) as well as "group" interviews (including focus groups). The data can be recorded in a wide variety of ways including stenography, audio recording, video recording or written notes. In-depth interviews differ from direct observation primarily in the nature of the interaction. In interviews it is assumed that there is a questioner and one or more interviewees. The purpose of the interview is to probe the ideas of the interviewees about the phenomenon of interest.

- **Direct observation**
  Direct observation means very broadly here. It differs from interviewing in that the observer does not actively query the respondent. It can include everything from field research where one lives in another context or culture for a period of time to photographs that illustrate some aspects of the phenomenon. The data can be recorded through the same way as interviews (stenography, audio, and video) and through pictures, photos or drawings (e.g., those courtroom drawings of witnesses are a form of direct observation).

- **Written documents**
  Usually this refers to existing documents (as opposed transcripts of interviews conducted for the research). It can include newspapers, magazines, books, websites, memos, transcripts of conversations, annual reports, and any form of written documents.

### 2.3.1 Theoretical study

The empirical study and theoretical study is differentiated by the source of data. The theoretical framework is based on written documents such as literature, discussion, and logic reasoning while the empirical study is based on data, information, gathered from the reality (Repstad, 1993).

We look for any source of materials of ERP either written documents or electronic sources (E-books and Journals). We used the word hint of “critical factors”, “ERP”, and “Enterprise Resource Planning” for the searching.

As language becomes a barrier for us, we mostly use literature references written in English. But however we also found a good reference written in Swedish. And to overcome the language problem we asked a person fluent in Swedish to translate the content of that literature.

While reading and gathering information of ERP from reference books, the lack of information has sometimes led us to find its origin source with broader information. We also test the validity of the source, especially with the internet source. Sometimes this brings us some problems because not all electronic sources are still valid. Meeting with this problem we then have to search for the source all over again or neglect that literature source.
By reviewing related books and articles about critical success factors in ERP implementation, we compare and combine their different ideas, and then build up our own framework about CSFs. In this part, the definitions and evolution of ERP systems is mentioned briefly, definition of Critical Success Factors will be laid, and CSFs will be explained in details from three aspects: strategic, tactical, and cultural, but prior to that we describe the forming of our CSFs framework until we come up with our perceived CSFs. The theoretical framework is the bridge between research questions and empirical study. It will contain some theories that will be used in analysis to answer the research questions. Only by solid and comprehensive theoretical framework, will empirical study go forward and proceed.

2.3.2 Empirical study

As we mentioned previously the empirical study is based on information and data gathered from the reality (Repstad, 1993). With the pre-answers of research questions gaining from theoretical framework, the empirical study is put into practice to answer the research questions.

The qualitative approach that we use is in-depth interviews that are used to gather adequate information. We conduct a semi-structured interview with some questions guidelines but we do not let ourselves bound to those questions. The interview flow is dependent on the answers of our respondents. With more flexibility we believe that we can gather more information and touch distinctive aspects of our research purpose.

Since we intended to gather comprehensive information for our analysis we conducted the interviews with customers, consultants, and vendors to get the overall point of view from them. The interviews were conducted mixed by phone and direct interviews as we were limited by time, resources, and availability.

As the key players of ERP implementation, interviews with customers, consultants and vendors would share their experiences and provide knowledge about CSFs in the implementation of ERP. And compared with the theoretical framework, the findings of empirical study would be used in analysis in order to answer our research questions.

2.3.2.1 Selection of respondents

We chose two representatives of each customer, consultant, and vendor as our respondents. We believe six respondents will be quite representative since we intend to dig deeply from the interviews as we chose to do qualitative approach. To get more information from the respondent’s direct interviews will be a good method to explore many aspects from the answers. In order to fulfill that we focused on respondents that were located in Jönköping.

• Selection of consultants

Because we are unfamiliar with the local (Swedish) vendors and also lack of information which companies that implement ERP, we started it by contacting the consultants. With the help of Yellow pages or gulasidorna (www.gulasidorna.se) we contacted all IT consulting in Jönköping because we do not have specific consulting firm in mind and
the fact is that not all IT consultants are dealing with ERP. We also got help from our research tutor, Ulf Seigerroth, who directed us to a Swedish consulting firm, SYSteam. After receiving some reply and communicating with the respective consulting firms we then came up with three consultants that were willing to be interviewed. They are Sogeti Sverige AB, SYSteam, and Cap Gemini Sverige.

Sogeti Sverige AB

Sogeti Sverige AB is a consultancy specializing in local professional IT services. They offer clients a full range of technological IT knowledge and expertise, such as IT management, IT specialists, development and integration projects, testing, application management and infrastructure services (Sogeti Sverige AB, 2005).

SYSteam

SYSteam works as a general IT consultant for medium-sized enterprises (SME) and as a specialist in global ERP, system development and management services for large companies. SYSteam has today employed around 1000 persons and has subsidiaries and offices in more than fifty locations throughout northern Europe (SYSteam, 2005).

Cap Gemini Sverige

The Cap Gemini Group is one of the world's largest providers of consulting, technology and outsourcing services. Headquartered in Paris, Cap Gemini’s regional operations include North America, Northern Europe & Asia Pacific and Central & Southern Europe. The company helps businesses implement growth strategies and leverage technology. Capgemini designs and integrates technology solutions, creates innovation, and transforms clients’ technical environments. These services focus on systems architecture, integration and infrastructure (Cap Gemini Sverige, 2005).

Although we made interviews with those respective respondents, but only two of them are made with direct interviews that are Sogeti Sverige AB and SYSteam. The respondent of Cap Gemini Sverige is located in Malmö and he has limited available time so we only made a phone interview with him. But regards to inadequate information and considering the balance number of each respondent representative we decided not to use Cap Gemini’s interview in our analysis.

The choice to start the interviews with the consulting firms was also based on our assumption that the consulting firms could lead us to their clients since it was difficult and took a lot of effort to determine which companies implement ERP. Especially in Jönköping companies are mostly SMEs (Small and Medium-sized Enterprises) and not all of them implement ERP.

Another factor is because there are not big well-known vendors locating in Jönköping so we tried to reach the local or Swedish ERP vendors. Being lack of this information, the early interviews with consulting firms will help us identify those vendors.

- Selection of vendors

After getting some information about local vendors in Jönköping we began to contact them. Among the limited number of local vendors’ representatives in Jönköping we were only able to reach two of them, but due to tight schedule of their respective con-
sultants we were unable to fix an interview appointment for immediate future at that time. Coping with that situation, we decided to gather data from vendors outside Jönköping and our choice led us to two biggest vendors in the market, SAP and Oracle, because they are more cooperative compared to other vendors.

SAP

Founded in 1972, SAP is the recognized leader in providing collaborative business solutions for all types of industries and for every major market. Its headquarter is located in Walldorf, Germany (SAP, 2005).

Oracle

Oracle, founded in 1977 in the USA, is best-known for its database software and related applications and is the second largest software company in the world after Microsoft. Oracle’s enterprise software applications started to work with its database in 1987 (Oracle, 2005).

Reaching these two respondents is not difficult since our SAP respondent is very cooperative and responsive to our request. But the Oracle respondent we interviewed is actually from Oracle subsidiary in Jakarta, Indonesia, and currently he resides in Gothenburg pursuing his further education. But due to area and time restriction we were unable to perform direct interview with them. The phone interview we used provides us with adequate information for our research.

- Selection of customers

Our intention to get further contact with companies through consultant’s references is unsuccessful because our consultant respondents are quite restrictive with their client’s information. Regarding this we try to find respondent companies through contacting big companies in Jönköping. This effort took us a lot of time since many big companies’ subsidiaries in Jönköping had their IT personnel in their main offices, which were situated in Stockholm. Another difficulty is that not all big companies implement ERP. But the main difficulty is in determining the size of the companies, since from the yellow pages or gulasidorna (www.gulasidorna.se) we cannot figure the size of the company nor make sure of its business activities due to language barrier. So we try to contact Huskvarna Viking because we consider its origin, which is from Jönköping land, therefore it will probably primarily based in Jönköping (Huskvarna).

Huskvarna Viking formerly belonged to VSM group but now they have separated and each group has different management. Our contact with Huskvarna Viking leads us to VSM group because Huskvarna Viking does not implement ERP and that is why they lead us to VSM. With the same reason as we search the vendors, we try to reach another company outside Jönköping. Our main focus is big companies around Stockholm because they are most likely to implement ERP. And through a lot of contacts via phone calls we have got one more respondent that is Scania.

VSM Group

VSM Group develops, manufactures, markets and sells sewing machines and related products on the consumer market and the Group has a history of more than 125 years. The company holds a leading position in the medium to high-end segments of house-
hold sewing machines in the world market. VSM Group has sales companies and representative offices in 17 countries and independent distributors in another 40 countries. The Group has modern manufacturing facilities in Huskvarna, Sweden, and in Brno, the Czech Republic.

**Scania**

Scania was founded in 1891. Today it is one of the world’s leading manufacturers of heavy trucks and buses. Industrial and Marine Engines is another important business area. The company also markets and sells a broad range of service-related products and financing services. Scania designs its products to have the lowest possible impact on the environment. They are optimized to consume less energy, raw materials and chemicals during their life cycle and to be recyclable. The present main business contains vehicles, services and customer financing. Scania is an international corporation with operations in more than 100 countries.

**2.3.2.2 Interview procedure**

Our first intention is to perform direct interview because it would provide us with more detailed information (Mark, 1996). But due to the constraint we have explained above, some interviews were done by phones. We try to make our phone interviews gather as much information as direct interviews, and as informative as possible. Further interviews could be performed if we were unclear of certain information.

Using semi-structured interviews, we prepared some basic questions as a guideline in doing our interviews. Even though we use some questions guidelines but we do not want those questions to limit the interviews. Our interview direction depends on the information from our interviewees, and based on their answers we dig deeper into the relevant subject.

When we conducted the interviews firstly we wanted to hear their opinions about the critical success factors in ERP implementation and why they think it is important. Then we showed them a list of critical success factors that we had identified (11 factors explained in the theoretic framework) and asked them to rank the importance of each factor. We made 3 criteria for them to judge the criticality of each factor, they are:

1 = strongly determine the success  
2 = determine the success  
3 = necessary for success

Some respondents asked about our research questions prior to the interviews, and we only gave them a broad overview of our questions. The reason for this is because the honest and genuine answers are what we searched for, and if they are prepared with the answers then it will reduce the genuineness of the answers. The main parts in our interviews are about general information about their ERP service for clients (such as what kind of ERP packages they supply) and their opinions about the CSFs according to their experiences. We also prepared a questionnaire for respondents where we asked them to rank the importance of CSFs based on the factors that we have perceived. Since we do not want to influence their opinions of CSFs, we only did that after the interviews were conducted.
All direct interviews were recorded in order to avoid misunderstanding in the future and it also helped us in arranging the information further when we wrote them in this paper. However, we can only make notes when we conducted phone interviews but we try not to leave any important information. In spite of the time and effort we made, the information we got from the interviews was adequate and useful, and we could make further analysis and answer the research questions in the following part.

2.3.3 Presentation and analysis procedure of empirical findings

Before we presented the empirical findings in this paper, we edited the whole information we had gathered from the interviews. We scrutinized and compiled it into relevant subject since in some conversations the topic of our respondents might jump from one subject to another and did not entirely flowing forward. In editing we also tried to identify and manage with incompleteness, errors, and gaps of the information. Irrelevant information is not included in the presentation of findings.

Our empirical findings are communicated in descriptive ways (Kumar, 1996) as they present perception, knowledge, and experience. And we try not to change the content when we are doing the editing.

