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Preparing for ERP Implementation

Case: Enersize Oy

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<p>This thesis studied enterprise resource planning (ERP) systems and ERP implementation projects. The thesis is comprised of a theoretical part and a case study. The case study concentrates on the initial stages of an ERP implementation project in a Finnish start-up company Enersize Oy.</p> <p>The purpose of this thesis is to provide information on ERP systems and ERP implementation projects. The case study provides a practical aspect on an ERP implementation project in a small company.</p> <p>This study was conducted using qualitative research methods. The primary source of information for the theoretical part was a thorough search through the extensive literature on the subject. The main methods used for obtaining information in the case study research were observing the work at the case company and conducting qualitative interviews on Enersize Personnel.</p> <p>ERP systems are getting more and more important for modern companies as the competition is fierce on many sectors and concentration on core competencies is leading to wide partner networks. In this kind of business environment, managing business information is very important for companies' competitiveness. By using ERP systems companies can manage and utilize information efficiently. For the aforementioned reasons ERP implementations are getting more common also among small and medium-sized enterprises (SME) and many ERP vendors are now providing ERP systems that are developed for SMEs needs.</p> <p>In the case study, the ERP requirements of the case company were defined and an ERP system that fills those requirements was proposed for implementation. Also other tasks related to initial stages of an ERP implementation project were carried out and recorded.</p>	
Keywords	ERP, ERP Implementation, SME, Start-up, Enersize Oy

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1 Introduction

The background for this thesis is the researcher's work placement at Enersize Oy. The intended tasks for the internship included planning and rationalizing the logistic processes of the company. While discussing the specifics of the work placement, Enersize's need for an Enterprise Resource Planning (ERP) system was brought up. It was decided together with the CEO Tuomas Rouhikko that the subject of the thesis should be the determination of Enersize's requirements for an ERP system and the search of a suitable ERP solution for the company.

The business environment in most industries is becoming more complex and international, which means that managing and utilizing information effectively is very important for the success of modern companies. Concentration on core competencies and outsourcing other activities are leading to wider partner and subcontractor networks and often to internationalization. Managing the whole operation throughout the network requires information systems that can integrate both external and internal information into readily available and usable forms. Many companies are using information technology solutions, such as ERP systems, to manage their business processes and to integrate all the different operations in order to enhance information flow within the company as well as collaboration with partners, suppliers and customers.

For the reasons mentioned above, implementation of an ERP system is considered very important for Enersize's competitiveness. Selecting and implementing a suitable ERP system is a very challenging task, especially for small and medium-sized enterprises (SMEs), and not least because of the high costs involved in the process. However, more and more SMEs are going through with the task because of the potential benefits that ERP systems can bring. Also many ERP vendors have realized the potential in SME markets and launched new products that are designed for smaller companies.

1.1 Objectives and Scope of the Thesis

The goals of this thesis include providing general level information on ERP systems and their problem-prone implementation projects by researching the literature and previous

studies on the subject. Another goal is to carry out the definition of Enersize's enterprise resource planning requirements by examining the current state of the company and considering the future needs. Surveying and comparing the different system options available in the market in order to propose a suitable ERP solution for the company is also included into the goals of the thesis. Therefore, the main goals of this research work can be further divided into three objectives.

- The first objective is to provide a theoretical background for the subject matter of the thesis.
- The second objective is to define the requirements for Enersize's ERP system and to determine the functionalities that need to be included in the software.
- The third objective is to find an ERP system that would best suit the needs, requirements, and resources of Enersize.

This thesis consists of two parts: a theoretical part and a case study. The first part, which is the theoretical part, aims to provide an insight into the subject matter, i.e., ERP systems and ERP implementation projects. The purpose of the theoretical part is to explain the function, history, benefits and disadvantages of ERP systems. The first part also covers ERP implementation projects on a general level.

The second part of the thesis, the case study, is a part of the ERP system implementation project for Enersize Ltd. The purpose of the case study is to help Enersize in its ERP implementation project by planning, carrying out and documenting the necessary tasks in the early stages of the ERP implementation project. This study is confined to cover Enersize's implementation project up to the final selection of the ERP product and its vendor and therefore it does not cover the actual deployment stage.

This thesis aims to provide useful general level information on enterprise resource planning and despite focusing solely on the case company, the case study can be helpful in gaining a general understanding of ERP implementation projects in SMEs and start-up companies. The thesis is beneficial for the case company itself, because the research will contribute significantly to Enersize's ERP implementation project. It can also be advantageous for other SMEs or startup companies who are undertaking the same project.

1.2 Research Methodology

This research is conducted using qualitative research methods. The objective of qualitative research is to gain an in-depth understanding of certain behavior and the reasons behind such behavior. Instead of focusing only on what decisions are made, qualitative research examines why and how they are made. (Glenn 2010: 95) This thesis consists of a theoretical part and a case study. Therefore the research has characteristics of both empirical and theoretical study. The theoretical part focuses on explaining the theory behind ERP systems and ERP implementation projects in order to provide deeper insight into the subject matter of the case study.

The primary research method for the theoretical part of the thesis was thorough search through literature on the subject. A lot of previous research has been done on the subject and as a consequence, a vast amount of relevant literature is available. The sources that were used in literature research were mainly obtained from Metropolia's libraries and electronic databases.

According to Woodside (2010), a case study research is an inquiry that focuses on describing, understanding, predicting, and/or controlling the individual. In this context the word 'individual' does not necessarily mean a person, but can mean different things (such as: process, animal, person, group, household, organization, culture, industry, or nationality) depending on the study. The case study part of the thesis focuses on the case company, Enersize Oy, and aims to fulfill the goals and objectives of the research by completing and documenting the first stages of Enersize's ERP implementation project.

The main methods used for obtaining information in the case study research were observing the work at the case company and conducting qualitative interviews on Enersize personnel. Because the researcher was working for the case company during the research, a lot of information could be obtained by participating the meetings and discussions regarding the ERP implementation. To gain an understanding of Enersize's business processes, in order to find out its ERP requirements and needs, several unstructured interviews with the workers of Enersize were carried out.

1.3 The Case Company

Enersize Oy is a technology company that provides comprehensive energy saving solutions for process industry. Enersize was established in February 2010 as a spinoff from Rocca Group Oy. Rocca Group is an importer and seller of compressed air equipment and systems. Compressed air is an important energy utility for process industry and it is used basically in every production plant in the world. Inefficient compressed air systems waste huge amounts of energy globally every year. The potential for energy efficiency improvement in compressed air processes was realized in Rocca Group's business environment and that was the starting point of Enersize Oy. Due to this background, Enersize's energy saving solution was mainly focused on compressed air systems in the beginning, however, the same concept can be utilized in other process industry support processes as well. For this reason Enersize is now providing energy saving solutions also on pumps, fans conveyors and other energy consuming processes.

Enersize has created a complete technology called Enersize Platform for monitoring energy efficiency in industrial processes. The Platform is a tool for collecting information on energy consumption and for presenting that information in understandable and usable form. Enersize's Platform solution gives a better understanding of how a production process consumes energy and how process quantities and energy are tied together. This information makes energy usage transparent and significantly helps optimizing that usage.

The Platform consists of two elements: Enersize Gateways and Enersize Cloud software service. The Gateway is a data collection unit that gathers information from sensors, analyzers and transmitters. Gateway units need to be installed in the customers' premises according to the mapping of the surveillance points and machines that the customers want monitored. Gateways are easy to install by using standard industrial cables and they are not tied to any specific industry field so they can also be connected to previously installed existing meters. The gathered information is then sent to Enersize Cloud through which it can be accessed by the end user. Enersize Cloud is a proprietary software that utilizes cloud computing technology. The Cloud can be accessed

from anywhere in the world with any device with a web browser. Through the Cloud the customer can process and analyze the measurement information and view tailored reports and charts for example. The principle of Enersize Platform is illustrated in figure 1.

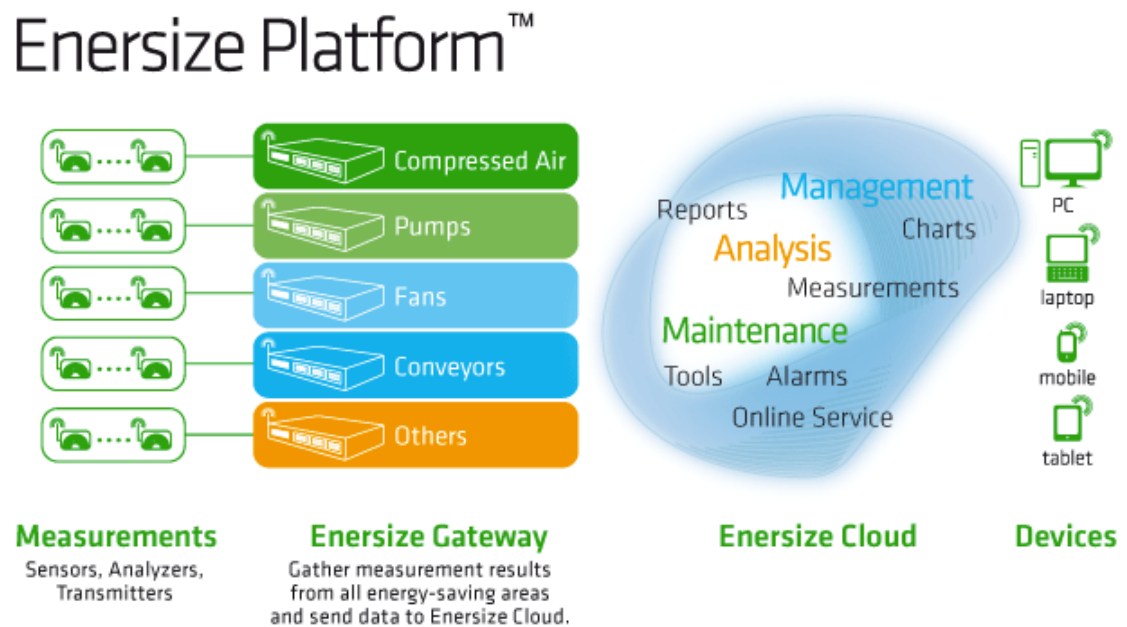


Figure 1. The Enersize Platform.

Enersize sells the energy saving solutions in two different kinds of forms. One option for customers is to purchase the Platform only, in which case the measuring system is installed in the customer's facility to monitor the processes that are wanted to be optimized. After the installation, the customer gets access to the Enersize Cloud software where the energy consumption can be monitored and Enersize offers consultancy on how the energy efficiency can be enhanced. The other option is to purchase a complete energy saving service called ESaaS (Energy Saving as a Service). ESaaS also utilizes the Platform but this service includes Enersize carrying out all the necessary changes that are needed in order to achieve savings on energy consumption. ESaaS service is sold with a no savings - no costs guarantee, which means that the achieved savings are divided between the customer and Enersize according to the contract and if there are no savings achieved there will be no costs for the customer.

2 Enterprise Resource Planning Systems

Enterprise Resource Planning (ERP) systems are business software tools that allow companies to automate business processes, share data and practices across the enterprise, and produce and access real-time information (Sumner 2005: 3). The main objective of ERP systems is to integrate all departments and functional information flows across an enterprise onto a single computer system that serves all of the company's needs (Turban and Volonino 2010: 380). ERP systems are widely used by organizations of all sizes and functions because their potential benefits are too significant to disregard. In order to be competitive in modern business environment, organizations must establish good business practices and effectively share information internally, as well as with their suppliers, partners and customers.

The benefits that an ERP system can bring to organizations, stem from the system's ability to overcome the inefficiencies of independent information systems. For example, compared to stand-alone information systems, an ERP system:

- Supports coordination across business functions
- Integrates data
- Gives access to consistent real-time information
- Enables uniform information system maintenance
- Supports consistent business processes. (Sumner 2005: 3-5)

By integrating all the information flows, ERP systems help organizations manage the supply chain, inventory, customer orders, production planning, receiving, shipping, accounting, human resources and other business functions (Sumner 2005: 3). An information system that enhances the planning and implementation of business processes can save costs and time, improve resource allocation and enhance customer service. Therefore ERP systems can have a significant impact on the profitability and competitiveness of companies. (Kouri and Vilpola 2006: 7)

Most ERP systems consist of separate modules that support different functional areas. Modules for such areas as customer relationship management, financial accounting,

supply chain management, and human resources are integrated together and they access the same data from central database. Companies implementing ERP solutions can choose which modules they want to implement according to their needs, and the modularity of the systems gives them the opportunity to start using only parts of the ERP alongside other systems in order to save costs. The total implementation of a vendor ERP system is costly and time consuming but offers the benefits of total integration of data across multiple functional areas of the business. (Sumner 2005: 7-9)

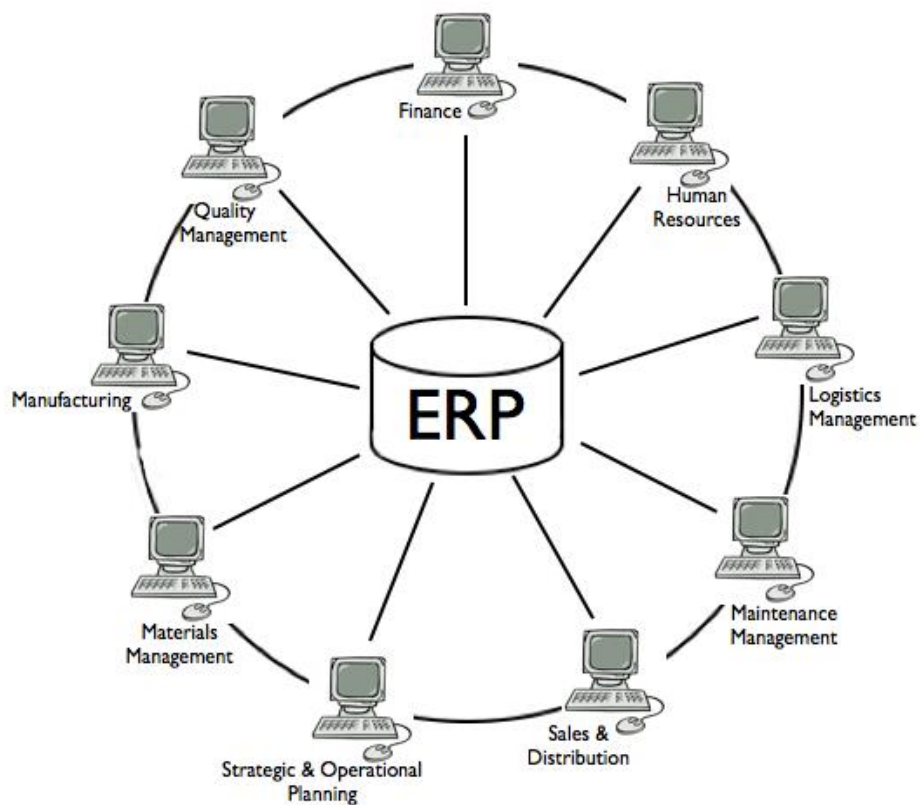


Figure 2. Information integration through ERP systems (Train-Srv, 2012).

