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# Preparing for ERP Implementation

Case Study

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## **Preface**

After working five years in the case company, I felt that I needed something that would support me in my further career plans. This Master's degree Program in Industrial Analysis exceeded my expectations. Although it has been a long and a challenging year, it has been very rewarding.

I want to thank Dr. James Collins and Dr. Marjatta Huhta for their tenacious support and professional guidance during this study, as well as Zinaida Grabovskaia, PhL for all the assistance.

Finally, I would like to express my gratitude to my wife, Jasmiina, for her support and encouragement, as well as taking care of our son during my studies.

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<p>This Thesis develops a proposal for Operations and the local management in the case company how to prepare for ERP implementation and ensure successful implementation.</p> <p>ERP implementation can be considered successful when the ERP system has been in effective use after a certain period of time after implementation. The objective of this Thesis is to create recommendations and action points how to ensure the efficient implementation of ERP. The Thesis is focused on the pre-implementation phase and the target is the Operations department. The need for this study has become evident since the case company has decided to implement a new ERP system organization wide.</p> <p>This study applies a descriptive single case study method. First, the current state of the ERP usage is analysed and the data collected by interviewing employees from the Operations. The findings from the current state analysis are then combined with the findings from the literature and best practice and the first draft of the recommendations for ERP implementation is built. Recommendations are then validated by the experts and case company employees, and the final version with the action points is created.</p> <p>With the help of this study it is possible for the case company to increase the importance of the ERP system and ensure the efficient and innovative use of ERP.</p>	
Keywords	ERP, Enterprise Resource Planning

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## 1 Introduction

Enterprise resource planning (ERP) is a system that collects all the company data from different stages and gives a real-time view of the business. ERP can also be thought as an ideology. ERP software or solution is business management software where the best business practises have been built in by the software providers. The purpose of ERP is to give managers better support for rapid and accurate decision making.

### 1.1 Case Company and the Unit

The case company of this study is a Finnish site of a multinational company and the principal company is in England. The principal company is a leading provider of high technology tools and systems for both, research and industry. The company designs and manufactures equipment that can fabricate, characterise, manipulate and analyse matter at the atomic and molecular level. (Case company website). The company was established in 1959 and currently has over 2000 employees worldwide.

The case company of this thesis was acquired by the principal company in 2004 and it was originally a part of a large Finnish stainless steel company. The case company has approximately 60 employees and functions as a XRF Technology centre in Finland, as its main business is to design and research new XRF instruments as well as research and manufacture detectors and proportional counters. This thesis is done for the Operations of detector production in the case company. The case company is described more precisely in Section 3.1.

### 1.2 Business Problem

The company has been expanding by acquiring smaller companies worldwide. Currently, the company already has 43 sites in 14 countries. As the individual companies have had their own ERP systems, if any, these multiple acquisitions have led to the situation in which the acquired sites cannot share their up to date data easily and immediately. Additionally, the communication and reporting between the sites has been difficult and occasionally inaccurate. Since currently the data provided from the existing



ERP system is being uploaded to the corporate database monthly, it makes it not possible for the main company to have the most recent and up-to-date data. Therefore, the company has decided to implement and already selected a new conjoint ERP system to eliminate these risks and to have up-to-date data for more accurate decision making.

By the principal company decision, the conjoint ERP has been selected to be implemented across the sites. To get full potential out from the new ERP, its daily use has to be effective and active. For that reason, the operators, i.e. the employees in the Operations of the case company, have been given a crucial role in the implementation of the ERP. This means that the unit in Finland will be responsible for implementing the new ERP system later this year or early next year. The new ERP will replace the current one which was implemented over a decade ago. As the researcher is part of the Operation's Extended Core team, his role will be to concentrate on the ERP implementation.

### 1.3 Research Objective and Scope

The objective of this Thesis is to develop recommendations for the local management team how to prepare for the new ERP implementation in the Operations department of the case company.

This case study concentrates on the preparation stage, before the new enterprise resource planning (ERP) software in the case company is taken into use. The focus of the study is more particularly on the pre-phase of the implementation. The goal is to study how the implementations were carried out in the previous cases, what are the critical elements in the successful implementation and to give recommendations what should be taken into consideration to make the planned implementation successful. The later stages lie outside the scope of this Thesis, but they are briefly discussed in the Practical Implications in Section 7 as the steps necessary to be taken after the ERP has been in efficient use for a certain period of time.

There has been a project team established in the main company for the implementation of the new ERP. The project team consists of Steering Committee, Core team and Extended Core team. Because of the existing project team as well as the new ERP software provider has already been selected, it is safe to assume that instructions to actual

implementation will mostly be addressed to them. Therefore, technical, IT related issues are not included in the scope of this Thesis.

#### 1.4 Structure of the Thesis

This Thesis is written in six sections. Section 1 introduces the case company and the research objective; it also defines the research problem and objective before further analysis. Section 2 describes the research methods and research design; it describes how the research in this Thesis is done. Section 3 presents the case company in more detail and discusses the results of the current state analysis on the research problem. Section 4 is an overview of the literature and best practise related to the ERP implementation. In this section the conceptual framework is built which will be utilized in the following section. In Section 5, the recommendations are build according to the conceptual framework and then validated with the expert team. Section 6 discusses and summarizes the research and also action points for the management to consider before the ERP implementation.

## 2 Research Method

This section describes the research method, research design and data collection in this Thesis. In this study, qualitative research methodology is applied in a case study research approach. The case for this research is to study the current use of the ERP within the Operations of the case company. Qualitative research methodology is suitable for this case because the case company has had implemented ERP once before and it is possible to study the reasons why the ERP is not used well as intended.

The purpose of this section is to introduce why this study is important to the case company. With the help of this study, it is possible to increase the meaning and the relevance of the ERP system in the case company and accordingly efficient use and as a result, more accurate data will be available. As the use of the ERP system is mandatory in the case company and the new system will be implemented to the all sites of the principle company, it is important that the system will be used efficiently and actively.

### 2.1 Research Design

This study applies a descriptive single case study research design. The case study research is defined by Yin (2009) as an analysis of holistically studied phenomenon. The information of the phenomenon is from the real-life and it can be from a single case or multiple cases.

A descriptive case study focuses explicitly on an individual or a small group in a defined case. The research design of this Thesis is based on the descriptive case study research approach. The design in this study is described in Figure 1 below.

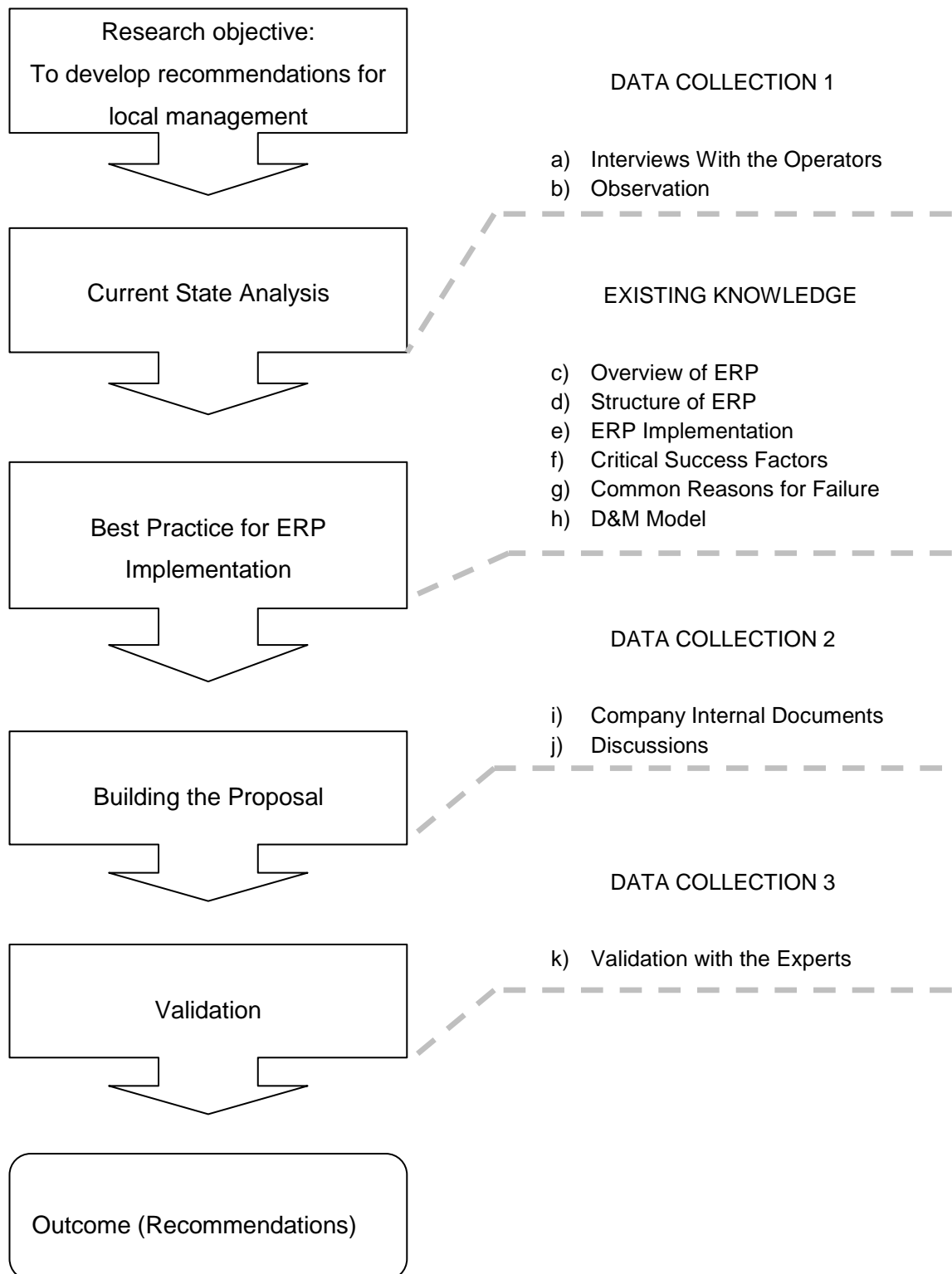


Figure 1. Research design of this Thesis.

As Figure 1 shows, this Thesis starts with defining the research objective. In the next step, data has been collected for the current state and analysed. The data has been collected by interviewing the current ERP users in the Operations of the case company and by the observations by the researcher. In the next phase, the literature is reviewed by taking the findings from the interviews into the consideration. The research design also includes ERP implementation best practises from the literature to further investigate and re-check the key points that come out in the interviews. In the final phase, as an outcome of this Thesis, there are recommendations suggested for the management in the case company what should be taken into the consideration when implementing the new ERP successfully.

## 2.2 Data Collection and Analysis Methods

There are several ways to collect data for the research. One of the key points for collecting data is selecting a method that gives valuable results and correct type of data (MacNealy 1997: 186). Data collection phases for this study are shown in Table 1 below.

Table 1. Data collection details.

<b>When</b>	<b>Data 1</b>	<b>Data 2</b>	<b>Data 3</b>
January -14	Current State Analysis: <ul style="list-style-type: none"> <li>- Interviews (n=7)</li> <li>- Observations,</li> </ul> Researcher's 6 years experience in the case company		
February -14		Challenges: <ul style="list-style-type: none"> <li>- Company Internal Documents</li> <li>- Business Management System</li> <li>- Process Maps</li> <li>- Discussions with</li> <li>- Business Controller</li> <li>- Operations Manager</li> </ul>	
April -14			Validation: <ul style="list-style-type: none"> <li>- World Cafe with 7 operators</li> </ul>

In the first data collection round for the current state analysis, data has been collected by interviewing seven persons from the Operations of the case company. They were selected because the Thesis focuses on the Operations department of the case company. Additionally, five employees were interviewed from the production, their team leader and one purchaser. They also use current ERP almost daily and their work as well as ERP use, although it is rather minimal, has a great impact on the reporting and data validity the ERP provides. Finally, the researcher's observations were also included. Table 2 below presents the details of the interviews.

Table 2. Interviewee Details.

	<b>Interviewed</b>	<b>Date</b>	<b>Content</b>	<b>Documentation</b>
A	Micromechanic	31.1.2014	Concerns on current and the new ERP	Field Notes
B	Micromechanic	31.1.2014	Concerns on current and the new ERP	Field Notes
C	Micromechanic	31.1.2014	Concerns on current and the new ERP	Field Notes
D	Micromechanic	31.1.2014	Concerns on current and the new ERP	Field Notes
E	Micromechanic	31.1.2014	Concerns on current and the new ERP	Field Notes
F	Logistics Coordinator	31.1.2014	Concerns on current and the new ERP	Field Notes
G	Detector Production Team Leader	31.1.2014	Concerns on current and the new ERP	Field Notes

The interview sessions were carried out on 31st of January 2014. A meeting room was booked for the occasion and each interviewee had pre-reserved 45 minutes slot. The interviews were agreed to be held in Finnish as were field notes captured from the interviews. MacNealy (1997: 190) argues that video or tape recording the interviews are the best tools for capturing the session. But the tape and especially a video recorder make the atmosphere tense during the interview and for that reason it was avoided. Therefore, field notes were selected as capturing method. The interview questions are listed in Appendix 1. These questions were selected based on the informal discussions

before the interviews and on the researcher's observations from working in the case company.