The analysis is about interpreting the information gathered but it is also important not to eliminate the facts that do not fit with the expectations (Repstad, 1993). As the findings and theories are being reviewed and compared over and over, new ideas will appear and affect the final analysis. Whether it corresponds to the expectation or not, these ideas and themes will influence the outcome (Repstad, 1993) and show the objectivity of the study.

In the analysis, firstly we used the quantitative approach to manipulate the data (in analyzing the questionnaire), and then we combined this approach with qualitative approach to interpret and further discuss the findings (when we discuss each factor of CSFs and the differences among customers, consultants, and vendors). All aspects are critically analyzed and discussed to gain insight from similarities to differences, and also to present new aspects in the context (Silverman, 2001).

2.4 Method Critism

In conducting our research, although we have put all efforts, we still feel there are some weaknesses of our method, which is what we would like to discuss in this sub chapter.

2.4.1 Degree of generalization

Degree of generalization in a research is how to be able to express the knowledge in universal conformities law (Mark, 1996). Mark (1996) further described there were two kinds of generalization: theoretical generalization and empirical generalization. The theoretical generalization is limited by theory assumption, delimitation and simplification. While in empirical generalization the subject is more affected by actual facts of the information gathered.

In conducting our research about critical success factors in ERP implementation, we do not limit our research into certain degree, because although we are aware that the ERP implementation according to several authors consists of several phases, one of them are
Markus and Tanis who mentioned chartering, project, shakedown, onward and upward as ERP phases (Markus & Tanis, 2000), but we consider taking the approach from another perspective. We look at the implementation as a whole process, and the role of strategic, tactical, and cultural is embedded in each stage.

Furthermore, we also do not limit our research subject to any specific group because of the difficulties in respondents contact, as our primary idea is to find two customers/companies, two consultants, and two vendors. To be balance in the research we first decided to look for one success and one failure company (in ERP implementation), because our research is to define the factors that deal with success or failure of ERP project. As we explain above, our searching does not meet any progress, so to deal with this problem we have to be flexible and be satisfied with acquired respondents. We consider this might have some implications with our analysis, but we try to make use of the gathered information and do not let this limitation reduce the importance of the whole research.

The lack of compatibility of our respondents is another point that we think is critical. Due to the availability of the companies that we contacted, we chose six respondents of VSM Group, Scania, Sogeti Sverige AB, SYSteam, Oracle, and SAP. They differ a lot with each other in size and business. Their different points of view regarding different experiences may bring random result in the empirical findings. In this context we cannot generalize our conclusions into some specific target group (such as manufacturing industry). But if we had chosen two companies/customers in the same industry and contacted their consultants and vendors, or maybe if we want to focus in investigating CSFs regarding ERP implementation in SMEs, we could target our research group on SMEs and choose only local vendors with local consultants. In that way we could have gained a result that specifically targets in this certain industry or scope. On the other hand, this is also why we are not trying to delimit our research in one particular field, and we want to get more generalized findings instead.
3 Theoretical framework

This chapter aims to build up the theoretical framework for the empirical study. By pointing out some basic definitions of ERP, Success and CSFs, it guides readers to the formulation of our 11 CSFs, and emphasizes these factors in details from three categories: Strategic, Tactical, and Cultural.

3.1 ERP

3.1.1 Definition of ERP

As we mentioned before ERP system is a packaged business software system that allows a company to automate & integrate the majority of its business processes, and share common data and practices across the entire enterprise (Seddon, Shanks & Willcocks, 2003). Klaus (2000) further defined the concept of ERP in an easy-understood way. It can be viewed from a variety of perspectives. First, and most obviously, ERP is a commodity, a product in the form of computer software. Second, and fundamentally, ERP can be seen as a development objective of mapping all processes and data of an enterprise into a comprehensive integrative structure. Third, it can be identified as a key element of an infrastructure that delivers a solution to business. This concept indicates that ERP is not only an IT solution, but also a strategic business solution.

As an IT solution, ERP system, if implemented fully across an entire enterprise, connects various components of the enterprise through a logical transmission and sharing of data (Balls, Dunleavy, Hartley, Hurley & Norris, 2000). When customers and suppliers request information that have been fully integrated throughout the value chain or when executives require integrated strategies and tactics in areas such as manufacturing, inventory, procurement and accounting, ERP systems collect the data for analysis and transform the data into useful information that companies can use to support business decision-making. They allow companies to focus on core and truly value-added activities (Nah, 2002). These activities cover accounting and financial management, human resources management, manufacturing and logistics, sales and marketing, and customer relationship management.

As a strategic business solution, it will greatly improve integration across functional departments, emphasize on core business processes, and enhance overall competitiveness. In implementing an ERP solution, an organization can quickly upgrade its business processes to industry standards, taking advantage of the many years of business systems reengineering and integration experience of the major ERP vendors (Myerson, 2002). ERP systems are important tools to help organizations change business and gain sustained competitive advantages via their opponents.

3.1.2 Evolution of ERP

To have a better image of ERP systems, the evolution of ERP will be discussed shortly and simply. The name ERP was derived from the terms material requirements planning (MRP) and manufacturing resource planning (MRP II).

In the 1950’s, MRP were the first off-the-shelf business applications to support the creation and maintenance of material master data and bill-of-materials (demand-based
planning) across all products and ports in one or more plants. These early packages were able to process mass data but only with limited processing depth (Klaus, 2000).

**During the 1970s,** MRP packages were extended with further applications in order to offer complete support for the entire production planning and control cycle. MRP II were initiated with long-term sales forecast to encompass new functionality such as sales planning, capacity management and scheduling (Klaus, 2000).

Then **in the 1980s,** MRP II were extended towards the more technical areas that cover the product development and production processes. Computer Integrated Manufacturing (CIM) supplied the entire conceptual framework for the integration of all business-administrative and technical functions of a company. Such as finance, sales and distribution, and human resources (Klaus, 2000).

Today, data and process modeling techniques are developed into the integration information systems, which consist of data, function, organization, output and process views. ERP is widely used for this integration to support enterprise modeling of data and processes. Their functions contain financials (accounts receivable and payable), human resources (personnel planning), operations and logistics (inventory management & shipping), and sales and marketing (order management & sales management). Gradually, ERP vendors add more modules and functions as “add-ons” to the core modules giving birth to the extended ERPs (Hossain, Patrick & Rashid, 2002). These ERP extensions include advanced planning and scheduling (APS), e-business solutions such as customer relationship management (CRM) and supply chain management (SCM).

### 3.1.3 Benefits of ERP

As the evolution of ERP systems, they are empowered to facilitate the information flow throughout the whole enterprise more efficiently and effectively. The practical benefits are divided into five aspects by Seddon (Seddon, Shanks & Willcocks, 2003): operational, managerial, strategic, IT infrastructure, and organizational. From the following, we can review the benefits of ERP systems from different directions, and better understand why they are attractive to the modern organizations no matter they are multinational companies or small-size firms.
Table 3.1. Benefits of ERP

Source: *Proposed enterprise system benefits framework* (Seddon et al., 2003, p. 79)

<table>
<thead>
<tr>
<th>Operational benefits:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>By automating business processes and enabling process changes, they can offer benefits in terms of cost reduction, cycle term reduction, productivity improvement, quality improvement, and improved customer service.</td>
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</table>

<table>
<thead>
<tr>
<th>Managerial benefits:</th>
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<tbody>
<tr>
<td>With centralized database and built-in data analysis capabilities, they can help an organization achieve better resource management, improved decision making and planning, and performance improvement.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Strategic benefits:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>With large-scale business involvement and internal/external integration capabilities, they can assist in business growth, alliance, innovation, cost, differentiation, and external linkages.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>IT infrastructure benefits:</th>
<th></th>
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<tbody>
<tr>
<td>With integrated and standard application architecture, they support business flexibility, reduced IT cost and marginal cost of business units’ IT, and increased capability for quick implementation of new applications.</td>
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</table>

<table>
<thead>
<tr>
<th>Organizational benefits:</th>
<th></th>
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<tbody>
<tr>
<td>They affect the growth of organizational capabilities by supporting organization structure change, facilitating employee learning, empowering workers, and building common visions.</td>
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</table>

### 3.2 Success definition & measurement

One of the most enduring research topics in the field of information systems is that of system success (DeLone & McLean, 1992). Prior research has addressed the measurement of success, the antecedents of success, and the explanation of success and failure. However, with many new types of information technology emerge, the question of success comes up again. In ERP systems, success takes on special urgency since the cost and risk of these valuable technology investment rivals the potential payoffs.

Optimal success refers to the best outcomes the organizations could possibly achieve with enterprise systems, concerning with its business situation, measured against a portfolio of project, early operational and long-term business metrics (Markus & Tanis, 2000). Optimal success can be dynamic, in a sense that what is possible for an organization to achieve may change overtime, as business conditions also may change.
The definition and measurement of success are thorny. Success depends on the point of view from which you measure it. People often meant different things when talking about ERP success. Project managers and ERP consultants often defined success in terms of completing the project plan on time and within budget. But people whose job was to adopt ERP system and use them tended to emphasize having a smooth operation with ERP system and achieving business improvements (Axline, Markus, Petrie, & Tanis, 2001).

In this paper we adopt both perspectives, from project managers/consultants’ perspective to customers/companies’ perspective, because we would like to be balance in our judgment by considering from both sides, and it is also considered with our further empirical research that is to investigate on the CSFs from customers, consultants, and vendors point of view.

An important issue in the measurement of success concerns when one measures it (Larsen & Myers, 1997). Because project managers and implementers can afford to declare success in the short run but executives and investors are in it for the long haul (Axline et al., 2001). Further on Axline (2001) argued that the companies that adopted ERP systems needed to be concerned with the success not just at the point of adoption, but also further down the road. Because our research will involve project managers/implmenter as well as the executives of the companies, we tend to look at the success from short run and long haul perspectives.

Another important issue in the measurement of success is to compare adopters’ objectives, expectations, and perceptions as the standard for defining and measuring success (Sauer, 1993). In this case the adopters’ criterion is used to compare an actual level of achievement. But these subjective judgments maybe unreliable because it uses internal measures and objectives that might not be adoptable in every company, which also makes it quite difficult to generalize it in every case.

### 3.3 Forming the critical success factors framework

#### 3.3.1 CSFs definition

Critical success factors (CSFs) are often used to identify and state the key elements required for the success of a business operation (Hossain & Shakir, 2001). Further on critical success factors can be described in more details as a small number of easily identifiable operational goals shaped by the industry, the firm, the manager, and the environment that assures the success of an organization (Laudon & Laudon, 1998). The definition by Laudon and Laudon is similar with the definition by Rockhart and Scott (1984) that mentioned that CSFs are the operational goals of a firm and the attainment of these goals will assure the successful operation.

The CSFs framework technique suggested by Rockhart (1982) declared that the use and scope of CSFs framework depended on the subjective ability, style, and perspective of the executives. He further explained that the shaping of CSFs could be seen from four viewpoints that were shaped by industries and the structural changes, by firm operational strategies, managers perception, and the changes in environment (with regards to technology). We intend to study the CSFs in ERP implementation from firm operational
strategies because ERP software impounds deep knowledge of business practices accumulated from vendor implementation in many organizations (Seddon & Shang, 2002).

3.3.2 Our CSFs framework

Several authors have written about the success and failure of ERP implementation but they merely focus only on limited area of study, such as in business strategies, technology or organizational fit (Hong & Kim, 2002). Several articles that we found gave us some perception about critical success factors in ERP. Since some of them are referring Kuang, Lau, and Nah’s (2001) article as their main source, we decided to look for it instead.