2.1 The History of ERP

Enterprise Resource Planning is not a new concept in the business world. The functions that ERP systems perform are basically the same business functions that organizations have performed for decades. The advances in computerization and networking have allowed the emergence of computer-based ERP systems as we know them today. (Dowlatshahi: 2005)

The History of the ERP systems can be traced back to the 1960s when the development of computer software for inventory management purposes started. The development was done by the user companies themselves or software companies that were specialized in tailoring computer programs. (Kettunen and Simons 2001: 46) Most of the business software packages were limited to only inventory control functionalities back then. These systems were reorder point systems that were designed to manage high-volume production of small number of products with a constant demand. They used historical data to forecast inventory demand by automating inventory replenishments when a stock item fell below predetermined level. (Sumner 2005: 3)

The next generation of business software were Materials Requirement Planning (MRP) systems which were introduced in the early 1970s. MRP systems were focused on demand-based planning of production and inventory control and the purpose was to guide purchasing activity and to automate the creation of purchase orders. MRPs attempted to minimize inventory levels while ensuring adequate materials for the production process. These software included master production schedule and a bill of materials file. Master production schedule is one of the primary inputs in MRP and it states which items are to be produced, as well as when and in what quantities they are needed. Bill of materials (BOM) file is the list of materials required to produce each item. MRPs emphasized production planning and integration and were later enhanced with tools for sales planning, customer order processing, and rough-cut capacity planning. In the end of the decade the development of commercial standardized business software became more common and all the systems were not tailored for the needs of a particular company anymore. The planning of required materials for production in today's ERP systems is still handled with similar MRP logic. Figure 3 illustrates the MRP function. (Sumner 2005: 3; Kettunen and Simons 2001: 46; BN.Tafe 2005)

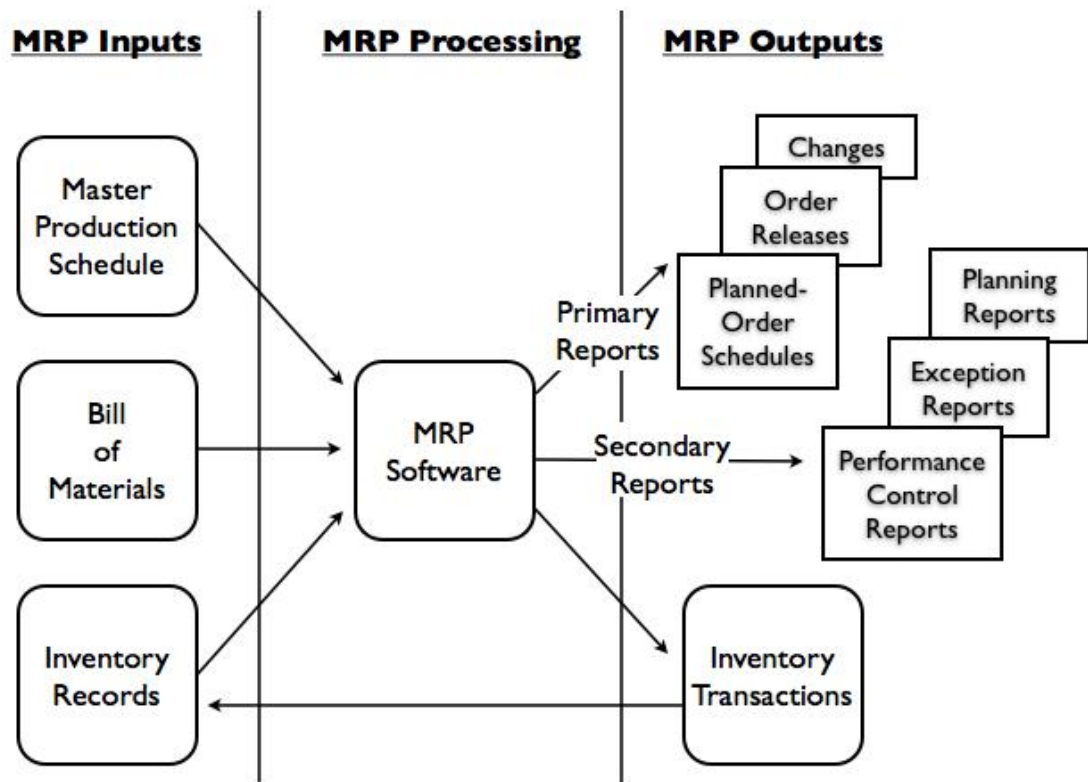


Figure 3. The function of MRP software (BN. Tafe 2005).

Manufacturing Resource Planning (MRP-II) systems emerged in the 1980s. MRP-II concept was based on the MRP systems but new features were added. The focus of these systems was on quality and they had the ability to schedule and monitor the implementation of production plans. Later on, MRP-II systems' focus shifted more towards fulfilling customer needs and the ability to adapt production schedules to meet specific customer needs on timely basis was included in the software. In the early 1990s, MRP-II systems were leading the way towards integrated business systems by including software for other departments in addition to production. Software for financial accounting, project management and human resource management among others were integrated with MRP concepts. This led to the development of ERP concept as we know it today. By the late 1990s ERP systems integrated all the information flows within the company and the ideas of e-business and increased information sharing between companies' information systems were incorporated in the ERP concept. (Sumner 2005: 3; Kettunen and Simons 2001: 46-48)

While business software were initially designed for manufacturing companies, the use of ERP systems is not limited to certain types of industries or organizations and today all kinds of companies are using ERP systems. Service organizations are utilizing ERP software to improve their efficiency and decision-making. Manufacturing companies continue to use ERPs but are now relying more on them for handling the whole process associated with a customer order from start to finish. Modern ERP systems can perform a wide range of functions and operations for different departments, whether it is small, medium or large organization. (Dowlatshahi 2005) As already mentioned in the introduction, companies today are increasingly concentrating on their core functions and therefore forming collaboration networks with other organizations. As companies are forming networks, in order to optimize their operations, the need for integrations between different information systems grow. Nowadays ERP systems are required to help controlling business networks. Figure 4 illustrates how business software and their functionalities have evolved.

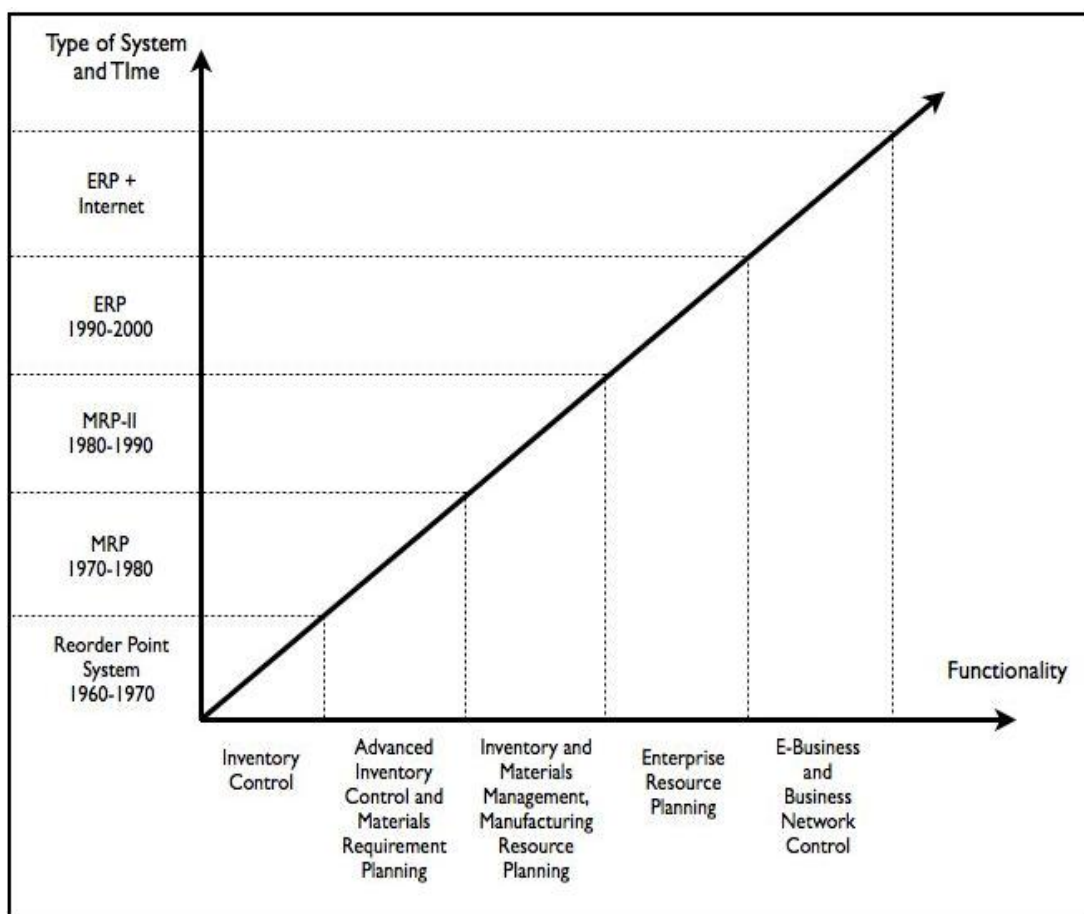


Figure 4. ERP history and the evolution of ERP functionalities (Kettunen and Simons 2001: p47)

2.2 ERP Function and Benefits

Enterprise resource planning systems are expensive investments that are often associated with many problems. There are numerous stories about failed ERP implementations and complex systems that are difficult to use. Despite the dubious reputation of the systems, they are widely used. In this section of the text, ERP system's role in an organization and the common benefits that it can bring, are discussed.

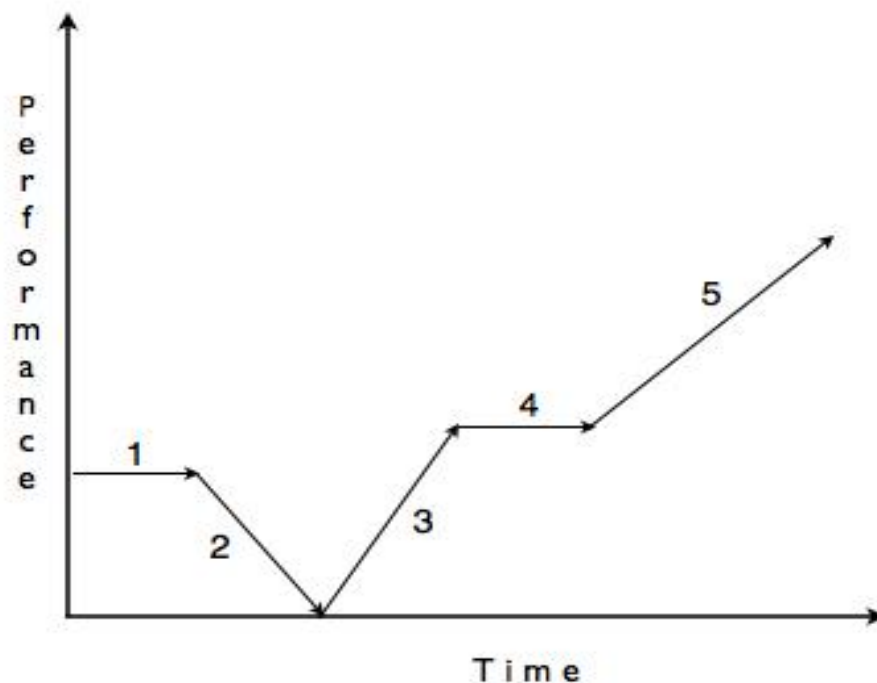
According to Statistics Finland (2011), 75 % of Finnish companies, that employ more than 100 people, are using ERP systems. The usage rate is 56 % even amongst companies with 50-99 employees. These figures suggest that using an ERP must be beneficial for companies. Below is a list of common ERP benefits from a business standpoint.