For the team discussion, this Thesis has not categorized a particular list of questions, instead, as MacNealy (1997: 188) suggests, the themes for discussion has been selected that capture the best essence of the subject. This discussion thus included open-end questions guided by the researcher.

The second data collection round is used in Section 5.1 when the challenges of the current systems were described for the building the proposal. The company internal documents, such as internal process maps and system reports, supported by the team discussions with the other stakeholders were used.

As a third data source for the validation of the proposal, a World Cafe method was used. According to Carson (2011: 11), World Cafe method is used to have more open discussions among the attendees in a welcoming atmosphere. It is also recommended that the participants have the knowledge and experience about the topic (Carson 2011: 11). The participants that attended the World Cafe sessions were the same seven operators who were interviewed for the current state analysis. They have the knowledge and experience on using ERP and the World Cafe method was a valid method for this round of data collection.

### 2.3 Reliability and Validity

As this Thesis applies qualitative research methods, validity and reliability has to be ensured. As Patton (2001) defines, qualitative research studies phenomenon from the real life and produces findings related to the case context. Patton (1999; 1990) has also described three aspects that affects on validity and reliability of the qualitative research, methods how data is collected, credibility of the researcher and philosophical belief in the value of qualitative inquiry. According to Golafshani (2003: 600), the credibility of the qualitative study has to be tested and demonstrated.

In this Thesis, the reliability will be secured by ensuring trustworthiness and authenticity of the results. Firstly, as this study is a single case study, the research design includes the current state analysis, then building the recommendations and validating them, before the final proposal is suggested. In each phase, data collection will be included with the reliability increased by ensuring the richness of the data and collecting data at

different points of time. In the first data collection round, all full-time employees will be interviewed to secure the fairness of the research objective. The research method applied in this Thesis is qualitative research method. The questions used in interviews for gathering data are empirical and open type of questions. This is done to ensure wider and more meaningful results for the current situation. Secondly, the credibility of this Thesis will be ensured by triangulation of methods for data collection and data sources. According to Patton (1999: 1993), the triangulation can be achieved by combining different kinds of methods, samples and perspectives. Thirdly, the researcher's bias will be avoided as much as possible by interviewing and involving the key stakeholders in the team discussions. The final requirement, dependability, will not be completely achieved due to the subject of this study and time limits.

The validity of this Thesis will be ensured by arranging a validation session with the experts to evaluate the draft version of the recommendations. Validity will be increased by applying the findings from the existing literature and using a well-established model to produce the outcome for this study. The researcher's relationship to the interviewees will also be described.



### **3 Findings of Current State Analysis**

This section, first, presents the case company followed by the current state analysis and discussion on the findings from the interviews. The findings from the current state analysis are based mainly on the interviews with the key stakeholders. The researcher's observations are taken into consideration later in Section 4.6, Building the Recommendations.

#### **3.1 Case Company**

The case company of this report is a local office of a British company. The case company, located in Espoo, Finland, was acquired by the principle company in 2004. The company's head office is located in Oxford, England. The company was founded in 1959 and it is one of the most successful University spin-off companies in England. Oxford Instruments plc listed in London Exchange in 1983 and reached FTSE 250 index in 2011. The company has approximately 2000 employees.

The company was acquired by the principal company in 2004 and it was originally part of a large Finnish stainless steel company and it became the case company. The case company has 60 employees and currently the XRF technology center in Finland, whose main business is to design and research the new XRF instruments, including handheld analyzers.

The original idea for the XRF handheld analyzer came from a large Finnish mining company specialized in stainless steel. They found that it would be cost efficient if the drilling samples could have been analyzed quickly on site instead of sending samples to laboratories. The first unit was manufactured in 1976. Unit weight over 10kg and it had radioactive source in side. It was designed for the company own use. Today the latest units weight less than 2kg, radioactive source has been replaced with x-ray source and the product can be used on many different fields.

These products are now used on many different fields and for many different purposes. Main applications are sorting scrap, Positive Material Identification (PMI), mining, soil and precious metal. The product is same for every application but the specialization to different fields is done by calibrations and applications embedded in the system. This is

considered as an embedded service. The total annual sales of XRF handheld products are approximately 10 000 units and this is divided between five major manufacturers.

### 3.2 Key Findings

This section describes the findings from the first data collection which was the interviews of the seven operators from the Operations as presented in Section 2.2. The questions were developed based on the researcher's experience on the topic in the case company. The questions were designed to clarify how they were introduced to the current ERP, the reasons why the current ERP is such unpopular in the case company and what are their key concerns related to the implementation of the new ERP and the system itself. Additionally, if the employee was in the company when the current ERP was implemented, the experience on that was asked.

As background information ERP is not widely nor often used by operators as the actual work happens in a production stations. Even that the researcher of this study works in the case company in the same department with the interviewed employees, it was a surprise how much resistance there are against using the ERP. Additionally, it was difficult to get proper results for analysing. Results below include great deal of interpretation.

The results are shown in themes as explained in Section 2.3. The resistance for using the ERP is explained by these three themes:

- the lack of training
- the lack of engagement
- no key concerns related to the new ERP.

Because of the small sample size of the interviewed employees, the interviewees' answers can be led from the titles presented in Table 2. Therefore, the quotations in the following sections are not specified to the interviewed A, B, C, D, E, F or G. Additionally, quotations have been translated from Finnish to English by the researcher. There were three main findings from the data 1.

### The Lack of Training

As the starting point it was asked how the training and introduction to the ERP in use happened. The main theme that was mentioned by every interviewed was the lack of appropriate training. It turned out that in the most cases the training was done only shortly by co-worker as a one working step during the learning the job. Additionally, no specific trainings have been arranged on the ERP which would explain and teach deeper knowledge of the system.

*Training was arranged poorly. Own learning has happened by learning from the mistakes and the knowledge had to be discovered from other employees from other departments (interviewee response, Data 1).*

When there are no training and introduce arranged for the ERP it has lead to another unsustainable situation. When there is no organizational culture how the ERP should be used, the employees can try to “beat the system” to achieve set targets.

*By cheating you can do anything (interviewee response, Data 1).*

It is also important to recognize the settings and the environment of the training. One interviewed had taken part in a training for larger group which was not found useful as the own personal needs could not be covered in enough details.

### The Lack of Engagement

The second main theme is closely related to the lack of training. When the employees lack engagement, they do not understand or are not interested in knowing the whole picture and why the use of the ERP is so important. The results of actions operators do in ERP are not well known.

*It feels complicated to use the ERP and I am afraid to try (interviewee response, Data 1).*

Additionally, it seems that the use of ERP is seen as a mandatory, extra step, in the daily work. Operators could do their work without ERP; ERP is only used in the last

step to record the actions done into the system. According to the interview results, this step would rather be excluded from the operators' responsibilities and should be done by someone else.

*It would make sense to understand why this has to be done and why the actions in ERP are needed. Also understanding the consequences what happens if I press this button would be nice (interviewee response, Data 1).*

This leads to situation where the operators lack the self-confidence and knowledge of developing the process or to do the actions, for example, to recover from wrongly entered data.

#### Key concerns

The final main theme that was recognized was that there were no key concerns about the new ERP. There are several reasons for that. The main reason is related to the fact that ERP plays only little role in their daily work.

*I don't use ERP every day, but almost daily. Mainly the only action I do is the one step in the manufacturing process to record the stock actions (interviewee response, Data 1).*

Another reason is that current way how the operators use the current ERP. They have very detailed instructions what to follow in each work step. Similar instructions are expected to be received for the new ERP from the key user or users of the new ERP.

*No concerns because there will be instructions anyway (interviewee response, Data 1).*

The final reason for no key concerns is the researcher's observation. As the new ERP project in the principle company is in designing phase at the point of when the interviews were accomplished, the new ERP has not yet been very widely communicated and, therefore, it is not known among the employees what to expect, how it will be different to use, and what can be expected from the group level implementation team.

### 3.3 Summary

As summary from the interviews it is clear that implementation plan for the new ERP is required to cover the subjects found from the interviews. The users' attitude towards the ERP is critical if the company wants to have ERP used efficiently. Also the organizational culture has a key role on how important ERP is to the company. With the open organizational culture, the employees can be shown the outcome of their action and based on the interviews, this would increase their likelihood to use ERP more often and innovative.

## **4 Best Practice for Enterprise Resource Planning**

This section describes ERP, implementation, the main recognized parts, and focuses on seven subjects for answering the research question of what the company of this Thesis should take into consideration when preparing for the new ERP implementation. The themes recognized from the interviews and also best practises are discussed to cover the main suggestions that are seen useful.

This section is divided in eight sub-sections. First, ERP is overviewed. Secondly, ERP implementation is described shortly. Then, critical success factors for the successful implementations are presented and followed by the common reasons why the implementations have failed. Next, the model for the Thesis is overviewed and, finally, the conceptual framework is build.

### **4.1 Overview of ERP**

This section is divided in two sub-sections. First, the evolution of ERP is described with the connection to the evolution of marketing. It tells shows how ERP has developed and explains loosely how the development of marketing has set the requirements for ERP. Secondly, the structure of ERP is described.

#### **Evolution of ERP**

Enterprise Resource Planning (ERP) has been developed to support businesses to run and operate more efficiently. ERP has developed in the line with the evolution of marketing. ERP originates from Material Requirements Planning (MRP) and the first forms of MRP were formed in the 1970s for manufacturers to organize information flow in the manufacturing processes (Beheshti 2006: 186).

During the next decade capacity resource planning was included in the MRP and a new Manufacturing Resource Planning (MRP II) became available (Martinek and Szikora 2005: 418). Later in the 1990s, when technology developed rapidly, ERP was developed by integrating all the internal processes in to the MRP II. Also some of the intercompany processes such as the supplier and customer relationship management were included. Figure 2 below summarizes the evolution of ERP.



Fig 2. Evolution of ERP (Rashid et al. 2002: 4).

The evolution of ERP can be linked to the evolution of marketing. According to Vargo and Lusch et al. (2006: 6), before 1960 the marketing were based on goods-dominant logic. The main focus was to manufacture products to the markets. This period is called as “to market”. During the next decades the marketing moved towards service-dominant logic. Lusch et al. (2006: 6) describe the period from 1950 to 2010 as a “market to”. Customers and markets were analyzed and the manufacturers manufactured products to meet the markets needs. This created a need for better controlled manufacturing. In the most recent years the IT and mobile technology has made possible for ERP systems to develop to support the latest trends which Lusch et al. (2006: 6) define as “market with”.

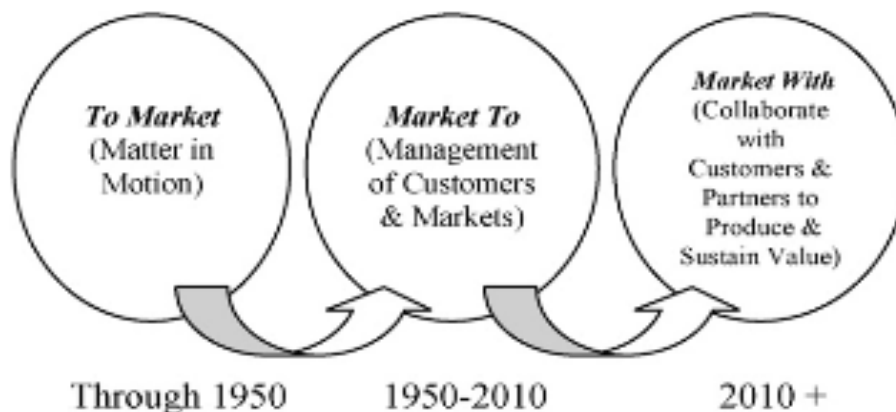


Fig 3. Evolution of marketing (Lusch et al. 2006: 7).

ERP combines together all the internal business processes and also some of the inter-company processes. Main functions of ERP, also called as modules include the following:

- Customer Relationship Management
- Data Services
- Financial Accounting
- Human Resources
- Management Accounting
- Manufacturing
- Order Entry
- Project Management
- Supply Chain Management

ERP does not only combine business processes together within a company or a department but the most benefit comes when a multi-national company with several departments integrates into the one ERP. In many cases, especially when acquisitions have been done, there are several different systems or ERP within one company. In these cases usually separate reporting system is needed for gather information from each department or site. This causes additional work when data has to be entered manually and risk of inaccurate data increases. Additionally, when the data is not up-to-date, it does not support quick decision making. By integrating all the data in to one system, ERP, accurate data is available for planning and decision making. It also makes easier to correct errors in data from one source than to trace and correct it in various places.

Another widely recognized (Calisir and Calisir et al. 2004: 506) benefit from ERP is its capability to improve internal processes. As Beheshti (2006: 187) states, a company is profitable when the product or service it provides through the value chain can be sold for more than the expenses in the production were. ERP can for example help to identify costly processes, track the poor quality and improve business processes.



