

MASTER'S THESIS | LUND UNIVERSITY 2016

# A Framework for Selecting an ERP Open Source System: A Case Study

---

Alexander Magnusson

Department of Computer Science  
Faculty of Engineering LTH

ISSN 1650-2884  
LU-CS-EX 2016-46





---

# A Framework for Selecting an ERP Open Source System: A Case Study

---

Alexander Magnusson  
ada09am1@student.lu.se

December 20, 2016

Master's thesis work carried out at Netset.

Supervisors:

Elizabeth Bjarnason, elizabeth.bjarnason@cs.lth.se

Björn Olsson, bjorn@netset.se

Examiner:

Martin Höst, martin.host@cs.lth.se



## **Abstract**

An ERP system is a company spanning program that handles everything from production and logistics to sales and customer support. They are extremely costly to implement and thus exclude smaller businesses from usage. By using an open source solution the total cost can be reduced to modification and support costs, eliminating the acquisition and license costs. In this thesis we construct a framework from previous related work and then use it to determine what criteria can be useful in an e-commerce scenario. This was done by performing a case study at a Swedish business-to-business e-commerce company that was looking to bundle their proprietary web shop offer with an ERP system to their clients. The criteria that were found to be of great importance were functional fitness, internationalization, security, programming language, community activity and license.

**Keywords:** enterprise resource planning, ERP, open source, e-commerce, case study, Sweden



# Acknowledgements

A huge thanks to Elizabeth Bjarnason for continuous support and valuable feedback throughout the whole process. I also want to thank Björn Olsson for introducing me to Netset and giving me this opportunity as well as the people who have come by our room and shown interest and encouragement in the thesis.





# Contents

<b>1</b>	<b>Introduction</b>	<b>7</b>
1.1	Case . . . . .	7
1.2	Scope . . . . .	9
1.3	Contribution . . . . .	9
1.4	Outline . . . . .	9
<b>2</b>	<b>Related Work</b>	<b>11</b>
2.1	Open source . . . . .	11
2.2	ERP systems . . . . .	12
2.2.1	Benefits of ERP systems . . . . .	13
2.3	Critical success factors in ERP implementation . . . . .	13
2.4	Customization costs . . . . .	15
2.5	Risks . . . . .	15
2.6	Existing ERP selection frameworks . . . . .	15
<b>3</b>	<b>Research Method</b>	<b>17</b>
3.1	Preparation . . . . .	17
3.1.1	Literature study . . . . .	17
3.1.2	Designing the framework . . . . .	18
3.2	Data collection . . . . .	18
3.2.1	Framework application . . . . .	18
3.2.2	ERP implementation . . . . .	19
3.2.3	Evaluation and validation . . . . .	19
3.3	Data analysis . . . . .	21
<b>4</b>	<b>Framework for selecting an open source ERP system</b>	<b>23</b>
4.1	Company requirements identification . . . . .	24
4.2	ERP system selection . . . . .	26
4.3	Framework Design . . . . .	26
4.3.1	Benefits . . . . .	26
4.3.2	CSFs and risks . . . . .	26
4.3.3	Selection criteria . . . . .	28
<b>5</b>	<b>Framework application</b>	<b>31</b>
5.1	Results of the framework application . . . . .	31
5.1.1	Goal identification . . . . .	31
5.1.2	ERP selection . . . . .	32

- 5.1.3 System implementation . . . . . 35
- 5.2 Evaluation of framework application . . . . . 35
- 6 Discussion 37**
  - 6.1 Framework discussion . . . . . 37
  - 6.2 How relevant are the criteria included in the framework? (RQ1) . . . . . 38
  - 6.3 What relevant criteria are missing from the framework? (RQ2) . . . . . 38
  - 6.4 How can the proposed framework support identifying relevant requirements for the ERP system? (RQ3) . . . . . 39
  - 6.5 How can the proposed framework support an SME in selecting a suitable OSS ERP system? (RQ4) . . . . . 39
  - 6.6 Limitations . . . . . 39
    - 6.6.1 The selected ERP system . . . . . 40
- 7 Conclusion 41**
  - 7.1 Future research . . . . . 42
- Bibliography 43**
- Appendix A Interview transcript 47**
- Appendix B Evaluation session 51**

# Chapter 1

## Introduction

With the advent of the 21st century e-commerce was introduced and has since shown no sign of slowing down. Revenues in Sweden increased from 25 billion SEK to a projected 50 billion SEK between 2010 and 2015, PostNord, Svensk Digital Handel, and HUI Research (2015). With a constantly changing internet environment it is crucial for companies to stay ahead of their competitors and offer unique solutions. One way to succeed in this is by using an enterprise resource planning (ERP) system.

An ERP system is a complex software that usually can manage and increase efficiency in every department of a company such as human resources, accounting, production, customer relations and sales. By migrating to an ERP system a company can achieve objectives that previously were infeasible such as adapting to a changing (business) environment or to gain a competitive advantage.

For small or medium-sized enterprises (SMEs) it is rarely cost effective to develop their own ERP system but instead either buy a proprietary product or use an open source software (OSS) alternative. OSS is free to use while adhering to certain conditions defined by the accompanied license. These conditions detail several aspects such as how the code and compiled programs can be distributed, if it requires attribution to developers and the usage of names. OSS has several benefits over proprietary software and Johansson and Sudzina (2008) found three main reasons explaining why the benefits of OSS in ERP solutions are greater than in other applications: increased adaptability, decreased reliance on a single supplier and reduced costs.

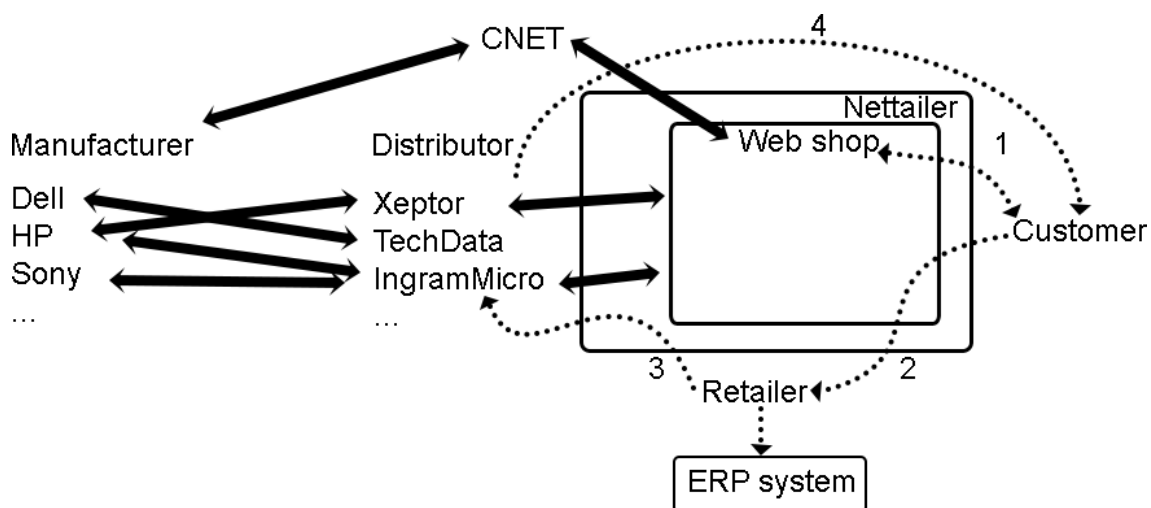
While the benefits are clear it is not clear what criteria can be used and which are most important when trying to choose an open source ERP system in an SME.

### 1.1 Case

This master's thesis was conducted as a case study at Netset, a Malmö-based business-to-business e-commerce company. Netset provides an e-commerce platform called Nettaretailer that handle presentation through a web shop, management of orders, payment option integration and distribution chain integration, but lacks other beneficial components usually found in an ERP system such as accounting, account receivables, account payables, ticketing and human resources. The main idea behind the platform is to offer a solution that increases the profit for the retailers by lowering the existing transaction costs.

The Netailer platform simplifies the whole process in the business model for the retailer. By providing distributor integrations, a retailer only needs to sign deals with the distributors they want to work with to get access to all products they want to offer to the market, normally between 100 000 and 300 000 products, without developing their own integrations and systems. By providing a web shop and an integration to CNET<sup>1</sup>, the worlds largest product data provider, a retailer only has to select which products to display in their web shop, the product data is automatically provided from CNET, and then optionally sign a deal with an on-line payment processor, such as Klarna<sup>2</sup> or Dibs<sup>3</sup>, to which the integration is also already provided.

The problem today is that the retailers manually have to export the orders to their chosen ERP or accounting system, resulting in a lot of repetitive manual labour that could be more or less fully automated. Another aspect is that the retailers existing ERP or accounting system often is connected to high costs. Netset's small and medium business clients are interested in using an ERP system in conjunction with the platform, and Netset is interested in bundling such a solution to all of their SME clients. Since we were looking at smaller companies and the idea of growing profitability by lowering the costs an open source ERP system was considered the best option.



**Figure 1.1:** Overview of Netailer's current flow of goods. 1. A customer browse to the web shop that presents a set of products. 2. The customer place an order in the web shop. 3. The retailer receives the order in Netailer, sends an order to the chosen distributor and can also export the order to their own ERP or accounting system. 4 The distributor sends the product to the customer.

In Figure 1.1 an overview of the Netailer process is presented. A manufacturer produce goods and have an agreement with some distributors that they send their products to. They also have an agreement with CNET that they send product information to. A distributor has a set of products from several manufacturers that they offer to retailers who in turn offer them to customers. Customers browse the web shop and place an order that

<sup>1</sup>[www.cnet.com](http://www.cnet.com)

<sup>2</sup>[www.klarna.com](http://www.klarna.com)

<sup>3</sup>[www.dibs.se](http://www.dibs.se)

the retailer can then manage in Nettare. The retailer then choose from which distributor to order the product from in Nettare. Finally the distributor sends the product directly to the customer.

In Nettare the retailer can then manually export the order to their own ERP or accounting system.

## 1.2 Scope

In this case study we limited our scope to open source ERP systems and with the goals of identifying one that is healthy and suitable for small businesses on the Swedish market as well as maintainable by Netset. Since ERP systems are costly and take a long time to implement the research is based on qualitative data of one implementation. The questions we try to answer are the following:

- RQ1. How relevant are the criteria included in the framework?
- RQ2. What relevant criteria are missing from the framework?
- RQ3. How can the proposed framework support identifying relevant requirements for the ERP system?
- RQ4. How can the proposed framework support an SME in selecting a suitable OSS ERP system?

Due to time constraints our study ended before the ERP system was fully implemented. We found several benefits and contributing factors and we hope that future applications of our framework will help in revealing more factors and evaluating their usefulness.

## 1.3 Contribution

The main contribution of this thesis is a framework for selecting an open source ERP system in an e-commerce solution. The thesis was conducted as a case study in which we applied and evaluated the framework at Netset, an e-commerce company thereby providing insight into the area and helping us in identifying potential improvements to the framework. The main system criteria in our scenario were Functional fitness, Internationalization, Security, Programming language, Community activity, Support infrastructure and License.