As we looked through Kuang, Lau, and Nah’s (2001) article, we perceived that the article is quite comprehensive and could give us a good blueprint in understanding about critical success factors in broader perspective. They identified eleven key critical factors for ERP implementation success, aiming to give practical suggestions to the companies in the process of ERP implementation (Kuang et al., 2001). These factors were listed randomly, from business strategy to technological issues.

Table 3.2. Critical success factors in ERP implementation

Source: Critical factors for successful implementation of enterprise systems (Kuang et al., 2001)

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1.</td>
<td>ERP teamwork and composition</td>
</tr>
<tr>
<td>2.</td>
<td>top management</td>
</tr>
<tr>
<td>3.</td>
<td>business plan and vision</td>
</tr>
<tr>
<td>4.</td>
<td>effective communication</td>
</tr>
<tr>
<td>5.</td>
<td>project management</td>
</tr>
<tr>
<td>6.</td>
<td>appropriate business and legacy systems</td>
</tr>
<tr>
<td>7.</td>
<td>project champion</td>
</tr>
<tr>
<td>8.</td>
<td>change management program and culture</td>
</tr>
<tr>
<td>9.</td>
<td>business process reengineering and minimum customization</td>
</tr>
<tr>
<td>10.</td>
<td>software development, testing and troubleshooting</td>
</tr>
<tr>
<td>11.</td>
<td>monitoring and evaluation of performance</td>
</tr>
</tbody>
</table>

Further on we have studied critical success factors from various authors such as Pinto and Slevin (1987); Barrar and Roberts (1992); Raman, Thong, and Yap (1996); Arens and Loebbecke (1997); Bancroft, Seip, and Sprengel (1998); Bowen (1998); Falkowski, Pedigo, Smith & Swanson (1998); Bingi, Godla, and Sharma (1999); Buckhout, Frey, and Nemel (1999); Holland and Light (1999); Sumner (1999); Coulanos, Galliers, Krumbholz, and Maiden (2000); Rosario (2000); Sykes and Willcocks (2000); Kuang, Lau, and Nah (2001); Kumar, Kumar, and Maheshwari (2003); Razi and Tarn (2003).
Some factors they argued are similar, but some not. After looking through the different factors, we generalized the most-stated factors according to different authors, and then ended up by listing the factors that we perceived were really important and related with the success of ERP implementation, which is based on our personal understanding.

However there are several factors that we found are also related with common information system implementation so we didn’t think they should stand as ERP critical factors specifically, such as:

1. IT legacy system

IT legacy system was mentioned by Holland and Light (1999) and Kuang, Lau, and Nah (2001). Kuang et al. (2001) stated that business and IT systems involving existing business processes, organization structure, culture, and information technology affected success (Kuang et al., 2001). Holland and Light (1999) also mentioned that legacy systems determined the IT and organizational change required for success. Although we agree with them but we believe that IT legacy systems influence a new applied information system as any other type of new information systems, not especially in ERP project.

2. Training

Sumner (1999) and Grabski, Leech, and Lu (2000) stated training as critical factors in the implementation. We couldn’t agree more, but we consider training is a common process in any installation of new information system, what differentiates them is what aspect that must be given stronger consideration. In the ERP project, because the system is much more complex and comprehensive then the training will take longer time, and also problems are more likely to occur. In order to manage that, project team role is very important to motivate the whole end users, and there might be a necessity to change the management, to decrease the resistance from end users.

We only want to focus on the factors that are really important and critical and especially related with ERP project, because ERP projects are different from other information system projects. ERP system is unique, because of its size, scope, and organizational impact (Sumner, 1999). The common information system projects are often only to serve as solutions for a particular function in the business process.

When we were doing our analysis, we grouped some related factors into one sub factor because we thought they were strongly related. For example, we put minimum customization & implementation time, under one sub factor: ERP strategy. We think ERP strategy is a broad definition; it captures everything about evaluating ERP software alternatives that considers many factors such as software fit with business process, project schedule, business vision, and goals with the implementation. Later on we will explain more about the grouping in our CSFs framework.

We then came up with 11 factors that we thought were critical for the successful ERP implementation:

1. Top management support
2. ERP strategy
3. Business Process Reengineering
4. Project team & change management
5. Retain the experienced employee
6. Consultant and vendor support
7. Monitoring and evaluation of performance
8. Problems anticipation (troubleshooting, bugs, etc.)
9. Organizational culture
10. Effective communication
11. Cultural diversity

As we think that the critical success factors should be classified under specific criteria for easier understanding, instead of listing all the factors randomly, we came to Pinto and Slevin model (1987), which was further, expanded by Holland and Light (Holland & Light, 1999).

It was Pinto and Slevin (1987) who first argued that project managers must be capable in both strategic and tactical aspects of ERP project management in order to manage projects successfully. To clarify that they made an ERP implementation project profile that consisted of ten critical success factors organized in strategic and tactical framework. The critical success factors were divided under the strategic (planning) phase and the tactical (action) phase of the implementation project.

Strategic issues specify the need for a project mission, top management support, and a project schedule outlining individual action steps for project implementation. Tactical issues focus on communication with all affected parties, recruitment of necessary personnel for the project team, and obtaining the required technology and expertise for the technical action steps. User acceptance, monitoring, and feedback at each stage, and troubleshooting are also classified as tactical issues (Pinto & Slevin, 1987). We choose their type of classification because we think that classifying those CSFs into strategic and tactical would make it easy to understand and outline the differences.

Holland and Light (1999) further expanded the framework based on the critical success factors (CSFs) of ERP projects and their integration. The CSFs were also grouped under strategic and tactical headings but the factors were expanded further. The framework is shown in Table 3.3. below.
Table 3.3. A critical success factors framework for ERP implementation

<table>
<thead>
<tr>
<th>strategic</th>
<th>tactical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legacy information system</td>
<td>Client consultation</td>
</tr>
<tr>
<td>Business vision</td>
<td>Personnel</td>
</tr>
<tr>
<td>ERP strategy</td>
<td>Business process change and software configuration</td>
</tr>
<tr>
<td>Top management support</td>
<td>Client acceptance</td>
</tr>
<tr>
<td>Project schedule/plan</td>
<td>Monitoring and feedback</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td>Trouble shooting</td>
</tr>
</tbody>
</table>

Holland and Light emphasized the need to align business processes with the software during the implementation. Further on they said that naturally, strategies and tactics were not independent of each other. Benjamin and Levinson (1993) also identified the need to manage organization, business process, and technology changes in an integrative manner. Strategy should drive tactics in order to fully integrate the three main management processes (planning, execution and control) (Holland & Light, 1999). Nevertheless, CSFs will determine the success and failure of ERP implementation.

But along with our research, we think that strategic and tactical have not captured our discussion field of CSFs that we have identified (11 factors that we mentioned above). We think that there is another point of view from which we should look at the factors, which is cultural. We believe that organizational culture can significantly affect the ERP implementation in a company. It can inhibit or support ERP implementation. It also affects the efficient and effective use of ERP that can support the success or even lead to the failure of ERP project. Furthermore, we think that the cultural diversity among customers, consultants, and vendors can lead to the different results in ERP implementation. Therefore we divided these 11 CSFs into strategic, tactical and cultural categories.
We perceived that culture was embedded in strategic and tactical factors that directly or indirectly affected the ERP implementation process. Culture is slightly brought up by many authors since they mostly focus on strategic, tactical, and operational point of view. We hereby argue that culture is another factor that is essential.

Table 3.4. Our perceived critical success factors in ERP implementation

<table>
<thead>
<tr>
<th>Strategic</th>
<th>Tactical</th>
<th>Cultural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Business Process Reengineering</td>
<td>1. Problems anticipation (troubleshooting, bugs, etc.)</td>
<td>9. Organizational culture</td>
</tr>
<tr>
<td>2. Project team &amp; change management</td>
<td>4. Consultant and vendor support</td>
<td>10. Effective communication</td>
</tr>
<tr>
<td>4. Consultant and vendor support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Monitoring and evaluation of performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Problems anticipation (troubleshooting, bugs, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Top management support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. ERP strategy</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.1. A framework of relationship among strategic, tactical, and cultural categories.
3.4 Critical success factors in ERP implementation

3.4.1 Strategic factors in ERP implementation

In this article, the implementation process covers from project initiation until its going live. Project initiation begins with the decision leading to funding of the ERP system project. What can be done in this process is initiation of idea to adopt ERP, to develop business case, search for project leader, selection of software and implementation partner, project planning and scheduling (Markus & Tanis, 2000). When the ERP systems are going live, they have been in real use through the business process. Bugs will appear in this period, and more work should be focused on monitoring and constantly making adjustments to the system until the “bugs” are eliminated to keep the system stabilized. (Markus & Tanis, 2000).

3.4.1.1 Top management support

Top management support was identified as critical success factors by Barrar and Roberts (1992); Bingi, Godla, and Sharma (1999); Buckhout, Frey, and Nemel (1999); Holland and Light (1999), and Sumner (1999).

The IT literature has clearly demonstrated that for IT projects to succeed top management support is critical (Johnson, 1995). This also applies to ERP implementation. Implementing an ERP system is not a matter of changing software systems; rather it is a matter of repositioning the company and transforming the business practices (Myerson, 2002). It must receive approval from top management (Bingi, Godla & Sharma, 1999) and align with strategic business goals (Sumner, 1999).

Management must be involved in every step of the ERP implementation and committed with its own involvement and willingness to allocate valuable resources to the implementation effort. In this way, the progress of the project can be monitored and provided direction. Top management needs to identify the project as a top priority publicly and explicitly, to set up the suitable and competent project team, to share the role of new systems and structures through the whole organization. Top management commitment is much more than a CEO giving his or her blessings to the ERP system, which implies that they are willing to spend significant amounts of time serving on steering or executive committees overseeing the implementation team (Chen, 2001). Intervention from management is often necessary to resolve conflicts and bring everybody to the same thinking, and to build cooperation among the diverse groups in the organization, often across the national borders (Myerson, 2002). Top management must act as a coach, keeping his staff motivated and in harmony (Mousseau, 1998).

Additionally, there are two issues that should be emphasized in the function of top management support. First, business plan. Each company should evaluate its resources and business needs in order to figure out whether it is ready for the system or not (Razi & Tarn, 2003). A clear business plan and vision to steer the direction of the project is needed throughout the ERP life cycle (Buckout, Frey & Nemec, 1999). Through a business plan, top management can outline proposed strategic and tangible benefits, re-
sources, costs, risks and timeline. In the whole project implementation, goals and benefits will be identified and tracked, which would make work easier and impact on work (Rosario, 2000). Second, financial budgets. Compared with other information systems, ERP systems are more demanding and complicated. Top management needs to allocate enough budgets to fund the project, such as hiring competent consultant, and training employees. Given the complex nature of an ERP system and its costly implementation prospect, it is essential for a company to find out its financial, technological and human resources strengths before embarking on an ERP system implementation (Razi & Tarn, 2003).

3.4.1.2 ERP strategy

ERP strategy indicates what kind of ERP packages would be purchased and how long is the implementation process. It considers minimum customization and implementation time.

Minimum customization

Minimum customization was identified as critical success factors by Barrar and Roberts (1992); Bingi et al. (1999); Holland and Light (1999); Sumner (1999), and Rosario (2000).