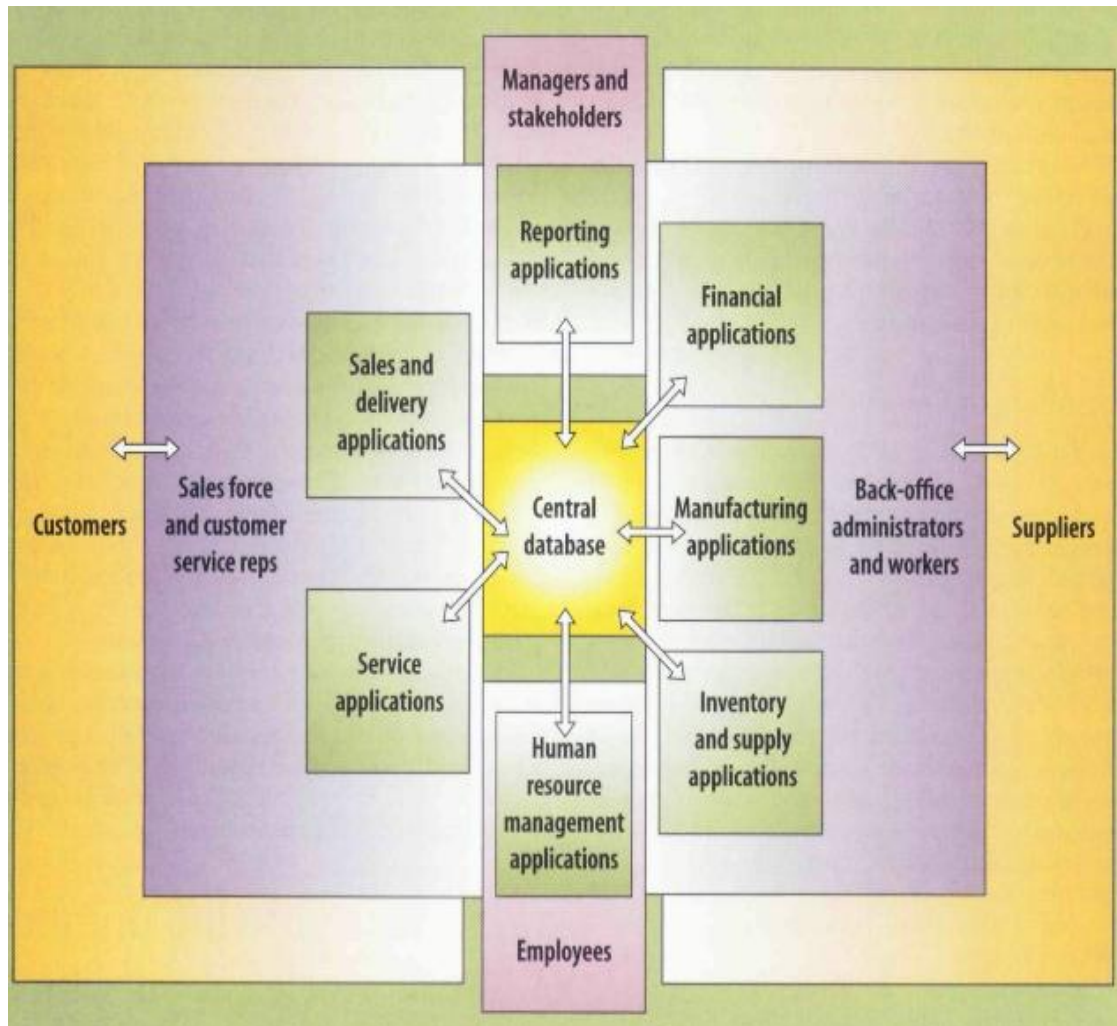


Figure 4. ERP Modules (Davenport 1998: 124).

As Figure 14 presents, ERP system consists of applications that are designed to serve four major stakeholders; management, employees, internal customers and external customers. Between internal and external customers there is central database that stores the data from all the modules within the ERP. Applications are to run the organization and the business within the company. Data available from the database can be accessed from each stakeholder group. For internal customer, ERP systems usually have modules or applications that are needed to run the business, such as financial, manufacturing, supply chain, human resource, sales, service and reporting.

#### Structure of ERP

ERP systems are designed to have all business processes and best practises in the one software. It is a companywide system that offers users one user interface which

can be usually be tailored for user's specific needs. All the users share same application and database.

Basically there are two options where the company can choose; vanilla or customized ERP. Vanilla ERP is basic ERP that the provider offers. It does not include any customization. Benefits of the vanilla ERP is that it's cheaper to implement as it does not require as long designing phase as customized ERP does. Additionally, vanilla ERP is easier to update later as the software communicates more easily with updates the software provider might offer. On the contrary, customized ERP requires longer and detailed planning. Therefore, it is more expensive to the customer and the updates are not as easy to implement. Customized ERP can however provide an advance if it is tailored and based on customer organization's requirements.

The ERP system is based on the database. Data across different business units or functions is stored in a database which is shared among every user and, therefore, the same, up-to-date and accurate data is available for every user across the company. On the database, the ERP software provider has built an application. Application includes industry's best practises and includes selected modules, as listed in Section 3.1. Then the application has Graphical User Interface (GUI) whereby the user can use the application and access the database. The basic structure of the ERP is presented in Figure 5 below.



Figure 5. Basic structure of ERP.

In ERP users can be divided in user groups. The GUI can be modified for each user or user group. The modification depends on the role of the user, the employee, and user or user group can be given an access to different modules or functions which are relevant to the employees' work

## 4.2 ERP Implementation

ERP systems are so complex that the implementation can take years for the bigger, global companies. Moreover, the bigger the company is the more expensive the implementation is. Although IT technology has a great deal in ERP implementation and ERP is considered as software, ERP affects how the company runs the business. Since ERP implementation changes how the company do business, the employees have to change the way they do work as well. Often organizations focus on technical aspects by building the IT structure and then the need and long-term value of change is neglected (Jarrar et al. 2000: 122).

Easy and risky way to measure the success of ERP implementation project is to measure only two characteristics: ERP is running well and the implementation budget or the project deadline has not been exceeded (Jarrar et al. 2000: 123). These measurements pave the way for the idea that only the functionality and usability of the ERP is important and the actual users, the employees, are not in the scope of the implementation.

The implementation consists of three stages as shown in Figure 6.

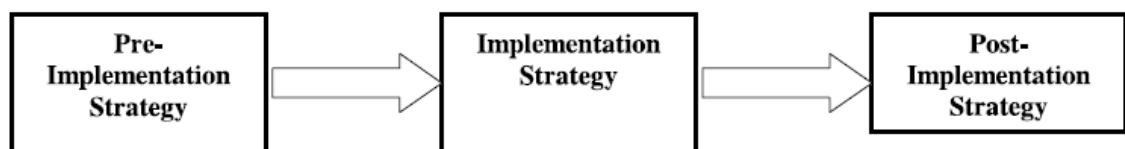


Figure 6. Stages of the implementation (Mandal and Gunasekaran 2003: 277).

As shown in Figure 6 the implementation consists of three stages: Pre-Implementation Strategy, Implementation Strategy and Post Implementation Strategy. As defined in Section 1.4 – Research Objective, this study focuses on the Pre-implementation phase in the case company.

Mandal and Gunasekaran (2003: 275) support the proposition that the understanding the nature of changes is one of the key topics that implementation project demands. Other two key topics that Mandal and Gunasekaran (2003: 275) mention are a clear business objective and understanding the project risks.

## ERP in Operations

ERP plays a key role in the organization's business strategy but it is in even more important for the operations. If the company is not able to utilize the full potential the ERP offers, in the terms of the best practises or business processes implemented, the company can lose its competitive advantage (Gupta and Kohli 2004: 688). According to the research, ERP can cover only 70% of the company's needs and processes (Jarrar et al. 2000:124). For the remaining 30%, the company has to consider re-engineering the existing processes for being able to utilize the full potential of the ERP. Another important aspect is that the company should have clear strategies for functional areas and it has to support both the company's external customers, such as customers and suppliers, and its internal customers, such as the employees, management and production.

As Gupta and Kohli, (2004: 690) define in accordance with Porter's framework, ERP system has to be in line with. There are two types of strategies for a company in a manufacturing industry. First is the imitation where the company enters to the existing markets with the standard product that is usually low cost product. The second strategy is the innovation where the company provides highly customized and quality parts. These two different strategies have different requirements for the ERP. When the company is focused on the imitation strategy they prefer make-to-stock process. Illustrative to his process is that the company produce high volume products at the lowest possible cost. This emphasizes the requirements of the ERP to be on cost control such as procurement management and process optimization. In contrast, when the company has chosen the innovation strategy, it uses make-to-order process. This requires flexibility in the operations and ability to adopt in the changing environments. From the ERP make-to-order asks for more flexibility as well as better quality control and operations planning from the ERP.

In the next section the factors of the successful ERP implementation are described. These critical success factors, CSF, have been recognized from the successful implementations and studied by the researchers.

### 4.3 Critical Success Factors in ERP Implementation

There are two main research lines investigating successful ERP implementations; study of the case studies or best practises and the study of the Critical Success Fac-

tors, CSF. In the past the researchers has criticized the use of CSF in ERP implementation because the list of CSF can be seen as a long list of information, typical to any project management without focusing on the complexity of the ERP implementation. Only the latest researches propose that it is necessary to understand the relationships between critical success factors (Schniederjans and Yadav 2013: 365).

The research of CSF studies the conditions prior to the implementation that predict and explain the successful project. Researchers analyse the existing literature and by using coding technique for identified phenomena occurred in a successful implementation. For aiming completing the project successfully, with the recognized Critical Success Factors ERP implementation project team would be able to assess the project planning phase and direct effectively concerns to relevant stakeholders (Finney and Corbett, 2007: 330).

Jarrar et al. (2000: 123) categorize the critical success factors under the four main categories: top management commitment, change management, IT infrastructure and business process re-engineering. The relationships between the four categories are shown in Figure 7 below.

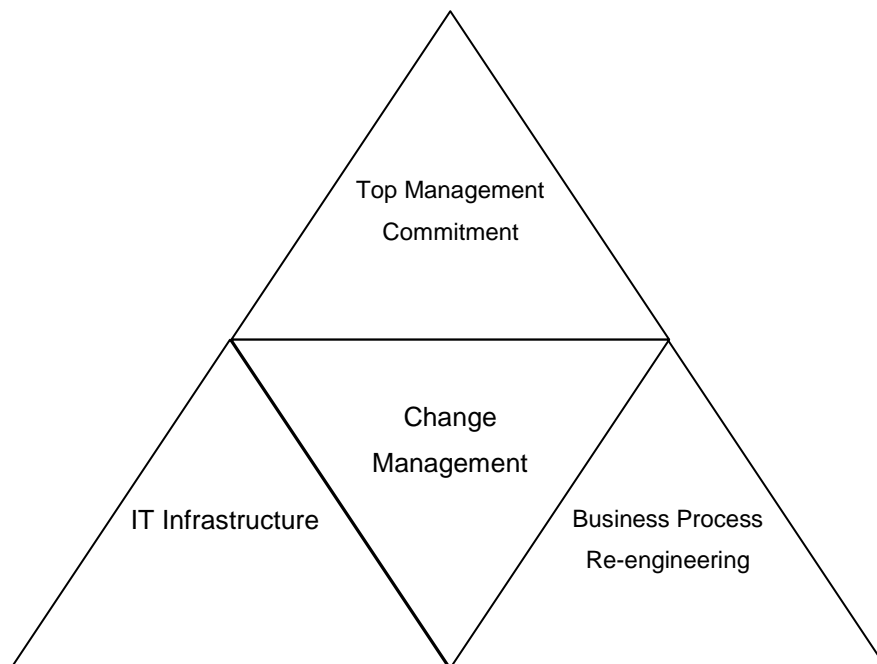


Figure 7. Main categories of critical success factors (Jarrar et al. 2000: 123).

Figure 7 presents how the critical success factors can be divided in the four main categories. Change management is in the middle as it is the major part of the implementation and affects on the other factors and categories.

Top management commitment is one of the most often recognized CSF. For succeeding project it is critical to have top management's strong and committed leadership (Jarrar et al. 2000: 123; Finney and Corbett 2007: 335). As it is stated in Section 4.4, ERP projects can easily turn to be purely IT project. Only the top management is able to emphasize the business aspect into the project which is vital for success.

IT infrastructure is a critical assess for the implementation. Schniederjans and Yadav (2013: 371) propose in their study that "IT capability level, constructed of IT capability, knowledge management system characteristics and CMM level, is positively associated with ERP implementation success". Therefore, IT infrastructure applies the organization's readiness to the new ERP.