## 1.4 Outline

The report is structured as follows. In Chapter 2 the relevant literature is presented. In Chapter 3 we present the methods used to solve the problem. In Chapter 4 the framework is presented and its design is discussed and in Chapter 5 the framework application findings are presented. In Chapter 6 the results of the thesis are presented and discussed. Finally in Chapter 7 the conclusions are presented and potential future work.



# Chapter 2

## Related Work

In the following Chapter we present the reasons for choosing an open source ERP solution, the potential benefits an ERP system can bring to a company, critical factors that are so important they are deemed critical for succeeding in implementing an ERP system, a smaller discussion about the costs of an implementation, a presentation of the most common risks to occur and finally an overview of current evaluation frameworks that present different criteria that can be used to choose an (open source) ERP system. We mainly searched Google Scholar and the databases covered by the Lund University Libraries EBSCOhost membership for related work and grouped them according to their main area of research as presented in the sections below.

### 2.1 Open source

In this thesis we chose to use the free as in beer open source definition set forth by the Open Source Initiative<sup>1</sup>. The key points in the definition related to this thesis include free redistribution, source code availability and that you are allowed to make derived works. Open source as opposed to proprietary software is free to use and modify under certain circumstances defined by its license. We found one paper identifying reasons for choosing open source ERPs and one paper supplying recommendations when using open source in commercial software. Benlian and Hess (2011) conducted a study amongst information system managers that were asked to rank proprietary and open source ERPs according to their selection criteria. It was found that proprietary ERPs were mostly chosen because of their (in descending order of importance) reliability, functionality and ease of use whereas the OSS counterparts were valued based on cost, support and ease of implementation.

Höst, Oručević-Alagić, and Runeson (2011) held a focus group meeting with the objective of identifying recommendations to engineers for the four main phases when using open source in commercial software. The identification phase recommended engineers to identify needs, investigate well known components, talk to (other) engineers and to search in open source forums. The selection phase recommended engineers to take ad-hoc standards, legal, technical and community aspects into account while the modification phase recommended that deep knowledge is required for component modifications and to avoid changes or make glue software. The last phase “giving back” recommended that giving

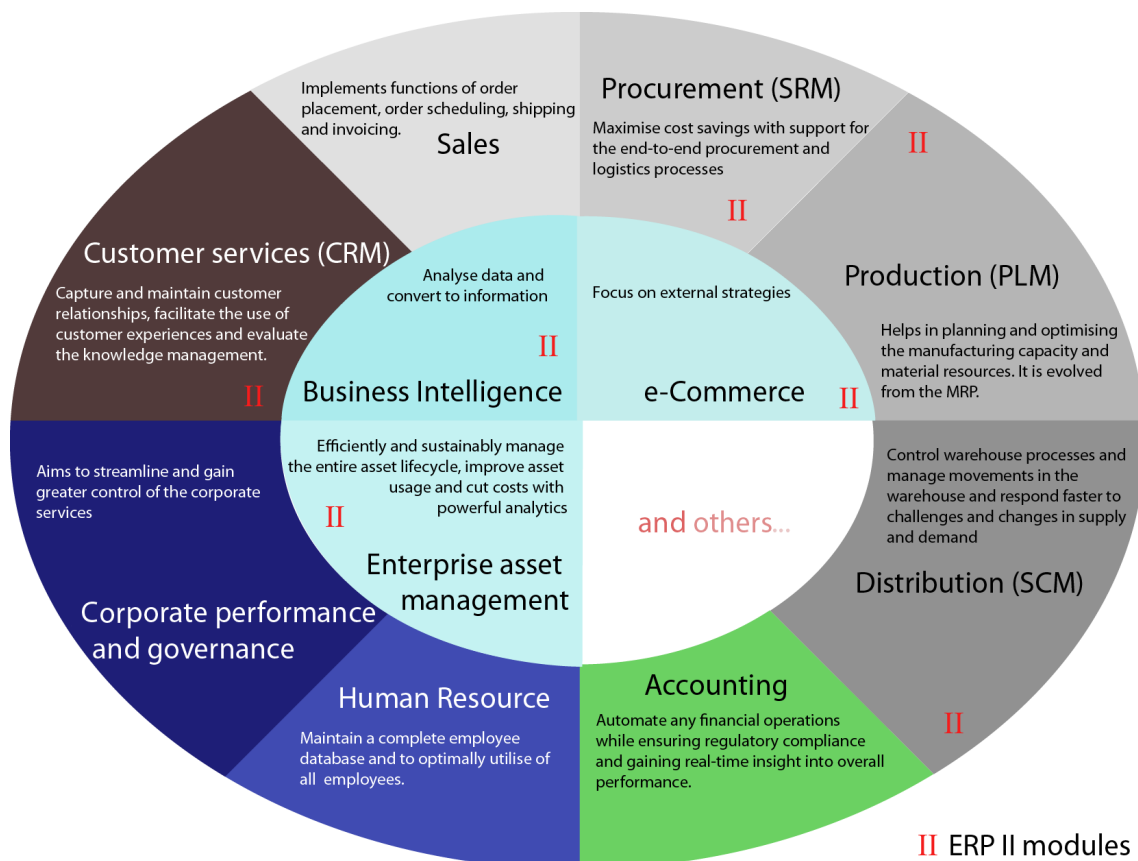
---

<sup>1</sup>[www.opensource.org](http://www.opensource.org)

back helps later modification, to become an active member in the project, that intellectual property rights are the main reasons not to give back and that supplying test cases can raise chance of acceptance).

## 2.2 ERP systems

ERP systems are application suites used in companies to manage almost every operation in a company, from production lines and accounting to sales and customer support. The aim of ERP systems is to use one single system instead of many independent. Figure 2.1 shows an overview of the different areas an ERP system usually has capability to handle. Most companies use proprietary software such as Microsoft Dynamics, SAP ERP and Oracle PeopleSoft. These are extremely functionality rich applications but cost a lot to implement. Even though economic benefit is not always the primary reason it is almost always a byproduct of the process streamlining that ERP systems bring. Bendoly and Kaefer (2004) analysed 115 firms and found that business-to-business e-commerce solutions were more efficient when coupled with ERP systems and even more so when the system had been implemented before the e-commerce.



**Figure 2.1:** Overview of the typical areas an ERP system could be used in. Original image by Shing Hin Yeung, licensed under CC BY-SA 3.0<sup>2</sup>

<sup>2</sup>[www.creativecommons.org/licenses/by-sa/3.0/](http://www.creativecommons.org/licenses/by-sa/3.0/)



### **2.2.1 Benefits of ERP systems**

Implementing an ERP in a business can be the single most expensive task in a company's lifetime so it has to provide some benefits to warrant this cost. Bendoly and Kaefer (2004) analyzed 115 firms and found that by using fewer systems a company could reduce the variability in different areas such as database redundancies, user interpretations and processing times. An ERP can give a better bottleneck overview and helping the management identify critical paths limiting the production chain as well as waste detection abilities. By using a benefit framework it can be easier to distinguish the benefits and Shang and Seddon (2000) created one that has been improved over time. Their comprehensive framework consists of 5 dimensions with a total of 21 sub-dimensions that address potential areas where benefits in ERP systems could be achieved. The framework was later improved by Staehr (2007) to include two more categories and one addition to another category. The first dimension describes operational benefits such as cycle time reduction and improvements in productivity and quality. The second dimension, managerial, suggests benefits in resource management and decision making and planning activities. Strategic benefits such as expansion, differentiation and innovation are presented in the third dimension while the fourth details flexibility, capability and cost reductions in the IT infrastructure. Finally, the fifth dimension represents organizational benefits such as employee training, satisfaction and morale and organization standardization. This framework is presented in Table 2.1.

## **2.3 Critical success factors in ERP implementation**

Factors that are deemed so important that failing to address them correctly might jeopardize a whole project are called critical success factors. Several studies have been conducted to identify and categorize these. Nah, Lau, and Kuang (2001) first identified 11 potential critical success factors for companies implementing ERPs that were later used in an early-phase ERP-implementation survey by Nah, Zuckweiler, and Lee-Shang Lau (2003) amongst CIOs to rate them by importance.

Luo and Strong (2004) found that ERP integration can be linked to business process reengineering (BPR), which can mean that people will be laid off as the process becomes more effective – what three workers did manually before might have been reduced to the work of one due to automation. Meanwhile, Huang et al. (2004) identified support from the users before, during and after the implementation as critical to a long term successful usage of the system. Failure to address these CSFs can prove disastrous with users actively ruining the implementation to show dissatisfaction with it as happened in the FoxMeyer bankruptcy in the '90s, Scott (1999). Ahmad and Cuenca (2013) later conducted a wider literature study and identified 33 CSFs (critical success factors). They observed that many of the ERP implementations were conducted from an operational rather than organizational perspective. Potential failures of ERP implementations can be ascribed to the lack of understanding of what an information system can and cannot do and the expectation that just using it is going to solve the problems a company is experiencing. Of the top 10 CSFs that were investigated 8 were organizational and could be grouped into three categories. The basic category is linked to the initiation and selection stages of an ERP implementation and contains the CSFs, "Project team skills" and "experienced project manager". The initiation stage includes defining requirements, goals and benefits and per-

**Table 2.1:** Benefit framework when using an ERP based on Shang and Seddon 2000 with improvements from Staehr 2007. The benefits are categorized after their area of benefit.

<b>Dimension</b>	<b>Sub dimensions</b>
1. Operational	1.1 Cost reduction 1.2 Cycle time reduction 1.3 Productivity improvement 1.4 Quality improvement 1.5 Customer services improvement 1.6 User accountability
2. Managerial	2.1 Better resource management 2.2 Better decision making and planning 2.3 Better performance control
3. Strategic	3.1 Supports current and future business growth plan 3.2 Supports business innovation 3.3 Supports cost leadership 3.4 Supports product and service differentiation 3.5 Enables external linkages 3.6 Enables world wide expansion
4. IT Infrastructure	4.1 Increased business flexibility 4.2 IT costs reduction 4.3 Increased IT infrastructure capability
5. Organizational	5.1 Supports business organizational changes 5.2 Facilitates learning and broadens employee skills 5.3 Empowerment 5.4 Changed culture with a common vision 5.5 Changed employee behaviour with a shifted focus 5.6 Better employee morale and satisfaction 5.7 Standardization

forming an adoption impact analysis while the selection stage includes the actual software acquisition and required resources. Thus by having appropriate skills and experience, a clear understanding of the objectives and a better choice of system can be made.

The critical category is defined by the adaptation and acceptance stages. The adaptation stage is defined by the CSF “(use of) consultants”, who are to be used for the implementation, and when the users start using the system but without any knowledge of its power. The acceptance stage CSFs are “cultural change” and “management support” and define when the users have gotten used to the system and start appreciating the benefits and capabilities of the system. With the domain knowledge provided by consultants, the system should stand a higher chance of being correctly implemented and supporting all the required tools by the users, who then can focus on learning the tools as opposed to fighting a badly implemented workflow.