- Time and cost reduction of business processes
- Faster transaction processing using common data
- Improved operational performance (e.g. reductions in excess inventory and accounts receivable)
- Enhanced supply chain management (linkages with suppliers and customers)
- Consistent business processes conforming "best practices"
- Improved financial management and customer service
- Enhanced organizational communications (e.g. with customers and suppliers)
- Improved e-business with web-based interfaces
- Improved availability of information for planning and control (Sumner 2005: 4-5)

It needs to be emphasized that an ERP system is only as efficient as its users allow it to be. In other words, the success of an ERP system is completely dependable on how the workers utilize it. Even the best systems will not be beneficial without timely input of accurate information by their users. (Exforsys 2009)

An ERP system can be advantageous for an organization in numerous ways. All of the benefits are not easy to associate with the system because ERPs can increase profits and cut costs in ways that are difficult to measure. Some advantages can also emerge a long time after the initial implementation, and therefore are impossible to notice in

the short run. (Vuorenpää 2007) Figure 5 illustrates the effects of an ERP implementation on organizational performance. As can be seen in the figure 5, the performance of an organization tends to decline during the implementation. This decline is due to difficulties that employees often have in adopting the new system and new ways of business processing. The implementation project will also cause distractions to employees, who still need to perform their daily tasks while participating in the project. The decline of the organizational performance is only a temporary phase and if the new system is properly utilized, the organization can quickly become more efficient than before the ERP implementation.



1: Before ERP implementation 2 & 3: During implementation
 4: After implementation, during training 5: After training and going live completely

Figure 5. The performance of an organization before, during and after ERP implementation. (Parthasarthy 2007: 42)

Perhaps the most important advantage of an ERP system is the integration of information throughout the supply chain, which can result in improved operating performance, cost reduction and inventory reduction (Sumner 2005: 4). For example, inventory management is improved by order entry that allows immediate access to invento-

ry, product data, customer credit history and prior order history. This kind of availability of information makes it easier to optimize production schedules and inventory levels, raises productivity, and increases customer satisfaction. (Turban and Volonino 2010: 380) Some of the benefits brought by improved visibility of organizational information can be difficult to measure exactly, but it makes planning, forecasting and decision making easier and improves control over all the operations. Access to real-time information also enables companies to response to changes in market conditions and customer needs more quickly. (Sumner 2005: 4-6)

By integrating information, a properly functioning ERP system overcomes the problems generated by working with information systems that do not "communicate" with each other (Turban and Volonino 2010: 380). ERP systems support the coordination between different business functions and the data has the same meaning across the enterprise, whereas with non-integrated systems the data might have different definitions for different departments. With ERP solution, the data need to be imported to the system only once, after which it is available for everyone with access to the system. This reduces useless manual work of inputting the same data several times. (Sumner 2005: 4-6) Although ERP systems are often associated with high costs, one benefit that stems from using an ERP is lower information technology maintenance costs and possibly even lower license fees compared to using multiple separate systems. It is costly, time consuming and troublesome to maintain separate systems on a piecemeal basis and the yearly license fees can end up being very high, even though the fee for each individual system is relatively low. (Sumner 2005: 3-7)

The main reason why companies exist in the first place is to make profit. Naturally, when an organization makes a major investment like implementing an ERP system, they are interested in making more profits through the system. As we know, profits can only be increased by reducing costs or increasing revenues. The major contribution of an ERP system is improved information quality in various aspects such as availability, accessibility, accuracy, and timeliness. The improved quality of information affects the decision making processes and functional operations of a company. All of these benefits that an ERP can bring, facilitate increases in organizational productivity which should be transformed into more profits. Utilizing better information leads to using less resources, like less manual labor or machine hours, and raises revenues by accurate

sales forecasting and better customer service which leads to increased profits. (Jipyo 2009) The figure 6 illustrates how ERP benefits can be turned into profits.

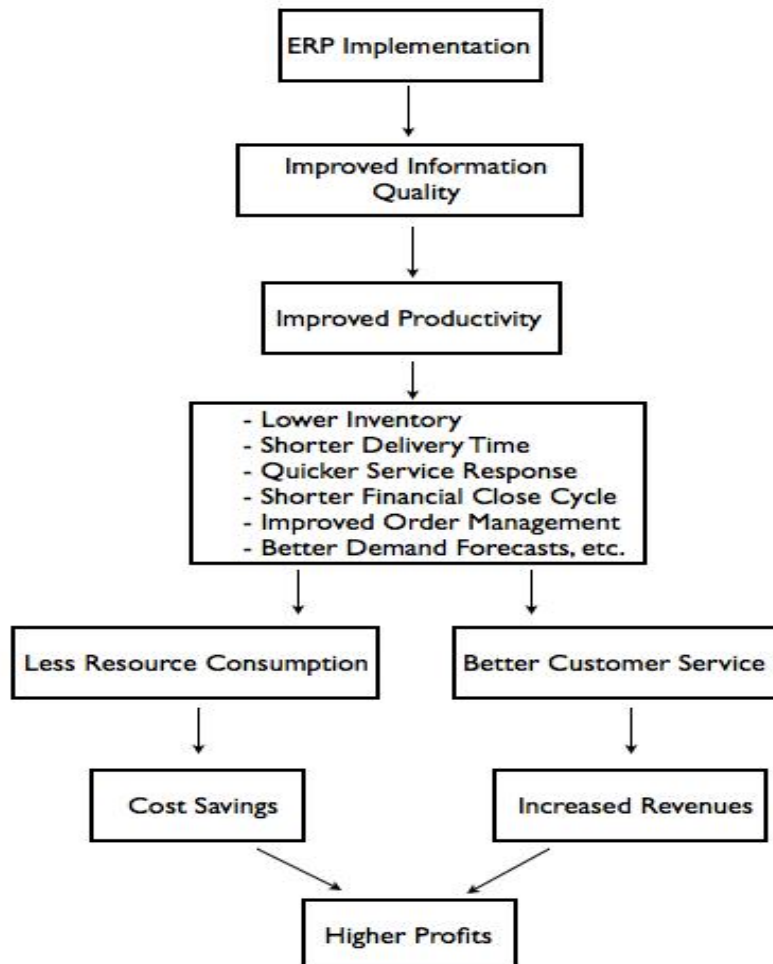


Figure 6. Realization of profits through ERP. (Jipyo 2009)

2.3 ERP Disadvantages

Although ERP systems can be very advantageous for the organizations using them, the implementation of these systems has often proven to be problematic, as mentioned earlier. In addition to problems regarding the ERP implementation process, there are other disadvantages associated with ERP solutions. Probably the biggest down side to ERP systems is the high costs of the technology (Exforsys 2009). The total costs of the

implementation project can be very high and more often than not, ERP projects are late or over budget (Sumner 2005: 13). For big companies ERP adoption is always a multimillion euro undertaking and the consulting expenses often get much higher than the original ERP license fee (Fuß, Gmeiner, Schiereck and Strahringer 2007). The costs of ERP implementation for a small or medium-sized company are naturally lower than for large companies, but nevertheless, the costs are substantial for any company adopting an ERP. Even after the costly implementation, the systems are often expensive to maintain. (Parthasarthy 2007: 5)

ERP systems introduce "best practices," which are practices that are found to be the best ways to perform certain processes. Although best practices can improve companies' business processes, they create challenges for ERP implementation because the system imposes processes on the companies that implement it. (Sumner 2005) The standard processes included in ERP software replace old procedures, which very often improve a company's operations, but sometimes these new processes replace business procedures that were the source of competitive advantage. For example, in some industries, where competition is fierce and ERP systems are widely used, a unique old way of doing business might allow for flexibility and differentiate a company from the competition. In this case implementing an ERP solution could lead to loss of competitive advantage. (Fuß, Gmeiner, Schiereck and Strahringer 2007) The best practices of an ERP system might also be inappropriate to the organizational culture, which leads to "culture clash" and creates further problems (Parthasarthy 2007: 5).

The best practices embedded in the ERP systems mean that organizations often need to change their practices to better fit the new system, which typically creates resistance from workers. The resistance to change has been identified as a considerable reason for the failure of information systems implementations and therefore it is an issue that needs to be understood and managed (Hee-Woong and Kankanhalli 2009). One of the ERP benefits is that it reduces the need for manual labor in the organization, which is another thing that can create user resistance because some of the employees might fear being downsized due to the new system (Parthasarthy 2007: 5).

A major problem with ERP is that it is often difficult to tailor to the needs of specific companies. Only very few companies can use ERP right out of the box and in most

cases it needs to be tailored to suit organizations' needs. Tailoring can include both configuring and modifying the system. Especially modification, which is done by changing the code of the software, can be tedious and very expensive. (Exforsys 2009) ERP systems are also often seen as too rigid and difficult to adapt to specific workflow and business processes of certain companies. In these cases, the adoption of ERP can cause loss of flexibility and complicate the everyday work of the users. (Parthasarthy 2005: 4-6) As mentioned earlier, ERP systems are only effective if the users utilize it properly. Many of the systems are quite complex and difficult to use without proper training, which can be time consuming and very expensive. (Exforsys 2009)

3 ERP Implementation Project

The concept of implementation is traditionally related to installation of hardware and software. In the case of ERP systems, "implementation" is used as a term to describe the whole project spanning from the preliminary project planning through configuration of the system and training until the system is in use. This, in reality, is the vendors' and consultants' view on the implementation. From the company's point of view, implementation means a continuous learning cycle where the organizational processes supported by the ERP are gradually aligned with the business objectives. (Parthasarthy 2007: 35) This section of the thesis covers the different phases in the ERP implementation project as well as common risks associated with them.

ERP implementations are reputedly unsuccessful and infamous in the business world because so many organizations have had major problems with them. It seems to be almost an accepted fact that these projects never are on time, within the budget, and meeting the desired business outcome (Parthasarthy 2007: 35). The failure rates of ERP implementation projects vary from study to study, but the percentage of ERP implementations that can be classified as "failures" ranges from 40% to 60% or even higher. These failures have been known to result in problems as serious as organizational bankruptcy. (Chau, Davison, Scarbrough and Wong 2005). ERP implementation is a project that includes such concepts as objectives, schedule, budget, scope, resources, phases, activities, and roles just as any other project in an organization. The most important of these concepts is objectives. An ERP implementation project is always a business development project, which aims to enhance the company's operational performance and therefore business-related goals and objectives should be set for the project. An organization implementing an ERP system should have a clear vision of why it is embarking on this project and what are the business objectives that it wants to reach by utilizing the system. Careful planning can significantly affect the success of the implementation project and the reaching of objectives. (Kouri and Vilpola 2006: 11)

3.1 Phases in ERP Implementation Project

Figure 7 illustrates the main phases of ERP implementation project. The phases that are side by side in the figure can be completed in different order or they can be partially overlapping.

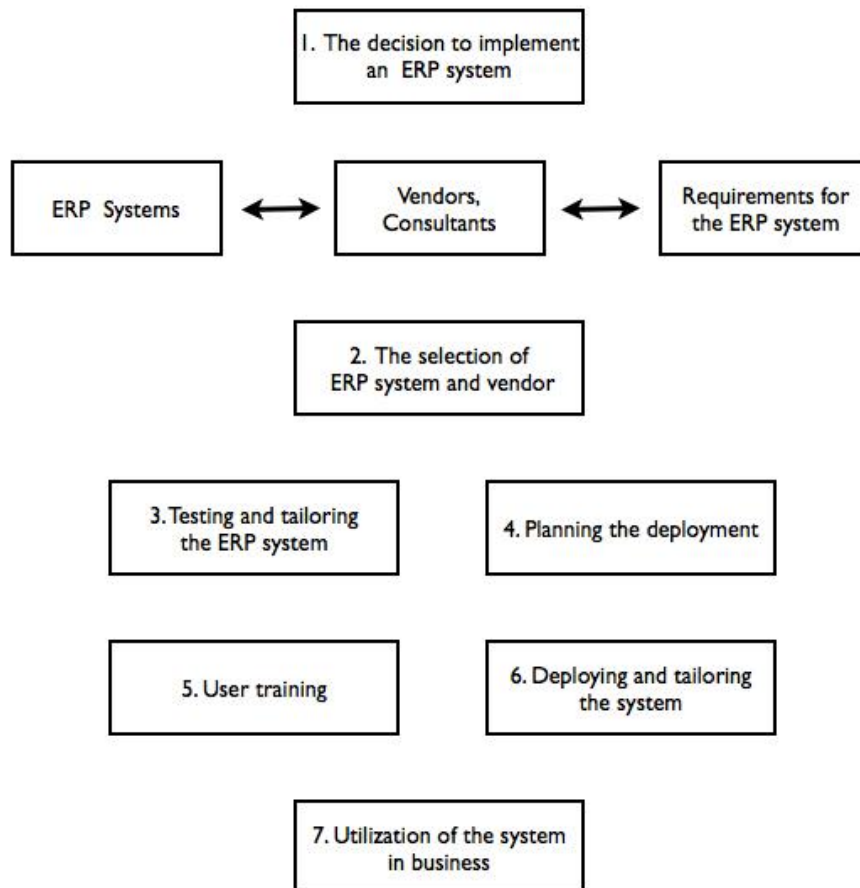


Figure 7. The main phases in the ERP implementation project. (Kouri and Vilpola 2006: 13)

The first phase of the project is the company's decision to implement an ERP system. This first step includes the preliminary estimation of the budget and schedule as well as designating the management team for the project. The business objectives and goals, that the company seeks to achieve with the ERP system, need to be determined at this stage. The company's requirements for the ERP system should be determined in accordance with the business objectives. When the requirements and objectives are

determined, ERP systems available in the market need to be compared and their functionalities assessed in order to find the most optimal system for the company's needs. Vendors and consultants of the systems should be evaluated and compared, because the vendor often has an important role in the implementation project. (Kouri and Vilpola 2006: 13-16)