While choosing an ERP package, companies will consider the software with its business fit. An organization will try to purchase the package that fits best into its business process. Unfortunately, the off-the-shelf ERP package is not made only for one particular business. To make software and business process perfect with each other, a further technical choice is whether to carry out custom development on the package software and the amount of custom development (Holland & Light, 1999). However, modifying the software to fit the business means that it is possible that any potential benefits from reengineering business processes will not be achieved (Holland & Light, 1999).

Customization means that the general ERP packages need to be configured to a specific type of business. The extent of customization determines the length of the implementation. The more customization needed, the longer it will take to roll the software out and the more it will cost to keep it up to date (Myerson, 2002). But many adopters could not avoid software modification, because the operation cannot function effectively with software functionality, even with modified business process (Axline et al., 2001).

An ERP system that comes with a pre-defined “reference model” to reflect the new customers functional style and business practice may be preferable to others that do not come with reference models, and they will modify the system source code in some degree. Custom modification may be an option to reduce the gap between the system capability and the business practice, which allows the customer to enhance the capability of the system (Razi & Tarn, 2003). But on the other hand, too much modification leads to a complex system difficult to support and virtually impossible to upgrade to the newest version of the software. Just like Myerson (2002) said, “software should not be modified as far as possible; otherwise, it will increase errors and reduce the advantage of newer versions and releases of ERP packages.

As chief information officer at Federal Prison Industries, Thomas Phalen offered three keys to successful implementation of ERP. Besides strong leadership & project management, and intensive users training, another key is to use a commercial ERP solution
in its purest form. Phalen said, “If you modify it, you are in trouble. You won’t be able to do the seamless upgrade.” (Trimble, 2000)

One interesting founding is that adopters often made unnecessary modification because they usually made modification plans early in the project beginning before fully understood the software thoroughly, and later on after “wrestling” with modifications and understanding the software better they discovered a way to implement the capabilities without modifications (Axline et al., 2001).

Implementation time

As one part of business plan, implementation time was identified as critical success factors by Barrar and Roberts (1992); Falkowski, Pedigo, Smith & Swanson (1998); Buckhout et al. (1999); Holland and Light (1999), and Rosario (2000).

When should we implement the ERP systems and how long shall we expect the installation job will be done? Managers may have good reasons to move fast, to keep pace with a competitor that has already implemented the ERP systems. The danger is that while the ERP systems may help them meet their immediate challenge, the rush act of implementation may create even larger and long-term problems. Managers should consider its own business implications and organizational resources, and then make a reasonable schedule of implementation plan. A speedy implementation of an enterprise system may be a wise business move; a rash implementation is not (Davenport, 1998).

The length of implementation is affected to a great extent by the number of modules being implemented, the scope of the implementation (different functional units or across multiple units spread out globally), the extent of customization, and the number of interfaces with other applications. The greater the number of units, the longer the total implementation time (Myerson, 2002). According to the characteristics of ERP modules and organization resources, suitable and reasonable implementation time should be planned for a standard and smooth adoption process.

3.4.2 Tactical factors in ERP implementation

3.4.2.1 Business Process Reengineering (BPR)

Business Process Reengineering was identified as critical success factors by Bingi et al. (1999); Holland and Light (1999); Sumner (1999); Sykes and Willcocks (2000); Rosario (2000), and Kuang, Lau, and Nah (2001).

BPR is another important factor that is constructed in the beginning of the project phase. Business Process Reengineering is strongly related with how suit is the ERP software chosen with current business process (Bingi et al., 1999). Companies need to identify their current business structure and business process associated with their existing IT systems in the beginning of ERP project and relate this to the business process contained within ERP system.

ERP software configuration is different from building a customized system because the development focus shifts from system analysis and design to software configuration (Holland & Light, 1999). Companies should be willing to change the business process
to fit with the software (Holland & Light, 1999) because software should not be modified as far as possible (Sumner, 1999). Besides Holland and Light (1999) further argued that the majority of system analysis and design effort had already been captured within the ERP software, and software modification can reduce the software functionality and increase in error possibility (Rosario, 2000). The philosophy of the business process changes besides to align the business process with the software is to simplify the process so as to eliminate redundant activities.

3.4.2.2 Project team & change management

Project team was identified as critical success factors by Falkowski et al. (1998); Bingi et al. (1999); Holland and Light (1999); Sumner (1999); Rosario (2000), and Kuang et al. (2001). A good project team is crucial to the success of any large endeavor, and this is especially so in a large ERP project (Davenport, 2000). There are 3 focus areas that we will discuss in this section which are team composition, team skills, and change management.

Team composition

Project team should consist of a good team composition, preferably the one with experience. But generally companies are lack of this so combining consultants and companies’ management in the project team is necessary to provide expertise in those areas (Cameron & Meyer, 1998). Caldas and Wood also stated that ERP implementation teams were “multidisciplinary, dedicated teams, comprised normally of Information Technology specialists, key users and operations personnel, as well as consultants with process redesign and change management skills” (Caldas and Wood, 2000). Using a mix of consultants and internal staff to work together in the project team would enable internal staff members to grow the necessary technical skills for ERP system design and implementation (Sumner, 1999). The project team and consultant should be assigned on a full time basis to ensure their focus on the project (Adams & Lee, 1990). A lot of time and effort must be devoted to ensure the project goes smoothly.

Team skills

Frequently, companies do not fully comprehend the impact of choosing internal employees with the correct skill sets. The right employees for the team should not only be experts in the company’s process but also be knowledgeable of the best business practices in the industry. Some large consulting agencies provide guidelines for selecting employees for ERP projects, but companies often do not carefully follow these exercises. Ignorance of the project needs and an inability to provide leadership and guidance to the project by the company’s team is a major reason for the failure of ERP projects. It is easy to find functional areas reluctant to sacrifice their best resources to the project; this is a difficulty that must be overcome (Bingi et al., 1999).

Change management

User resistance has been associated with almost any type of system change, even more so for a large information system change like ERP systems (Grabski, Leech, &Lu, 2000). The main resistance is because the users are worried that their job might be eliminated or be changed from their usual way of doing things. The biggest challenge is
when the workers who are reengineered (in BPR process) out of their previous position may show a “grieving process” that results in low productivity (Arnold, Hunton, & Sutton, 2000). Appleton (1999) also noted when an organization moved to a complex information system environment (ERP for example), changes in staff relationships were most likely to occur. Some employees may need to create new working relationships, new information sharing among departments, assume additional responsibilities. This can lead to resistance, confusion, and fear (Glover, Prawitt & Romney, 1999). Therefore, managers’ soft skills (communication and team building skills) are required for a successful implementation (Appleton, 1999).

Users involvement from the beginning of the process was also identified to gain users’ buy in for the project (Cameron & Meyer, 1998). This is also suggested by Brookes, Grouse, Jeffery & Lawrence (1982) that users should take part in the activities of project selection, approving the technical approach proposed by the system’s designers, and management and control. And many companies develop formal communication plans and issue regular reports (Cameron & Meyer, 1998) to achieve a higher level of acceptance on ERP project.

For the case of ERP selection, users may help to determine what efficiency is achieved in service delivery. This participation and involvement of users is encouraged to ensure that user requirements are met, to gain user commitment, and to avoid user resistance (Cavaye, 1995). Users’ involvement enables the project team to be aware of users’ requirements and address users concerns (Best, 1997).

3.4.2.3 Retain the experienced employee

Retain the experienced employee was identified as critical success factors by Bingi et al. (1999); Sykes and Willcocks (2000), and Kumar, Kumar, and Maheshwari (2003).

Sykes and Willcocks (2000) noted that ERP’s greatest challenge was to find and retain individuals with ERP skills in the context of an IT workforce crisis. This view is also shared by Kumar, Kumar and Maheshwari stating that ERP skills are in acute shortage because of high demand for people with good understanding of business and ERP systems (Kumar et al., 2003). Bingi et al. (1999) also mentioned that the ability to recruit and retain qualified ERP consultants was critical for the project success. Kumar et al. (2003) further argued that unfortunately some employee with ERP experience finally ended up being ERP consultants. This often results in high employee turnover rates and leads to overdue time for ERP project because the company needs to train a new unskilled employee from the beginning. But problems do not just rise in the companies; external service providers (such as consultants) themselves are unable to maintain continuity of customer support personnel.

Nowadays there are more employees with ERP experience compared with five years ago, but ERP skills is still an important value added. Therefore recruitment and career development of experienced employee must be taken into consideration. Finding the right people and retaining them is a major challenge of ERP implementation because these projects require multiple skill sets, including functional, technical, and interpersonal skills (Bingi et al., 1999).
3.4.2.4 Consultant and vendor support

Consultant and vendor support was identified as critical success factors by Raman, Thong, and Yap (1996); Arens and Loebbecke (1997), and Bowen (1998).

Companies frequently search for assistance from external experts when they are having problems with a highly centralized organization structure or lack of experience (Raman et al., 1996). In a highly centralized structure organization, the top management often do not recognize or is not familiar with the real operational process therefore consultants and IT vendors role is to remove knowledge barrier between various level of management within a company. Consultants can help in information system requirement analysis by assisting companies in making blueprint of their business process from the bottom level until the top management, consultants also can recommend which hardware and software that is most suitable, and assist companies in implementation management (Arens & Loebbecke, 1997). A close working relationship between consultants and companies’ project team can lead to valuable knowledge transfer in both directions (Bowen, 1998).

Lack of in-house skills is a common problem of inexperienced companies. Lack of in-house skills has often been associated with software development (Jiang & Klein, 1999; Holland & Light, 1999; Anderson & Narasumhan, 1979). The need for consultants and vendor’s support in ERP implementation is stronger than in another IS project because ERP implementation project requires a wide range of skills that are change management, risk management, and also business process reengineering (BPR) in addition to technical implementation knowledge (Davenport, 2000; Glover, Prawitt & Romney, 1999). Further on, ERP system is based on programming languages and concepts that are most likely new to existing IT staff (Kay, 1999). In that case consultants can help companies because of their previous implementation experience; consequently, they also can act as knowledge providers that lower the knowledge deficiencies existing within companies (Arens & Loebbecke, 1997). Consultants could provide training as a valuable resource to develop skills that are lacking in house.

Later on Ginzberg, Lucas, and Walton (1988) suggested that package implementation was different from custom implementation because the user might have to change procedure to work with the package, the user likely wanted to change some programs in the package to fit the company needs, the user became dependent upon the vendor for assistance and updates. Some of the variables according to Ginzberg et al. (1988) that are associated with the successful implementation of ERP are:

1. greater vendor participation in implementation and support
2. higher rating of user capabilities by vendor
3. higher rating of user skills by MIS (Management Information System) management. A highly skilled workforce is important for a successful ERP implementation.

However, companies should not completely rely on consultants, as consultants also have limited specific knowledge of the companies’ operation. This is supported with research findings by Caldas and Wood; they found that the support given by ERP consultants in ERP project is less than adequate (Caldas and Wood, 2000). Consultants are seen
to be of little relevance and insufficiently prepared for the task. In 1995, the ERP consultancy market was insignificant, but by 1998, it grew to a $10 billion industry (Caldas and Wood, 2000). Thus, Caldas and Wood (2000) also suggested that ERP consultants were simply jumping in the ERP bandwagon and, for the most part, they did not possess the requisite skills for the job. For example, their survey revealed that only 47% of respondents believed that their consultants were operative and influential during the implementation process. Only 23% stated that the consultants had the necessary skills and experience for the project (Caldas and Wood, 2000). So although consultants and vendors are mastery in the best business practice of the industry, only the people inside the company know more about their business operation, therefore the management must carefully analyze each situation instead of just jumping into consultants or vendors suggestion.