The last category, dependent, describes the CSFs that depend the most on other CSFs and are found in the last stage of an implementation, process tuning, and are highly affected by the outcome of previous stages. An ongoing “evaluation (progress)” of the integrated system and continuous “communication” and “cooperation” between employees will boost the benefits of the implementation. With the correct tools and a working implementation, few details can be changed in the software itself, so it is no surprise that analysis and improved interaction between employees represents the last stage.

By analysing the CSFs presented we noted that in the early phases, as identified by Nah, Zuckweiler, and Lee-Shang Lau (2003), organizational factors were found to be critical and Ahmad and Cuenca (2013) confirmed them to be important throughout the whole project lifetime. Ahmad and Cuenca (2013) collected some of their CSFs from Finney and Corbett (2007) who also stressed the need for a post-implementation evaluation and a feedback network but also noted that it might be hard to construct unless there are pre-implementation established metrics of relevant resources and processes.

## **2.4 Customization costs**

An ERP system can rarely be used out-of-the-box and usually requires substantial customization. We identified two papers discussing the costs and recommendations related to ERP implementations. Luo and Strong (2004) found that adapting both the ERP and the target system is necessary and if not necessary it is still a lot cheaper than fully customizing only one to fit the other.

Open source ERP alternatives are cheaper if the company decides to integrate these on their own, but this usually requires in-depth knowledge from consultants as identified by Ahmad and Cuenca (2013). For an SME a cheaper alternative gives the company an opportunity to benefit from the power of an ERP system while avoiding the huge costs associated with proprietary ERP systems.

## **2.5 Risks**

Almost all major changes to an enterprise are associated with risks and so is the case when implementing an ERP, which naturally follows from the fact that it is involved in every part of the workflow in a company. Poba-Nzaou, Raymond, and Fabi (2008) found that the integration of an ERP in a business has a failure rate of 66% to 70% and is prone to several risks while success is associated with great benefits. A few risk studies have been conducted and we noted that most of the risks are closely related to CSFs. Sumner (2000) identified several risk factors that Huang et al. (2004) later included when assessing 28 different risks, where the majority were related to organizational shortcomings. The top ten risk factors are listed in Table 2.2.

## **2.6 Existing ERP selection frameworks**

There have been previous attempts at deriving selection criteria and creating frameworks and we found three relevant papers. Wei, Chien, and Wang (2005) developed an extensive

**Table 2.2:** Top 10 risk factors adapted from Huang et al. 2004 that a company implementing an ERP can face, they are closely related to CSFs.

Priority	Risk
1	Lack of senior manager commitment to project
2	Ineffective communications with users
3	Insufficient training of end-user
4	Fail to get user support
5	Lack of effective project management methodology
6	Attempting to build bridges to legacy applications
7	Conflicts between user departments
8	The composition of project team members
9	Fail to redesign business process
10	Unclear/Misunderstanding change requirements

framework for selecting an ERP system and suggested the ranking of criteria based on a step-by-step method, the analytic hierarchy process (AHP). Several criteria were identified and discussed and then grouped if they were system related or vendor related.

Wang and Wang (2014) examined open source ERPs from a teaching perspective and based on previous literature identified five important criteria that might have been overlooked before due to infeasibility or impossibility. With the arrival of dynamic websites, HTML 5 and the recent expansion of cloud computing companies can avoid having to lock-in on a specific operating system and can avoid having to develop specific (native) client applications. Instead the client applications can run in any web browser typically found on the client OS and be integrated through web sockets and standardized interfaces. This can further reduce the system requirements and costs.

Herzog (2006) compared several open source ERP systems and created five different criteria that could be used to compare and assess them. The first criterion is functional fitness and pertains to the relative level of matching functionality out of the box in an open source ERP and a company's requirements. With a higher fit fewer customizations are required, which in turn lowers the total cost of ownership. The second criterion concerns flexibility and is closely related to the first. Its subcriteria are based on the customization needs for successful current and future process growth. The third criterion details the support requirements for the system and its users. The fourth criterion concerns the continuity aspect, the rate at which the project is developing. The fifth and last criterion, maturity, is used to assess the quality of the product.

# Chapter 3

## Research Method

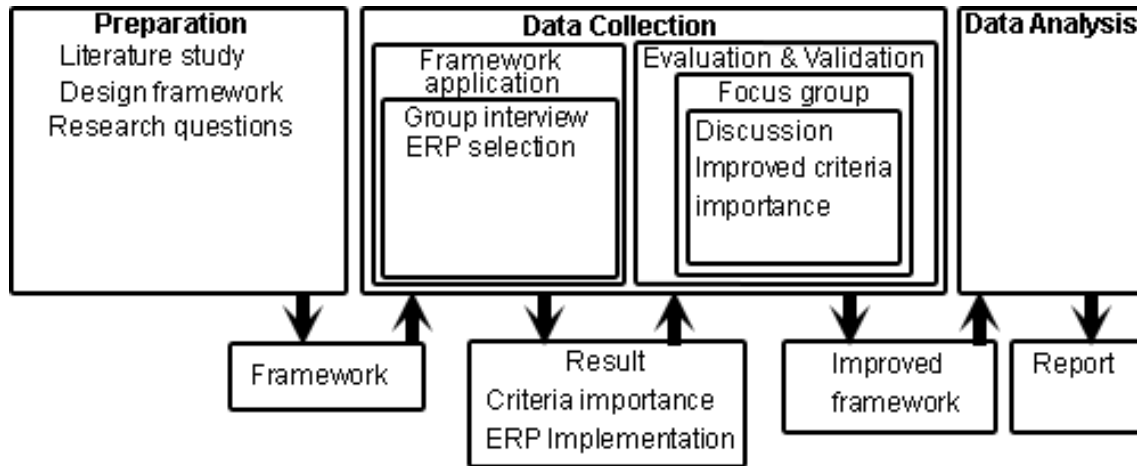
Our thesis was a case study based on the case study process described by Runeson and Höst (2009). We chose this qualitative method because our goal was to determine and implement only the best system given our criteria and a case study is ideal for analyzing the whole process. It consisted of four stages as shown in Figure 3.1. The first stage, Preparation, involved understanding the case company, planning the study, analysing relevant literature and designing the framework based on this information. The framework was then used in the second stage, Data Collection, that was split in the two activities framework application, where the stakeholders were interviewed and different ERP systems were compared, and Evaluation and Validation, where a focus group was held. The framework application resulted in a list of important criteria and iDempiere as the system to implement. The process we had undertaken to derive and apply the framework was presented to the managers at a focus group meeting. We discussed what decisions had been made in each step and a discussion on the choices was held as well as how suitable the framework was and what more could have been analyzed. The last stage involved analyzing and reporting the findings and relating the results to the research questions. In the following sections we present what the target of the different areas was and how we sought to achieve them.

### 3.1 Preparation

The preparation stage was setup to deepen the knowledge for the researchers and to help us properly understand the problems that were present at the start and those that could arise during the thesis. Given the cost and time requirements to implement an ERP system we decided that only one should be evaluated and a case study was therefore the most appropriate method. To see if the proposed framework would work we applied it and evaluated the results at Netset that had a client that was interested in an integration. It had two major activities, the literature study and designing the framework.

#### 3.1.1 Literature study

Without prior knowledge about the research area we searched for relevant literature on different topics that we expected to come across. To find literature we mainly searched Google Scholar and the databases covered by the Lund University Libraries EBSCOhost



**Figure 3.1:** Overview of the case study workflow. The bold-named boxes are the different stages, each containing the activities performed and the arrows showing artefact inputs and outputs of the stages.

membership. The goal of the literature study was to find recommendations or key factors that would help the researchers understand Netset’s goals and how we could achieve them. “ERP” combined with key words such as “success”, “benefit”, “framework”, “open source” and “risk” helped us find articles of interest from which related articles could be derived. They are presented in more detail in Chapter 2.

### 3.1.2 Designing the framework

The literature study provided a lot of input on what factors can make-or-break an implementation. We felt the need to address two topics, what can we achieve with an ERP system and how can we find the right one. The framework was split in two parts, the first part aims to identify sought benefits and which critical success factors a company should plan for while the second part provides criteria that can be used to distinguish one system from another. See Section 4.3 for more details.

## 3.2 Data collection

The data collection stage is split in two major parts, the framework application part where we used our framework and which was evaluated in the second part, Evaluation and Validation.

### 3.2.1 Framework application

The framework is split in two parts, the first part is used to identify requirements and the second part is used to choose a system. To collect necessary data for this case a group interview with stakeholders from Netset and their client was deemed the most suitable method. The first part of the framework was an interview and the second part was analysing different systems and then comparing them to find one suitable for implementation. Based

on this an integration was started and then the results of the framework application was evaluated in a focus group. The whole framework can be found in Chapter 4

### **Group interview**

For the researchers to understand the need of ERP systems and to what extent this was relevant for the proposed framework we decided to interview one of Netset's clients. The manager at the client company had more than 20 years of experience in the business and was part owner and sales manager. The company has 10 employees and sells consultancy services as well as products through Netset's web shop.

A semistructured interview, as described by Runeson and Höst (2009), over a video link with the sales manager was performed with open questions constructed from areas discussed in the literature study. By using open questions we hoped the sales manager would expand into areas not necessarily covered by the questions and that could be of help to identify more specific problems not adhering to companies in general. The questions were chosen to target their current workflow, time consumption and bottlenecks; organizational problems and structure; sought benefits; perceived risks, goals and requirements. By recording the interview we could transcribe it and send a copy to verify the interpretations of the answers. Netset stakeholder's that were present at the interview, CEO and CTO with more than 15 years' experience in the business, were questioned directly after and confirmed that their intentions with the implementation was in line with those of their client. Table 3.1 presents the different questions that were posed. The whole transcript can be found in Appendix A and the framework identification part can be found in more detail in Section 4.1.

### **System selection**

To analyze and compare different ERP systems a collection of 15 systems was created. The systems chosen were found by searching on Google, Wikipedia and from the literature study. By using the terms "ERP" and "open source" we found relevant and widely used and accepted systems. Our goal was to only implement one system so we decided to use an iterative reduction method where for each iteration a subset of features or requirements were chosen and those systems that did not qualify were eliminated. This was repeated until only one system, iDempiere, was left that was then chosen for integration. More details about how the selection worked in our case can be found in Chapter 5.

## **3.2.2 ERP implementation**

The system selection left us with iDempiere as the most suitable system to implement and after confirmation from Netset it was decided to be implemented. The implementation was contracted to a Swedish consultant with domain knowledge in iDempiere and it was coded to be compliant with the GPL and to preserve the proprietary nature of Netset's product.

## **3.2.3 Evaluation and validation**

To evaluate the framework and the result of the framework application a focus group was arranged with the managers from Netset that were involved in the project and the

**Table 3.1:** Interview questions designed to understand and identify current and future problems and the type of question explaining why it was posed. The full transcript is available in Appendix A.