Change management is an organizational aspect and also one of the most often recognized CSF. The new ERP implementation is always about to change how the company does the business and, therefore, change management is important for preparing the organization for ERP (Jarrar et al. 2000: 124). As recommend in the business literature, "planning the ERP project must be looked upon as a change management initiative are not an IT initiative" (Finney and Corbett 2007: 336). One factor that creates a demand for a change is when a global company implements a conjoint ERP. It brings different cultures, organizational cultures and the ways to do business together. When the way organization does business changes, it requires the employees to change the way they work (Jarrar et al. 2000: 124). When the organization has a culture that is open towards the changes, ERP implementation is more likely to success. This means that organizational atmosphere has to be built to be positive among the employees and approving for the project. This can be achieved by communicating the benefits and the need of the ERP (Finney and Corbett 2007: 336). Further on, organizational readiness in terms of organization culture can have an impact on knowledge sharing and, therefore, on the outcome of the ERP implementation (Schniederjans and Yadav 2013: 373). Thus, managing cultural changes makes an important part change management.

Business process re-engineering, BPR, should always be involved when implementing a new ERP. How the business operates after the implementation is dependable on the

outcome of the BPR (Finney and Corbett 2007: 337). Jarrar et al. (2000: 124) argue that, as stated in Section 4.3, the best ERP systems can cover only 70% of the company's needs and processes. By BPR the company is able to fulfil the missing 30% of the requirements as well as users' needs in ERP system (Jarrar et al. 2000: 124, Schniederjans and Yadav 2013: 372). Users' needs are essential for successful implementation of the ERP as "users can control the success or failure of a system" (Schniederjans and Yadav 2013: 372).

In summary the critical success factors can also be split in technological, organizational and environmental factors. Schniederjans (2013: 369) defines 33 critical success factors, as shown in Figure 8. In this Thesis only the CSF considered essential, based on the interview results and observer's notices, for the implementation in the case company will be managed in the next section.

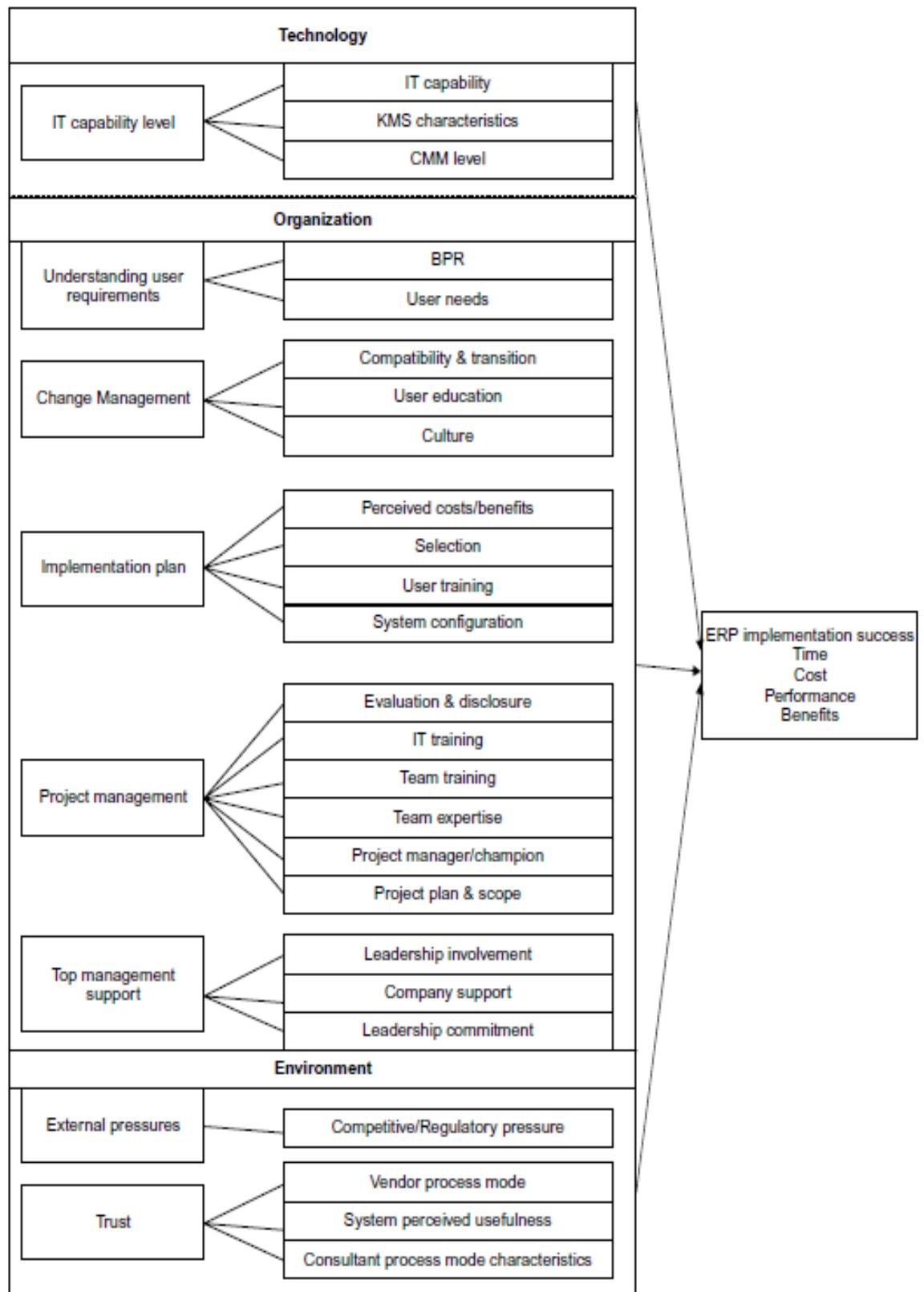


Figure 8. Critical success factors by categories (Schniederjans and Yadav 2013: 369).

Figure 8 presents the critical success factors recognized by Schniederjans and Yadav (2013: 369). It is a more detailed list and clearly put factors in sub-categories. This has



been selected as structure of this study because it clearly presents the factors and shows the definition for the successful ERP implementation; time, cost, performance and benefits.

#### 4.4 Common Reasons for Implementation Failures

It is also important to understand the elements of why ERP implementation projects fail. The failure rate for the projects can be as high as 90%.

The definition of failure depends on how the implementation success is measured and what are the set objectives. If the project is managed from IT infrastructure perspective, one may define that implementation were successful when the ERP system is up and running within the project budget and time limit. This might however cause that ERP does not support the company's business strategy or the employees, users, are neglecting the ERP which will have an impact on the data entered. As a result, in couple of years after the implementation the ERP is not in full possible use and this can be considered as a failed implementation. Therefore, as proposed by Schniederjans and Yadav (2013: 370), four metrics should be used to measure the success of the implementation: reduced costs, time allotted to project, performance of the system and benefits accrued to the organization due to the implementation.

In other words, the implementation is seen a successful when organization's costs have decreased, service levels increased, benefits to external and internal customers have occurred and when the organization has been able to maintain user involvement and adequate performance (Schniederjans and Yadav 2013: 370). Therefore, the ERP implementation has been successful when the system remains in active and efficient use more than one year after the implementation.

Umble et al. (2003: 251) define the reasons for the failure under ten categories. Categories are shown in the list below.

1. No clear strategic goals are set
  - The company has not thought defined the goals that ERP needs to achieve
2. No Top management's commitment to the new ERP

- They are not committed to the ERP
  - They do not recognise the changes system develops
  - Top management neglect their role in implementation
3. Weak Implementation project management
    - The scope, size and complexity of the project is not realized by the project management
    - Project schedules are too optimistic
    - Selected ERP is not suitable for the business
    - Less important processes are included in the implementation
  4. The organization is not open for a change
    - Employees are satisfied with the current system and do not see the need for the new ERP
    - Employees are afraid that the new ERP replaces them or make them less important
    - Employees find it disruptive that the company's management may see more easily what the employees are doing
  5. Not the best project team possible has been selected
  6. Not enough or correct type of training has been arranged which causes that employees are not able to use the ERP efficiently
  7. No enough attention paid on data accuracy
    - Wrong or insufficient data in ERP will lead employees to ignore the system
  8. Performance measures are not in place for ensuring the change of organization
  9. Multi-site issues have not been identified and solved
  10. Difficulties with technical issues, such as software and hardware problems, can cause the implementation to fail

Failing in implementing ERP can cause huge additional costs in the terms of lengthened project or in sales lost when problems in production have been occurred due to the material shortage caused by inaccurate data in ERP. In the worse case the ERP implementation will be cancelled or, in the worst case, the whole company may not overcome the damages failed implementation has caused and the company terminates its business.

#### 4.5 DeLone & McLean IS Success Model

DeLone & McLean IS success model means a model “which recognizes success as a process construct which must include both temporal and causal influences in determining information system success” (DeLone and McLean 1992: 83).

DeLone and McLean (1992) have studied Information System (IS) success. They created a framework, IS success model, by analysing 180 conceptual and empirical researches. Their intention was to create organized and integrated view of IS success in comprehensive taxonomy. DeLone and McLean (1992: 62) identify six major categories of measurements that are interrelated and interdependent:

- System Quality – Measurements of the ERP itself
- Information Quality – Measurements for the reports, outputs that ERP produces
- Information Use – Measurements of how the reports are being used
- User Satisfaction – Measurements of the user’s satisfaction on the reports
- Individual Impact – Measurements of what is the ERP’s impact on the individual
- Organizational Impact – The measurements of how the system impacts on the organizational performance

In DeLone and McLean IS Success model, shown in Figure 9 below, System Quality and Information Quality jointly affect use and user satisfaction. System Quality includes the measurements and characteristics of the information system. Information Quality measures the quality of the information system outputs. The measurements that are included in Information Quality focus on the quality of the reports and other outputs, not the system performance measures.

Use and user satisfaction affects then on each other and the effect can be either positive or negative. Use or Information Use measures the use of the reports the information system outputs while User Satisfaction category measures the user’s satisfaction on the use of the output of the information system. Use and user satisfaction has then impact on the Individual Performance which finally has an Organizational Impact.

If the Use and User Satisfaction of the information system are positive, that affects positively on individual’s or team’s performance. It can also be measured how information system impacts on the productivity through the improved decision-making. Finally,

the measurements how the information system effects on the organization's performance are included in the Organizational Impact category.

DeLone and McLean also point out that when the use of information system is mandatory, system and information qualities have less meaningful impact on the use and user satisfaction.

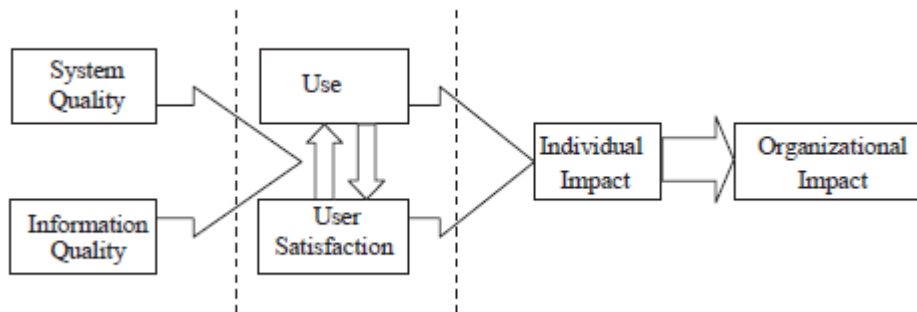


Figure 9. D&M IS Success Model (DeLone and McNeal, 1992: 87).

Later, in 2002, DeLone and McLean (2002) carried out the researches associated their original IS success model. As a result, they did three changes in the measurement categories. Firstly, due to the researches occurred from their model and due to the changes in information systems during the previous 10 years, a new variant was a necessary. Besides that, the IS are information providers, they also provide services for the end-users. Therefore, they extended the model by adding the measurements of the service quality as a component to system quality and information quality.

Secondly, in the updated model, shown in Figure 10, use has been replaced with "Intention to use". As shown in the original model, shown in Figure 9, use and user satisfaction has an effect on each other. In practical terms there must be use before the user satisfaction is possible. When the experience with the use of IS is positive, it will create positive user satisfaction. In contrary, positive user satisfaction increases the user's intention to use the IS.

Finally, DeLone and McLean replace categories of Individual Impact and Organizational Impact with the Net benefits and added causality backwards from Net benefits to User satisfaction and Intention to use. With the backward causality, positive Net benefits can increase the User Satisfaction and Use.