When all the activities of the first phase are completed, the selection of the ERP system and its vendor can be done. The decision concerning the selection of a system is crucial for the whole project because, by choosing a certain ERP, the company makes a commitment to the practices and procedures that this specific ERP system supports. Also the decision about the vendor is very important and requires careful consideration. The company needs to keep their own interests in mind and demand the best possible service from the vendor because the whole project is challenging and big risks are involved. (Kouri and Vilpola 2006: 13-16)

Testing and tailoring the ERP system are technical operations that are performed in order to ensure the system's adequacy for the company's business needs. The term tailoring, in ERP context, can have slightly different meanings in different studies or books. In this thesis the term is used as Brehm, Heinzl and Markus use it in their 2001 article 'Tailoring ERP Systems', according to which, tailoring encompasses both configuration and modification of the software. Configuration (sometimes called customization) refers to the setting of parameters in the software package to best suit the organization's needs. Modification refers to changing of the code in the software in order to make the system support processes that the out of the box package does not support. (Brehm, Heinzl and Markus 2001) Modifications are not very common nowadays because of the high costs and the fact that they complicate the software's updating. Testing is done to ensure the compatibility between company's data and the ERP system's data handling routines. At the same time the usefulness and necessity of the existing data is verified and only useful data are input into the ERP database. New processes might also require creation of large quantities of data, such as price lists and product catalogues. (Kouri and Vilpola 2006: 13-16)

Planning the deployment includes the determination of the user training, the schedule of the deployment and the required activities. The challenge is to smoothly change

from the old systems to the new ERP without causing unreasonable harm to the company's operations or to the employees. (Kouri and Vilpola 2006: 15)

User training has an effect on how quickly the employees can adopt the use of the new system and therefore it affects how quickly the business objectives of the implementation project can be achieved. Training is expensive but the users need enough training to understand the general idea behind the system's logic and its potential benefits as well as the impact of their own activities on the big picture. (Kouri and Vilpola 2006: 15)

The deployment and tailoring of the system needs careful consideration regarding the timing and method of the deployment. The deployment should not be done during the busiest season and it can be done step by step, for example one function at a time. When planning the deployment, the potential problems need to be prepared for and alternative ways of carrying out the process need to be considered beforehand. Additional tailoring may still be needed at this stage, and it should be done in accordance with users' feedback and wishes. This step of the project requires careful attention because the mistakes made at this stage can lead to a situation where the users are not utilizing the system properly. (Kouri and Vilpola 2006: 15-16)

When the use is established and the system is being properly utilized in business, the original business objectives of the project should be revised and the measurable objectives should be measured. After this, the project can be finalized. (Kouri and Vilpola 2006: 16)

3.2 Risks in ERP Implementation Project

There are unique challenges and risks involved in ERP implementation projects. Sumner (2005) lists four different categories of risks that pose a threat to successful implementation project. These four risk categories are: technology, organization, people and project size. The common risks associated with ERP projects are discussed in this section in accordance with Sumner's categories.

Technology risks vary according to how well the new system fits with the current corporate technology infrastructure and operating system environment. When a company implements a technology that is inconsistent with current operating system, database and network environments, the system implementation will require fundamental changes in technology infrastructure. Changing the technology infrastructure will raise the technology risk and might lead to a situation where the company's internal technical expertise is inconsistent with the new infrastructure. To keep the technology risks low, the technical requirements for the chosen ERP system should be consistent with the company's technical know-how and the technology infrastructure. Despite the efforts to mitigate these risks, technological bottlenecks often occur when implementing a new ERP software package, especially when attempting to build bridges to legacy applications. These issues pose risks to the project and can result in lack of integration. Technological issues must be taken into account when selecting the ERP software package in order to avoid unnecessary exposure to technology risks. (Sumner 2005: 116-118)

The organizational risks deal with company's business processes and organizational factors (Sumner 2005: 116). When the features of the ERP software do not fit the company's business requirements there are two possible strategies in implementing the software. First option is to re-design the business processes to fit the software with minimal tailoring and the second possibility is to modify the software to fit the processes. The first option should reduce errors and help to take advantage of newer versions and updates of the system. On the other hand, changing business processes to fit the system could mean changes in established ways of doing business, which can lead to worker resistance and even to loss of competitive advantage as discussed in the ERP disadvantages-section (see p15). The second option includes modification of the software, which slows down the project and raises implementation costs, could affect the stability of the system, and make managing future releases more difficult. On the other hand, modifying the software implies less organizational changes. (Themistocleous 2005) For the success of ERP implementation project, in terms of project constraints, the less modifying needed, the lower the risk of budget overrun and schedule delays. The organizational risks also vary according to the amount of business processes that the ERP implementation project affects. If the scope of the project affects nearly all

the company's business processes, the risk is greater than if it affects only 25% of the processes, for example. (Sumner 2005: 116-118)

The third area of risk is associated with people resources. If the company's IT professionals are familiar with the application-specific ERP modules, then the probability of successful implementation is enhanced. Insufficient training and re-skilling of the staff and failure to efficiently mix internal and external expertise raise the risks of project failure. People factors that affect the level of risk also include the know-how of the ERP user staff and their involvement in the project. Inadequate training of end-users, ineffective project communications and lack of sensitivity to user resistance all lower the chances of success. Risk of failure raises significantly, if the users are not fully committed to completing their activities in the implementation project. (Sumner 2005: 117-118)

The fourth source of risk deals with project size. As an ERP implementation project can be the largest single investment in corporate technology for many organizations, the sheer size of the project poses considerable risk. Any project, that is as large and important as an ERP implementation project, needs senior management support, a proper management control structure and effective communications in order to be successful. (Sumner 2005: 117-118)

3.3 Controlling the Risks

Let us take a look at some strategies that companies can follow in order to mitigate the risks involved in ERP implementation project. The risk mitigation strategies in this section are categorized in the same four groups that Sumner lists in her book Enterprise Resource Planning (2005).

The technology risks can be controlled by selecting an ERP software that fits the technological infrastructure and technological expertise of the company in the best possible way. Acquiring technical expertise through training, recruiting, or buying consultancy or any combination of these activities, will lower the technological risk factors. Commitment to using project management methodology and best practices specified by the

vendor as well as adherence with the specifications supported by the ERP software are also important factors in controlling the risks. (Sumner 2005 : 118-119)

The organizational risk factors can be mitigated by committing to re-designing business processes according to the best practices included in the ERP software. One of the biggest benefits associated with ERPs is business process re-engineering that can be gained by adopting best practices embedded in the ERP package. Many organizations do not achieve this benefit because they rather modify the system in order to avoid change. Planning the business process re-engineering carefully and implementing best practices increases the chance of project success greatly. Careful process planning is called for also in order to avoid changing the processes that can be identified as sources of competitive advantage. Top management's commitment to restructuring and following an enterprise wide design that supports data integration and new business processes is crucial for mitigating organizational risks. Resistance to change is an issue that needs to be dealt with by the companies implementing ERP. Employees need to be well informed about the interrelationships that the ERP system creates and the impact of their own actions on the big picture. An organizational culture that promotes open communications is important to avoid resistance to change. (Sumner 2005: 119-120)

The risks associated with people resources can be lowered with effective recruiting and retaining of skilled technical personnel and by efficient re-skilling and training of existing work force. Effective and appropriate use of consultants in the project is very important as well. Proper user training is critical to ERP success and organizations must be willing to invest in training despite the high costs. User training should also focus on business processes and not just on technical issues about how to use the software. If the users are fully committed to their roles in the project, the possibilities of success increase significantly. Effective communication strategies are important in mitigating people factor risks as well as many other risks. (Sumner 2005: 118-121)

The fourth risk category that addresses project size can be mitigated by thorough project planning and by assuring top management's support for the project. Establishing a proper project management structure and clear roles for all the members involved in the project, as well as properly planned schedule and budget help making the project

successful. Effective communications and contingency plans created for unexpected issues are important for the success of ERP implementation. (Sumner 2005: 119-121)

4 The Enersize Case

This case study deals with the initial stages of Enersize Oy's enterprise resource planning implementation project. The following sections of the text cover the details of carrying out the case study, justification for acquiring an ERP system, the analysis of Enersize's present state, the company's requirements for ERP, and the risk analysis of the project.

4.1 Carrying Out the Case Study

A case study is both the process of learning about the case and the product of that learning (Marschan-Piekkari and Welch 2004: 109). The aforementioned sentence rings true in this case, since the researcher had plenty of issues to learn about the case through research and products of that learning did not only contribute to the case study but also contributed significantly to the project that is the subject of the study. This is because the researcher was heavily involved in the project itself and therefore in addition to the research done for the case study there were numerous practical tasks related to the project that needed to be done. According to Handbook of Qualitative Research Methods for International Business (Marschan-Piekkari and Welch 2004: 109) a case study is perhaps the most frequently used approach for thesis and dissertation research in business studies. In this case, as the researcher was working for the project, it was a natural choice to research the ERP systems and ERP implementation projects in general as concepts and this individual project as a unique case and combine the findings in this thesis. Case studies require data collection through various sources such as personal interviews, verbal reports, observation, and written reports. As the subject of the study is a unique case, there is a need for sufficient information to understand the unique features of the case as well as the characteristics that are common to other similar cases. The research done for the theoretical part of the thesis provided a strong understanding on the subject matter and thus also helped in the case study research. (Marschan-Piekkari and Welch 2004: 109-110)

The actual implementation phase of an ERP implementation project is often led by the vendor company and that is also the case with Enersize's ERP project. But as men-

tioned earlier, the whole implementation project is much larger from Enersize's point of view than just the actual implementation phase and therefore the project must be started already much before the vendor company is even chosen. The researcher was responsible for planning and handling the practical tasks of the initial stages of the project. Those tasks included planning the project, preparing the schedule, and organizing and participating discussions, negotiations, meetings, and demo sessions with ERP vendor companies as well as communicating the progress to the management of Enersize who were responsible for making the decisions concerning the project.

The researchers role in the Enersize's ERP project served as a means to gather data and gain understanding of the case. Observation was an important way to gather information and it was easy to observe the project, since the researcher was participating the meetings and discussions regarding the project. Verbal discussions and e-mail correspondence between the researcher and both the case company employees and the ERP vendors' representatives provided in-depth understanding of the case. Being involved in the project diminished the need for interviews and other ways of gathering information compared to what would have been necessary for an outside researcher. Nevertheless, in order to find out the problems of the present situation and the requirements for the ERP system, many interviews and discussions with the workers of Enersize were carried out.

4.2 ERP Implementation Justification

Enersize is a new company with an aggressive growth strategy, which generates many challenges for selection and implementation of a suitable ERP system. First of all, the future operations are difficult to forecast accurately because the whole business concept is new and Enersize, as a start-up, needs to be able to adapt to the market needs. Secondly, the company's operations have not started on a large scale yet, so many of the processes and procedures need to be planned and created without the possibility of comparison with existing procedures. Thirdly, although Enersize is a small company at the moment, the ERP system should be scalable and comprehensive enough so that Enersize's operations will not outgrow the system in the near future. Also the fact, that Enersize is a small start-up company, sets constraints for the ERP project in terms of costs and scope.

Despite the above-mentioned challenges, implementing an ERP system at an early stage can also be beneficial because many of the business procedures have yet to be established and therefore the need for reengineering and changing working standards is practically nonexistent, which decreases the employees' resistance to change. An early implementation also helps Enersize avoid the many problems related to changing a familiar IT system and entrenched procedures. Another justification for an ERP project in a new company, is the relatively small amount of employees that will make the project cheaper and less time consuming. In most cases, there are less employees and hence less ERP users in the beginning of the company's lifecycle compared to an implementation at a more mature stage. Therefore the initial license and training costs will be lower. Employees that are recruited later on, can be trained internally without outside consultants.

The main objective of an ERP implementation project is to develop an organization's business activities. Renewal of information systems alone is not enough for business development but some level of change is needed for the procedures and processes. (Kouri and Vilpola 2006: 11) The potential benefits of utilizing an ERP system, that were introduced in the second chapter of this thesis, can all be used to justify the substantial effort and costs that goes into an ERP implementation project. However, all the organizations that are considering ERP implementation need to deliberate their individual situation from a business point of view, weigh the benefits against the risk, and carefully consider the timing of the project.

Prior to this implementation project, Enersize has no ERP system in use. Although there is a system for file sharing and another system for sharing information informally between employees, there is a real need for a software that can manage enterprise wide information on a real time basis. By implementing an ERP at an early stage Enersize can take the advantage of optimizing the business processes and working standards from the beginning. Managing the whole supply chain is considerably easier with an enterprise resource planning solution in use. Having the ERP system up and running at the early stages enables employees to utilize uniform data in order to manage operations from the start and reduces the need for parallel spreadsheets and other diverse ways for individuals to handle the daily business processes.

Enersize operates on an international scale from the beginning and aims to extend the operations to a global level in the future. International business requires partner, supplier and customer networks, that are very difficult to manage without an efficient information system. Global operations most often require subsidiaries, branch offices, or strategic partners in geographically remote locations. As an ERP system creates and maintains consistent data processing methods and an integrated database across different business divisions, it enables the company to uniform its procedures across different places of business and helps creating and preserving company culture (Murphy and Wood 2011: 53).

Enersize's operations consist of customer projects, many of which remain open for several years. These kinds of operations require quite complex project management tools for monitoring and controlling budgets and allocating costs and workloads, for example. In addition to the project management issues, Enersize needs to be able to manage complicated purchasing activities with an international supplier network. ERP systems are very efficient tools for managing complex operations like these and they can also enhance financial management, which facilitates managerial decision making. For all the reasons mentioned in this section, it is beneficial for Enersize to have an ERP in use before the operations grow much larger in order to manage all the different aspects of the business.