3.4.2.5 Monitoring and evaluation of performance

Monitoring and evaluation of performance was identified as critical success factors by Pinto and Slevin (1987); Falkowski et al. (1998); Bingi et al. (1999); Holland and Light (1999); Sumner (1999); Rosario (2000), and Kuang et al. (2001).

An ERP system is complex and contains lots of checks and balances. A common risk is the data visibility, integrity, and accuracy across the system (Razi & Tarn, 2003). Management must understand that during the implementation system glitches may occur, and will disturb the work. Therefore all efforts must be made to eliminate major system glitches. Subsequently monitoring system performance is needed to identify any alignment problems that may have occurred and were not apparent.

Cameron and Meyer (1998) stated that by appointing an executive-level individual with extensive knowledge of the organization’s operational processes to be the project leader would ensure the monitoring of ERP progress. The project leader would hold direct responsibility and be accountable for the project outcome.

Kuang et al. (2001) argued that milestones and targets were important to keep track of progress. They further added that achievements should be measured against the project goals. Barrar and Roberts (1992) developed two criteria that were project management criteria and operational criteria. Project management criteria is used to measure against the completion dates of each stages, realization costs, and quality. While operational criteria is used to measure against the production system. The project goals should be measurable and reasonable. The monitoring will include the exchange of information between the project team members and analysis of user feedback (Holland & Light, 1999).

There should be an early proof of success to manage skepticism (Rosario, 2000). Team morale is a vital component for the success of the project. Team members are required to put in long hours (as much as 20 hours per day), and this stress coupled with their regular duties could quickly diminish team morale (Rosario, 2000). With continuous evaluation, the achievement of the project can be quickly monitored and this proof of
project progress will keep motivating the team. Taylor (1999) and Jiang et al. (2001) also emphasized that honest and open communication, cooperation among all parties (vendors, managers, project leaders, users, and consultants) were needed in monitoring the project progress and helping to evaluate the performance.

### 3.4.2.6 Problems anticipation (troubleshooting, bugs, etc.)

Problems anticipation was identified as critical success factors by Bingi et al. (1999); Holland and Light (1999); Rosario (2000), and Razi and Tarn (2003).

Software problems such as bugs in the system and troubleshooting might appear during the testing. Especially a modified system would increase the possibility of bugs and troubleshooting (Razi & Tarn, 2003).

Quick response, patience, perseverance, problem solving and firefighting capabilities are important to manage any troubleshooting (Rosario, 2000). Therefore hands-on cooperation with vendors and consultants is needed to resolve the problems. Vigorous and sophisticated software testing eases implementation (Rosario, 2000).

### 3.4.3 Cultural factors in ERP implementation

Besides strategic and tactical factors, cultural factors are another perspective that we think is necessary to dig into. When two companies implement the exact same ERP package, the results sometimes are different (Seddon, Shanks & Willcocks, 2003). Technical problems can be analyzed and solved by computers and experts, but human factors are not easy to be handled only by codes or programs. The embedded culture issues in the company set an unneglectable effect on the success of ERP implementation, which will be touched in the following part.

Culture is often quoted as “the collective programming of the people in an environment.” The collective programming manifests itself through the values of this group of people (Khosrowpour & Szewczak, 1996). In ERP implementation, we divide cultural issues into organizational culture, effective communication, and cultural diversity among customers, consultants, and vendors.

#### 3.4.3.1 Organizational culture

Organizational culture was identified as critical success factors by Kuang et al. (2001).

As argued in former research, the organizational culture can be divided into three layers (Schein, 1992). It is easy to understand what is inclusive in organizational culture through this division. In the outer layer there are values about the strategies, missions, and objectives of the organization. In the middle layer there are beliefs, which are the issues that the employees of an organization talk about. In the inner layer there are the “taken for granted” assumptions that are those aspects of the organizational life which people find it difficult to recall and explain. All these cultural issues will cultivate the working way in an organization.

A culture with shared values and common aims is conductive to success because it emphasizes quality and empowers the willingness to accept new technology (Kuang et al., 2001). It would greatly aid in implementation efforts. Organization should have a strong
corporate identity that is open to change (Kuang et al., 2001). Being a strategic solution, ERP systems will change the way people used to work, rather than operational levels, such as using a new computer program. The innovative open organizational culture will facilitate the user participation throughout the whole implementation process.

An open and creative culture recognizes employees as the primary source of ideas, actions, and delivery of performance, which results in a stable work environment that reinforces the loyalty of its employees (Ross, 1996). On the other hand, an organizational culture that is not supportive of organizational learning and information sharing will discourage employees from discussing the possibility of failure of new systems implementation.

3.4.3.2 Effective communication

Effective communication was identified as critical success factors by Falkowski et al. (1998); Holland and Light (1999); Sumner (1999), and Rosario (2000).

The following summary of metaphors highlights the importance of organizational communication: communication is the lifeblood of the organization; the glue that binds the organization; the oil that smoothes the organization’s functions; the thread that ties the system together; the force that pervades the organization; and the binding agent that cements all relationships (Goldhaber, 1993). Communication effectiveness remains a key issue in organizational and individual success, how we connect, receive, and deliver messages in organizational may be the key to success (Harris, 2002). It also works in the implementation of ERP systems.

The effective communication can make the new system penetrate into the organization. It should also reach all levels in the company, from upper managers to bottom operators; they should know what they could expect in the business process change. They have to change their responsibility and roles according to the new requirements of ERP systems. Communication effectivity would enhance their willingness to change and take part, and result in the increase speed of business process reengineering. Sandra Borden, deputy project manager for Coast Guard Vessel Traffic Services acquisition once said, “Technology is not the issue. It’s the people.” (Trimble, 2000)

Constant communication owns another strategy of avoiding company-wide rebellion to new systems implementation. Throughout the project’s various stages, getting employees to understand what is changing, why it is changing, and how it will help the organization is crucial to acceptance (Mendel, 1991).

Therefore, the environment of effective communication should be formed and cultivated across the organization while implementing the ERP systems. Communication includes the formal promotion of project teams and the advertisement of project progress to the rest of the organization. Top-town communication takes place when information regarding IS policy, project priorities, and selection criteria is passed from top management to users. Furthermore, information regarding budget policy, standards and the predefined needs of senior management is passed to all personnel. Bottom-up communication occurs while new users’ needs and investment requests from all personnel are reported to top management. And parallel communication between users and IS personnel is required to obtain the consensus of the demand and the supply.
On the other hand, communication between internal groups and external groups (vendors and consultants) cannot be ignored either (Nah, 2002). Good communication could maximize the support from vendors and consultants, which means that an organization can better make use of its technique resources from ERP.

3.4.3.3 Cultural diversity

Cultural diversity was identified as another critical success factors by Coulianos, Galliers, Krumbholz, and Maiden (2000).

The cultural difference among customers, consultants and vendors indicates not only organizational culture but also national culture. We have talked about the three divisions of organizational culture in the above. Trompenaars (1994) argued that national culture could be described into three classes: how people relate to each other (sub-divided into universalism versus particularism, individualism versus to collectivism, neutral versus emotional, specific versus diffuse, achievement versus ascription), people’s attitudes to time, and people’s attitudes to the environment. The national culture differences reside more in values and less in practices, and organizational culture differences reside more in practices and less in values (Hofstede, 1994).

The present problems are (Coulianos et al., 2000):
1) the vendor’s culture, implicit in the ERP package, clashes with the customer’s organizational culture,
2) few consultants understand their customers’ organizational culture and business processes sufficiently.

Accordingly, a common problem when adopting package software has been the issue of ‘misfits’, that is, the gaps between the functionality offered by the package and that required by the adopting organization (Davis, 1988; Ginzberg, Lucas & Walton, 1988). ERP presents the problematic choice to organizations. To bridge the cultural diversity, they have to choose among changing the organizational culture and business process to fit into the off-the-shelf ERP systems, or customizing the package to smooth alignment of the software functionality to business requirements.

As a result, the companies need to consider the cultural diversity among vendors, consultants and themselves before they decide which ERP packages to purchase and implement. Otherwise, they probably have to scale back their projects and accept minimal benefits, or even abandon implementation (Marcus & Tanis, 2000).
4 Empirical findings

In this chapter, the empirical findings from 6 respondents are stated and interpreted. Two companies (VSM Group & Scania), two consultants (Sogeti & SYSteam), and two vendors (Oracle & SAP) talked about the factors that they thought were critical for ERP implementation, and listed the rank for the 11 CSFs that were addressed in Chapter 3. Conclusively, this chapter supplies the basic information for the future analysis.

4.1 Perceived CSFs from companies

- VSM Group

VSM Group develops, manufactures, markets and sells sewing machines and related products on the consumer market and the Group has a history of more than 125 years. The company holds a leading position in the medium to high-end segments of household sewing machines in the world market. VSM Group has sales companies and representative offices in 17 countries and independent distributors in another 40 countries. The Group has modern manufacturing facilities in Huskvarna, Sweden, and in Brno, the Czech Republic.

Our respondent in VSM Group is Peter Josefsson, an IT Manager that reports directly to CIO. He is in charge of all ERP development and maintenance matter and also data warehousing. VSM uses two kinds of ERP software: JD Edwards and PRMS. JD Edwards (now from Oracle) is used for their distribution, finance, and sales department for offices in United States, Canada, Sweden and other parts of Europe. PRMS from SSA global is for their production department and all factories in Huskvarna and Czech Republic. VSM Group will roll out its ERP in Switzerland by September this year, and still consider the plan for Australian branch. VSM Group has used both ERP software since 1990, but they keep upgrading it to the new version gradually. The latest upgrading they made was in 2001. He is in charge as the project leader in ERP implementation.

He identified users involvement, project team competency, top management commitment were the very important factors in ERP implementation. He also added good planning for the process and testing as important factors.

1) Users involvement

He explained that users (employees) needed to understand why they need ERP system. The management needs to give the information about the benefits to motivate the whole users, and show the success stories by giving the real examples (P. Josefsson, personal communication, 2005-04-20).

2) Project team competency

“It is necessary to have qualified people with adequate skills to be part of the project team, but qualified people are not enough, it is also important to do a careful and well-planned roll-out in order to be successful” (P. Josefsson, personal communication, 2005-04-20).

3) Top management commitment
A good commitment from top management is essential to support the implementation progress. The implementation plan also must be communicated from top to down to show the attention from the top management.

4) Good planning

The careful and well-analyzed plan must be equipped with good documentation. He further added that the plan must be process-oriented rather than functional-oriented, because ERP is mainly about the process change (P. Josefsson, personal communication, 2005-04-20).

5) Testing

It is necessary to perform testing before the real “going live” to detect early problems.

He pointed out top management support, Business Process Reengineering, retain the experienced employee, organizational culture, and effective communication as strongly determine the success (the first category). He further placed ERP strategy, project team & change management, consultant and vendor support, monitoring and evaluation of performance, and cultural diversity in the second category that meant they determined the success of ERP implementation. But he thought that problems anticipation was less important than others, it was only necessary for success.

- Scania

Scania was founded in 1891. Today it is one of the world’s leading manufacturers of heavy trucks and buses. Industrial and Marine Engines is another important business area. The company also markets and sells a broad range of service-related products and financing services. Scania designs its products to have the lowest possible impact on the environment. They are optimized to consume less energy, raw materials and chemicals during their life cycle and to be recyclable. The present main business contains vehicles, services and customer financing. Scania is an international corporation with operations in more than 100 countries. The number of employees is more than 28,000.