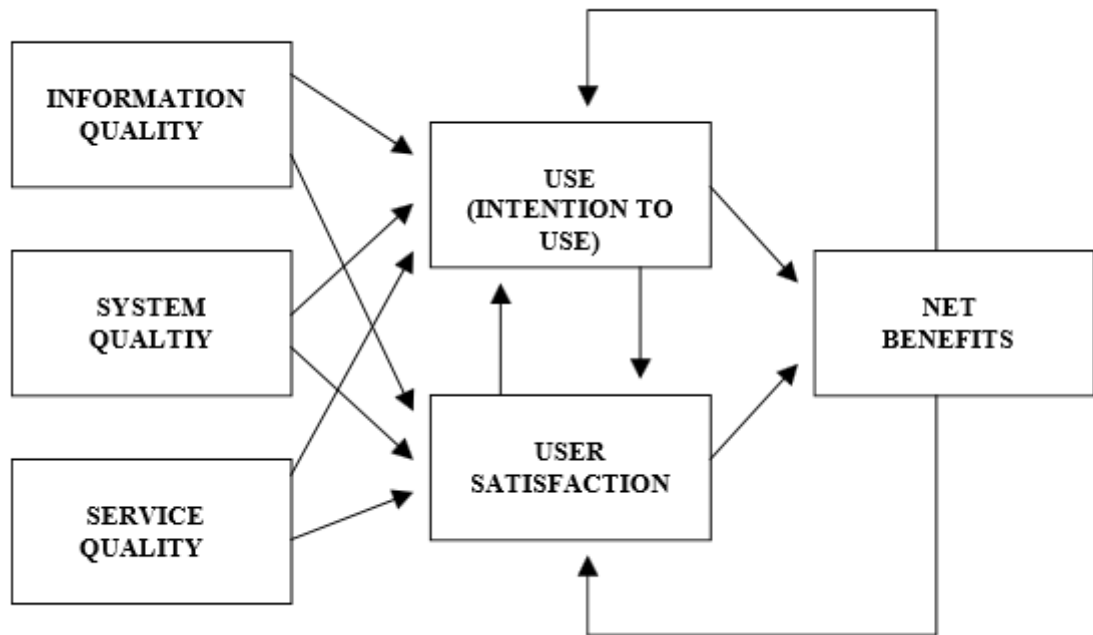


Figure 10. Reformulated D&M IS Success Model (DeLone and McNeal 2002: 9).

For this Thesis, the reformulated IS success model will be conducted. Based on the arguments by DeLone and McLean (2002), categories Information Quality, System Quality and Service Quality are less important when the use of the information system, ERP, is mandatory. Additionally, based on the preliminary circumstances in the case company where the ERP project and selection is run by the main organization, these three categories are less meaningful. Therefore, the model used in this Thesis for the ERP implementation includes categories of User Satisfaction, Use (Intention to use) and Net benefits as shown in Figure 11 below.

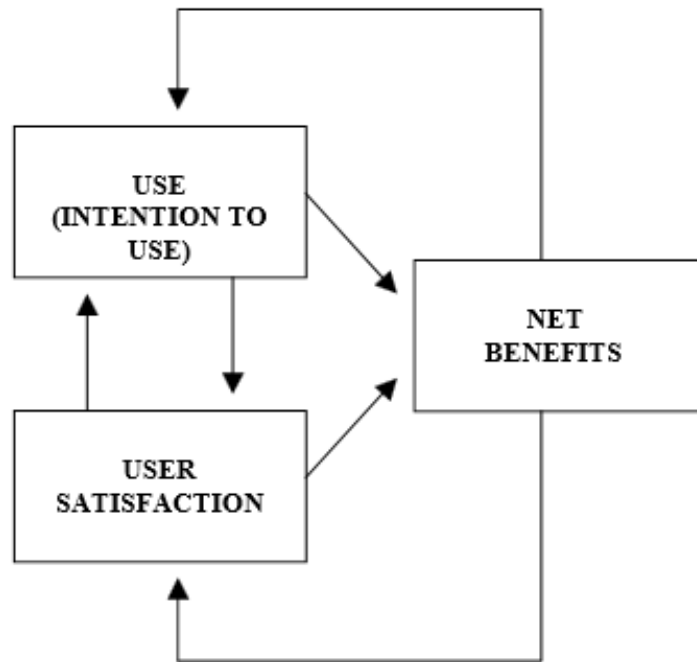


Figure 11. Part of D&M Model utilized in this Thesis.

Figure 11 presents the part of the D&M IS success model that will be utilized in this Thesis. By utilizing the widely accepted model it contributes the reliability of the research. The model presents and indicates the causality flow between use, user satisfaction and net benefits. Each category in the model is a success variable that has to be measured for recognizing the effect of the variable. Use (intention to use) and user satisfaction are preceding factors that have to occur before the benefits.

#### 4.6 Building the Conceptual Framework for ERP Implementation Success

Based on the preliminary circumstances set by the main company of the case company as well as the current state analysis, the literature of the critical success factors and adopting the IS Success Model from DeLone and McNeal (1992), the structure of this Thesis is based on the two main categories. The frame of the conceptual framework of this study is shown in Figure 12 below.

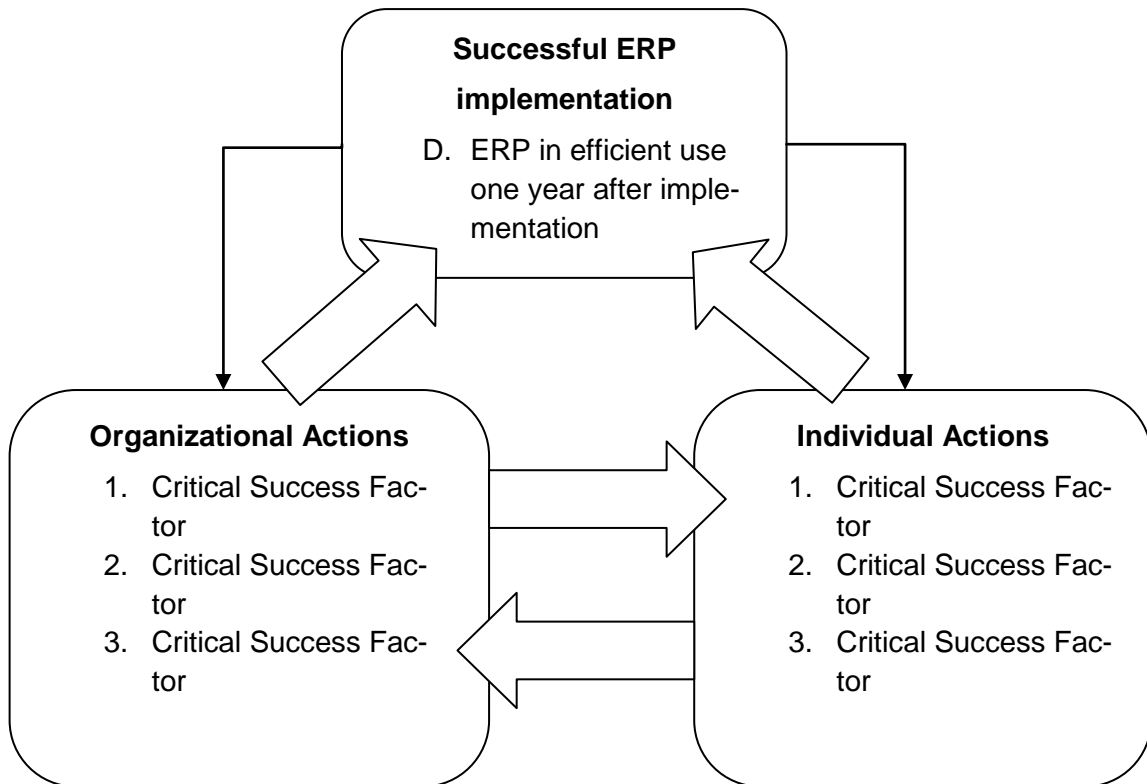


Figure 12. Formal Conceptual Framework for this Thesis.

The framework of this Thesis is based on the three successful ERP implementation characteristics: Individual Actions, Organizational Actions and Successful ERP Implementation. As in the D&M IS Success Model “User satisfaction” affects on the “Intent to use”, and vice versa. From this point of view and taking the circumstances of the ERP implementation in a big organization into consideration, in this Thesis the categories are named “Individual Actions” and “Organizational Actions”. Further, as D&M IS Success Model defines, if the experience from individual actions is positive, it increases the demand for improved Organizational Actions and its response. And vice versa; if the individuals find Organizational Actions positive, it will increase individuals’ satisfaction and their reaction is more likely to be positive. Therefore, when these two categories “Individual Actions” and “Organizational Actions” both have positive experience, the outcome will be successful ERP implementation.

By analysing the current state, factors for the two applicable categories, Organizational and User Actions, are selected. The category “Individual Actions” is appropriate for the findings from the interviews and the category “Organizational Actions” is more suitable

for the researcher's observations from the current state as well as existing knowledge from the literature.

In the case of ERP implementation in the organization, the "Net Benefits" from the D&M IS Success Model equals with the success of the implementation. As the desired outcome is successful implementation, the third category is named "Successful ERP Implementation". Based on the existing researches, the success of the ERP implementation can be measured only after certain period of time after the implementation. As the research problem of this study is how the efficient use of the new ERP can be ensured in the case company, the successful ERP implementation is defined in this Thesis as "ERP is in efficient use one year after the implementation".

In the next eight sub-sections, the reasons for the factors selected for the conceptual framework are derived from the current state and summarized.

#### Involvement

For successful ERP implementation, one of the most critical issues is to get the people, the employees, involved in the implementation. In the terms of measuring the success of the implementation after the ERP is up and running is to commit the employees to use it effectively. As Robey et al. (2002: 28) discover that it is difficult for the users to understand the effect of their actions in ERP towards other stakeholders in the organization. Accordingly, "users can control the success or the failure of a system" (Schniederjans and Yadav 2013: 272). As stated in Section 4.3, ERP system can cover only 70% of the organization's processes and the remaining part needs to be revised. For removing the barriers of the employees from learning to use ERP efficiently, Robey et al. (2002: 32) suggest that the employees need to be involved and learn the revised processes before they are able to use ERP efficiently. Accordingly, Shirouyehzad et al. (2010: 3) suggest that the employees should be involved in decision-making, problem-solving and the financial success of the organization. Therefore, the employees should be more closely related to the organization's targets and objectives.

In the case company there is a big gap in the knowledge of how users' own actions affect other stakeholders in the organization or furthermore, in the discipline company. This gap can be decreased, if not removed, by involving the employees in ERP imple-



mentation by empowering employees, giving them more information, increasing their knowledge and rewarding by the performance achieved (Shirouyehzad et al. 2010: 3).

From the interview answers for the current state analysis, the second identified theme “The lack of engagement” falls under this recognized critical success factory. They are shown in Table 3 below.

Table 3. Involvement.

#	Data 1	CSA	CSF
R1	Interviews	The lack of engagement	Involvement

The connection between the lack of engagement and involvement is obvious. By involving the employees more deeply in business, it can increase their intention to use the ERP when the other processes support the use of ERP.

### User Satisfaction

As D&M model describes, user satisfaction has an effect on user’s intend to use the ERP. If the user’s experience on ERP is positive, user is more likely to continue using ERP more and proactively. As it has been described previously, in the company case the use of ERP is a mandatory, one phase in daily routines. This and the fact that the new ERP has been selected by the principal company, the quality of the ERP is a less meaningful. Therefore, in consistent with Wu and Wang (2007: 2), the user satisfaction has a key role in a successful ERP implementation.

According to Calisir and Calisir et al. (2004: 511), there are two key characteristics that have a great effect on the user satisfaction. Firstly, the usefulness of the ERP has a greater impact on the user satisfaction. If the employees can realize that by using the ERP they are able to increase their productivity and performance, they will more probably be satisfied with the ERP. Calisir and Calisir et al. (2004: 507) also define that easiness to use ERP has an indirect effect on the usefulness, thus user satisfaction.

Secondly, Calisir and Calisir et al. (2004: 511) add learnability as a factor that has an effect on user satisfaction. They suggest that by designing the graphical user interface (GUI) of ERP the user satisfaction can be increased. By recognizing the relevant modules and functions, the employees need most often and removing unnecessary, confusing menu structures of ERP, the user may be capable to adapt the logic flow of the

ERP and thus, reduces the disorientation. Therefore, modifying the GUI for user specific can increase the learnability and further user satisfaction. Although, at the stage of this Thesis and the ERP implementation project within the discipline company it is not yet clear how much individual sites, such as the case company, can affect the GUI.

From the current state analysis, none of the identified themes fall directly under this section. However, it can be defined that as the current ERP is not in efficient use, the users, the employees, are not satisfied. Table 4 below summarizes this section.

Table 4. User Satisfaction.

#	Data 1	CSA	CSF
R2	Interviews	Use of current ERP is not efficient	User Satisfaction

When the employee using the ERP is not satisfied with the ERP and the way it works, it decreases his or her intention to use it more. Therefore, by taking the steps to increase the user satisfaction, the employee is more likely to use the ERP more and more efficiently.

### Training

It is also essential to understand the users' individual needs and requirements. The employees, people, have different requirements for adapting a new system based on the targets as well as different learning styles. According to Sage (1981: 642), people are different how they adapt and analyze the information as well as how they evaluate and interpret the information. For adapting and analyzing the information Sage (1981: 642) defines two personalities; the sensing-oriented persons who prefer detailed well-structured problems and routine tasks and intuitive-oriented persons who dislike routine tasks and view issues holistically. For evaluating and interpreting the information Sage (1981: 642) also distinguishes two personality types; feeling-oriented who relies on emotions, ethics and personal values and thinking-oriented who relies on logical arguments.

The organization has to realistically define a time and money budgets for training. In the end, the ERP cannot help the company to improve and reach net positive benefits if the employees do not know how to use it (Jarrar et al. 2000: 126). Training divides in two groups, key user or key users and users (Finney and Corbett 2007: 338). Umble

et al. (2003: 254) found in their research that in successful implementation case the training was focused firstly on the key users and later on other users. Further, key user should be a person who is familiar with the business processes and has knowledge on the relevant areas (Wu and Wang 2007: 4). Key user then trains the other users.