4.3 Analysis of the Present State

This section of the case study focuses on the problematic aspects and development needs of Enersize's processes at present. The information needed for the analysis of the present state of the company was derived from interviews and discussions with the employees as well as through observation. By analyzing the present state, the areas of business that need improvement could be identified and at the same time the requirements for the ERP solution could be further defined.

The situation at Enersize, at the moment of writing the thesis, is quite hectic because there are many things to be taken care of in order to get the operations up and running as planned. As a new company, Enersize must put a lot of effort into research and

development as well as building recognition and obtaining financing, for example. Before the ERP implementation, Enersize's business is run mostly on a case by case basis, meaning that most activities have not yet been formed into rationalized procedures. At the moment there is only a small amount of projects that have already started and therefore this approach has worked so far, but there is a need for systematization in the near future. An ERP system provides good basis for rationalizing business processes. The activities that need to be supported by the ERP system include: sales process and customer relationship management (CRM) functions, project management, financial management, and purchasing and other logistic activities.

4.3.1 Sales Process

The problem with the sales process at the moment is that there is too much time consuming manual work to be done in order to keep all the pieces of information together. Because there is no common information system in place, the sales people must keep their own records of customers, opportunities and prospects. On top of that, keeping track of all the appointments and customer calls etc. takes plenty of time. Since there is no common database, the information sharing is problematic and can become an issue in case someone falls ill, for example. A customer relationship management (CRM) tool, which most modern ERPs include, would facilitate the work of sales people by organizing all the customer-related information and making it readily available for all those concerned. An ERP system can also automate other repetitive tasks related to the sales process and thus allow people to focus on the actual task of selling the service. Figure 8 illustrates a simple outline of a sales process at Enersize at present. The orange boxes in the figure represent actions that require manual work from Enersize's workers.

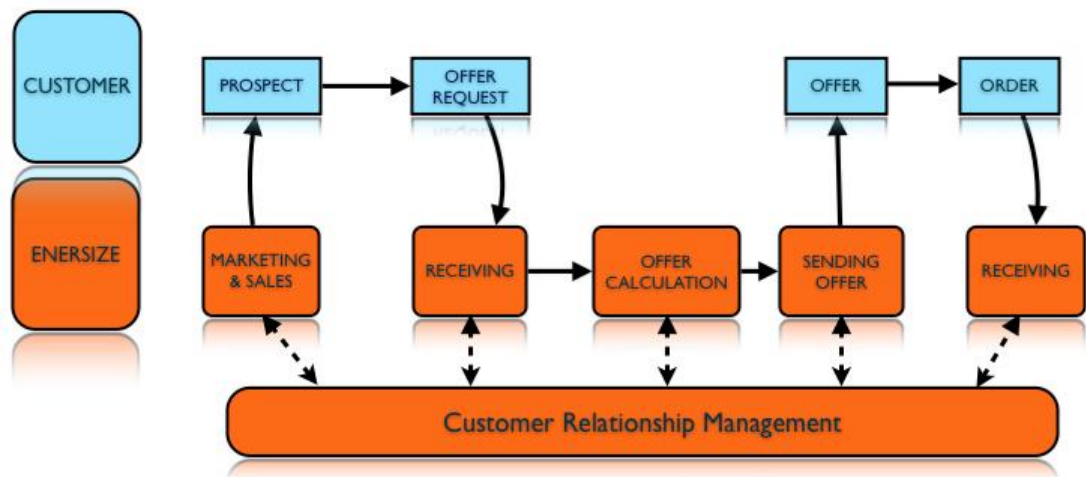


Figure 8. The outline of Enersize's basic sales process at present.

4.3.2 Project Management

Project management is a major issue for Enersize, since the energy efficiency services that the company sells are handled as customer projects. A proper project management tool allows for easier control over the entire project. It enables the person in charge to monitor and control the progress of the project, regardless of the amount of people completing tasks for the project in question. All the components and services that are purchased for a project must be allocated to the right project, as well as related travel expenses and employees' work hours. Allocating all incurred costs to the right project is very important in order to find out the actual costs of the project. The actual costs of projects are vital pieces of information for making decisions concerning future projects. At the moment, the cost control is quite problematic because many employees do different tasks for different projects and there is no common system for work hour entries in place. There are many aspects of project management that are demanding without a comprehensive project management tool. For example, tracking the components that are purchased for a certain project and installed in the customers' premises and following their life cycles becomes problematic without a proper tool, as more and more projects start.

4.3.3 Financial Management

Enersize has outsourced its accounting and bookkeeping to an outside agency. This kind of arrangement is suitable for a small company, but the current system has proven to be problematic even with a relatively small amount of financial transactions that Enersize needs to handle at present. The invoice circulation is not transparent, and approval of purchase invoices requires too much work. Allocating the purchase invoices to right projects is problematic and there is a lag before the financial transactions are recorded. Also the handling of travel expenses is quite burdensome at the moment. Because the bookkeeping is outsourced and handled in the agency's system, finding out specific information about certain historical transactions requires work from an employee of the agency, which is always charged by the hour and hence rather expensive. Enersize is looking to automatize, simplify and clarify the invoice circulation and the entire bookkeeping process with the new ERP system. The bookkeeping process will take place in Enersize's own ERP system in the future, although the process will still be handled by an outside bookkeeper. Figure 9 illustrates how the purchase invoice circulation is handled at the moment.

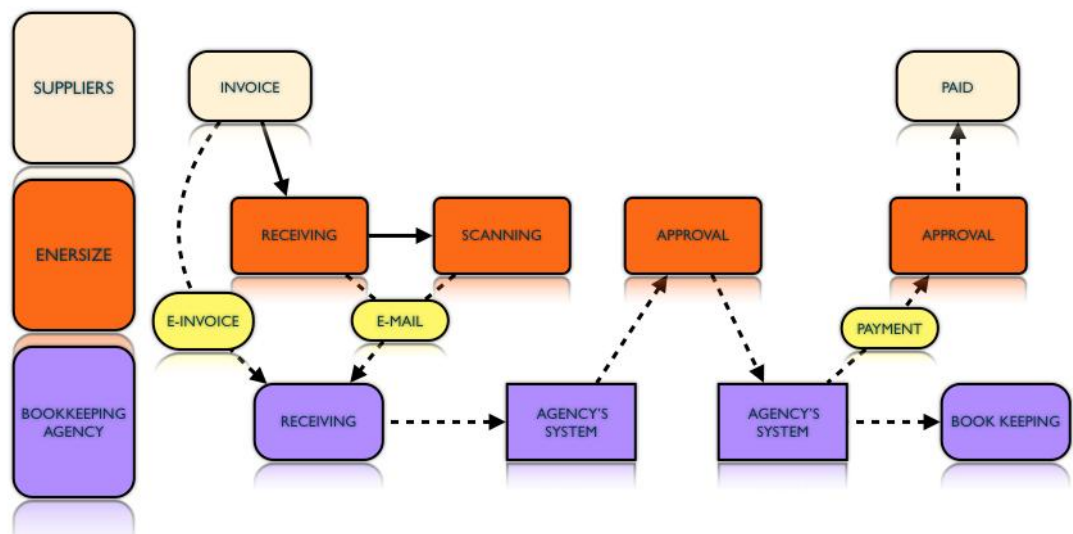


Figure 9. Enersize's purchase invoice circulation at present.

4.3.4 Logistics

There is a need for systematic approach to managing the logistic functions, such as procurement, warehousing and transportation. The whole supply chain needs rationali-

zation and therefore an ERP system is called for, because it can considerably facilitate supply chain management. At the moment the contracts with suppliers and transportation companies as well as the warehousing and assembly are not carried out in the most efficient way. As an example, components are purchased from suppliers separately for each project and shipped to Enersize's premises in Ulvila, Finland. After assembly and packaging, the components are shipped from Ulvila to the customers' locations by a transportation company with a one-off contract. Some of the components have been purchased from Central Europe, shipped to Finland and then shipped again to the final destination, which in some cases, is in China. It is clear that Enersize's business calls for some level of geographic decentralization of logistics infrastructure. For example, the components that will end up in China, should be, when feasible, purchased, warehoused and assembled in China, in order to save transportation and customs costs. As mentioned earlier, not many customer projects have started yet and the thought process and planning for rationalizing the supply chain is under way. The implementation of an ERP system will provide the basis for efficient supply chain management.

4.3.5 Working Environment and Communication

The working environment of a company comprises both physical and social environments. Both aspects must be in balance in order to create a healthy and functional working environment that accommodates the employees' productivity and efficiency. The working environment also affects the organizational communication and vice versa.

Enersize has two separate offices at the moment. The head office is located in Ulvila and the other one in Helsinki. Both locations are open space offices with well-functioning and modern furniture, office supplies, and IT infrastructure. There are eleven workers in the main office and three in the Helsinki office at the time of writing this thesis. Due to the small amount of employees, everyone in the company knows each other and get on well. The atmosphere in the company is good and people are committed to working for the organizational goals. As the company is new and has a lot of potential, there is a general feeling of everyone pulling together to realize that potential.

The communication within the company functions well, partly due to the small amount of employees and to the physical proximity of the workers in the same office. Physical proximity enhances the informal communication and relationships between employees and at the same time supports the creation and preservation of company culture. The open space office also facilitates the informal communication and social interaction between the workers. The communication between the two offices is more problematic and some issues of small importance might go unnoticed by the workers in the other office. The organizational communication is enhanced by the company's intranet which is called Enersize Wiki. This is a forum for informal reports and announcements which enable workers to know what is going on with other employees' individual tasks. Enersize Wiki is a useful communication tool, since individuals are often engaged with their own tasks and sometimes others are not fully aware of what is going on elsewhere in the organization.

While organizational communication works well at the moment, there are aspects to it that can be enhanced with the introduction of the new ERP system. And communication will become more problematic as the company grows and more employees are recruited and new office locations opened. At the moment an ERP system could facilitate the communication related to projects and other business processes. It could eliminate or at least reduce the need for spreadsheets and other individual ways of managing business related information. Managing the information takes considerable amount of employees' time and effort and creates problems in sharing of that information. The difficulties in information sharing can be harmful for the company in case of sickness or holidays etc.

4.4 Risk Analysis of Enersize's ERP Project

Enterprise resource planning implementation is a significant investment and therefore the risks of the project should be analyzed. ERP implementation projects differ from typical production investments because it is not possible to make comprehensive investment calculations on ERP projects. An ERP implementation project is often classified as a strategic investment and the success of the project is not typically measured in monetary terms, but by comparing the goals and objectives of the project with the

actual outcome. Although information system implementations are costly investments, it is very difficult to define the profits these investments generate. (Kouri and Vilpola 2006: 70)

The purpose of the following risk analysis is to prepare for the realization of risks, mitigate the risks, and possibly prevent some of the risks altogether. The risks were identified by discussing with the personnel and analyzing the current situation at Enersize and by predicting the potential problems that can arise during the project. The most prominent risks were derived from the analysis of the present state as well as from relevant literature and case studies of other companies' ERP implementations. This risk analysis is conducted before the actual implementation and there might be risks that emerge at later stages of the project. Therefore the risk analysis should be an ongoing process and all relevant risks need to be revised as the project proceeds. In this analysis the risks are divided into three categories according to which phase of the project they affect. The categories are:

- risks of ERP system selection,
- risks of ERP implementation,
- and risks of ERP usage.

4.4.1 Risks of ERP System Selection

There is a need for careful consideration before making the decision on which ERP system to implement. If the risks that appear in this phase of the project realize, they can create serious problems at later stages or even lead to failure of the entire project. (Kouri and Vilpola 2006: 76) The biggest risks concerning Enersize's ERP system selection are illustrated in the risk matrix in figure 10. The risks associated with the selection are situated in the matrix according to their probability and impact, so that the most severe risks are at the top right corner.

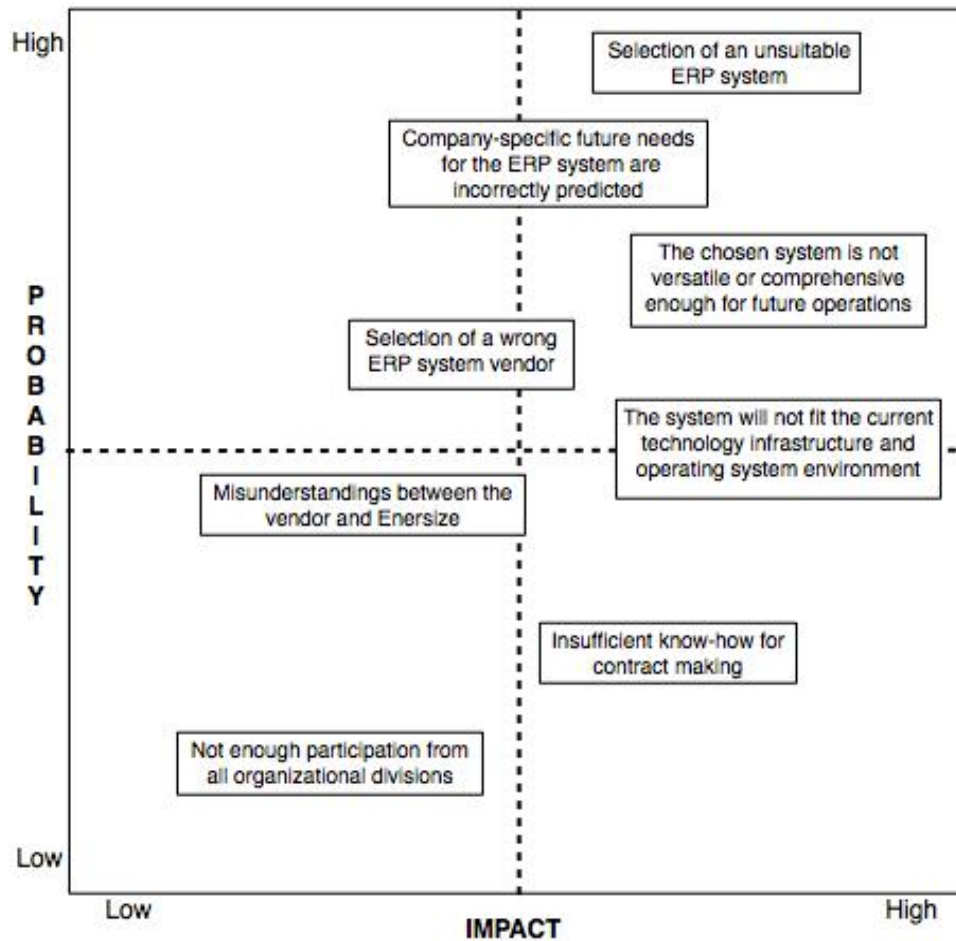


Figure 10. Risk matrix of ERP system selection.