Question	Type
Tell us about your role and what your company does?	Understanding
What is your typical customer?	Understanding
Do you sell a lot products today or only services?	Follow up
Describe the company structure?	Understanding
How long have you been in the business?	Understanding
Describe the workflow of a customer making contact with you until you get paid?	Understanding
What part of the workflow has least return on investment?	Understanding
What programs do you use?	Understanding
What goals do you recognize by having everything in one system?	Understanding
What additional benefits do you seek if you migrate?	Follow up
Are there other requirements from other employees?	Follow up
How much of your time is put on other things than core business activities, such as time reporting?	Understanding
Do you recognize any risks in changing system?	Understanding
Would you rather adapt your workflow or the ERP system to suit the other?	Understanding
Do you need to integrate with any current system?	Understanding
Do you have any required life span on a new system?	Understanding

researchers. Netset chose to exclude their client from the evaluation as their criteria for a system only concerned generic functionality found in almost every ERP and not the more technical details that differs.

### Focus group

The focus group meeting with the CEO and CTO of Netset was held as a presentation, see Appendix B, where notes were taken during the discussion and presented at the end of the session to confirm nothing was missed. For each part that was discussed the goals were first presented and then the findings. The participants were asked if the results seemed reasonable from a company and market perspective and if they felt something was missing. The participants were free to comment on the results and ask questions to the researchers. To start off the meeting Netset's and their client's criteria identified through the interviews were presented as a reminder of the projects goals. The analysis and selection process was then presented, discussed and evaluated to find out if there were other criteria that could have been useful to investigate. The CSFs were subsequently presented to identify if there was something that should have been planned for. The benefits that were identified in the framework were then presented. Finally the current status of the integration was evaluated and iDempiere as a system choice was discussed. The framework was refined based on the results of the interviews and the post-implementation focus group to include the findings.



The evaluation results can be found in Chapter 5.2.

### **3.3 Data analysis**

To understand what benefits and criteria Netset's client was trying to solve we constructed the questions to identify their current solution and what they felt was problematic. After the interview we coded key comments and words in the interview that could be matched to relevant benefits, CSFs and risks. Answers like "Not enough/takes too much time to ...", "we do this in one program and then we do the same in another..." and "we want to do ... but are limited because of ..." were easily matched to corresponding benefits.

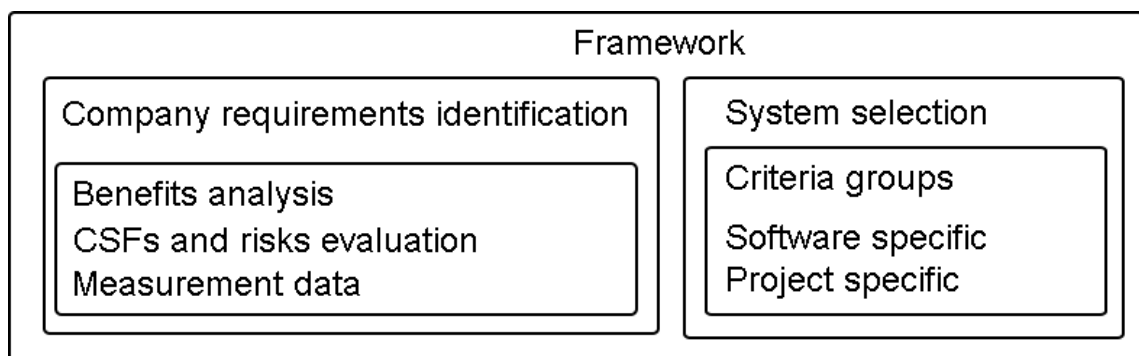
To compare open source ERP health we used OpenHub to gain a brief understanding of how the projects we had chosen were doing. By analysing the number of recent commits, mails in the mail lists and amount of unique users a projects activity could be approximated to dead (very few impactful commits during the past year, no consistent flow of commits, few unique developers), small (several feature and bug fix commits during the past year, at least 10 users each with more than 5 commits, active mail list or forum) and active (everything else).



# Chapter 4

## Framework for selecting an open source ERP system

This chapter is split in three parts, company requirements identification and system selection, being the actual framework, and then framework design that discuss the reasoning behind the framework. An overview of the intended framework usage is presented in Figure 4.1. Our framework is an approach that can be executed and the first step is to identify the requirements by understanding benefits, CSFs and risk and taking measurements. The result can then be used as input for the second part, system selection, where criteria are determined and a system is decided on. An ERP system is a complex software system



**Figure 4.1:** An overview of the framework. The company requirements identification part consists of a benefits analysis, a CSF and risk evaluation and a measurement data collection. The system selection part consists of two criteria groups, one with focus on the software properties and the other on the project properties.

that requires the full commitment of the whole organization implementing it, from top to bottom, from sellers and support personnel to managers and owners. It is evident from the literature study that choosing an ERP and successfully implementing it requires more than analysing ERP feature matrices and choosing the most suitable system. That does not mean that features are unimportant but upon failure to properly implement and adapt the company to the ERP the features are present but they are totally unusable or induces extra overhead in the workflow.

After analyzing the literature presented in Chapter 2 it was apparent that of the CSFs

organizational factors were more important than operational as 8 of the top 10 were organizational, see Table 4.1. This can mean that the road to a successful implementation hence lies in a proper understanding of the company and its structure and the company's understanding of the ERP and its risks, benefits and CSFs. We have therefore designed the framework to cover these aspects and it is split in two parts, *company requirements identification* and *system selection*.

## 4.1 Company requirements identification

The identification part is aimed at analyzing the company to reduce the risks and potential losses while ensuring that goals and requirements for the implementation are achieved. Based on the literature study we believe that by understanding the sought *benefits* and addressing the *CSFs and risks*, organizational issues can be kept to a minimum. We suggest basing the interviews and questions on a benefit framework to ease the identification of primary goals and requirements. In this case study we used the benefit framework by Luo and Strong (2004). It provided ERP specific benefits that we used to confirm the interest and the reasons for wanting to introduce an ERP. The CSFs cover important areas that must be addressed to reduce the risk of failure. Since ERP implementations are unique to each and every company, a full coverage of all the CSFs might not be necessary, relevant or possible. In general the bigger the company is the more people an ERP will affect as it usually spans the whole organization and might therefore require a stricter evaluation to reduce potential conflicts. We evaluated the CSFs by Ahmad and Cuenca (2013) and planned for the inclusion of a consultant to provide domain knowledge. Finally, collecting *measurement* data for an effectiveness evaluation after the implementation is suggested to confirm requirements, sought benefits and hard evidence of the achieved improvements.

To summarize the above, by interviewing managers and users the following should be possible to obtain:

- Clearly defined beneficial goals of ERP usage. We suggest using a framework such as the one by Luo and Strong (2004) (see Table 2.1) and the reductions described in Bendoly and Kaefer (2004).
- Relevant CSFs and risks identified and a plan developed of how to address them. Table 4.1 provides an overview of the CSFs by Ahmad and Cuenca (2013) and Table 2.2 lists some of the risks by Huang et al. (2004) that can be used.
- Measurements taken on streamline-targeted processes for post-implementation effectiveness evaluation as proposed by Finney and Corbett (2007).

**Table 4.1:** Critical success factors based on Ahmad and Cuenca (2013) with the ten most important bolded. They are described in more detail in Section 2.3.

Organizational factors	Neutral factors	Operational factors
Formalised project plan/schedule	<b>Interdepartmental cooperation</b>	Good project scope management
Project management	Software customisation	Management expectations
<b>Cultural change/political issues</b>		Steering committee
Business process reengineering(BPR)		<b>Adequate resources</b>
<b>Experienced project manager-leadership</b>		Trust between partners
Project champion role		Empowered decision makers
<b>Interdepartmental communication</b>		Vendor's tool
<b>Project team composition/team skills</b>		Managing consultants
<b>Management support and commitment</b>		Software configuration
<b>Monitoring and evaluation progress</b>		Education on new business processes
<b>Appropriate use of consultants</b>		Vendor support
Reduced troubleshooting-project risk		<b>Data analysis and conversion</b>
Training on software		
Formal methodology-ERP implementation strategy		
Carefully defined information and system requirements		
Adequate ERP software selection		
Clear goals and objectives		

## 4.2 ERP system selection

The selection part of the framework is intended to support analysis and comparison of OSS ERPs in order to select one that is suited to the requirements that were found in the identification part. The framework contains both software-specific and project-specific criteria and are presented in Table 4.2. The software specific criteria are those that are based on the code, its structure and its features. The project specific criteria are those that are derived from the usage of the software and the developer network associated with it. In this case study we used an iterative method as described in Section 3.2.1 to determine which one to use. Other methods, such as the one used in the AHP by Wei, Chien, and Wang (2005), might also work but we leave that for future research.

## 4.3 Framework Design

The framework was designed based on the related work, see Chapter 2, and the idea of identifying reasons and causes of problems as a tool to determine important evaluation criteria for the selection part. The reasons for this inclusion in the design will now be described.

### 4.3.1 Benefits

SMEs usually introduce ERPs in their workflow in an attempt to achieve benefits or to reduce certain negative effects created over time as the business expands. By identifying the causes we can use it to our advantage when selecting a system and it is therefore a crucial part in the framework's identification part, see Section 4.1. By using an ERP benefit framework, such as Shang and Seddon (2000), identifying clear objectives is made easier and by stating the sought benefits relevant metrics can be measured pre- and post-implementation to analyse potential improvements. It can also serve as a post-implementation checklist for additional benefits gained that were not the main targets of the ERP implementation.

### 4.3.2 CSFs and risks

Critical success factors are called critical for a reason and we found enough previous research on them to warrant their inclusion in the framework. Risks are closely related to CSFs as they describe the problems an organization can face, during and post implementation, if they fail to address the CSFs. What follows is a brief discussion about the most important organizational CSFs and risks identified in several papers, contributing to the identification part in the framework, see Section 4.1, as avoiding or, if it is not possible to avoid, dealing with them is necessary.

Nah, Zuckweiler, and Lee-Shang Lau (2003) and Ahmad and Cuenca (2013) identified (top) management and change culture support as critical success factors. By clearly stating what benefits the company is seeking to achieve before implementation, it can be used to fuel support from management and users if they are struggling through the implementation and learning stages. If the company seeks no specific benefits, it is questionable why they need an ERP and the usage of it can backfire and be counterproductive, likely with reduced interest from users resulting in losses for the company.

**Table 4.2:** Items that can be evaluated in the ERP system selection process, a merge of Wei, Chien, and Wang (2005) and Herzog (2006) grouped by the ISO-25010 categories. The framework was refined after the evaluation to include the items that were found to be important for Netset in an e-commerce perspective and are marked.

Criteria group	Category	Evaluation item	Case
<b>Software</b>	Functional suitability	1. Functional fitness 2. Module completion	✓
	Performance efficiency	1. Scalability	
	Compatibility	1. Interfaces	
	Usability	1. Ease of operation 2. Ease of learning 3. Internationalization	✓
	Reliability	1. Stability 2. Recovery ability	
	Security	1. Security 2. Permission management	✓
	Maintainability	1. Upgradeability 2. Flexible upgrade 3. Ease of integration 4. Ease of in-house development 5. Customization 6. Programming language	✓
<b>Project</b>	Portability	1. Operating System Independence 2. Database Independence 3. Architecture	
	Maturity	1. Development status 2. Reference sites	
	Continuity	1. Project structure 2. Community activity 3. Transparency 4. Update frequency 5. Lock-in effects	✓
	Support	1. Support infrastructure 2. Training 3. Documentation 4. Social network	✓
	Other	1. License 2. Total costs 3. Implementation time	✓

Insufficient end-user training is regarded as a big risk, as knowing how to properly use the tools can reduce user introduced errors into the system and increase effectivity for the end-user so more time is dedicated to the business' core areas and less to ERP related work. Huang et al. (2004) notes that due to the integrated nature of an ERP, inaccurate data entered into it can affect another department which over time will make the ERP lose credibility, while support for the old system used before the ERP was introduced might grow. ERPs are designed to be used for several years after implementation and, considering the cost of implementing a new one, continued support is crucial.