Further, training objectives should be separated in two objectives; training how to use the ERP and more focused on the business processes that have changed during implementation (Umble et al. 2003: 254). Key user is in the key role in identifying changed processes and training other users specifically on those areas.

The first theme from the findings of the current state analysis falls under this recognized critical success factors. They are shown in Table 5 below.

Table 5. Training.

#	Data 1	CSA	CSF
R3	Interviews	The lack of training	Training

There is a direct and obvious link between the lack of training and the success of training. With proper training, the employee's user satisfaction can be increased and, therefore, the ERP's efficient use ensured.

### Change Management

ERP implementation is always about the people and change as described in Section 4.2. Especially when the company is implementing ERP for the first time it is about change of organizational culture. But also even when the company already has an ERP system which is being replaced, change is required to fully realize the potential of the new ERP. Change management and organizational culture change management are closely related in the terms of critical success factors for ERP implementation. Therefore, both aspects are included in this section.

Change management describes the ability to anticipate future and adapt the change while cultural change management means accepting, supporting and working towards the improvements through the change (Schniederjans and Yadav 2013: 373). Further, it's important for the organization to have a culture that shares values and open for change identity (Shirouyehzad et al. 2010: 2). Therefore, "organizational culture can

significantly impact the pre-implementation stage, which will significantly impact overall change management” (Schniederjans and Yadav 2013: 373).

One of the important tasks that have been recognized is the employee’s acceptance for the implementation project and positive attitude towards the new ERP (Finney and Corbett 2007: 336). Even with adequate training and management’s capability to react on the occurring problems during the implementation, without the change management and open culture, the risk of implementation not succeeding increases significantly.

Typically in the company where the ERP has not been in use, the employee’s resistance derives from the fear of losing jobs. As the case company already has an ERP which will be replaced, the fear of losing jobs is not the objective for the change management. Instead, the focus should be on managing change related to the changed processes and adapting working methods and processes that will be brought by the implementation team from the principle company.

People also have a tendency to stay in their comfortable zone and if the benefits of the new system are not clear, they may neglect it (Umble et al. 2003: 245). By managing the cultural change with the committed leadership and open communication, the risk of ignoring the new ERP can be mitigated. Leadership commitment is included in Section Top Management Support and communication.

This critical success factor has been selected here because based on the researcher’s observations currently the culture in the case company is not open and supportive for the using ERP. By creating more open culture towards the new ERP, it is possible to create ERP centric organizational culture. The significance of change management is shown in Table 6 below.

Table 6. Change Management.

#	Data 1	CSA	CSF
R4	Observations	The need for more ERP centric culture	Change Management

ERP could be in bigger role in the case company. Currently, nothing urges to use the current ERP, except the necessary actions. To ensure continuous and efficient use of the new ERP, change management is needed for ensuring it.

## Top Management Support

Top management support is one of the most critical subjects that the researchers have identified in critical success factors in ERP implementation. Strong leadership is required for leading the implementation project, quick decision-making and overcoming the resistance and the barriers that will come. Furthermore, strong leader has a great effect on the organizational culture and change management as described in previously.

Robey et al. (2002: 28) argue that resistance to change does not occur due to the barriers in learning the new processes or system. Instead, the employees have difficulties understanding how to do their jobs in changed environment. By top management support, the employees can be involved more deeply so that they can better understand the outcome of their actions. Further, Robey et al. (2002: 28) also suggest that ultimately discipline use of ERP should be emphasized instead of creativity. If creativity is allowed, people tend to continue using the old habits and finding alternative options for reaching the objectives. This can lead ignoring the new ERP and failing to implement ERP. Therefore, the employees have to unlearn the working habits related to the previous ERP systems or systems that are related to ERP but cannot be replaced.

Schniederjans and Yadav (2013: 374) recommend that organizational support is required for top management. Therefore, even if the project leader is committed, without the company support the project will more likely be delayed and hindered.

It was mentioned in the interviews, and the researcher's observation supports the comment that the current management tend to ignore the relevance of the ERP system. In the other words, the support is not sufficient. Therefore, the success factors selected in this study are shown in Table 7.

Table 7. Top Management Support.

#	Data 1	CSA	CSF
R5	Interviews, observations	The lack of management support	Top Management Support

The top management support in this study is considered more on supporting the implementation project. However, currently management's actions do not support or en-

courage the employees to use ERP properly. Therefore, this critical success factor has been selected in this study.

### Communication

Communication is a critical factor for change management and entire implementation project. Communication is important in the terms of change management and top management support. With proper communication plan, open environment can be ensured within the entire organization and between the external stakeholders (Finney and Corbett 2007: 337). Al-Mashari et al. (2003: 357) have recovered several issues that the communication plan has to include for being able to support the implementation. These issues are listed in Appendix 2. Further, communication has to cover the scope, objectives and tasks of ERP implementation project (Sumner 1999).

Nah et al. (2001: 291) suggest that every level of the organization has to be communicated about their expectations. In addition for ensuring end user's satisfaction, user requirements, comments, reactions and approvals should be gathered as a part of communication (Nah et al. 2001: 291).

As communication is an important part of the project and related to the change management as well as to top management support, it can be derived from the findings of the current state analysis and researcher's observations as presented in Table 8 below.

Table 8. Communication.

#	Data 1	CSA	CSF
R6	Interviews, observations	The lack of communication	Communication

Communication related to the issues with change management and top management support is currently missing and it has been seen as an important factor. Therefore, communication has been recognized as a one developing areas.

### Business Process Re-engineering

The final factor selected is about the changes in business processes that ERP system requires. It has been estimated that the best ERP solution can cover only 70% of organization's needs (Jarrar et al. 2000: 124). In the case company, the new ERP will

replace the current ERP and, therefore, the gap is most likely less than 30%. Additionally, the balance of 30% describes the need for entire organization while this Thesis focuses only in Operations of the case company.

According to Jarrar et al. (2000: 125), total failure during the implementation is often caused by finding out that the new ERP does not support one or some of the company's key processes. Further they suggest that in that situation, the company has two options, either change the process or modify the ERP. Foremost option may require changes in processes that are in key role to the company and which brings the competitive advantage. The latter option is not recommended as it can cause additional problems in terms of delayed project or software malfunctions.

Business process re-engineering should happen in three phases for achieving full advantage; BPR should start even before the new ERP has been selected, during the implementation and after the implementation (Nah et al. 2001: 294). As well as change management, also BPR requires strong leadership. Therefore, when the company is changing its key, unique business processes, it is not easy to get everyone to agree with the changes (Bingi et al. 1999: 5).

This factor has been included in this study because of researcher's observations and its importance based on the literature review. As it includes all the main processes of the company, it is important to identify them and make sure those processes will be included in the new ERP. The results are shown in Table 9 below.

Table 9. Business Process Re-engineering.

#	Data 1	CSA	CSF
R7	Observations	Not well enough defined business processes	BPR

Business process re-engineering is one very critical factor in ensuring efficient and target oriented use of ERP. Currently, in the case company the processes do not necessarily support the business strategy.

#### 4.7 Conceptual Framework

The conceptual framework of this study includes the selected critical success factors. Figure 13 below presents the conceptual framework of this study.

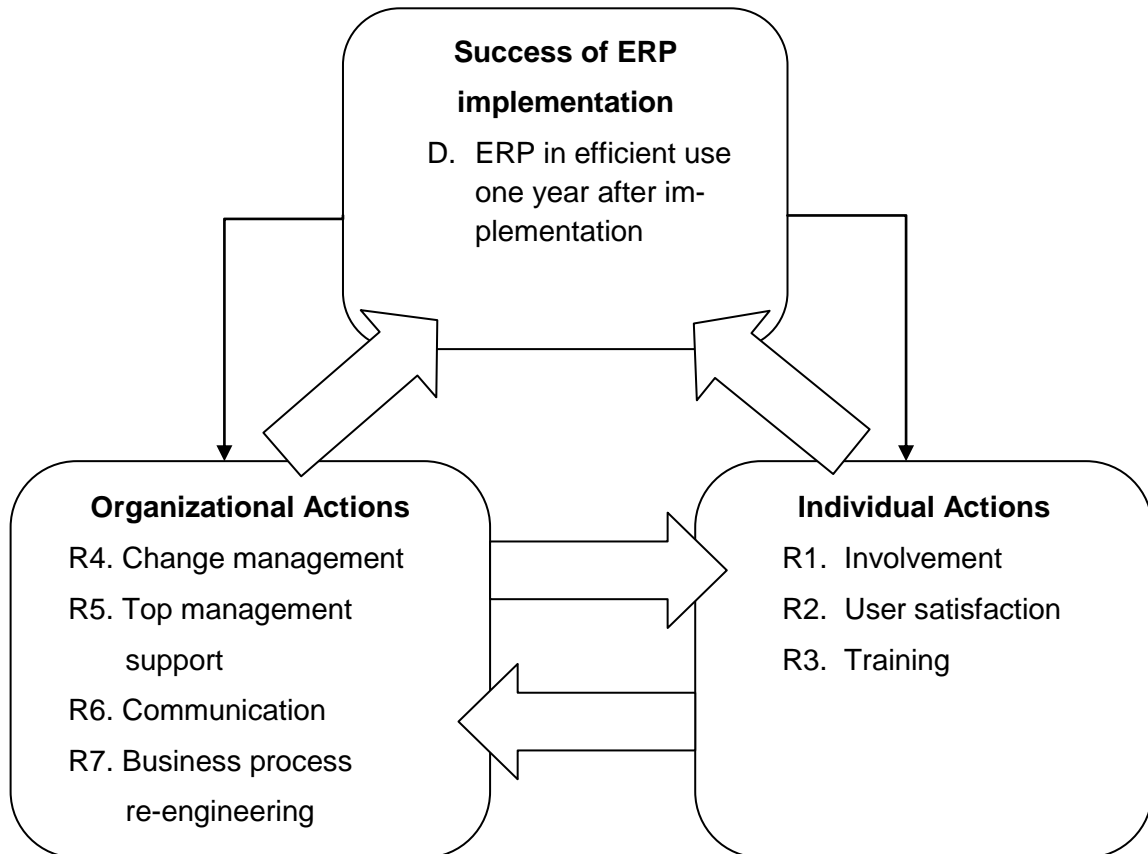


Figure 13. Conceptual Framework.

As D&M IS success model defines, there is causality between the selected categories. Before the net benefits, success of ERP implementation in this study can be positive, individual actions and organizational actions have to have positive impact. If the measures of the individual actions such as involvement, user satisfaction and training are positive, it has an effect on organizational actions and increases its likelihood of being positive by creating a demand. And according to the causality of the D&M IS success model, also when the measures of the organizational actions such as change management, top management support, communication and business process re-engineering are positive, it will cause positive demand for individual actions. These two actions together cause that ERP implementation will be successful.



This model also allows the causality backwards. The net benefits can be negative and that will more likely cause a decrease in the use of the information system (DeLone and McNeal 2002: 8). Therefore, it is important for the researcher to define how the net benefits, success of ERP implementation is measured. In this Thesis, the measurement has been defined that the ERP implementation has been successful when the use of ERP has remained effective one year after the implementation.

#### 4.8 Summary of the Current State Analysis

Table 10 below summarizes the findings from the current state analysis. Researcher's observations have been included to take the critical parts of the implementation that did not come out of the interviews into consideration. Then the findings have been categorized and related to the critical success factors from the literature have been selected to the conceptual framework.

Table 10. Summary of Selected CSF.

#	Data 1	CSA	CSF
R1	Interviews	The lack of engagement	Involvement
R2	Interviews	Use of current ERP is not efficient	User Satisfaction
R3	Interviews	The lack of training	Training
R4	Observations	The need for more ERP centric culture	Change Management
R5	Interviews, observations	The lack of management support	Top Management Support
R6	Interviews, observations	The lack of communication	Communication
R7	Observations	Not well enough defined business processes	BPR

Table 10 shows the selected critical factors as the measurements that are in the scope of this study for achieving positive experience from the individual and organizational actions and, therefore, ensure positive, successful ERP implementation.

Based on the interviews and the researcher's own observations, it was possible to identify seven themes that capture the best essence of the current state. These themes are shown in Table 10 in the column CSA. Then, each theme has been derived to the recognized critical success factor that has been consequently recognized from the studies of the successful ERP implementation.

In the next section the recommendations will be built for the each selected critical success factor. First, the challenges for each selected CSF are defined considering the current state in the case company. Finally, the recommendations will be validated by the experts for the local management team and the final recommendations are modified.

## 5 Building the Recommendations

This section develops the recommendations for the case company's management team. This section builds on the interview results, the company documentation and the researcher's observations, as well as critical success factors from the literature into consideration when building the recommendations. The structure of this section is bottom-up; from the issues related to the employees to the organizational issues. The following factors are not clearly independent and usually overlap with each other.