Per-Olof Sundman, manager for business solutions & financial systems of industrial operations, is our interview respondent in Scania. This department acts as the bridge between IT department and end users, and that is, whenever Scania implements any new information systems it will coordinate the IT department and users, such as to make the implementation of information systems go smoothly and quickly. The respondent has been working in this area for 10 years. In 1997, they started to implement the financial module from Oracle in Sweden, and finished in the march of 1998. In 2002, this financial module was upgraded in Sweden and implemented in Brazil. Then it was carried out in France in 2003 and in Holland in 2004. In Sweden they get the software support from WM-data (the supplier of IT-related services in Nordic regions) and Oracle, which supports Holland as well, and they use local consultant support in Brazil and France.

The factors that Per-Olof thought were critical and important for ERP implementation are business model, top management support, education/training, and test plan.

1) Business model
“From project, people, budget and so on, you have to know what you expect from the ERP package” (P-O. Sundman, personal communication, 2005-05-18). A suitable business model is needed to get ready for the ERP implementation. The question mark should be put in how they can fit for each other.

2) Top management support

Per-Olof said, “From the top to the low level, people should know what they are supposed to do in the new software implementation” (P-O. Sundman, personal communication, 2005-05-18). The involvement and commitment of top management is quite important. The authority and support from the top level is the security for a successful implementation. People should realize and make sure of their responsibilities and roles.

3) Education/training

While implementing the ERP packages, both center project team and local project team are in the process in Scania. The key persons are involved in the center team, and their main tasks are financial, technical, server, and interface from legacy system; while the local team deals with different units in the ERP package. We quoted what Per-Olof argued like this, “The project leader should 100% run the project, and the project members should 100% devote to the project as well” (P-O. Sundman, personal communication, 2005-05-18). The education and training covers different levels from top to bottom inside the company.

4) Test plan

“The test plan should be dedicated to each unit” (P-O. Sundman, personal communication, 2005-05-18). For example, they rolled out two units in the beginning, then found the problems and corrected them, and then the next unit could go ahead. The test plan can decrease the risk of large-scale use, once there is any problem, the company can adjust the units and make it more suitable for the present business process, which can increase the success percentage. Otherwise, the company will get into trouble if it pushes to implement a whole new information system without small-unit testing. Just like Per-Olof stated, “You will feel less painful by test plan for each unit” (P-O. Sundman, personal communication, 2005-05-18).

He pointed out top management support, ERP strategy, Business Process Reengineering, and project team & change management as strongly determine the success (the first category). He further placed retain the experienced employee, consultant and vendor support, monitoring and evaluation of performance, problems anticipation, effective communication, and cultural diversity in the second category which meant they determined the success of ERP implementation. But he thought that organizational culture was less important than others in the third category.

4.2 Perceived CSFs from consultants

• Sogeti Sverige AB

Sogeti Sverige AB is a consultancy specializing in local professional IT services. They offer their clients a full range of technological IT knowledge and expertise. Sogeti
Sverige AB is a part of the Sogeti-Transiciel Group, owned by Cap Gemini. The Sogeti clients are mostly SMEs in Jönköping.

Our respondent’s position is a team leader consultant. His name is Pär Hansson. Besides being a project leader, part of his time is spent in looking for the qualified people for the project team. The software they offer is mainly Excapta (from Microsoft, originally Danish software). Besides that they also have cooperation with Jeeves Swedish software).

Several factors he mentioned as critical for successful implementation of ERP are: pre-study, Business Process Reengineering (BPR), budget, team composition, and testing.

1) Pre-study

“Pre-study is important because the choice of the software would be based on that. A good start is important for a good next step. Companies need to identify all business process from major to minor, all must be well documented” (P. Hansson, personal communication, 2005-03-21).

2) BPR

It is the ground process of the whole project. It is also important that there is an official agreement of the whole process plan agreed by both sides (company and consultant). It is important to do BPR independently, and then take a look to the ERP system. “A lot companies do not have a blueprint of their business process, especially in small companies (P. Hansson, personal communication, 2005-03-21) which are mainly Sogeti’s clients. “First the companies and consultants will look at the basic flows, the critical flows” (P. Hansson, personal communication, 2005-03-21).

3) Budget

Budget is very important as the support of the activities and in choosing the software. “It is often happen that companies buy cheap software, doing less customization, and in the end customers don’t get what they expected. This is a major problem” (P. Hansson, personal communication, 2005-03-21). Therefore considering the available budget and the purpose of ERP implementation is needed so companies can get a maximized profit of their source.

4) Team composition

“It is good to have someone experiencing in IT, also in ERP, but it is not often. Each side would have a project leader. The project manager from the company doesn’t have to be a process manager; it could be someone who has the adequate skills and knowledge about related area” (P. Hansson, personal communication, 2005-03-21). He further stated that in the company’s practice it was not the manager of the process because usually the manager would not have enough time to fully concentrate on ERP project. It’s better to choose someone in the operational level because they have more time, but the negative thing is that the operational level cannot take important decision. Therefore it is necessary to have guidelines on how and what to decide.

5) Testing
“Testing is very important to be done prior to “going live” but customers often neglect it. A few years ago, consultants usually did pre-study first and then suggested the functionalities required by the system. Consultants then would program the modification, and test the system before they go live. But now we prefer to do testing in steps” (P. Hansson, personal communication, 2005-03-21). Testing should be done in parallel of the implementation. Because the implementation project usually is divided into many smaller projects so testing of one project should be conducted while implementing the other small project. But the problem is that end users usually can see and try the new system only a few moments before they go live, because the system keeps modified. But ideally testing should be done as early as possible, so users can get familiar and recognize the functionality of the system earlier. He also added that sometimes companies did not do the testing because of lacking time or budget. He further suggested that it was better that half portion of the consultancy hours were for testing, but this seems hard to be achieved.

When we asked him to rank the CSFs in our list, he ranked top management support, ERP strategy, Business Process Reengineering, project team & change management and effective communication in the first rank (strongly determine the success). He then placed consultant and vendor support, and monitoring and evaluation of performance in the second place that means determine the success. And he considered retain the experienced employee, problems anticipation, organizational culture, and cultural diversity as less important, and he only placed them in the third place.

• SYSteam

SYSteam was incorporated in 1984. It works as a generalist IT consultant for small and medium-sized enterprises and as a specialist in Global ERP, system development and management services for large companies. SYSteam has today employed around 1000 persons and has subsidiaries and offices in more than fifty locations throughout northern Europe. The headquarters are in Huskvarna, in the south of Sweden. Their ERP packages contain SAP, JEEVES, AXAPTA, NAVISION, SCALD, and J.D. EDWARDS. Some of their customers are: Volvo, Electrolux, Scania, Shell, IBM and Astra. They operate more as a co-operative partner than a supplier of products.

Our respondent is the senior salesman in SYSteam, Mats Gunnarsson. The critical success factors he mentioned are as follows:

1) Business Process Reengineering (BPR)

“This is the most important, grounded” (M. Gunnarsson, personal communication, 2005-03-29). Their consulting work starts from BPR, then project group, implementation, and going live. “We have special consultants do the BPR with the company, and they interview everybody in the company. We document from main process to detailed process.” (M. Gunnarsson, personal communication, 2005-03-29).

2) Training

“We help the clients with training” (M. Gunnarsson, personal communication, 2005-03-29). They have different levels of training. The main process is for top management, and then topples down to end users. He drew this diagram to show the training process.
3) Project team

“You must have top owners for the whole function of the company” (M. Gunnarsson, personal communication, 2005-03-29). Who takes the responsibility is very important. Usually, the project team led by top owners is composed by:

The head of different departments are involved in the project team, such as finance manager, logistic manager, human resources manager, and many other departments.

His rank of 11 critical success factors is shown like this: The first rank belongs to Business Process Reengineering, project team & change management, cultural diversity. He positioned top management support, ERP strategy, retain the experienced employee, consultant and vendor support, and organizational culture in the second rank. Then go the necessary factors for success: monitoring and evaluation of performance, and problems anticipation.
4.3 Perceived CSFs from vendors

- Oracle

Oracle, founded in 1977 in USA, is best known for its database software and related applications and is the second largest software company in the world after Microsoft. Oracle’s enterprise software applications started to work with its database in 1987. Oracle’s ERP system is known as Oracle Applications, having more than 50 different modules in six major categories: finance, accounts payable, human resources, manufacturing, supply chain, projects and front office. Its latest product is called Oracle E-Business Suite 11i.10.

The person we interviewed is Erlangga Arfan, a senior consultant of Oracle Jakarta, Indonesia. He specializes in supply chain and management. He mentioned implementation goals, client’s resources (human), consultant resources, leadership from project manager and high-level attention as critical success factors in ERP implementation.

1) Implementation goals

The implementation goals are usually identified in the pre-sales activity. But because it is still in pre-sales, details of the problems are not identified yet. Usually the problems occur when the deal or agreement that is made in pre-sales cannot be fulfilled entirely with the software or sometimes clients ask for more benefits than what was previously decided. Therefore he said, “A very clear agreement should be made before the project begin” (E. Arfan, personal communication, 2005-04-27), including the alternatives if the project scope changed.

2) Client’s resources

There must be competent human resources from the companies (clients) who can dedicate enough time and efforts to work with the consultants. But often the assigned person is also doing their regular work that makes them not focus on the ERP project.

Another kind of resource that also comes into consideration is the companies’ infrastructure, for example Internet and computer facilities.

3) Consultant’s resources

The assigned consultants must be the one with enough skills and competency. He further mentioned that in several cases the consulting companies were not playing fair (E. Arfan, personal communication, 2005-04-27). They sent an experienced and competent consultant during the presentation and pre-sales activity, but when it came into implementation the role was played by the freshman. Therefore, to make sure that the companies are assisted with an experienced and competent consultant is very important.

4) Project manager leadership

The project manager leadership in both sides must be good to ensure smooth implementation because it is strongly related with the working atmosphere along the implementa-
tion. “It can affect the working mood among the project team members which in the end will affect the whole company” (E. Arfan, personal communication, 2005-04-27).

5) Attention from top management

Top management support is needed because sometimes there are unsolved problems from both sides that need a hand from top management.

He further ranked top management support, ERP strategy, consultant and vendor support, problems anticipation, organizational culture, and effective communication in the first category that means that those factors are strongly determine the success. Then he placed Business Process Reengineering, project team & change management in the second criteria, as determine the success factors. Retain the experienced employee, monitoring and evaluation of performance, cultural diversity as only necessary for success in ERP project.

• SAP

Founded in 1972, SAP is the recognized leader in providing collaborative business solutions for all types of industries and for every major market. Its headquarter is located in Walldorf, Germany. SAP is the world's largest inter-enterprise software company and the world's third-largest independent software supplier overall. Today, SAP employs more than 32,000 people in more than 50 countries. The solution of mySAP ERP provides end-to-end functionality for business analytics, financials, human capital management, operations, and corporate services -- and allows clients to upgrade to the full range of SAP solutions.

Guus Creusen, a senior business consultant, is our respondent in SAP of Sweden. The office is situated in Stockholm. He listed the following four factors he thought was critical for ERP implementation success in our phone interview.

1) Change management

Implementing ERP not only means the basic computer stuff, such as collecting and updating some data, and it is more about implementing a new way of working throughout the whole company. “People have to change the way of working” (G. Creusen, personal communication, 2005-04-28). From the top management until the bottom operators, they should realize the real deep change ERP packages would bring about to their daily work.

2) Commitment from management

The fluent process of the implementation of any software packages needs the strong commitment from management. Then the appropriate time, sufficient effort, enough budget and qualified technique support will be allocated to the implementation process, which is a secure investment for ERP. “Commitment is more or less like top management support” (G. Creusen, personal communication, 2005-04-28).