Sumner (2000) discovered that by building bridges to legacy applications, a company risks inducing considerable cost and time overruns into the implementation and instead adapting completely to the new system is preferred.

### 4.3.3 Selection criteria

We now present the reasoning behind the second part in the framework, the selection criteria. The criteria were collected from different papers and compared against each other to find differences. Figure 4.2 provides an overview of the comparison.

We collected the main reasons for choosing an open source ERP system from Benlian and Hess (2011) (cost, support and ease of implementation) and Herzog (2006) (functional fit, flexibility, support, continuity and maturity). By comparing their criteria we find that ease of implementation is backed by choosing an as functionally fit system as possible, making initial integration easier and lowering the technical skills and time required. Ease of implementation is also boosted by a flexible system with a scalable and customization-friendly architecture and is further enhanced by a high continuity factor. Support is evidently supported by a strong support infrastructure consisting of, for example local consultancy partners, training sessions and rich documentation. Low costs are direct side effects of a faster and less complex implementation and the availability of high quality support material.

We also related the five findings that Wang and Wang (2014) found with those from Herzog (2006) as follows: completeness of commonly required ERP functionalities (1) is directly related to functional fitness, ease of configuration on any OS (2) and cloud computing readiness (3) are sub criteria of flexibility where also the non-functional requirements usability, reliability and security (4) are included. Finally a large social network for community support (5) is obviously covered by the support criteria.

The AHP framework from Wei, Chien, and Wang (2005) supplies a proprietary perspective on the criteria for the selection process. Their framework is divided into two major parts evaluating the software and the vendor. While their described vendor aspect is irrelevant in a community open source context, we find it interchangeable with the maturity (reputation), continuity and support (service) categories from Herzog (2006) when applied on the community. Their software aspect highlights one criterion not directly discussed in the other frameworks, reliability, relating to the stability (backups, unexpected crashes) and recoverability (restoration of data) that can still be of importance.

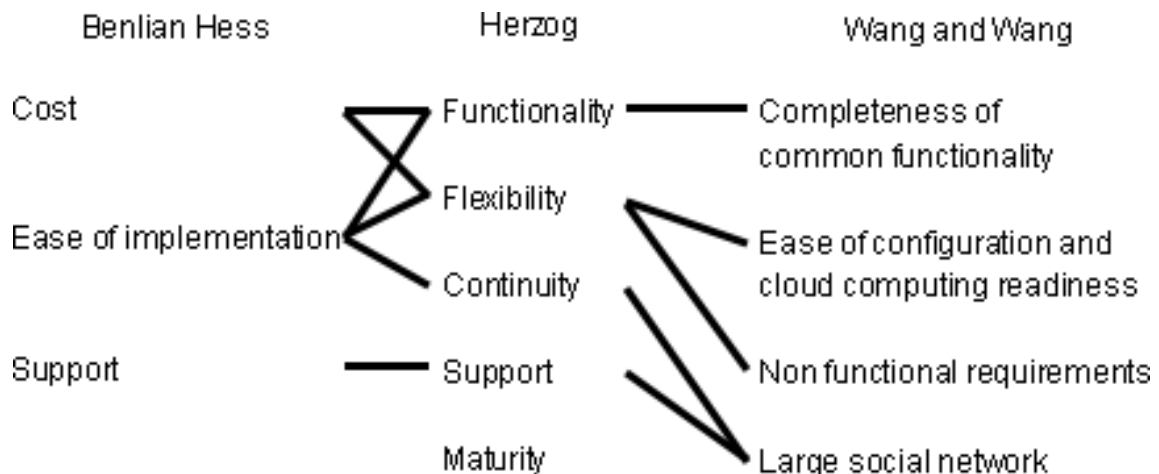
One of the most important parts to evaluate in an open source context that has not been explicitly stated above is the type of license used as it is a cornerstone in being allowed to use a system or not. By including a license evaluation and a combination of criteria from the above mentioned frameworks we end up with a framework covering the main criteria.



To more easily distinguish the types of criteria we split them into two groups, software-specific and project-specific. For the software specific group we use the product quality categories defined in the ISO-25010 standard where appropriate. Since the focus is on the above identified criteria, we make no use, claim or disregard about the importance of the subcategories in the standard but leave it for future research as there currently exist no study evaluating them in an ERP context. The project-specific criteria are those that pertain to the project and the implementation and not the actual code.

### Case criteria

This case study required 5 criteria to be considered for a successful choice at Netset, Functional fitness, Internationalization, Programming Language, Community activity and License. Security and Support was proposed as requirements after the framework evaluation was performed, see Section 5.2. Functional fitness is the relation between required functionality and available functionality. The more functionally fit a system is the less has to be developed in order to use it. Internationalization is the presence of locale specific features such as translations and date/time and currency formatting. With more programs being exposed to the web and an increasing amount of money being spent on criminal activities Netset felt that the Security aspect can not be ignored. Programming language can be an important criteria as a company can either choose to use their own developers or more expensive consultants. Choosing a healthy open source project is important, as described in Section 2.1, in order to benefit from the nature of open source. It is not always the case that a company has prior knowledge about the domain or the system they want to use but with the presence of a support network it can be solved. The last point, License, is crucial for giving proper attribution to developers and in avoiding illegal usage that can result in a lawsuit.



**Figure 4.2:** The findings of the three papers Benlian and Hess (2011), Herzog (2006) and Wang and Wang (2014) are compared to show their relationship and to support our selection part in the framework.



# Chapter 5

## Framework application

To evaluate and see if our framework was usable we applied it using one of Netset's clients. This chapter is split in two sections where we first present the outcome when we applied our framework and then we discuss the evaluation of our framework.

### 5.1 Results of the framework application

This section presents the results of applying the framework to our case at Netset. The results are presented in chronological order starting with the group interview followed by the selection and finally the implementation.

#### 5.1.1 Goal identification

The identification part of the framework, see Section 4.1, was conducted by interviewing a manager of Netset's client with open questions, and follow up questions were posed if more details were needed. The manager was first questioned about current workflow and what he found problematic. He presented several problems mainly related to the use of multiple programs to handle different aspects of the same task such as sales opportunity and time registration. Their main goal, however, was one unified system instead of three to help with reducing the current double entry problem. When asked about the time spent not doing core business activities, "way too much" was the reply. While not stating a specific amount of time they noted that it was part of the double entry problem so a reduction in time can be expected.

No time reporting functionality is available at the moment but was requested as they have no overview and seek such managerial benefits. Their company only consists of 9 people, 1.5 sales representatives and 7.5 IT consultants, so handling a system change is not a big deal and most of the employees seemed happy about a change. The client was planning on recruiting 2 more employees and finds a need to abandon their current solution to be able to expand.

The client hires an accountant that uses a proprietary system and the manager was not sure if he was willing to change or if they wanted to keep it as they had not discussed it, but having one single system was their ultimate goal. When questioned about potential risks they said they were willing to take them but also noted that whatever happened would be better than their current solution. The full transcript can be found in Appendix A.

Of the top ten CSFs, see bolded factors in Table 4.1, that the client was questioned about they showed strong support for “Management support” and “change culture” while data for the “evaluation (progress)” was noted in the form of excessive time spent logging working hours and the use of multiple systems. “Business process reengineering”, “communication” and “cooperation” were deemed irrelevant or too redundant due to the small size, nature and usage area of the client. The stakeholders from Netset that were present at the group interview also showed “support from management” and willingness to “use consultants” who in turn would provide the required “project skills”. These CSFs are summarized in Table 5.1.

**Table 5.1:** Critical success factors that were investigated and found relevant during the group interview.

Stakeholder	CSF
Netset’s Client	Management support Change culture
Netset	Management support Use of consultants Project skills

Based on the interview we could identify 11 potential benefits and they are summarized in Table 5.2. The operational benefits are related to the time spent doing non-core business activities, such as entering the same data in multiple systems. The managerial benefits are a side effect of better time reporting. The strategic benefit to support business expansion was clearly noted by their intention of employing more people but felt their current solution scales badly and that they have to change to something better. IT infrastructure benefits are achieved by using only one system. Finally organizational benefits can be achieved by letting employees perform more core business activities and less unrelated activities, such as time reporting.

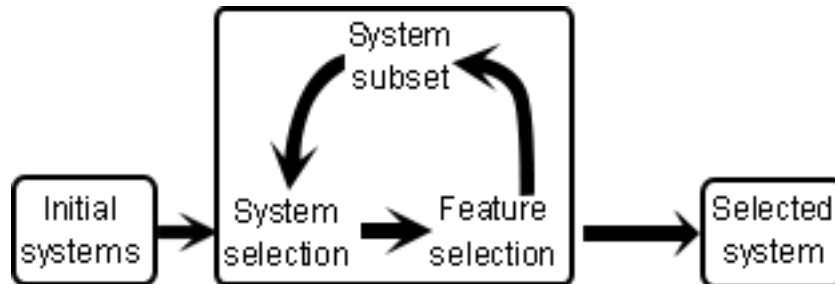
### 5.1.2 ERP selection

The selection part of the framework, see Section 4.2, was used to determine which system to implement. To find candidate systems we searched on Wikipedia, Google (including linked blog posts and forums) and those that we came across in the literature study. While there are hundreds of systems and derivatives we limited our primary search to those that either had a substantial amount of downloads from official repositories, a widely recognized open source backing body (i.e. Apache or GNU) or had existed for a long time. By then applying an iterative process as seen in Figure 5.1 where for each iteration a new subset of the requested features and attributes from the previous iteration was kept and the rest discarded. This was repeated until only one system was left. In general the easiest identifiable feature or attribute to include was chosen for every iteration. The items to evaluate were primarily defined in the scope with the addition of programming language and Swedish translation after discussion with Netset after the first iteration. The functional fitness did not contribute anything except in the case of Dolibarr as the requested functionality is standard in almost all ERPs. A spreadsheet was created to collect information and

**Table 5.2:** Benefits sought to be achieved as a result of the interview with Netset's client. A subset of the benefits in 2.1.

Dimension	Sub dimensions
1. Operational	1.2 Cycle time reduction 1.3 Productivity improvement 1.5 Customer services improvement
2. Managerial	2.1 Better resource management 2.2 Better decision making and planning 2.3 Better performance control
3. Strategic	3.1 Supports current and future business growth plan
4. IT Infrastructure	4.3 Increased IT infrastructure capability
5. Organizational	5.5 Changed employee behaviour with a shifted focus 5.6 Better employee morale and satisfaction 5.7 Standardization

an overview of the selection process can be seen in Table 5.3 and the detailed results in Table 5.4.