### 5.1 Conceptual Framework and Challenges

In this section, the challenges of the critical factors in the two categories, Organizational and Individual Actions from the conceptual framework, are described and analysed. The third category, successful ERP implementation, includes the ultimate objective of the ERP implementation project.

For the data used to defining the challenges related to the selected points R1 – R7 in the conceptual framework, the researcher has utilized the case company's internal documents and informal discussions with the colleagues. The discussions have mainly involved the business controller and operations manager as the key stakeholders in the ERP implementation. Internal documentation used as a source of data includes the process maps and the data from business management system.

The challenges of the process are related to the selected critical success factors and listed in Table 11 below.

Table 11. Challenges Related to the Selected CSF.

#	CSF	Data 2	Key Challenge
R1	Involvement	Discussions	How the employees would become more interested in using ERP?
R2	User Satisfaction	Discussions	How to ensure the ease of use and long term usability?
R3	Training	Discussions	What should be included in training?
R4	Change Management	Discussions	How to ensure open environment towards to the new ERP
R5	Top Management Support	Internal Documents	What is the management's role in the implementation?
R6	Communication	Internal Documents	What can be done to help ensuring open environment?
R7	BPR	Internal Documents	What are the key business processes and is the company strategy in line with it?

As seen from Table 11, the first challenge is related to the user involvement. As it was found out in the current state analysis, currently the ERP use in the operations is a mandatory step in the work process which the operators would not want to do. In the discussions with the operations manager, it has been mentioned that this working step cannot be removed from them and be given to other employees. Additionally, the operators have considerable experience related to their work, and their experience could be used more efficiently for innovating and creating improved ways to use the ERP. Therefore, the challenge is how the employees would get more interested in using the ERP.

The second challenge is closely related to the first challenge. If the users, operators, are satisfied with the system, they are more likely to use it more and be interested in. Therefore, the second challenge is how the long term usability can be ensured.

The third challenge is how the training for the new ERP should be arranged what should be included in. The training is the key factor enabling involvement and user satisfaction.

The fourth and sixth recommendations have similar challenges because the communication is a critical tool in change management. It was mentioned in the discussions that the environment in the organization has to be approving for the change and the new ERP.

The fifth recommendation asks for the top management's support in the project. The change requires strong leadership and the management has to be involved closely in the project.

Finally, the seventh recommendation includes the concerns on the business processes. The case company has a comprehensive business management system where all the processes are recorded. To be able to utilize the ERP completely, the key processes have to be included in line with the company strategy.

To overcome the identified seven challenges, the recommendations are created in the next section.

## 5.2 Recommendations

This section describes the recommendations for the local management (please repeat, Antti). The recommendations are based on the findings from the existing knowledge from literature which is described in Section 4.6. Each point from the framework has a specific recommendation related to the subject and the corresponding challenge.

First, recommendation R1 aims to increase the employee involvement in the Operations. If the target and objective of the Operations were defined and clearly visible, it would involve the employees to reach the desired results together. Additionally, if the employee could clearly see the outcome of the actions that has been done by ERP, it would help to increase the employees' interest in achieving the targets set. Based on this, the first recommendation is described as:

R1: Target and objectives for Operations should be defined and outcome of the employees' actions should be visible for ensuring efficient use of ERP.

Second, recommendation R2 is to help ensure a long term efficient use of the ERP and, therefore, is closely related to achieving the ultimate target of the implementation project. Two main characteristics of the ERP system, usefulness and learnability, are especially important for improving the user satisfaction and, therefore, a long term efficient use of the ERP. Therefore, the second recommendation is described as:

R2: Recognize the employees' requirements for ERP system itself to increase usefulness and learnability of ERP for achieving improved user satisfaction.

Third, recommendation R3 is about training. To achieve the increased user satisfaction, sufficient training is necessary for more efficient use of the ERP. As the trainer should be familiar with the business processes related to the employee's role, it should be done by the selected key user of the ERP. By selecting the key user who knows widely the company's business processes, the objectives of the learnability can be achieved. Therefore, a two-staged recommendation for training is described as:

R3-a: Name department's key user or users.

R3-b: Recognize users' requirements from learning style perspective and create a training plan accordingly. Focus training on two subjects, using ERP and changed processes.

Forth, recommendation R4 is for the organization and its management. As part of ensuring the efficient use of ERP, the organization has to be open towards a new ERP. The management especially can create a positive and accepting environment which then increases the importance of the ERP and, thus, ensure its support for the efficient use of the new system. The fourth recommendation is described as:

R4: Focus and ensure positive and open organizational culture towards the ERP implementation project.

Fifth, recommendation R5 overlaps with the forth recommendation. The top management as leaders of the organization should support the change required in the organizational culture. With the changed culture and management support, the users' involvement can be ensured. Thus, this increases the probability of long term efficient use of the ERP. Therefore, the fifth recommendation is:

R5: By the support of top management, the employee involvement and the meaning of the ERP in the company can be increased.

Sixth, recommendation R6 supports the top management and the change management. Communication plays an important role when the project is being introduced and later during the project. With the communication and communication plan, the top management and the project leader can involve the employees in achieving the targets. Therefore, the sixth recommendation is described as:

R6: Create a communication plan that sells the project to the employees and covers the scope, objectives and tasks of the project.

The seventh and final recommendation, R7, is for business process re-engineering. The successful implementation cannot be achieved unless all the key processes are included in the project planning. It is essential to have all the processes identified before the implementation. Moreover, during the implementation it has to be studied which processes can be included in the new ERP system and which could not. Those processes that cannot be implemented as they are in the current system have to be then redesigned or some other solution has to be found. Therefore, the final recommendation is described as:

R7: Identify and trace the key business processes for ensuring that those will be implemented in the new ERP.

Table 12 below summarizes the findings from the current state analysis, the challenges related to the selected critical success factor and the recommendations how to overcome them.

Table 12. Summary of Current State, Challenges and Recommendations.

#	Data 1	CSA	CSF	Data 2	Key Challenge	Recommendations
R1	Interviews	The lack of understanding the whole	Involvement	Discussions	How the employees would become more interested in using ERP?	Target and objectives for Operations should be defined and outcome of the employees' actions should be visible for ensuring efficient use of ERP
R2	Interviews	Use of current ERP is not efficient	User Satisfaction	Discussions	How to ensure the ease of use and long term usability?	Recognize the employees' requirements for ERP system itself to increase usefulness and learnability of ERP for achieving improved user satisfaction.
R3	Interviews	The lack of training	Training	Discussions	What should be included in training?	Name department's key user or users. Recognize users' requirements from learning style perspective and create a training plan accordingly. Focus training on two subjects, using ERP and changed processes.
R4	Observations	The need for more ERP centric culture	Change Management	Discussions	How to ensure open environment towards the new ERP	Focus and ensure positive and open organizational culture towards the ERP implementation project.
R5	Interviews, observations	The lack of management support	Top Management Support	Internal Documents	What is the management's role in the implementation?	By the support of top management, the employee involvement and the meaning of the ERP in the company can be increased.
R6	Interviews, observations	The lack of communication	Communication	Internal Documents	What can be done to help ensuring open environment?	Create a communication plan that sells the project to the employees and covers the scope, objectives and tasks of the project.
R7	Observations	Not well enough defined business processes	BPR	Internal Documents	What are the key business processes and is the company strategy in line with it?	Identify and trace the key business processes for ensuring that those will be implemented in the new ERP.



Table 12 above presents how the data has been gathered and the challenges built and related to the recommendations. Each recommendation, Rx, has the first data collection method and the theme recognized in the current state analysis. This is followed by the identified critical success factor from the literature and the challenge related. The final column shows the recommendation for the specific problem area. Recommendations presented in the final column are the proposal which will be validated with the experts. The validation process is described in the next section and the final recommendations are presented.

### 5.3 Validation and Final Recommendations

This section describes the feedback from the experts. A validation session was held with the 7 operators from the case company's operations. A World Café method was exploited in the session for allowing more open discussion in a less formal environment. This method was selected as it allows everyone to speak. Below are the recommendations and the feedback from the experts.

Recommendation 1: *Target and objectives for Operations should be defined and outcome of the employees' actions should be visible for ensuring efficient use of ERP.* This was considered as a good and important recommendation. It was recognized that by accomplishing this it will more likely increase employees' motivation, understanding of the business as well as the outcome of their own actions and most importantly, the feeling of being important for the company. It was also agreed that transparency is always good.

Recommendation 2: *Recognize the employees' requirements for ERP system itself to increase usefulness and learnability of ERP for achieving improved user satisfaction.* The team of experts strongly agreed that this recommendation is important for increasing user satisfaction by reducing the intimidation. If users' requirements are taken into consideration, it is possible to create simple and user friendly environment which will then lead to increased user satisfaction. Also one concern was raised. It may not be possible to recognize the requirements prior to the implementation and without actual experience on using the system.

Recommendation 3a: *Name department's key user or users.* This recommendation as such is obvious and did not stimulate much of discussion. The experts pointed out that if each department has own key user or users, they should have cross-functional knowledge. That would work as a back-up if key user leaves the company.

Recommendation 3b: *Recognize users' requirements from learning style perspective and create a training plan accordingly. Focus training on two subjects, using ERP and changed processes.* It was pointed out that users' level of knowledge should also be taken in account in planning the training. Some users may be more experienced using ERP than others. Overall, the opinions of the experts were emphasizing that training is not the target where money should be saved.

Recommendation 4: *Focus and ensure positive and open organizational culture towards the ERP implementation project.* The experts agreed that it is important to seed positive thoughts towards the new ERP on time. If the whole organization is positive and open for it, they would face the challenge together and it would have mitigating affect on the change resistance.

Recommendation 5: *By the support of top management, the employee involvement and the meaning of the ERP in the company can be increased.* This recommendation raised most discussion and it was seen as one of the most important recommendation. Firstly, top management acts as an example to the employees. If top management praises the system and uses it actively, it can create positive atmosphere among the employees. Secondly, by giving support and reacting quickly in a problem situations top management can show their commitment which can again increase the appropriation on the ERP. Finally, top management can show their commitment by affecting on the time and money budgets of the project and training plans. Currently, the management of the case company has very demeaning attitude on the current ERP in use and it has, as a one part, created negative atmosphere around it.

Recommendation 6: *Create a communication plan that sells the project to the employees and covers the scope, objectives and tasks of the project.* According to the experts, the communication plan is a must. It should clarify how the new ERP will affect the employees' tasks, the case company and the principle company.

Recommendation 7: *Identify and trace the key business processes for ensuring that those will be implemented in the new ERP.* This recommendation received most attention with the recommendation 6. Although the actual feedback to this recommendation was little, it raised discussion about the importance of the company strategy and especially a lack of it in the case company. The experts agreed that the key processes have to be identified. Further, they suggested that the knowledge of the experts from the different key areas should be put widely to account.

Table 13 below summarizes validation and presents the final recommendations. It also shows the experts' opinions for the related recommendations as well as the final recommendations.

Table 13. Summary of Validation and Final Recommendations.

Validation				
#	Data 3	Experts' Opinion	Comments	Final Recommendation
R1	Validation - World Cafe Method	Agreed	This will more likely to increase the motivation. Creates the feeling that own role is important to the company	Target and objectives for Operations should be defined and outcome of the employees' actions should be visible for ensuring efficient use of ERP
R2	Validation - World Cafe Method	Strongly agreed	Increases user satisfaction by reducing the intimidation. However, it may not be possible for users to identify needs before hands-on experience.	Recognize the employees' requirements for ERP system itself to increase usefulness and learnability of ERP for achieving improved user satisfaction.
R3	Validation - World Cafe Method	Agreed	Training is not the point where the money should be saved. Key users should have cross-functional knowledge.	Name department's key user or users. Recognize users' requirements from learning style perspective and create a training plan accordingly. Focus training on two subjects, using ERP and changed processes.
R4	Validation - World Cafe Method	Agreed	Important to create positive environment towards the new ERP. Reduces resistance if whole organization is committed.	Focus and ensure positive and open organizational culture towards the ERP implementation project.
R5	Validation - World Cafe Method	Agreed	Top management acts as example, they can show commitment by reacting quickly on problems and they can affect on time and money budgets	By the support of top management, the employee involvement and the meaning of the ERP in the company can be increased.
R6	Validation - World Cafe Method	Agreed	Communication plan is a must. It should present clearly how the new ERP affects on work tasks and company.	Create a communication plan that sells the project to the employees and covers the scope, objectives and tasks of the project.
R7	Validation - World Cafe Method	Agreed with addition	Strategy of the case company, what is it? Experts, employees, of the key processes should be involved.	Identify and trace the key business processes with the help of experts for ensuring that those will be implemented in the new ERP.

In summary the recommendations were widely agreed or strongly agreed. Only one recommendation, R7, had to be slightly modified. This may be related to the findings from the current analysis; the employees are not engaged to the current ERP system and they have not thought much about it. Therefore, recommendations like these get acceptance.

## 6 Discussion and Conclusions

This section overviews the results of the study and suggests managerial implications which can help to put the proposed recommendations into action.

### 6.1 Summary

This Thesis focused on pre-implementation phase of the ERP implementation project for the case company.