3) Clear responsibilities and roles
“Who is responsible for the project, and whose role is it to do this job?” (G. Creusen, personal communication, 2005-04-28). The clear division should accompany the ERP implementation. To state the clear responsibilities and roles will make the project more efficient. Otherwise, once some problems occur, the project maybe has to be delayed and stopped because of the ambiguity of responsibilities and roles. The common problem is that when some trouble is in the way of implementation, nobody will take charge of it.

4) Communication

Here, what Guus mentioned was more about internal communication. “People should know what they are supposed to do while facing a new situation, then they will feel security” (G. Creusen, personal communication, 2005-04-28). Just as he emphasized, “Sometimes, human factors are more important than technical problems” (G. Creusen, personal communication, 2005-04-28). The human factors include interactions and communication (G. Creusen, personal communication, 2005-04-28).

He ranked the 11 factors we listed as below. The first rank contains top management support, project team & change management, effective communication. Business Process Reengineering, monitoring and evaluation of performance, problems anticipation, and organization culture were placed in the second rank. The necessary factors for success (the third rank) are ERP strategy, retain the experienced employee, consultant and vendor support, and cultural diversity.
5 Analysis

This chapter aims to analyse the empirical findings in order to fulfill the research purpose. The analysis critically reviews the results and displays patterns corresponding or diverging from theories derived from the frame of reference. In this chapter, the rank of 11 CSFs is interpreted, and the differences among three parties are discussed. Furthermore, it adds three new factors that are in relation to the success of ERP implementation.

We made a list of all the critical factors with the ranks based on the answers of our respondents. The following table is what we have collected about the findings:

Table 5.1. The rank result of CSFs from respondents
Source: Interviews with six respondents

<table>
<thead>
<tr>
<th>Factor</th>
<th>Oracle</th>
<th>SAP</th>
<th>Sogeti</th>
<th>SYSteam</th>
<th>VSM</th>
<th>Scania</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>top management support</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>ERP strategy</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>BPR</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>project team &amp; change management</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>retain experienced employee</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>consultant and vendor support</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>monitoring and evaluation of performance</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>problems anticipation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>organizational culture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>effective communication</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>cultural diversity</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>14</td>
</tr>
</tbody>
</table>

As we offered 3 criteria in the questionnaire (1 = strongly determine the success; 2 = determine the success; 3 = necessary for success) the most important factors will be shown by the least score. And the bigger the score means the less important the factor.
5.1 The rank of CSFs

From the final score, we can easily find the critical success factors and how important and critical is each of them.

The most critical factors for ERP success are:

- **Top management support** (score-7);

  Most of all respondents agree that top management support is very important. In ERP implementation, repositioning the company and transforming the business practices must receive approval from top management (Bingi et al., 1999; Myerson, 2002). And a good commitment from top management is essential to support the implementation progress. The implementation plan also must be communicated from top to down to show the attention from the top management (P. Josefsson, personal communication, 2005-04-20).

  Management must be involved in every step of the ERP implementation and committed with its own involvement & willingness to allocate valuable resources to the implementation effort (Gibson, Holland & Light, 1999). In this way, the progress of the project can be monitored and directed. Top management needs to identify the project as a top priority publicly and explicitly, to set up the suitable and competent project team, to share the role of new systems and structures through the whole organization.

  One of the issues in top management support (Razi & Tarn, 2003) is strongly emphasized by Per Hansson, consultant of Sogeti. He acknowledge that budget is very important as the support of the activities and in choosing the software (P. Hansson, personal communication, 2005-03-21)

- **Business Process Reengineering** (score-8);

  Both respondents from Sogeti and SAP strongly think that BPR is very important and grounded process in ERP project. “This is the most important, grounded” (M. Gunnarsson, personal communication, 2005-03-29). As he said that their consulting work starts from BPR, then project group, implementation, and going live. “We document from main process to detailed process.” (M. Gunnarsson, personal communication, 2005-03-29). Companies need to identify their current business structure and business processes associated with their existing IT systems in the beginning of ERP project and relate this to the business processes contained within ERP system.

- **Project team & change management** (score-8);

  Project team & change management is another factor that being approved as the top priority in ERP implementation by most of the respondents. Project team supplies the ERP project with good team composition and sufficient team skills. And change management creates new working relationships and information sharing among departments, assumes additional responsibilities, and increases the user involvement based on the requirements of ERP implementation.

  **Change management**
As users involvement identified by Cameron & Meyer (1998) and Brookes, Grouse, Jeffery & Lawrence (1982), they thought that users should take part in the activities of project selection, approving the technical, and management & control to gain users’ buy in for the project. This is aligned with Peter Josefsson’s opinion (from VSMgroup). He said that users (employees) needed to understand why they need ERP system. The management needs to give the information about the benefits to motivate the whole users, and show the success stories by giving the real examples (P. Josefsson, personal communication, 2005-04-20).

Team composition

But for team composition, the respondents from Sogeti and SAP are quite contradicting in their thoughts. Pär Hansson stated that it was better to choose someone in the operational level because they had more time (P. Hansson, personal communication, 2005-03-21). This view is shared by Adam & Lee that stated the project team and consultant should be assigned on a full time basis to ensure their focus on the project (Adams & Lee, 1990). But the respondent from SAP clearly emphasized, “You must have top owners for the whole function of the company” (M. Gunnarsson, personal communication, 2005-03-29). This is perhaps because of the negative aspect that the operational level staff cannot take important decision, which is shared by both of them (P. Hansson, personal communication, 2005-03-21), (M. Gunnarsson, personal communication, 2005-03-29). Therefore it is necessary to have guidelines on how and what to decide.

• Effective communication (score-8);

The effective communication can make the new system penetrate into the organization, enhance employees’ willingness to change and take part, and maximize the support from vendors and consultants, which means that an organization can better make use of its technique resources from ERP.

Communication between internal groups and external groups (vendors and consultants) cannot be ignored (Nah, 2002). Our respondent, Guus Creusen, also agree with it. “People should know what they are supposed to do while facing a new situation, then they will feel security” (G. Creusen, personal communication, 2005-04-28).

But he also emphasized, “Sometimes, human factors are more important than technical problems” (G. Creusen, personal communication, 2005-04-28). As Sandra Borden, deputy project manager for Coast Guard Vessel Traffic Services acquisition once said, “Technology is not the issue. It’s the people.” (Trimble, 2000).

The medium critical factors for ERP success consist of:

• ERP strategy (score-10);

To implement ERP packages needs a good plan of what kind of package to choose (customized or non-customized) and implementation time, rather than just to purchase off-the-shelf software. To make software and business process perfect with each other, a further technical choice is whether to carry out custom development on the package software and the amount of custom development (Holland & Light,
That is why “Pre-study is important because the choice of the software would be based on that. A good start is important for a good next step.” (P. Hansson, personal communication, 2005-03-21).

- **Consultant and vendor support** (score-12);

Competent consultant and vendor support can help clients to remove knowledge barrier between various levels of management within a company while implementing new ERP package. The assigned consultants must be the one with enough skills and competency (E. Arfan, personal communication, 2005-04-27). Consultants can help in information system requirement analysis by assisting companies in making blueprint of their business process from the bottom level until the top management, consultants also can recommend which hardware and software that is most suitable, and assist companies in implementation management (Arens & Loebbecke, 1997).

He further mentioned that in several cases the consulting companies were not playing fair by sending the experienced and competent consultant during the presentation and pre-sales activity, but when it came into implementation the role was played by the freshman (E. Arfan, personal communication, 2005-04-27). Therefore, to make sure that the companies are assisted with an experienced and competent consultant is very important.

- **Organizational culture** (score-12);

Organization should have a strong corporate identity that is open to change (Kuang et al., 2001). Being a strategic solution, ERP systems will change the way people used to work, rather than operational levels, such as using a new computer program. The innovative open organizational culture will facilitate the user participation throughout the whole implementation process.

The less critical factors for ERP success include:

- **Retain the experienced employee** (score-14);

ERP success calls for high demand for people with good understanding of business and ERP systems.

- **Monitoring and evaluation of performance** (score-14);

Kuang et al. (2001) argued that achievements should be measured against the project goals. Subsequently monitoring system performance is needed to identify any alignment problems that may have occurred and were not apparent.

- **Problems anticipation** (score-14);

Quick response, patience, perseverance, problem solving and firefighting capabilities are important to manage any troubleshooting and ease implementation (Rosario, 2000).

- **Cultural diversity** (score-14);
The gaps between the functionality offered by the package and the functionality re-
quired by the adopting organization need to be bridged in the new software imple-
mentation.

Except the above 11 factors that are mostly talked about in the reference books, our re-
pondents emphasized other three critical factors:

- **Testing**

It is mentioned by Sogeti, VSM, and Scania in the interviews. Testing should be done prior to “going live”, and its function is to detect early problems and correct them, in order to decrease the risk of large scale use of the new package. Ideally testing should be as early as possible, so users can get familiar and recognize the functionality of the system earlier (P. Hansson, personal communication, 2005-03-21).

The challenges for the companies are to train end users so they know how to use the system and to carry out daily operation. The IT professionals are also trained so they know how to maintain, identify and solve the system glitches. In testing all the trainings are being test if it meets the purpose.

However, small companies restricted by limited source, particularly money and driven by strong desire to minimize disruption to the business, usually ignore adequate testing. Rushing to the finish line will never be a good idea because going back and repair patches to fix the problems is difficult, time consuming, and more costly (Razi & Tarn, 2003).

- **Business model**

The respondent in Scania talked about business model, and he thought it was another critical success factor (P-O. Sundman, personal communication, 2005-05-18). Before starting ERP implementation, the company should know what they expect from the implementation, and furthermore, they should work on a suitable business model (including people, legacy system, budget and so on) to make the new system fit in quickly and smoothly.

- **Client’s resources**

We got this factor from the interview with Oracle. The implementation of a new advanced software system requires capable human resources to work in the project team together with consultants. At the same time, the basic technical facilities, such as computer and Internet, should support the implementation process of ERP packages. Otherwise, it will be difficult to achieve the goal of the implementation.

### 5.2 The differences among customers, consultants & vendor

Reviewing the ranks from customers, consultants and vendors, we can find there are some different opinions about CSFs among them. We will discuss the 11 factors one by one to make the difference clear.
Top management support

Top management support gets approval among customers, consultants, and vendors. It leads to its first-rank place in all the 11 factors. It is obvious all of them agree that top management support is very crucial for ERP success.

ERP strategy

The consultants and vendors give it a high position in the ERP implementation, rank 1 or 2. However, the two vendors differ greatly with each other’s opinion. Oracle think it is strongly determine the success but SAP believed that it is only necessary for success. We cannot find the regulation for it as the vendors also cannot explain why.

BPR

It shows not much difference among those three groups of respondents. All of them agree that it is essential for ERP success.

Project team & change management

This factor also wins agreement among customers, consultants, and vendors. Without efficient project team and active change management, the dream of ERP will never come true.

Retain the experienced employee

For consultants and vendors, they think it is not so critical (the average rank is 3), while it is viewed as critical by customers. We think that the reason for vendors maybe because they have the modal resources of knowledge in ERP. And for customers, it takes time to train skilled IT personnel to fulfill the requirements of ERP. Once this kind of employees resigns their position, it will greatly affect the working process and morale. As mentioned by Kumar, Kumar and Maheshwari this often results in high employee turnover rates and leads to overdue time for ERP project because the company needs to train a new unskilled employee from the beginning (Kumar et al, 2003). But problems actually do not just rise in the companies; external service providers (such as consultants) themselves are unable to maintain continuity of customer support personnel.