**Figure 5.1:** Overview of the iterative selection process. A set of systems was reduced to a smaller set by excluding systems not having a given feature until only one was left.

**Table 5.3:** Overview of the selection process where we evaluated the license, open source health, programming language and the Swedish translation.

Iteration	Evaluation item	Remaining
0	-	15
1	License, Health	5
2	Programming language	3
3	Swedish	1

The first items to be evaluated in the first iteration were the license and the community. The health and maturity were analyzed with the help of [www.OpenHub.net](http://www.OpenHub.net), an OSS

**Table 5.4:** Results table of the evaluated systems with corresponding reason to why the system was eliminated. Dashed values were not evaluated as the system had already been eliminated.

Iteration	1		2	3	
ERP System	License	Community	Language	Swedish	Reason
topenTaps	AGPL	Dead	Java	-	License
Postbooks	CPAL	Active	C++	-	License
Compiere	GPL	Company	Java	-	Health
Adempiere	GPL	Dead	Java	-	Health
FrontAccounting	GPL	Dead	PHP	-	Health
LedgerSMB	GPL	Small	Perl	-	Health
WebERP	GPL	Small	PHP	-	Health
GNU Enterprise	GPL	Dead	Python	-	Health
Dolibarr	GPL	Active	PHP	-	Functionality
ERP5	GPL	Active	Python	-	Website
Odoo	LGPL	Active	Python	-	Language
ERPNEXT	GPL	Active	Python	-	Language
OpenBravo	MPL	Active	Java	No	Locale
Apache OFBiz	Apache	Active	Java	No	Locale
iDempiere	GPL	Active	Java	Decent	

project analyzer that provides an easily navigable web interface to explore each projects' contributors, their commits and the code. Most of the excluded systems had communities with 0-3 active users, relatively few commits over the past year or incompatible licenses with Netset's current business model. Projects not listed on OpenHub or were exclusion candidates were checked against their official repository to confirm their status and to exclude errors in OpenHubs analysis. Halfway through the iteration Odoo, first marked for exclusion, changed license from AGPL to LGPL and was re-evaluated and included again for the next iteration. ERP5 was active but had a non functioning website and had to be excluded because of time restraints, a new website is available at the time of writing. Dolibarr was active but was missing accounting and had to be excluded.

After the first iteration the initial set was reduced to 5 projects. The remaining projects to choose from were Odoo, ERPNext, Apache OfBiz, OpenBravo and iDempiere. They were all deemed relatively equal from an open source perspective, each with an active community, huge deployment worldwide and compatible licenses.

In the next iteration the requested functionality identified in the group interview was investigated. Feature lists on each projects web site was used if available as well as virtual environments or online demos, if available, to assess the features. The projects all provided the requested features and were showcased to a group on Netset that decided that one written in Java would be better suited to align with their current system, leaving the latter three for consideration (the two former were in Python).

After further discussion, Netset also wanted the system in Swedish so the last iteration evaluated the internationalization aspect of each project. While all three systems had multilingual support, only iDempiere had a decent existing translation and was therefore

chosen to minimize further customization needs and costs.

### 5.1.3 System implementation

iDempiere was found to be the most suitable system and was chosen to be evaluated. Netset contracted a consultant to do the implementation with the goal of being able to read an XML file containing an order, exported from Netset's current system, and then import it into iDempiere. Due to time restraints the implementation was not entirely finished when the report was finalized. It was estimated that after the final modifications had been coded, a total of 50 hours would have been spent on the system implementation.

## 5.2 Evaluation of framework application

The following section is presented in chronological order. The evaluation session was performed as a focus group meeting with two managers from Netset and was successful in revealing important factors that had not been obvious during the group interview. The slides used in the presentation is available in Appendix B.

They were first asked about what **criteria** from the selection part of the framework, see Section 4.2, that could also have been used to evaluate systems. The Netset managers felt that having "local reference sites" was very important as it is a clear indication that the system is capable of supporting the Swedish market requirements. Due to recent events with customers they valued the "Security" aspect as important and thought it should be considered critical partially because of the increasing use of public facing web services and Netset's role as a SaaS provider. Netset felt that the support in form of "consultants" was crucial, but since the market share of iDempiere in Sweden was relatively small so was the pool of local consultants. Therefore they suggested that a deeper evaluation of the "Support" criteria would provide helpful.

Of the **CSFs**, see Table 4.1, they felt that in their case "Software customization" was very important as it is a corner stone for their ERP usage. The "use of consultant" CSF was very important to bring domain and system knowledge to Netset and to succeed with the implementation. The implementation was partly delayed because of a lack of communication between the consultant and Netset so the CSF "Managing consultants" was also considered important. Since the implementation was only partially finished when the evaluation session was held, due to time constraints, it was estimated, based on current progress and remaining work, that a whole implementation would take roughly 50 hours.

The identified **benefits** and the reasoning behind inclusion of them were then presented. As the implementation was not completed and Netset's client had not started using the system we could not derive any specific improvement to it.

The evaluation ended with a discussion about the chosen system, iDempiere. iDempiere as a system choice was deemed good since it accomplished Netset's goal of the project and fulfilled their requirements. However, it fell short on the local supply of consultants in Sweden. It was also considered a bit too big and to contain too much unwanted functionality for Netset's client, but iDempiere is built on a modular architecture and disabling or hiding less important features was discussed as a possibility.

Overall Netset was happy with outcome of the selection process and the result.





# Chapter 6

## Discussion

In this chapter we discuss the different activities, their results and implications for the thesis as well as present the different limitations and how they were dealt with.

### 6.1 Framework discussion

In this section we provide our view on the success of the framework and how our findings from the application and evaluation relate to it. This is then used to answer our research questions.

The related work that we identified contributed the key parts in the framework. The benefits part was meant to help us understand the requirements for the implementation. During the group interview the client said that they wanted to expand but that they had out grown their current solution and were in need of a new. They also noted that they wanted more and better reports, something that most ERP systems provide out of the box. Being able to identify 11 different benefits in total as seen in Table 5.2 assured us that the company was highly interested and in need of an implementation. However due to the nature of the benefits being general side effects of using any ERP systems they did not contribute anything to our system selection when we applied the framework as most, if not all, system candidates would provide similar results. We believe the benefits could have been used as a more fine grained selection criteria if the amount and complexity of criteria was more extensive than ours as we were able to filter out one ERP system given the few criteria we had. As the thesis ended before the full implementation was completed a post implementation benefit analysis was not possible to perform nor a complete measurement on the impact of the benefits as intended.

The usage of CSFs was intended to identify important areas where the handling of the associated risks could make-or-break the implementation. Once again, as the study ended before the implementation was completed it was hard to say what effect they had on the process of the client converting from one system to another. For the thesis we were supposed to integrate an ERP system with one of Netset's products. The implementation was contracted to a consultant but was severely delayed and was not completed when the report was written. During the focus group it was concluded that we had failed the CSF *management of consultants* and it was mostly due to lack of communication and could probably have been avoided. We also think that a client can be too small to be affected by the failure of addressing some of the CSF as they might only show up in large busi-

nesses or in complex installations, such as Interdepartmental communication/cooperation and Team skills and compositions. As discussed in the related work, Section 2.3, critical success factors reaffirm their importance and how critical they really are for an implementation and should not be ignored. It can be a good idea to re-evaluate them throughout the implementation to make sure nothing critical has come up as the project plan changes.

By using different selection and criteria frameworks, see Section 2.6, focusing on OSS or ERP we created a comprehensive selection part in the framework with focus on the joint combination of OSS and ERP. As Netset and their client only had five basic requirements (basic functionality, a healthy and license compatible open source project, adapted for the Swedish market and in Java) the iterative method we adapted in Section 3.2.1 was easy to apply and left us with a single system to implement. If a larger company with more requirements this might not be the simplest method as there will probably be conflicting interests between departments and usage areas on what to pick in each step. It is also more likely that all the requirements then cannot be satisfied with any available system and prioritization of what to include and what to develop will have to take place. For this scenario we think that using a more weight oriented selection process, such as the AHP in Wei, Chien, and Wang (2005), will be more useful in finding the most fitting system.

## **6.2 How relevant are the criteria included in the framework? (RQ1)**

By researching related work with focus on the areas that we tried to cover (OSS, benefits and CSFs related to ERP systems) we created a framework by combining their findings into our own framework. To confirm the importance of the criteria we developed the framework at Netset. Through interviews with a client, a CEO and CTO each with 15 or more years in the business the main criteria they sought in an ERP system were identified (License, Health, Programming language and Internationalization). During the framework application we were able to use each criterion to reduce the number of systems to choose from to finally find one system. For the implementation these were all critical: License to be allowed to use it and reduce the costs for the end client, Health is a critical part of OSS and ERP systems have a long lifetime, Programming language to be able to customize and integrate with it and Internationalization so it is usable on the Swedish market. During the evaluation Netset felt that evaluating the Security and Support infrastructure criteria should have been done too. Security was due to more clients requesting it and Support because of the very few iDempiere consultants available in Sweden. To confirm the remaining criteria and their relevance more and bigger framework applications has to take place.

## **6.3 What relevant criteria are missing from the framework? (RQ2)**

The Netset managers confirmed during the evaluation focus group that they were confident in that we had evaluated enough criteria to select a system for our case. We believe that in order to improve the framework and potentially reveal more criteria we need a bigger sample size where we apply the framework to more companies and evaluate it.

## 6.4 How can the proposed framework support identifying relevant requirements for the ERP system? (RQ3)

By using a benefits framework as proposed to identify areas where improvements can be made we believe that identifying the cause of the problem should also be possible which in turn would become a criterion. In our framework application the benefits only supplied us with information that confirmed the problems but would be solved by using an ERP in first place. The selection part of the framework on the other hand provides a list that covers a broad spectrum of criteria based on previous OSS and ERP criteria frameworks. Given the coverage of criteria and their presence in every category in the ISO-25010 standard we believe a full representation of possible requirements are covered.

## 6.5 How can the proposed framework support an SME in selecting a suitable OSS ERP system? (RQ4)

The framework is designed with two aspects in mind, helping an SME to understand their needs and dangers, and to provide criteria to evaluate. To address the first part an SME can use the benefits framework suggested to first understand what they can expect from an ERP system and then create relevant interviews or prestudies. They can also use the CSFs to understand what has to be addressed to succeed and likewise base interviews and prestudies on it. We have not been able to fully confirm the success with the first part as our case ended before the implementation was done. To the extent possible we were however successful in identifying multiple benefits including operational, managerial and strategic, as well as CSFs that should be addressed to reduce risks, such as managing consultants and software customization. The selection part however was considered a success as discussed during the evaluation, see Section 5.2, as we were able to determine a subset of criteria (license, health, programming language, internationalization) from the suggested framework to use and successfully find one system to implement.

## 6.6 Limitations

In this section we discuss the limitations of our results based on guidelines by Runeson et al. (2012) and the steps taken to mitigate these.