The risk of selecting an unsuitable ERP system is very real for Enersize. As the company is at its early stages, there is no ERP system currently in use which is a good thing from change management's point of view, but it also means that there is nothing to compare the new system to. The operations of Enersize have yet to start on a full scale, and therefore it is quite complicated to know exactly what kind of a system would be the most suitable one for the company. The ERP software can be unsuitable for various different reasons and therefore it is very important to pay careful attention to the company's processes and needs and to the features of the software.

The decision concerning ERP system selection must be based on what is known at the moment and what can be predicted about the future. As Enersize is at its early stages, some aspects of the future operations are difficult to forecast and therefore the risk of

mispredicting some ERP needs is rather high. The impact of this risk depends on what kind of need was failed to predict, but in worst case scenario, the use of the whole system might be jeopardized. Even if the predictions prove to be correct, there are many processes that might need changing as the company grows and develops. Some changes can be posed by customers, some by competition and some by changes in political or economical environment, for example. As discussed before, Enersize plans to expand its operations on a global level. Therefore Enersize's ERP system needs to have good possibilities for international business activities and readiness for various localizations. The system must be versatile and comprehensive enough for complex international business operations, even though Enersize's ERP needs are much simpler and less demanding at the moment of implementation. All the things mentioned above, demand very careful consideration and planning, in order to mitigate these risks. It would be quite simple to select an ERP software that could support Enersize's current activities but the whole project will be deemed a failure, if the same ERP cannot be utilized five years from now.

The vendor of the ERP system plays an important role in the implementation project. The vendor company is partly responsible for managing the whole project and they provide training and other consultation. Enersize is looking for a vendor that can also provide the server maintenance and support services, so that Enersize's own IT personnel can concentrate on the development of Enersize's proprietary software Enersize Cloud. Although this confines the group of potential vendors a little, there are many ERP providers who offer server maintenance and related services. It is important for Enersize to evaluate and compare different vendors before choosing one. The vendor company's experience, references, and financial state are factors that affect the selection. One very important issue is vendor's attitude towards their possible customer and their willingness to take part in the demanding project. The risk of choosing a wrong vendor can be lowered by thorough search of available information on the possible vendors and by meeting their representatives and discussing with their project managers beforehand. After the selection, establishing good communications with the vendor company is essential in order to avoid misunderstandings and other unnecessary problems.

The technological infrastructure and operating system environment seems to be a problematic issue. Enersize uses Mac computers with Mac OS operating systems while most of the ERP systems available on the market are Windows-based and therefore not compatible with Mac computers. ERPs that are fully web-based, i.e. can be used through a web browser, are independent of the operating system. Although it seems that web-based ERP software are gaining popularity, it has proven to be difficult to find a web-based solution that would suit Enersize's needs. Windows-based software can be used on Mac computers through a virtual desktop solution, but it raises the risk of complications related to technological compatibility. In Enersize's case, this risk must be taken into consideration before deciding on which system to implement. The risk can be mitigated by testing the solutions beforehand and evaluating their usability and suitability for the company's needs.

Insufficient participation from different organizational divisions and lack of know-how for contract making are also featured in the risk matrix of figure 10. Due to a hectic phase in Enersize's life cycle, all the employees are quite busy with their daily tasks. This means that some people may not be able to contribute enough time to the ERP project. Therefore there is a risk that some organizational division's interests do not transpire when selecting the ERP software. The amount of employees is small and all the organizational divisions are still working closely together so the mitigation of this risk is not very complicated. It needs to be made sure that the communication within the company is efficient and that all organizational divisions are included in this phase of the project. The details of the contract itself are very important, especially if big problems arise during the implementation project. The contract must be carefully examined before signing and all the necessary particulars need to be included. If it seems like there is not enough know-how for contract making within the company, external consulting should be used.

4.4.2 Risks of ERP Implementation

The risk matrix in figure 11 illustrates the most prominent risks associated with the actual implementation phase of Enersize's ERP implementation project. According to Kouri and Vilpola (2006), the most significant risks of this phase are associated with change management and with the role of employees in the change process. While

change management is important in Enersize's case, it is not the biggest concern, since there are no old familiar procedures in place before the implementation. Employees' commitment to the implementation project and to the use of the new system, are vital to the success of the whole undertaking.

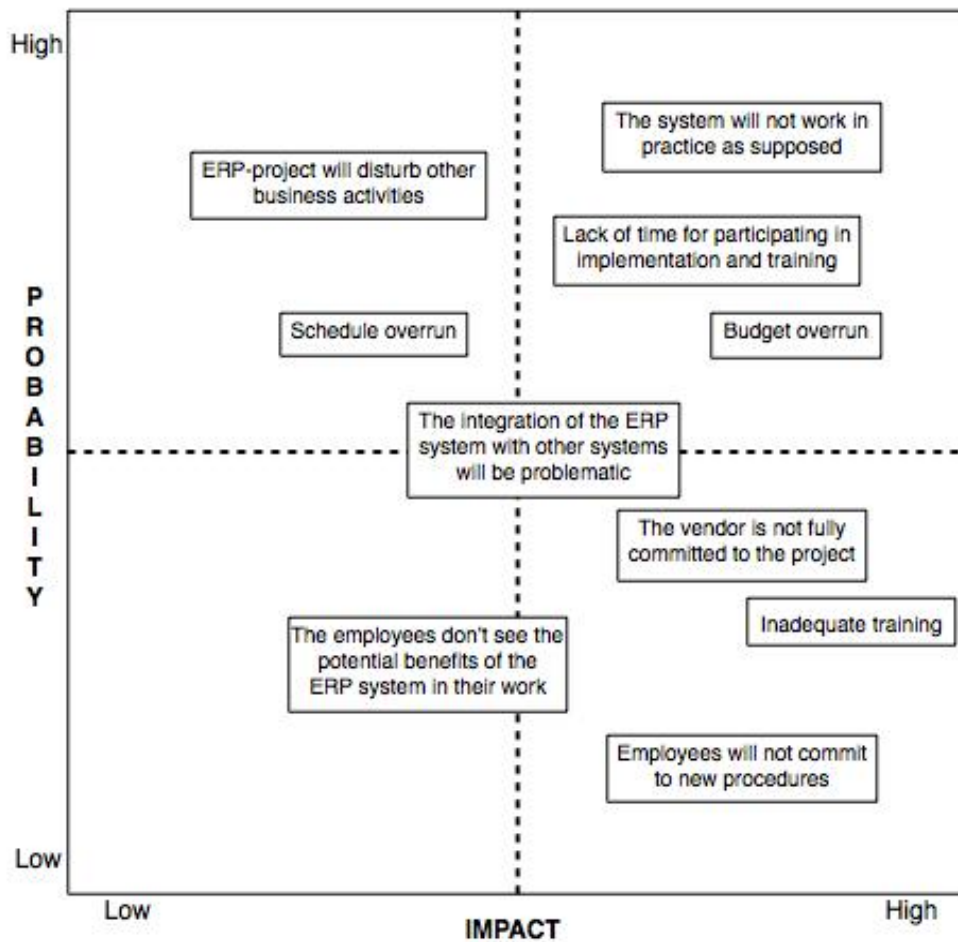


Figure 11. Risk matrix of ERP implementation.

As mentioned earlier, this phase of Enersize's life cycle is hectic and the possibility of unforeseen events is relatively high. Therefore some employees can have difficulties in finding enough time for participating in the implementation project. Employees' commitment to the project is extremely important for the success of the project and even though the project will disturb the workers' daily activities on some level, it should be planned and managed so that everyone involved has time to participate. Being able to commit to the project and running the daily business at the same time depend greatly on the project planning, communication and project management. All the project par-

ticipants need to be informed about their tasks and responsibilities well in advance. The extra effort needed from employees during the implementation needs to be justified and explained so that they understand the necessity of their contribution.

There is a risk that the system will not work in practice as anticipated. The integration with other systems (such as e-mail and calendar, for example) might also be problematic, especially if the chosen ERP software is based on a different operating system than the company's computers. These are risks that need to be conversed on with the vendor before the implementation and must be kept in mind when defining the company's processes. Adequate testing of the system in demo environment decreases the chance of unexpected problems regarding the use in practice.

The relationship between the vendor and the customer is essential for the success of the project. A company that is implementing an ERP system must be a critical and demanding customer in order to make sure the vendor carries out their part in a successful project. (Kouri and Vilpola 2006: 78-79) The whole project will turn out to be problematic if the vendor is not fully committed to it. This issue needs to be borne in mind already when selecting a vendor and when making the contract. The vendor's lack of commitment can also reflect to the training of the employees, which can be insufficient or of poor quality. Inadequate training will undoubtedly lead to problems in the use of the ERP. A common reason for inadequate training, which has nothing to do with the vendor's commitment, is companies' will to reduce the cost of the project by cutting down on training. Although training is expensive, it is a wise investment, because the problems that lack of training can create at later stages, can end up costing far more. Thorough project planning and communication with the employees are key factors in finding appropriate level for training.

The biggest issue concerning change management in Enersize's ERP project is the employees' willingness to commit to the new procedures. Even though there will be no change from any particular old system to the new one, the processes and procedures of the new ERP need to be adopted. There are tasks related to the use of the system that need to be turned into routines, such as work hour entries for example. Without timely input of correct information, the system will not contain up-to-date data and consequently produces false information for decision making. Some of these tasks

might seem unimportant if the actual purpose is not clearly explained. All the benefits of the system and the necessity of their contribution must be made clear to the users. Effective communication strategy and comprehensive information sharing are ways to facilitate employees' commitment to the new procedures.

Schedule and budget overruns are very common in ERP projects. Comprehensive project planning and effective project management are ways to mitigate the risk of exceeding these project constraints. An important thing is to plan the schedule so that it is tight enough but realistic. A tight schedule enables good pace for user training and allows for project manager's full commitment to the project. But the daily business of the company must be taken care of at the same time, so the schedule cannot be too hectic.

4.4.3 Risks of ERP Usage

There are several risks affecting the use of ERP systems. It is important to assess these risks already at the beginning of the implementation process, because many risks regarding the usage can be mitigated and prepared for already at earlier stages. As Enersize has not used ERP before, it is difficult to forecast the potential problems that might arise, but by paying attention to common problems related to ERP usage, Enersize can avoid some of the typical pitfalls. The risk matrix in the figure 12 shows the most prominent risks related to ERP usage in Enersize's case.

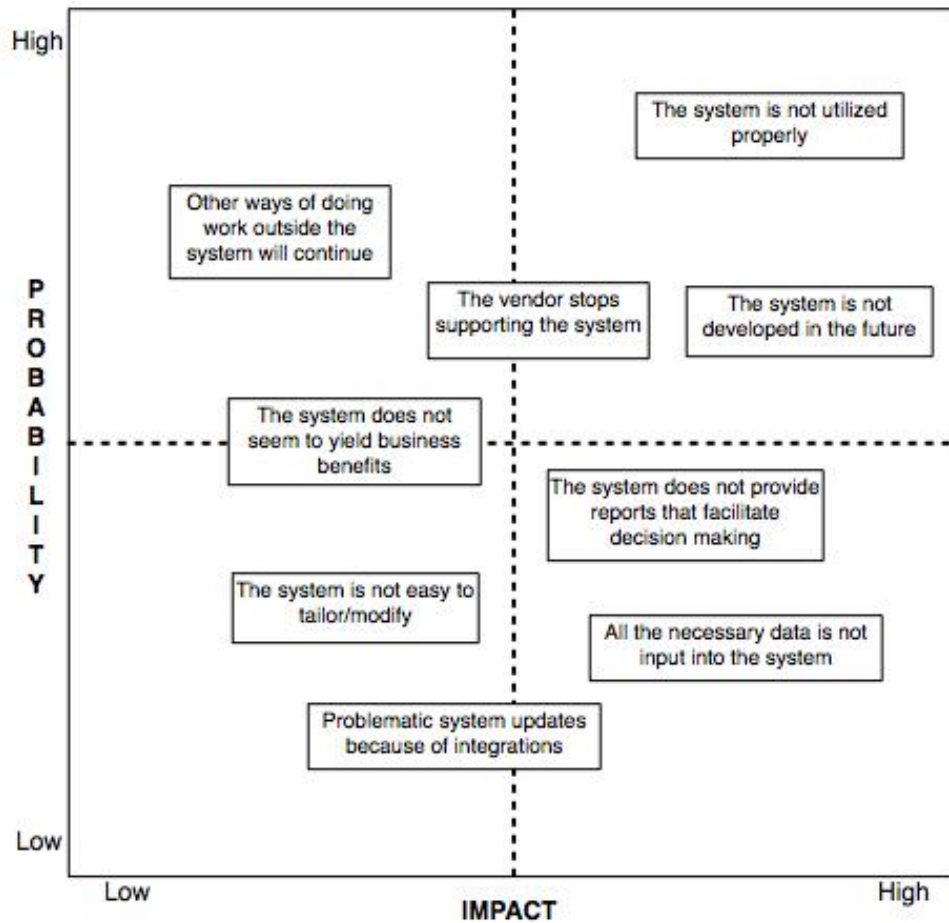


Figure 12. Risk matrix of ERP usage.