Supporting Kumar, Kumar and Maheshwari opinion’s above, it is interesting to view that our consultant respondent from Sogeti, Pär Hansson, is formerly worked in a company dealing with supply chain management before he became a consultant. Kumar argued that unfortunately some employee with ERP experience finally ended up being ERP consultants (Kumar et al., 2003).

Pär Hansson even mentioned that his previous experience brings an added value to him when he approaches a company as it adds his personal competency (P. Hansson, personal communication, 2005-03-21)

Consultant and vendor support

Both customers and consultants ranked this factor with number 2, which is medium critical. We thought this might be because of their strong relationship during ERP im-
plementation. But both vendors have completely opposite answers, one ticked 1 and the other ticked 3. Some famous vendors can deal with the technical problems effectively and efficiently because they have sufficient internal resource, but some not. This point somehow explains why their opinions differ with each other.

**Monitoring and evaluation of performance**

All the three parties voted that it was less important than other factors. Once a new information system is implemented, the job of monitoring and evaluation has to be done naturally, which is not particular for ERP packages.

**Problems anticipation**

The vendors put it in the most critical field, but both customers and consultants don’t think so. They categorized it into less critical. For the customers that do the real work of implementation, they know there will be technical problems after introducing a new information system. Therefore, it is natural work to anticipate the problems and solve them. But for vendors that supplies and nurture the software, any problem that occurs in the software would be considered important.

**Organizational culture**

This factor is the most disputed one. Different respondents showed distinct ideas, some thought it was critical, but some not. Maybe the nature of culture can explain why. Because companies cultivate their own culture, and accordingly, they share different opinions in organizational culture, for example, the importance of organizational culture and how to manage it for the sake of organizational goal.

**Effective communication**

Effective communication received almost the full votes of its importance from customers, consultants, and vendors. We can try to think about it in the opposite direction. If there is no effective communication for the new project from top to bottom, the ERP implementation surely will fail.

**Cultural diversity**

As in cultural diversity, the opinions from respondents are in a random. There is no rule or regulation to follow in this factor. We think the different practices in ERP implementation bring this result.
6 Conclusions

The conclusions sum up the analysis to present the most important aspects of the research. Based on the empirical findings, these aspects are indicated and discussed with our own views in focus, together with the problems identified in Chapter 1.2., in order to fulfill our purpose.

ERP systems link together an organization’s strategy, structure, and business processes with the IT system. For every company whatever the reason they come to decision in implementing ERP, they need to comprehend ERP as a broad and complex system, involving a lot of resources, efforts, and cost. It would need to assimilate ERP in the enterprise. After reviewing the literature articles and analyzing empirical case studies, we can reveal the list of critical success factors, the rank of their criticality, and the different opinions among three involved parties (customers, consultants, and vendors).

Researching the related books articles, and empirical respondents about ERP implementation, we list 11 CSFs that we think are most essential for the success. We argue that their importance is related with the implementation process.

Table 6.1. The importance of 11 CSFs for customers, consultants, and vendors

<table>
<thead>
<tr>
<th>The most critical Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Top management support</td>
</tr>
<tr>
<td>• BPR</td>
</tr>
<tr>
<td>• Project team &amp; change management</td>
</tr>
<tr>
<td>• Effective communication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The medium critical factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• ERP strategy</td>
</tr>
<tr>
<td>• Consultant and vendor support</td>
</tr>
<tr>
<td>• Organizational culture</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The less critical factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Retain the experienced employee</td>
</tr>
<tr>
<td>• Monitoring and evaluation of performance</td>
</tr>
<tr>
<td>• Problems anticipation (troubleshooting, bugs, etc.)</td>
</tr>
<tr>
<td>• Cultural diversity</td>
</tr>
</tbody>
</table>
In addition to these 11 factors, there are three other factors that need to be taken into account according to the new findings: testing (pre-stage); business model (suitability); client’s resources.

Looking through the empirical findings from customers (VSMgroup & Scania), consultants (Sogeti Sverige AB & SYSteam), and vendors (Oracle & SAP), we get the criticality ranks of the above 11 factors. The analysis shows that customers, consultants, and vendors differ with each other in viewing these 11 factors. The following table can explain the differences clearly.

Table 6.2. The diversity in opinion of 11 CSFs among customers, consultants, and vendors

<table>
<thead>
<tr>
<th>Agree as critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
</tr>
<tr>
<td>BPR</td>
</tr>
<tr>
<td>Project team &amp; change management</td>
</tr>
<tr>
<td>Effective communication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agree as less critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring and evaluation of performance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Disagreement / Random opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP strategy</td>
</tr>
<tr>
<td>Retain the experienced employee</td>
</tr>
<tr>
<td>Consultant and vendor support</td>
</tr>
<tr>
<td>Problems anticipation</td>
</tr>
<tr>
<td>Organizational culture</td>
</tr>
<tr>
<td>Cultural diversity</td>
</tr>
</tbody>
</table>

The agreement in the first table pushes them to stand in the place of first rank (the most critical factors), and meanwhile it enables the less criticality of the factor of monitoring and evaluation of performance. The three involved parties are engaged in different busi-
ness process, viewing from different perspectives and cultivated distinctive organizational culture, which can explain the disagreement in the remaining 6 factors in some way.

Conducting the research has gained us deepen understanding about the most important critical factors, knowing why they are critical, and viewing the degree of importance from three different perspectives (companies, consultants, and vendors). In a word we can say that we have fulfilled our research purpose. Besides answering our research questions, the extra findings add our knowledge of the real business world.

With better understanding of the issues involved in ERP implementation, management will be able to make critical decisions and allocate essential resources that are required to make ERP implementation a success.

6.1 Recommendations

The conclusions already answered our research questions in the introduction chapter. Except that, we can draw some other recommendations from the empirical case studies that we think are useful for the ERP implementation.

1. The customers/companies should increase their independence in ERP implementation (from Sogeti).

In the interview with Sogeti, Pär Hansson, the respondent, added that companies mostly depended on consultants’ suggestions especially when the consultants had sufficient experience in that particular business (P. Hansson, personal communication, 2005-03-21). For example, he was working as a manager in logistic and supply chain management before he became a consultant. It is good for the consultants on one side, but if the customers depend too much on the consultants, it is not good because the companies know best about their own business. And to boldly follow consultants’ suggestion will not always be good for the customers. Companies should not completely rely on consultants, as consultants also have limited specific knowledge of the companies’ operation (Caldas and Wood, 2000).

It is essential to get support from consultants and vendors because of the characteristic of ERP package. However, there is a lot of work that the customers should do by themselves in the real implementation process. The key actors in the implementation is the customers/companies themselves.

2. It is not the software but the way of handling that leads to the success or failure of ERP implementation (from VSM Group).

It is interesting that Peter Josefsson mentioned that the software that was used was not very important because basically most of them (Oracle, SAP, JD Edwards, SSA global) had similar capabilities, although some vendors were well known for certain specific industries or functions (such as the financial applications in Oracle). He further thought what was important was how the implementation was conducted, which would lead to the usefulness of the software (P. Josefsson, personal communication, 2005-04-20). If there is no problem when they are going live, and all the users understand how to use the system, then whatever the software is chosen it will support the business activities.
3. ERP implementation concerns more work of dealing with people than only performing technical tasks (from SAP).

We quoted the words from Guus Greusen in SAP, “Sometimes, human factors are more important than technical problems” (G. Creusen, personal communication, 2005-04-28).

The degree to make people aligned with new information system distinguishes the performance of ERP implementation. For the four most critical factors, there lies a lot of people work in top management support, BPR, project team & change management, and effective communication in order to secure the success of ERP implementation.
7 End discussion

This final chapter is introduced with a reflection on the results of the whole study from a critical point of view. It contains thoughts around applicability of results, and implications for future research.

In today’s competitive environment, the apparent development and changes in business markets puts more pressure on companies to respond faster to customer trends and needs, which aims to gain sustained competitive advantage. The implementation of ERP brings about both opportunities and risks for the companies. Once they find an efficient way to deal with ERP, they will benefit the great advantages of ERP. On the other hand, if they handle the ERP in an improper way, they probably have to scale back their projects and accept minimal benefits, or even abandon implementation (Marcus & Tanis, 2000).

The results of this research imply the most critical success factors in the ERP implementation for the companies. To secure a success ERP implementation, there are lots of tasks that should be considered and worked on. It is difficult to put the same efforts to all the factors facing ERP implementation. But how to allocate the limited resource to some essential tasks and aspects will make more sense to the companies. To realize the different criticality and importance and also focus on these issues is another academic contribution to scientific research.

7.1 Critical reflection

As we mentioned in Chapter 2.4.1, we chose the six respondents due to their availability and location. They are quite different with each other in size and oriented business. The limitation of the resource hinders us from following two main customers/companies, and searching for their vendors and consultants for ERP implementation. This leads to the situation that we couldn’t find the detailed reason for some random results in our rank list of CSFs.

Another critical aspect is the number of respondents in each party (customers, consultants, and vendors) for the empirical study, which are two per party. Having more participants would have justified for a higher degree of theoretical generalization and research applicability. However, in our opinion, the research results have fulfilled the purpose, and furthermore, we are satisfied with the extra empirical findings, which is discussed in Chapter 6.1.

7.2 Implications for future research

Once the criticality and importance of 11 factors has been stated, the following research can be continued and deepened into how to handle the four most critical factors. How to do a better job in top management support, Business Process Reengineering, project team & change management, and effective communication? There will be some interesting fields to dig in on these four aspects, and each aspect can take a lot of words to explain and address. This research work can make companies better prepared for the success in ERP implementation.
Furthermore, to distinguish the roles and responsibilities of three involved parties (customers, consultants, and vendors) can also be looked into in the future research. All the three parties participate in the implementation process of ERP, and the harmonious cooperation cannot be neglected to achieve the success in ERP.

To sum up, both of the future research concerns about the detailed aspects in the success of ERP implementation. As a great step in the evolution of information systems, the dream of ERP should come.
Appendix 1 – Interview guide for empirical study

**Q1:** Can you please explain your role or position in this company?

**Q2:** What kind of Enterprise Resource Planning (ERP) software do you supply the customers/are you using?

**Q3:** What kind of industries are your main customers? Are they mostly big, medium or small scale enterprise?

(for customers/companies, skip this question.)

**Q4:** How do you help your customers in ERP implementation?

**Q5:** What do you think are the critical success factors in ERP implementation?

**Q6:** Why do you think they are critical?

**Q7:** According to our research from reference books and journals, we have identified some critical success factors in ERP implementation, what do you think of these factors (listed below). Do you agree or not? Why?

If the answers of Q5 are included in the above factors, we are going to leave them out, and then we will ask the respondents what they think of the remaining factors.

**Q8:** How importance is each factor according to your opinion? Why?
Appendix 2 – CSFs rank for empirical study

Please rank the CSFs below according to the importance.
1 = strongly determine the success
2 = determine the success
3 = necessary for success

1. Top management support
2. ERP Strategy
3. Business Process Reengineering
4. Project team & change management
5. Retain the experienced employee
6. Consultant and vendor support
7. Monitoring and evaluation of performance
8. Problems anticipation (troubleshooting, bugs, etc.)
9. Organizational culture
10. Effective communication
11. Cultural diversity

Tack så mycket
References


Website references:

http://www.capgemini.com/about/
http://www.sap.com/company/index.epx
http://www.scania.com/about/company/
http://www.systeam.se/
http://www.vsmgroup.com/225.htm