The **construct validity** concerns the validity of the selected research method. Given the nature of ERP systems it is infeasible to evaluate using a quantitative approach due to the high cost of implementing alternatives. Therefore we chose a qualitative approach in the form of a case study instead as a means to get a more detailed understanding of the criteria and how they affected the outcome of the framework application.

With **external validity** we mean the generalizability of our results. Due to the case study only covering one sample implementation and only involved one person for the interview it is hard to draw conclusions but we believe we can achieve analytical generalization due to Netset's leading market position and that the resulting framework and the specific criteria we found important after the evaluation session are applicable to companies in the

same situation as Netset. Netset's client that was interviewed is a very small company and it is very likely that a bigger company will have more and stricter requirements. Netset is Sweden's biggest company in e-commerce distribution with over 600 clients and thus has a good overview of what similar clients might need. However more research is required to draw bigger conclusions.

The **reliability validity** is the risk that the researchers affected the outcome of the decisions or misunderstood the data. This case study was performed by one researcher and the outcome can possibly have been negatively influenced without our awareness. To mitigate this the Netset managers were consulted in every major decision where all relevant background data was also presented. We created a transcript of the group interview with the manager representing Netset's client that was sent to the manager to ensure that we had understood the answers. No corrections were received from the client. During the final evaluation meeting with Netset's managers we realised that "suitable" in Netset's "suitable for the Swedish market" criterion had been too vague and slightly misinterpreted by the researcher. It was interpreted as being usable in Sweden and to support tax plans and local accounting rules but not necessarily with a Swedish interface which was also intended. This did not affect the final result of the selection as potential candidates would have been eliminated due to other criteria.

### 6.6.1 The selected ERP system

It is hard to say if iDempiere was the most suitable system as we only did one implementation and more might be required to quantitatively determine its accuracy. Given the nature and cost of ERP implementations this is not feasible for one company. Due to our study ending before the implementation was completed the real impact of the first part in the framework covering benefits and CSFs is not fully determined. Therefore to further improve it more studies or implementations with focus on the benefit/CSF importance as well as their contribution to the post-implementation should be performed.

As this was a qualitative case study, gathering a bigger sample size of projects would further improve the framework quality as well as conducting it in other countries where e-commerce is common.

# Chapter 7

## Conclusion

The e-commerce market shows no sign of slowing down and is one of the hottest areas for IT companies. As companies grow, so does their infrastructure and the need of proper management overview and resource analysis. These are key components in proprietary ERP system which might be too expensive for SMEs and open source alternatives can instead serve as an alternative. By lowering the costs a company can hope to stay alive for longer and can be achieved with the proper investments in IT infrastructure.

In this master's thesis we designed a framework for choosing an open source ERP system that we hope will help small companies achieve higher profitability in this highly contested area. The framework was developed and evaluated by using it in a real world scenario at Netset.

The framework is split in two parts to provide support for identifying important criteria and what items that can be evaluated when comparing systems. The first part helped us understand Netset and their client's requirements, what their main issues were and their desired outcome. The second part helped us discover a suitable system, iDempiere, which we then implemented. Except for the delays caused by the mismanagement of our consultant Netset was happy with the outcome and felt that we had achieved a good result. We believe that the framework is applicable in similar situations but it will need more applications to provide quantitative reliability.

The main contribution of this thesis is the framework that will help SMEs to understand what can and cannot be achieved by just using an OSS ERP system. The first part of the framework should help a company to identify benefits and pitfalls and to help the company to understand if it is suited for an ERP system. The second part of the framework provides system and project specific criteria to help companies evaluate different open source ERP systems. The criteria come mainly from different frameworks but also include our own findings that the others were missing.

The most relevant criteria we found were license, project health, programming language and internationalization and thanks to Netset's market presence we are confident that these criteria are useful and accurate. To identify missing criteria a larger sample size of companies that use the framework is required.

There has been a lot of research conducted on open source systems selection and on ERP system selection but there are few case studies of the two combined. To support identifying relevant requirements for the ERP system and support an SME in selecting a suitable OSS ERP system we aggregated information found in several frameworks into

our framework and also conducted a case study. This thesis will be a good start for any researcher interested in the selection process of open source ERP systems. The thesis provides ample information on the different activities that we conducted and should be adaptable and repeatable for other applications.

Our evaluation phase was meant to provide input on if the proposed framework was useful and reliable in an e-commerce aspect. With the improvements that were proposed to the CSF and selection criteria parts in the framework as described in Section 5.2 we feel this framework was successful in the limited scope it was applied to. The validity of the framework was confirmed qualitatively by the use of a case study but requires more applications to quantitatively ensure its accuracy on the full scope, including post-implementation follow up and analysis that was missing in our case. During the evaluation phase it was noted that as a company such as Netset without a lot ERP domain or system knowledge it was crucial to obtain it through the use of consultants and thus a strong support network is important as iDempiere was not widely used in Sweden.

## 7.1 Future research

For future research we propose the following questions that we have not been able to answer in this study.

1. Does the advantages outweigh the disadvantages when using a huge system, such as iDempiere, in a small company such as Netset's client?
2. How important are CSFs when applied to very small companies?
3. How important is the health criterion for open source projects and how is it measured?

The first question is one that we found to be of interest when comparing the different systems and that could pose a problem. A system like iDempiere has an enormous code base and lots of modules that can be turned on and off, but are the costs of doing so worth it or is it better to go with a smaller project that might be less well maintained?

The second question was the most troublesome to address for this thesis as we did not have time to see the implementation in a live environment.

The third question concerns the definition of a health open source project. What is the combination of users, commits and mail list activity to consider a project active or dead?

# Bibliography

- Ahmad, M Munir and Ruben Pinedo Cuenca (2013). “Critical success factors for ERP implementation in SMEs”. In: *Robotics and Computer-Integrated Manufacturing* 29 (3). Extended Papers Selected from FAIM 2011, pp. 104–111.
- Bendoly, Elliot and Frederick Kaefer (2004). “Business technology complementarities: impacts of the presence and strategic timing of ERP on B2B e-commerce technology efficiencies”. In: *Omega* 32 (5), pp. 395–405.
- Benlian, Alexander and Thomas Hess (2011). “Comparing the relative importance of evaluation criteria in proprietary and open-source enterprise application software selection – a conjoint study of ERP and Office systems”. In: *Information Systems Journal* 21 (6), pp. 503–525.
- Finney, Sherry and Martin Corbett (2007). “ERP implementation: a compilation and analysis of critical success factors”. In: *Business Process Management Journal* 13 (3), pp. 329–347.
- Herzog, Thomas (2006). “A comparison of open source ERP systems”. In: *Institute of Software Technology and Interactive Systems, Business Informatics Group, Vienna University of Technology*.  
URL: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.127.6017&rep=rep1&type=pdf>.
- Höst, Martin, Alma Oručević-Alagić, and Per Runeson (2011). “Usage of open source in commercial software product development—findings from a focus group meeting”. In: *Product-Focused Software Process Improvement*. Springer, pp. 143–155.
- Huang, Shi-Ming, I-Chu Chang, Shing-Han Li, and Ming-Tong Lin (2004). “Assessing risk in ERP projects: identify and prioritize the factors”. In: *Industrial Management & Data Systems* 104 (8), pp. 681–688.
- Johansson, B. and F. Sudzina (2008). “ERP systems and open source: an initial review and some implications for SMEs”. In: *Journal of Enterprise Information Management* 21 (6), pp. 649–658.
- Luo, Wenhong and D.M. Strong (2004). “A framework for evaluating ERP implementation choices”. In: *IEEE Transactions on Engineering Management* 51 (3), pp. 322–333.
- Nah, Fiona Fui-Hoon, Kathryn M Zuckweiler, and Janet Lee-Shang Lau (2003). “ERP implementation: chief information officers’ perceptions of critical success factors”. In: *International Journal of Human-Computer Interaction* 16 (1), pp. 5–22.
- Nah, Fiona Fui-Hoon, Janet Lee-Shang Lau, and Jinghua Kuang (2001). “Critical factors for successful implementation of enterprise systems”. In: *Business Process Management Journal* 7 (3), pp. 285–296.

- Poba-Nzaou, Placide, Louis Raymond, and Bruno Fabi (2008). "Adoption and risk of ERP systems in manufacturing SMEs: a positivist case study". In: *Business Process Management Journal* 14 (4), pp. 530–550.
- PostNord, Svensk Digital Handel, and HUI Research (2015). *E-barometern Q3, 2015*. Accessed: 2015-12-11.  
URL: <http://www.hui.se/statistik-rapporter/index-och-barometrar/e-barometern>.
- Runeson, Per and Martin Höst (2009). "Guidelines for conducting and reporting case study research in software engineering". In: *Empirical Software Engineering* 14 (2), pp. 131–164.
- Runeson, Per, Martin Host, Austen Rainer, and Bjorn Regnell (2012). *Case study research in software engineering: Guidelines and examples*. John Wiley & Sons.
- Scott, Judy (1999). "The FoxMeyer Drugs' bankruptcy: Was it a failure of ERP?" In: *Americas Conference on Information Systems (AMCIS) 1999 Proceedings*. Paper 80.
- Shang, Shari and Peter B Seddon (2000). "A comprehensive framework for classifying the benefits of ERP systems". In: *Americas Conference on Information Systems (AMCIS) 2000 proceedings*. Paper 39.
- Staehr, Lorraine (2007). "Assessing business benefits from ERP systems: an improved ERP benefits framework". In: *International Conference on Information Systems (ICIS) 2007 Proceedings*. Paper 36.
- Sumner, Mary (2000). "Risk factors in enterprise-wide/ERP projects". In: *Journal of information technology* 15 (4), pp. 317–327.
- Wang, Shouhong and Hai Wang (2014). "A Survey of Open Source Enterprise Resource Planning (ERP) Systems." In: *International Journal of Business & Information* 9 (1), pp. 1–28.
- Wei, Chun-Chin, Chen-Fu Chien, and Mao-Jiun J. Wang (2005). "An AHP-based approach to ERP system selection". In: *International Journal of Production Economics* 96 (1), pp. 47–62.



# Appendices



# Appendix A

## Interview transcript

A–Berätta om dig själv och ditt företag och vad du håller på med.

L–Jag är en av delägarna i why solutions och vi är en infrastrukturleverantör där vi har både produkter och tjänster i vårt erbjudande. När det gäller tjänster är det både funktionslösningar och blandade produkter och tjänster. Jag jobbar som säljare, jag sitter idag och hjälper till med fakturering från nettailer där har vi pratat om att bygga en brygga till visma, vi hyr in en kille som sitter med det. Det här kanske inte behövs med en sån här lösning och det tycker vi är väldigt intressant.

A–Vilken är er typiska målgrupp?

L–50–500 användare, små medelstora företag, inte riktigt där än men landsting och försäkringskassan.

J–kompletterande fråga om produktförsörjning i offentligsektor?

L–nej inte så mycket, målet är det men inte idag.

A–Hur ser företagstrukturen ut, anställda samt roller?

L–9anställda, sälj och konsulter, 1.5säljare resten konsult

A–hur länge har ni varit i branshen?

L–företaget har funnits i 2år, jag har varit med i branschen sen 92, de flesta är ifrån 90talet.