The benefits of the ERP will not realize unless the system is utilized properly. It is important to plan the processes that the system supports, so that all the potential business benefits can be obtained. All relevant information must be included in the system for making the data, that is produced by the system, accurate and reliable for decision making purposes. In order to get the full advantage out of the system, it requires people to use the system as it is designed to be used. Therefore user training needs to be conducted in a way that all the users are provided with necessary know-how for comprehensive use. The risk of inadequate use of the ERP can be controlled by preparing the users for their responsibilities regarding the system and by aligning the business processes and the ERP system to meet the business objectives. Ensuring the proper use of the system will also reduce the risk that workers will have other ways of doing their work outside the system.

System updates can prove to be problematic if there are several integrations with other programs or if the system is heavily modified. Because Enersize can start the ERP implementation from a clean slate, there is an opportunity to design the processes to fit the selected system so that there is no need for massive tailoring. Enersize is also looking for a comprehensive system that will not need to be integrated with many other systems. Less tailoring and integrations also means less money spent on consulting. The system should still be quite easily modifiable due to the fact that many aspects of Enersize's future operations are quite difficult to predict. The aforementioned risks can arise after the implementation, but it is important to consider them already at the beginning of the project.

As mentioned earlier, the true benefits of the ERP system are quite difficult to calculate and might not be easy to notice. Therefore there is a risk that the system does not seem to be beneficial for business. If the system seems ineffectual, even if in reality it is not, its use will most likely suffer and that will eventually lead to redundancy of the system. To prevent this from happening, the business objectives of the ERP implementation should be clearly defined and their fulfillment monitored and evaluated as the system is in use. For Enersize it is difficult to set a point of reference because there is no old system to compare the new one to. Therefore the success of the ERP system must be measured by evaluating the accomplishment of the business objectives, instead of evaluating the system by itself. But this should not be a problematic issue, since the purpose of implementing an ERP is business development. The important thing for Enersize is to set clear business goals and utilize the ERP system in the best possible way to achieve those goals.

It is essential to consider the problems that will be caused if the development of the system stops or if the vendor stops supporting the system. A backup plan for a situation where the vendor must be changed should be in place and the possibilities of continuing the use of a system that is no longer developed should be considered. To prevent these problems, the background of the ERP system itself as well as the background of the vendor must be carefully studied before selecting the system.

The risk of not inputting all the necessary data into the system at the initial stage is quite low for Enersize due to relatively small amount of data. It is very important to

keep this risk in mind while the system is in use, because the system cannot provide reliable information if the necessary data is not entered into the system. The reporting abilities of the system also need to be carefully examined before deciding on which software to implement. In Enersize's case for example, the project management tools are very important because of the nature of the business. Therefore the reporting on projects must be versatile and precise, because the decisions on future projects are made according to the reports on former projects.

4.5 Requirements for the ERP System

There are a number of important issues that need to be taken into consideration when selecting an ERP solution for a company. An organization's operations, business processes, procedures, communication structure, goals, IT infrastructure, and resources must be closely examined before the criteria and the requirements for the ERP can be defined. After analyzing the present state of the company and its projected future needs and objectives, the requirements for Enersize's ERP system were defined.

4.5.1 General Requirements

The very basic requirement for Enersize's ERP system is that modules for all the business functions that are needed in Enersize's operations are included in the software. Enersize needs a comprehensive system that comprises a wide variety of ERP functionalities, even though the amount of data, that the system needs to handle, is relatively small at the moment. The functionalities that must be supported by the ERP include:

- sales management,
- customer relationship management,
- project management,
- financial management,
- logistics management (purchasing, inventory, distribution) and,
- reporting tools.

Despite the fact that Enersize needs their ERP solution to cover many different business functions, the system should be as light, simple, and easy to use as possible.

The cost of the system and its implementation are prominent factors in the ERP selection. It is important to consider and specify the amount that the company is willing to invest into the system and then attempt to carry out the project within the budget. Although cost effectiveness is a major issue for Enersize, as for any company, the price is not the most important factor affecting the decisions concerning ERP implementation. Enersize seeks to acquire the most optimal system for the company's needs, instead of just an inexpensive one. It is vital for the success of the implementation to obtain appropriate amount of consultancy and training, although they are expensive. The money saved in the wrong areas at this point, might later end up costing much more.

The selection of the ERP vendor is a vital decision and therefore it is important to consider what kind of contribution is expected and required from the vendor company. It is difficult to define exact requirements for the vendor, but the following are some qualities, that are deemed important by Enersize. The vendor must show good attitude and real interest towards Enersize's ERP implementation and be ready to commit to the undertaking. They must have plenty of experience in ERP implementations and good references. The vendor should also be economically stable and committed to continue supporting the chosen ERP solution. Enersize is looking for a vendor that can provide server hosting and all the maintenance for the system. Enersize's IT staff is concentrating on developing and maintaining the company's proprietary software and therefore is not willing to be responsible for server maintenance. Enersize is also reluctant to invest in any additional hardware, so the server hosting should be outsourced.

The ERP system should fit the IT-infrastructure of the company in order to avoid compatibility problems. This is a challenging issue for Enersize where all the computers run Mac operating systems. There are not many comprehensive ERP solutions available on Mac OS, since most are designed for Windows environment. The Windows-based ERPs can be used on Mac computers through a virtual desktop program and web-based ERP solutions are usable on all operating systems. Enersize must find the best possible compatibility between the solution and the company's IT infrastructure. Enersize is not considering changing the IT-environment of the company and therefore the system is required to be usable with Mac computers.

The system's ability to provide versatile and detailed reports is extremely important for management purposes. Management needs to base their decisions on reliable and up-to-date information and most modern ERP systems are equipped with comprehensive tools for report creation. Enersize is looking for the ERP system to enhance access to information by good reporting abilities. In addition to decision making, reports can help controlling costs and work hours, for example. Good reporting tools mitigate the need for searching specific information from the database and automated reports facilitate managing several aspects of the business.

4.5.2 Users, Locations, and Integrations

At the time of implementation there will be only ten users of Enersize's ERP solution and only two locations where the system will be used. These locations are Enersize's offices in Finland which are in Ulvila and Helsinki. There are no needs to integrate the new ERP system with any existing business software because there are currently no business software in use at Enersize and the idea is to implement a comprehensive ERP solution that eliminates the need to use other systems alongside the ERP. Enersize Cloud is the proprietary software of Enersize that contains data on customer projects, some of which is relevant to the ERP system. In the future the need to integrate the ERP with the Enersize Cloud might emerge but at the moment it is decided that the software will be kept independent from the ERP. In the beginning there is also no need to link the system with any partners' or suppliers' systems.

The ERP system must be linked to the e-mail and calendar or these tools must be integrated in the system, in order to make the communication as effective as possible and to avoid unnecessary duplicate entering and maintaining of information. E-mail is probably the most important means of communication for business people today and it is crucial that calendar system, contact lists, and task lists are closely linked with e-mail and that all these systems communicate seamlessly with the ERP system. It will depend on the chosen ERP solution whether Enersize's current e-mail and calendar systems will be linked to the new ERP or if Enersize will change to some other e-mail system that is already integrated in the ERP.

The paragraph above points out that there will not be many users, no need for integrations, and the amount of data that the system needs to handle is relatively small. All of this is true in the beginning but, as brought up before, Enersize's operations are projected to grow substantially in the forthcoming years. Therefore scalability is a very important quality in Enersize's ERP system. Scalability of the ERP system refers to the system's ability to handle growing amount of transactions or its ability to be enlarged according to growing needs. As Enersize's operations grow, the ERP must be capable of handling more users, more locations, and larger amount of data. The possible need for integrations with other software and linkages with some interest groups' systems that might emerge in the future must be considered when choosing the ERP solution. The current enterprise resource planning needs of Enersize could be met with relatively simple and light solution but the challenge is to find a system that will be efficient even when operating on a much larger scale than Enersize is currently operating.

Internationality is another crucial criterion for Enersize's ERP software. The company is operating internationally already at the time of ERP implementation and the goal is to expand the operations to various new countries in the future. Therefore it is vital that the ERP system supports multi-lingual and multi-currency features and that localizations to various countries are possible. In the beginning the ERP system will be used at only two locations but the system must be efficient and practical even in the situation where Enersize will have branch offices, subsidiaries, or partners in several locations around the globe.

The above-mentioned requirements of internationality and scalability are essential in ensuring the feasibility of the system in the future and thus preventing the situation where the ERP needs to be changed in the next few years due to its inability to accommodate the growth of the company's operations.

4.5.3 Process Requirements

Enersize is looking to implement a comprehensive ERP solution, which means that it must support all the business processes that are fundamental for the company's operations. The most important processes for Enersize include the sales process, processes related to the projects, financial management processes, and logistic processes.

The sales process is essential in most companies' operations because most companies generate profits through sales of products or services. The sales related information handling should be as automated as possible and readily available for controlling and decision making purposes. Customer relationship management tool is a necessary part of the ERP system that supports the sales activities by organizing the information about potential, existing, and former customers.

As mentioned in the analysis of the present state, the sales related activities and customer relationship management require too much manual work at the moment. The information concerning customers is not readily and easily available for all the employees when needed. Modern ERP systems have tools for automating unnecessary manual tasks that Enersize's sales personnel must currently carry out and the ERP unifies the information by utilizing a single database. Figure 13 illustrates the simplified outline of a sales process after the implementation of an ERP system. The orange boxes in the picture represent the manual work that Enersize's sales staff must do and the yellow boxes illustrate the tasks that ERP system supports and partially or fully automates. After the phases illustrated in the figure, the system continues to create the bill of materials, picking lists and/or purchase orders according to the order and finally generates an invoice to the customer.

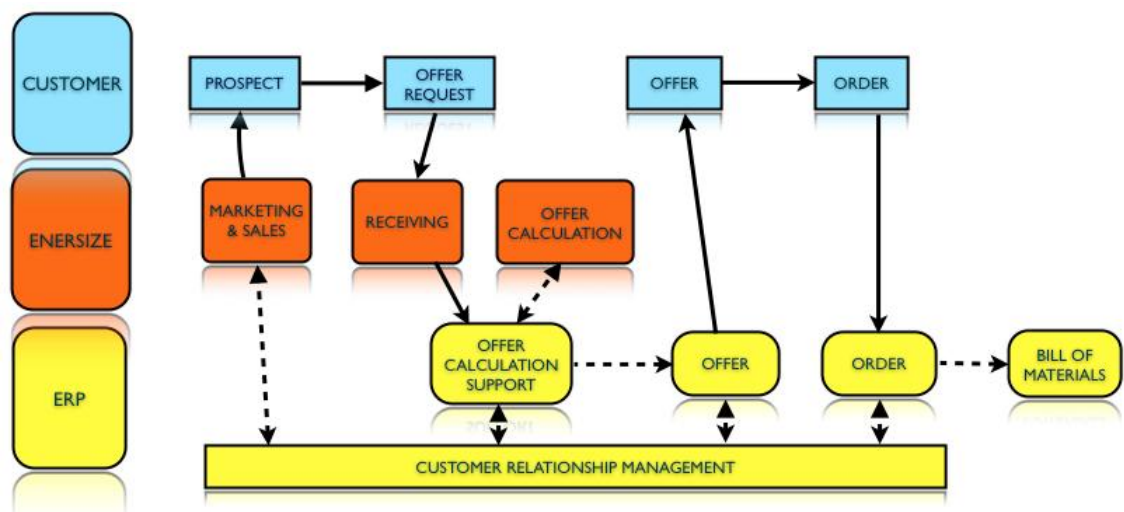


Figure 13. The sales process after ERP implementation.

Project management module is a very important tool for Enersize since the core business is conducted in form of customer projects. Enersize sells energy efficiency services that are carried out as projects. Therefore the project tool must be versatile and efficient. Enersize's projects can be relatively complex and long lasting and the system must be able to facilitate the project management and provide useful reports and information concerning the projects.

As a project is a unique and temporary undertaking that is planned and carried out to achieve a certain outcome, it differs from a process that can be repeated and performed in the same way each time. Although each project is different there are several processes within a project that can be carried out similarly in different projects. The main purpose of the ERP's project management tool is to facilitate the controlling and monitoring of the project's progression and costs. It is also important that all the hours worked for the project can be registered and all the incurred invoices can easily be allocated to the right project. In Enersize's case, some customer projects can go on for long periods of time after the installation is done. Therefore the system's ability to monitor the installed items, track and record customer requests, and create and send repetitive invoices, is important. Figure 14 illustrates an example of the outline of Enersize's customer project in the ERP system.