The objective of this Thesis was to achieve successful ERP implementation and ensure efficient use of ERP after the implementation phase. This project has been seen as important since the principal company has decided to implement a new ERP system across all the affiliated companies. An additional issue that makes this project important for the company is the fact that the current ERP in the case company is not popular among the employees and therefore is not efficiently used. The recommendations in this Thesis suggest the aspects on these issues that the local management should take into consideration before the actual implementation project can take place, as well as the aspects related to the user satisfaction that need to be increased to gain acceptance for the new system and thus ensure positive outcome for the case company.

Therefore, for developing the recommendations for the successful implementation of the new ERP, it was important to analyse the reasons behind the unpopularity of the current system. For this purpose, the exploratory single case study was selected as a research approach in this study. Qualitative data collection methods were used for collecting data for this study. The data for this study was collected from different sources. The sources used were, first of all, interviews and team discussions, as well as the company internal documents and the researcher's observations.

The outcome of this Thesis is a set of recommendations for the local management in the Operations department of the case company. The recommendations aim to improve user satisfaction and therefore ensure efficient use of the ERP. The recommendations have been categorized based on the critical success factors that the existing literature suggests as the key points for achieving successful ERP implementation. The first recommendation aims to increase the employees' involvement by defining the tar-

gets and presenting the results of the employees' actions more frequently. The second and the third recommendations increase the employees' user satisfaction by focusing on increasing the usability and learnability of the new ERP through the training. The fourth and the fifth recommendations suggest that the top management should ensure open organizational culture for the new ERP and overall demonstrate support for the project. The sixth recommendation, communication, is practically a tool for the top management for gaining the company wide acceptance for the project. The final recommendation urges the company to identify the key business processes that has to be included in the new system and also suggests re-designing those processes that are not possible to implement as they currently are. The concrete action steps for the management to consider are overviewed in the next sub-section.

Based on the results of the employees' interviews and discussions, the recommendations were built for this particular group of stakeholders in the case company. But since the case company is a mid-size organization, these recommendations may be applicable partly, if not fully, for other units of the case organization.

## 6.2 Managerial Implications

To implement the outcomes of this study into practice, the managers may consider the following recommendations before the project starts. Some of the recommendations proposed are not specific only to this project but can be more widely applicable in the case company. Additionally, some of the recommendations are very straight forward, while some need more planning. The recommendations are divided into two parts, those that need to be considered before the ERP implementation and those that should be considered after the ERP was put into use.

### Before Implementation

Since the due date for the project to start in the case company have not yet been announced, the project team can further extend the action points suggested below. Thus, before the EPR implementation has started, the following action points in Table 14 should be taken into consideration.

Table 14. Action Points and Responsible Roles.

#	Final Recommendation	Action Points	Responsible
R1	Target and objectives for Operations should be defined and outcome of the employees' actions should be visible for ensuring efficient usage of ERP	<ol style="list-style-type: none"> <li>1. Define clear monthly and quarterly targets</li> <li>2. Follow up in weekly meetings</li> <li>3. Define clear business plan and vision</li> </ol>	<ol style="list-style-type: none"> <li>1. Operations Manager</li> <li>2. Team Leader</li> <li>3. Site Manager</li> </ol>
R2	Recognize employees' requirements for ERP system itself to increase usefulness and learnability of ERP for achieving improved user satisfaction.	<ol style="list-style-type: none"> <li>1. Identify ERP function related to employee roles</li> </ol>	<ol style="list-style-type: none"> <li>1. ERP Project Manager</li> </ol>
R3	Name department's key user or users. Recognize users' requirements from learning style perspective and create a training plan accordingly. Focus training on two subjects, using ERP and changed processes.	<ol style="list-style-type: none"> <li>1. Name department's key user or users</li> <li>2. Create implementation team within the case company</li> <li>3. Apply "Learning Style Questionnaire"</li> <li>4. Consider "Learning organization" test</li> <li>5. Create training plan to accomplish two subjects; use of ERP and changed processes</li> </ol>	<ol style="list-style-type: none"> <li>1. Operations Manager</li> <li>2. Site Manager</li> <li>3. ERP Project Manager</li> <li>4. ERP Project Manager</li> </ol>
R4	Focus and ensure positive and open organizational culture towards the ERP implementation project.	<ol style="list-style-type: none"> <li>1. Define target status of change</li> <li>2. Establish strong team</li> <li>3. Analyze current status of resistance</li> <li>4. Communicate target</li> <li>5. Personalize target</li> <li>6. Follow-up</li> <li>7. Institutionalize working practices</li> <li>8. Define business performance measurements for follow-up and for defining success</li> </ol>	ERP Project Manager
R5	By the support of top management, the employee involvement and the meaning of the ERP in the company can be increased.	<ol style="list-style-type: none"> <li>1. Obtain top managements support</li> <li>2. Ensure sufficient time and money budgets</li> <li>3. Introduce strategic vision</li> </ol>	<ol style="list-style-type: none"> <li>1-2 ERP Project Manager</li> <li>3. Management Team</li> </ol>
R6	Create a communication plan that sells the project to employees and covers the scope, objectives and tasks of the project.	<ol style="list-style-type: none"> <li>1. Communicate the benefits of the ERP</li> <li>2. Communicate how new system will work</li> <li>3. Communicate how employees' outcome will improve</li> </ol>	ERP Project Manager
R7	Identify and trace the key business processes with the help of experts for ensuring that those will be implemented in new ERP.	<ol style="list-style-type: none"> <li>1. Identify processes related to current ERP</li> <li>2. Identify processes where current ERP is not used</li> <li>3. Recognize processes that can't be implemented to new ERP</li> <li>4. Re-design point 3 processes to fit new ERP</li> </ol>	ERP Project Manager Operations Manager

The action points in Table 14 offer the initial suggestions for the actions to consider before the implementation. They may serve as a basis for creating further step-by-step instructions for the implementation team. However, since these action points are not specifically designed just for the project team, these points can be taken in consideration simultaneously by different other stakeholders as for the steps to reflect upon. Next the recommendations and action points related to them are further explained.

The first recommendation sets the objectives in the recommendations and its actions points to increase employees' involvement in the operational issues. As the new ERP

project in the case company is still in the designing phase, it would be reasonable to develop the targets and the follow-up method for the new ERP before the implementation starts, so that the target of increasing the employees' involvement could be achieved. When the actual implementation will take place, it would be easier to transfer the process and methods to the new ERP. The case company is currently missing a business strategy or at least its business strategy is not immediately visible. There is a corporate level strategy but it has not been implemented in the case company specifically well enough. Therefore, the first recommendation is for the managers to define the business plan and vision for the case company or just for the Operations. After that, more detailed targets and the follow-up could be put in place.

The second recommendation aims to increase the users' satisfaction when using the new ERP. As described in Section 4.6, there are two aspects that can increase the user satisfaction, usability and learnability. Therefore, the recommendation and action points for improving the employees' satisfaction when using it is to identify the employees' tasks and clearly define what functions in the ERP are needed in their work. By removing all the un-needed functions from the ERP, the use would be easier and simpler. Additionally, by creating discipline culture for using ERP and by eliminating unnecessary functions from the user's ERP account, it possible to decrease the confuse of how the ERP should be used and also reduce the users' desire to find alternative ways to achieve the targets.

The third recommendation and its action points are related to the training. As it was found out in the current state analysis, there has been very minimum training available for the employees for the current ERP. When the training has been insufficient, it has contributed partly the current situation. Therefore, the action points in R3 emphasize that the money should not be saved from the training. The first step is to name the department's key user or users. The key user should have wide knowledge of the processes in the department but to have considerable cross-department knowledge as well. Additionally, it would be beneficial for the key user to visit and learn how the other sites within the principle company have arranged the training. This kind of benchmarking and earning from it will benefit his department. Next step is to create a training plan that covers the two major issues; how to use the ERP and what has changed. For the training purposes, it would also be helpful to identify the users' individual learning style. For that purpose, several tools are available. It would also be beneficial to carry out the learning organization test (Ojala).



The fourth recommendation is the most important part. As defined previously in this study, ERP implementation requires change management because the way the company is doing business is changing. The seven step process presented in the action points, points 1 - 7 (Rohweder), aims to achieve the desired goal. Additionally, it is also important to measure the current business performance which can be compared to the similar measurements in the new ERP, so that the outcome and the success of the project can be accurately compared.

The fifth recommendation relates to the top management support. With the help of a strong leader, the project is more likely to be successful. Strong leadership is required for brightening up the importance of the ERP within the whole organization. It is only with the support from the top management, that the sufficient funding for the training and overall project budget can be obtained. By using its wide strategic vision, the top management can show the way to the employees where the company is heading. This is an important factor in increasing the rationale and reasons for the use of ERP and, therefore, plays an important role for ensuring its efficient use.

The sixth recommendation aims at improving communication. The action points listed in Table 14 are the overall target for the communication during the project. Additionally, the project team should have an internal communication plan. As Verzuh (2008: 298) defines, there are four points that the project team should consider. First is responsibility; each team member should have a clear role as for what he or she is responsible for. Second is coordination; the team should be coordinated so that they work efficiently together. Third is the current status of the project; define the goal, track the progress and follow the progress in the meetings. Finally, fourth is authorization; the team should be aware of the decisions made in relation to the project.

Finally, the seventh recommendation is about business process re-engineering. As the ERP system without modifications covers only an estimated 70% of the company's business processes, for the remaining 30% processes, the company has to be aware of the gap and have a plan how those processes will be included. These steps recommend the case company to recognize the key business processes, as well as the current situation as for where the ERP is currently being used and where not. Then, the plan for implementing the processes to the new ERP must be created. Next step is to identify the processes that cannot be implemented into the new ERP. It may not be

possible to recognize the processes that cannot be implemented well before the actual implementation. But for each identified process a re-engineering plan has to be defined. The objective is to have all the processes implemented in the ERP.

#### After Implementation

As the success of the implementation can be measured only after a certain period of time after the system was implemented, it is important to prepare for the follow-up on the progress. To reduce the risk of the attitude of the employees slipping back to the current situation, a follow-up plan should be arranged. Mandal and Gunasekaran (2002: 282) recommend the following questions to be asked for further improvement:

- Have the set goals been achieved completely
- Was the options of the system reviewed sufficiently
- Was the information of the project accurate
- Are the agreed rules and processes being followed
- Have there been any other important issues that were not included in the implementation

Additionally, for measuring whether the benefits from business performance were increased or not, a system of measurements should be defined and into into the system to evaluate this area as well.

### 6.3 Validity and Reliability in This Study

This section discusses the validity and reliability of the study. In this Thesis, *reliability* was ensured by increasing the credibility of the data used in the research project by involving several different data collection sources and methods. The triangulation was secured by combining different data collection sources: firstly, by arranging individual interviews, secondly, by examining the company internal documents, and finally, by conducting team discussions.

Reliability was also increased by involving a considerable number of informants to collect the data. Data for the current state analysis were collected by interviewing seven persons from the Operations department. The interviewed persons cover all the key

stakeholders from the Operations, and everyone has a long history in the company, thus possessing the required expertise to ensure the quality of the data. In addition, the researcher himself has worked in the company for several years and has acquired sufficient knowledge of the business processes in the company. Although the number of interviewees may seem low, the in-depth interviewing has ensured a good coverage of the specific issues related to the use of ERP from the Operations department. On the other hand, interviewing employees from the other department could have increased the reliability.

To increase *validity*, the proposed recommendations were given to the experts for validation. The recommendations were mostly accepted and approved of for application to help achieving successful implementation of the ERP. The fact that the recommendations were developed based on the framework obtained from the best practices identified in the business and research literature also increases the reliability of the results. DeLone and McNeal's information success model (2002) was especially appreciated by the expert as a suitable model for the case company.

Although it is clear that the researcher's own biases have had an effect on the results of this study, the same results would have been obtained if the research were done by someone else, either inside or outside of the company. On the other hand, it may have been strength of this study that the researcher was familiar with the employees and the existing ERP culture, as this understanding may not have become immediately clear for an external researcher due to the limited background to interpret the interview results. Additionally, since the implementation project is planned to begin later this year or early next year, it has not been possible to test the recommendations. Hence, the next step for the management is to start creating positive atmosphere for the upcoming project and system.

Finally, a well-functioning and efficiently used ERP system can provide accurate and seamless data for the management. With the help of the well-implemented new ERP system, the company will be able to enjoy the benefits offered by the ERP involving all employees and serving the company business processes.

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## **Appendix 1: Interview Questions**

The interview consisted of the following 7 questions, translated in English from Finnish:

- How and how much do you use current ERP in your daily work?
- How was your training when you began to work with the current ERP?
- Was training or was it not successful and how?
- What are your key concerns related to the new ERP?
- What should be taken in consideration with the new ERP to improve the user experience?
- How would the use become more efficient?



## **Appendix 2: Communication plan**

Issues that the communication plan should include (Al-Mashari et al. 2003):

- Rationale for the ERP implementation
- Changes in business processes
- Demonstration of the system
- Change management strategy briefly
- Tactics and establishment of contact points