A–beskriv arbetsprocessen från det att en kund tar kontakt med er tills att ni får betalt?

L–Det är olika, vi har befintliga kunder och då handlar det om förvaltning, dels har vi nya kunder. Tittar vi på nya kunder så handlar det om att hitta en kund och in i

vårat säljssystem som är relativt enkelt idag och sen hitta en säljmöjlighet

J–Vad använder ni för säljssystem i mellansteget?

L–Lite enklare , mycket excel.

J–använder ni offertmodulen i nettailer?

L–Ja det gör vi , har använt den tidigare och den köper vi till extra

A–Vilken del av arbetsprocessen tar längst tid och ger minst?

L–bokföringsbiten är outsourcad till en ekonom men det vi har problem med idag är dubbelstansning av fakturor från webshop till visma .

A–Vilka program använder ni?

L–visma , nettailer , excel

A–Vilka mål ser du med att integrera detta i ett system?

L–Precis som du säger så får vi in det i ett system , gärna med tidsrapportering . Våra konsulter tidsrapporterar i excel sen i nettailer där vi fakturerar ifrån , sen i visma . Hade vi kunnat skippa steget från nettailer till visma vore det fantastiskt , antingen en brygga eller ett integrerat system .

A–Vilken ytterligare funktionalitet söker ni , ifall ni går över till ett nytt system?

L–tidrapportering , lager (dels dist , eget och ett kundunikt ) , rapporter(ekonomiska , försäljningsrapporter nedbrutna på lite olika nivåer(typ av leverantörer , olika produktområden)), sen är det som vanligt fakturering , kreditering , hantering av olika valutor , kundreskontra , kundsaldo , kreditspärr , påminnelsefaktura med någon typ av kravhantering , leverantörsreskontra , attestering av leverantörs fakturor . Mycket finns i visma redan men tidrapporteringen hade varit jättebra .

J–produktbegreppet finns inte i visma idag?

L–det stämmer

A–Finns det andra funktionella krav ifrån andra roller?

L–tidsrapportering för konsulter , vår ekonomikille kanske har fler krav , det kan jag inte svara på . Det ska vara enkelt och ge en bra överblick .

J–Det finns 2 saker som jag saknar i din listning ,

---

lönesystem?

L-Det ligger på ett separat system, visma agda, inte lika viktigt att få in, eller kanske.

J-Har ni ett ticket/ärendehantering idag?

L-Jag tror att vi har, men det är manuellhantering, kan vara intressant. Det som också vore intressant är en timbank där man kan göra avrop. Ett konto där man kan köpa ett antal timmar och utnyttja dem efterhand.

A-Hur mycket av er tid lägger ni på andra uppgifter än er kärnverksamhet, t ex att tidsrapportera?

L-För mycket, tidsrapportering flera gånger och sen ska det över till adminstationen, det blir för mycket.

A-Ser ni några risker med att gå över till ett nytt system?

L-Vi får ihop det till ett system, risktagandet blir väldigt litet eftersom det bara kan bli bättre.

A-Anpassar ni helst ERP till process eller processen till ERP, men som det låter så är ni väldigt glada i att få bort alla tidigare system?

L-ja, eftersom vi är så små och unga körde vi på med excel från början för att det fungerade men nu ska vi ha in 2 till måste vi ha ett tidsrapporteringsystem.

A-Finns det något system ni är i behov av att integrera med sen tidigare?

L-Vet inte, ekonomikillen är kanske i behov av en brygga till visma ifall han vill fortsätta i det.

A-Har ni någon förväntat livslängd på ett nytt system?

L-Nej, inget som vi tänkt på.

A-Hur ser ni på en webbaserad lösning framför ett separat?

L-Ett system, absolut.



# **Appendix B**

## **Evaluation session**

# Utvärdering

Vad gick bra?  
 Vad gick dåligt?  
 Gjorde vi rätt val?  
 Hur kan vi välja bättre?

## Netset

- Vad behöver dom?
- Open source
  - Kompatibel licens
  - Senare även
  - Java
  - Svenskt interface

## Client

- Vad behöver dom?
- Kontohantering
  - Olika lager
  - Tidsrapportering
  - Rapporter
  - Valutor
  - Ett system

## Process

Iteration	0	1	2	3
Evaluation item	-	License, Health	Programming language, Swedish locale	
Remaining	15	5	3	1

ERP System	License	Community	Language	Swedish	Reason
openTaps	AGPL	Dead	Java	-	License
Proteobooks	CPAL	Active	C++	-	Health
Compiere	GPL	Company	Java	-	Health
FrontAccounting	GPL	Dead	PHP	-	Health
LegendsMB	GPL	Small	Perl	-	Health
WebERP	GPL	Small	PHP	-	Health
GNU Enterprise	GPL	Dead	Python	-	Health
Dolibarr	GPL	Active	PHP	-	Functionality
ERP5	GPL	Active	Python	-	Website
ERPNext	GPL	Active	Python	-	Language
OpenErovo	MPL	Active	Python	-	Locale
Apache OFBiz	Apache	Active	Java	No	Locale
Idempiere	GPL	Active	Java	Decent	Locale

Var kraven tillräckliga?  
 Vad borde vi mer ha utvärderat?

## Critical Success Factors

Hur viktiga är de för vårt case och vad bidrar de med?  
 Vilka vore viktiga fall i tog en större kund?

Organizational factors	Neutral factors	Operational factors
Formalised project plan/schedule	Interdepartmental cooperation	Good project scope management
Project management	Software customisation	Management expectations
Cultural change/political issues		Steering committee
Business process reengineering(BPR)		Adequate resources
Experienced project manager-leadership		Trust between partners
Project champion role		Empowered decision makers
Interdepartmental communication		Vendor's tool
Project team composition/team skills		Managing consultants
Management support and commitment		Software configuration
Appropriate use of consultants		Education on new business processes
Reduced troubleshooting-project risk		Vendor support
Training on software		Data analysis and conversion
Formal methodology-ERP implementation strategy		
Carefully defined information and system requirements		
Adequate ERP software selection		
Clear goals and objectives		

## Integrationen

Faktorer som drastiskt påverkar chansen att lyckas med ERP implementationer

Organizational factors	Neutral factors	Operational factors
Formalised project plan/schedule	Interdepartmental cooperation	Good project scope management
Project management	Software customisation	Management expectations
Cultural change/political issues		Steering committee
Business process reengineering(BPR)		Adequate resources
Experienced project manager-leadership		Trust between partners
Project champion role		Empowered decision makers
Interdepartmental communication		Vendor's tool
Project team composition/team skills		Managing consultants
Management support and commitment		Software configuration
Appropriate use of consultants		Education on new business processes
Reduced troubleshooting-project risk		Vendor support
Training on software		Data analysis and conversion
Formal methodology-ERP implementation strategy		
Carefully defined information and system requirements		
Adequate ERP software selection		
Clear goals and objectives		

## Benefits framework

Tänkt att hjälpa oss identifiera fördelar med ERP och motiv för att använda det

Kan under en implementation användas för att motivera involverade att det kommer bli bättre, även om tröskeln kan vara hög

Kan hjälpa till vid en utvärdering efter en implementation för att hitta förbättrade områden

Dimension	Sub dimensions
1. Operational	1.1 Cost reduction 1.2 Cycle time reduction 1.3 Productivity improvement 1.4 Quality improvement 1.5 Customer services improvement 1.6 User accountability
2. Managerial	2.1 Better resource management 2.2 Better decision making and planning 2.3 Better performance control
3. Strategie	3.1 Supports current and future business growth plan 3.2 Supports business model innovation 3.3 Supports cost leadership 3.4 Supports product and service differentiation 3.5 Enables external linkages 3.6 Enables world wide expansion
4. IT Infrastructure	4.1 Increased business flexibility 4.2 IT costs reduction 4.3 Increased IT infrastructure capability
5. Organizational	5.1 Supports business organizational changes 5.2 Improves training and increases employee skills 5.3 Empowerment 5.4 Changed culture with a common vision 5.5 Changed employee behaviour with a shifted focus 5.6 Better employee morale and satisfaction 5.7 Standardization





**EXAMENSARBETE** A Framework for Selecting an ERP Open Source System: A Case Study**STUDENT** Alexander Magnusson**HANDLEDARE** Elizabeth Bjarnason (LTH), Björn Olsson (Netset)**EXAMINATOR** Martin Höst (LTH)

# Hur utvärderar man affärssystem för mindre företag?

---

POPULÄRVETENSKAPLIG SAMMANFATTNING **Alexander Magnusson**

---

Affärssystem är numera en kritisk del av verksamheten i större företag och de bidrar till ökad lönsamhet och processkontroll. Gemensamt för de största aktörerna på marknaden, Microsoft, Oracle samt SAP är att de är proprietära och kostar väldigt mycket att använda, vilket utesluter mindre företag från att använda dem. Vi sökte lösningen på detta problem genom att skapa ett ramverk och sedan utvärdera för och nackdelar i olika system byggda på öppen källkod.

För att lösa vårt problem designade vi ett ramverk för att på ett lätt sätt analysera och förstå de viktigaste faktorerna för att lyckas med att integrera affärssystem byggda på öppen källkod i mindre företag. Det finns flera fördelar och nackdelar med att använda öppen källkod. Den största fördelen i vårt fall är att det inte finns licenskostnader utan det är nästan bara implementations och underhållskostnader, något som även återfinns i proprietära lösningar. En annan fördel är att källkoden finns tillgänglig vilket gör produkten mer anpassningsbar till existerande system, dessa behöver alltså inte anpassas till ett specifikt gränssnitt för att stödja det proprietära system man annars kanske hade valt, utan man kan istället anpassa både affärssystemet och de existerande systemen vilket är något som bidrar till reducerade kostnader och implementationstider.

Det finns såklart även nackdelar med öppen källkod, ibland finns det inget företag som står bakom koden eller supporten vilket för över ansvaret till utvecklarna eller företaget som vill använda det. En annan nackdel är att det är lättare för andra att hitta buggar i systemet som sedan kan använ-

das i kriminella syften.

Företaget Netset där vi gjorde examensarbetet har en väletablerad webbshop som andra företag, tillika återförsäljare, utnyttjar för att förenkla kopplingen mellan distributörer och konsumenter. I dags läget finns det inte något affärssystem som sköter bokföringen efter att man lagt en order i webbshoppen och det var vår uppgift att ta fram ett passande system. Återförsäljarnas storlek varierar men de mindre har vanligtvis inte råd med ett fullskaligt affärssystem och därav anledningen till att titta på de som är byggda på öppen källkod.

Vi utgick ifrån 15 olika affärssystem och använde sedan vårt ramverk för att sälla ut ett som passade kriterierna som Netset och en av deras återförsäljare hade satt upp. Vi försökte sedan att koppla ihop webbshoppen med systemet vi kom fram till men stötte tyvärr på problem så kopplingen hann aldrig bli klar innan tiden för exjobbet gick ut. Vi hade dock tillräckligt mycket data för att göra en preliminär utvärdering av ramverket som visade på att våra kriterier skulle kunna fungera generellt för dagens e-handelsplattformar i behov av affärssystem.