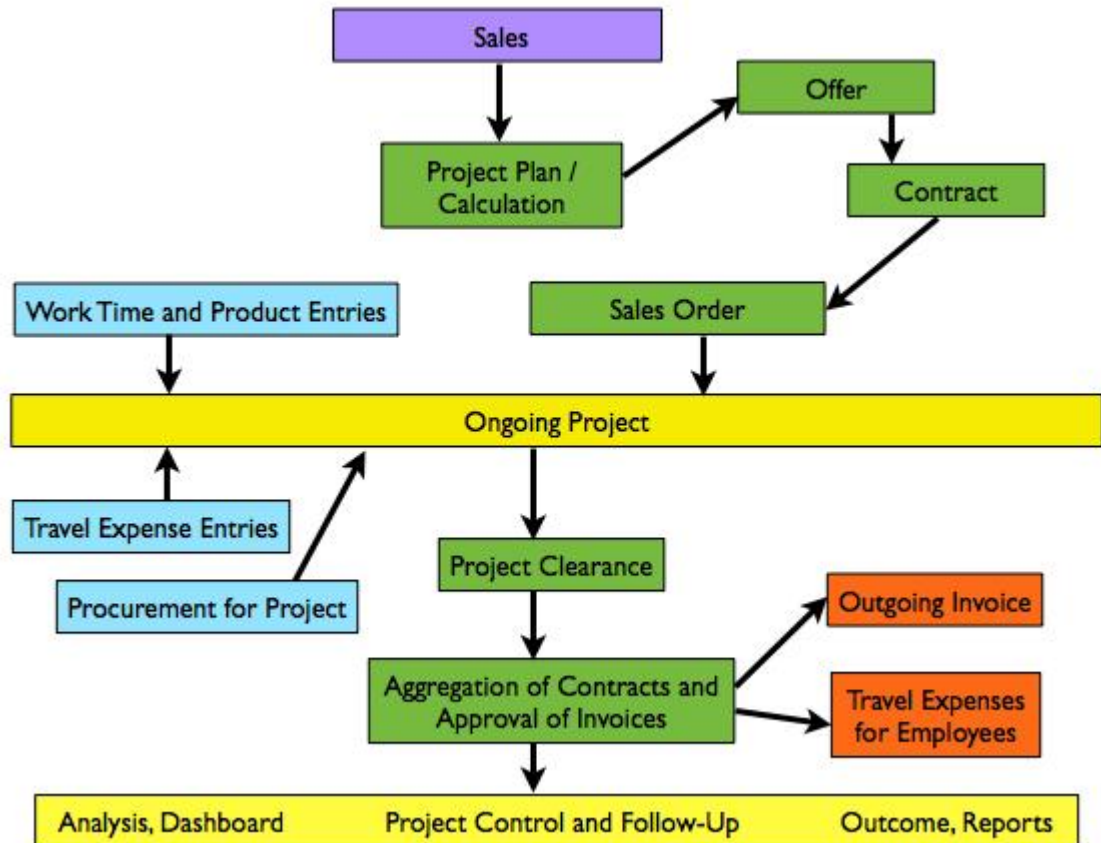


Figure 14. Outline of a customer project in ERP system's project management tool.

The financial management is at the core of every business and that is also the case with Enersize. Financial management tool of the ERP system is an important part of Enersize's future ERP solution and it will contribute to the overall efficiency and productivity of the company. Easy access to real time financial information enhances decision making and control and the access to that information can be improved by managing the financials in the company's own information system. Many modern ERP systems' financial modules have support for budgeting, bank reconciliation, and multiple currencies. They create automatic journal entries from transactions and the allocation of these transactions to a project or a profit center can be automated.

Currently the financial management in Enersize is outsourced and the access to historical financial information is not on optimal level. There is a lag before the transactions are recorded and allocation of some of the transactions to the right project is problematic. The invoice circulation is not satisfactory with the current system and that is one

of the most prominent problems at the moment. Figure 15 shows a simplified outline of the purchase invoice circulation as it is desired to be handled in the ERP system.

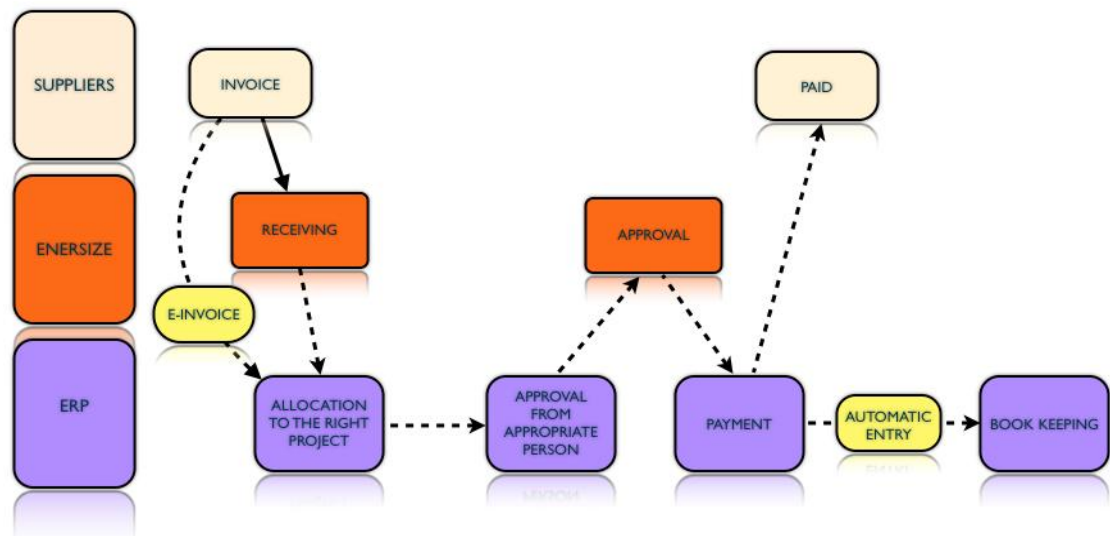


Figure 15. Purchase invoice circulation with ERP system.

Logistics management is an important factor in Enersize's operations even though Enersize is not a manufacturing company. The energy saving services that Enersize sells require hardware that need to be purchased, stored, and transported to the customers' premises. All these activities must be planned and turned into efficient logistic processes that will form the basis of the logistic operations.

The ERP system must be able to support purchase activities by arranging the supplier information and by automating the purchase order creation and related invoicing. The same applies to the transportation activities. The information concerning inventories and warehouse activities must be automated, kept up to date and made readily available. Enersize looks to optimize the supply chain management with the ERP system by creating processes that form the frame for the whole supply chain. ERP system has a major role in controlling the information flows related to the supply chain and in automating several tasks that currently need to be done manually.

4.6 ERP System proposition

One of the goals of the thesis was to propose a suitable ERP solution for Enersize to implement. There is a considerable amount of different ERP systems on the market and the company's needs and objectives must be clear in order to distinguish the most optimal solution from the mass. Thorough research was required before the options could be narrowed down to only include the feasible solutions for Enersize's needs. The final selection of the system is a major decision and therefore it is done by the top management of the company. The Tentative discussions with vendors and demo sessions were participated by project manager, IT manager, and the management assistant of Enersize in addition to the researcher, in order to include different perspectives and to take all the necessary aspects of the company's ERP requirements into consideration.

The ERP systems that were closely examined include SAP Business One, LeanSystem, Epicor, Jeeves, Visma, Lemonsoft, OpenERP, Pupesoft, and Compiere. OpenERP, Pupesoft, and Compiere differ from the other six as they are all open-source ERPs. There are no license costs involved in Open-source software and for this reason they are often less expensive to implement. All the aforementioned nine ERP solutions were selected for closer examination after preliminary research of a large number of systems. These solutions were thoroughly researched and compared with Enersize's ERP requirements in mind. Table one shows general level comparison between the nine ERP systems. All the systems were evaluated according to general qualities that are important from Enersize's point of view. Each quality was graded with one to three plus or minus points (see table 1).

System	Affordability	Comprehensiveness	Scalability	Internationality	Mac-compatibility	Project tool versatility	Suitability without tailoring	Score
SAP BO	+	+++	++	+++	-	+++	+++	14
LeanSystem	-	++	++	+	-	+	++	7
Epicor	--	+++	+++	+++	-	++	++	10
Jeeves	+	++	++	++	-	++	++	10
Visma	++	+	+	++	+	-	+	7
Lemonsoft	+	++	++	-	-	+	++	6
OpenERP	+++	++	++	+++	+	+	--	10
Compiere	+++	+	+	+	+	+	-	7
Pupesoftware	+++	+	++	-	++	-	-	5

Table 1. ERP system comparison.

After several discussions with vendors and many demo sessions, the most prominent solution for Enersize's needs proved to be SAP Business One, which is SAP's ERP system that is developed for small and medium sized businesses. SAP Business One meets the criteria that Enersize has for the ERP system. It is comprehensive and yet affordable ERP solution which is suitable for international operations. SAP Business One is supported by vendors all over the world. It is a robust ERP that can handle the future ERP needs of Enersize without being too expensive to implement. The proposed ERP solution for Enersize includes MARI Projekt which is a project management tool created by Maringo Computers. MARI Projekt is an add-on for SAP Business One for service providers. The project management tool in SAP Business One itself is not comprehensive enough for a service company that conducts its business in form of customer projects, such as Enersize. With the MARI project management tool SAP Business One includes all the functionalities that are necessary for managing Enersize's business. The system is very versatile and the user interface is clear and logical. SAP Business One is a system that fills the requirements that Enersize has for the ERP without need for extensive tailoring.

As mentioned previously, the IT-infrastructure of Enersize set constraints to the selection because there are not many ERP systems on the market that are compatible with Mac operating system. However, many vendors offer web-based solutions that are usable on all operating systems but none of the web-based ERPs proved to be suitable

for Enersize's needs after closer examination. They were all either missing a crucial functionality or they were not comprehensive enough for handling Enersize's future ERP needs. Therefore the most feasible solution for Enersize is to use SAP Business One, which is a comprehensive windows-based ERP, through a virtual desktop system.

5 Conclusions

It is clear that many modern companies need access to accurate real-time information as well as support and automatization for their business processes in order to keep up with the competition. Enterprise resource planning systems can provide access to such information and automate the business processes along with other benefits. ERP systems are not problem-free but instead are often associated with problematic implementations and high costs. Despite the problems, ERP systems are widely used and deemed beneficial.

An ERP implementation is a major investment for any organization, large or small. Undertaking the project requires careful planning, management, and participation from all organizational divisions as well as support from the top management. The goals of the project should always be business-related since an ERP implementation is a business development project.

In the beginning, business software were targeted to large manufacturing organizations but today there are systems for the needs of all kinds of companies available on the market, regardless of size or business sector. ERP vendors have recently started focusing more on serving the needs of the small and medium sized companies by offering more affordable and less complex solutions. ERP systems are developing as technology advances and new ERP needs emerge. The modern trend seems to be that ERP solutions are offered to companies on a software as a service (SaaS) basis. SaaS solutions eliminate the need for software installations and hardware maintenance and thus allow for concentration on core competencies.

The purpose of the theoretical part of this thesis was to provide insight into the history and function of ERP systems. The research for this part was conducted by going through various literature sources. This subject has previously been widely researched and covered in literature but there is room for further research since the enterprise resource planning is developing as a concept as new features are added to the systems and new ways of delivering the software are emerging.

The case study aimed to help Enersize with the initial stages in the ERP implementation project, i.e. to define the company's ERP requirements and needs and to find a suitable ERP solution for Enersize to implement.

Assessing the business processes to be supported by the ERP system required thorough evaluation of Enersize's current state and future business goals as well as the risks affecting the ERP implementation. The evaluation made the definition of ERP requirements possible and formed the criteria for Enersize's ERP solution. After comprehensive research the proposed solution was SAP Business One with MARI Projekt-project management add-on, which was accepted by Enersize's management to be the ERP system that the company will implement.

Participation and help from the employees and management of Enersize was required at many stages during the completion of the case study. An ERP implementation is a major investment and the consequences of certain decisions concerning the project are far reaching and therefore must be made by the company's management with careful consideration

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Frame for Interviews

Information about interviewee

Position in the company:

Description of daily tasks:

Problematic areas of daily tasks:

Do you think that ERP would be beneficial in your work?

Have you used ERP before? Which system? Opinions about the use?

Information about ERP requirements

How could ERP facilitate your work?

What kind of ERP functions and features would you need in your work?

Which tasks require unnecessary manual work?

How well is internal communication and information sharing working?

What are the problematic areas?

How would you solve these problems?

How well is external communication (with partners, customers, suppliers...) working?

What are the problematic areas?

How would you solve these problems?

Information about opinions on implementation

Do you think that Enersize needs an ERP system?

Do you think your daily work would be hampered during the ERP implementation?

Would you be ready for the extra effort needed during the implementation?

When would be the best time for ERP implementation in your opinion?

What is your opinion on the changes that the system will bring?

Timetable for the ERP Implementation Project

TASK	SEP	OCT	NOV	DEC	JAN	FEB	
Interviews & discussions with employees & management	[Timeline bar from start of SEP to end of JAN]						
Preliminary ERP requirement assessment	[Timeline bar from start of SEP to end of OCT]						
Search for suitable ERP options	[Timeline bar from start of SEP to end of NOV]						
Appointments with ERP vendors		[Timeline bar from start of OCT to end of NOV]					
ERP vendor assessment			[Timeline bar from start of NOV to end of DEC]				
ERP demo sessions				[Timeline bar from start of DEC to end of JAN]			
Determination of required ERP features & functionalities				[Timeline bar from start of DEC to end of JAN]			
Process mapping				[Timeline bar from start of DEC to end of JAN]			
Comparison of system options					[Timeline bar from start of JAN to end of FEB]		
Selection of most suitable ERP solution					[Timeline bar from start of JAN to end of FEB]		
Discussions with the chosen vendor						[Timeline bar from start of FEB to end of FEB]	
Implementation planning & contract making						[Timeline bar from start of FEB to end of FEB]	