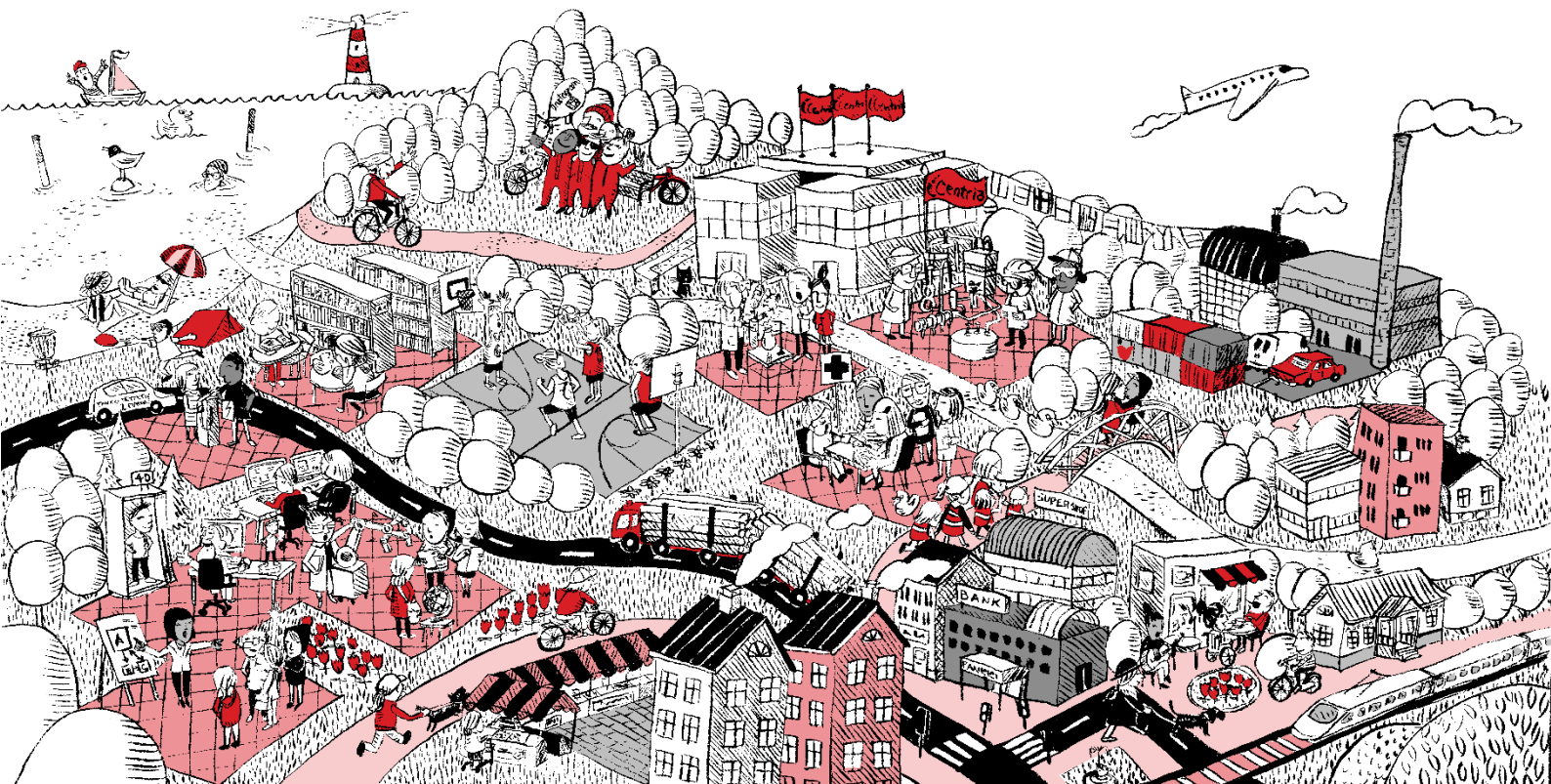Kati Siponen

TAKING ERP TO THE NEXT LEVEL WITH LEAN

Thesis
CENTRIA UNIVERSITY OF APPLIED SCIENCES
International Business Management
June 2021

ABSTRACT

Centria University of Applied Sciences	Date June 2021	Author Kati Siponen
Degree programme International Business Management		
Name of thesis TAKING ERP TO THE NEXT LEVEL WITH LEAN		
Instructor	**Pages** 45	
Supervisor Janne Peltoniemi		

The aim of this thesis was to develop the current enterprise resource planning system of two Finnish companies to be more efficient.

The theoretical framework presents enterprise resource planning, and the main Lean process principles. For several companies, the ERP system upgrade will be up-to-date in the coming years. BearingPoint research study showed the updating needs of Finnish companies' ERP systems. In addition to this, we went deeper into these case studies; what kind of problems companies have with their ERP system and how we can improve the system and develop people's working practices in the office. Lean methods were used to identify wastage and find opportunities for how Lean is suitable for office development.

The results showed that the ERP upgrade project and Lean accounting have been found to be useful, clear, and profitable. Automation has a big role in reducing unnecessary activities such as manual booking. Automation releases resources for analysis and data verification. Continuous improvement is an ongoing process and a part of the company's activities. Research shows that small and medium size companies need external help to improve their ERP systems to get more data to help management. This is something that should be paid attention to. Small and medium-sized companies do not have their own expertise and an external accounting firm or consultant feels distant. Do companies know how to take full advantage of the opportunities that ERP brings? ERP may be old or not used. Business intelligence reporting is the latest tool for creating various queries and reports from master data. An ERP system helps a company with basic operations, but various utilities have come to support management decision-making.

Key words
ERP, Lean management, Lemonsoft, Visma L7

CONCEPT DEFINITIONS

BI

Business intelligence

ERP

Enterprise resource planning system

HR

Human resource

L7

Enterprise resource planning system offered by Visma

Lemonsoft

Enterprise resource planning system offered by Lemonsoft

LTR

Web-based BI reporting tool that is integrated to Visma's L7 ERP system

ABSTRACT
CONCEPT DEFINITIONS
CONTENTS

1 INTRODUCTION

The heart of a manufacturing company is a well-functioning enterprise resource plan (ERP). How much of the system is unused due to incompetence or lack of time? How much can we benefit from the Lean ideology? The ERP system may have been chosen a long time ago, the company may have grown, and the operations may have changed since then. Does the ERP still serve the company? Is the supplier further developing it? Can the system be integrated with other systems if necessary? These are common questions in a Finnish industrial company. I have worked in an accounting firm, as well as a software company as the ERP product manager. I have seen companies agonize with a system, management does not get the information they want, or it will be too late. They do not know how to use the system, or they think the software does not serve their needs.

Lean is a topical topic that is used as part of office work and no longer just in a production environment. This thesis is presenting a case study of how two companies, in different industries were able to improve the use of their ERP system through a development project with a dedicated person, and with the Lean idea. For the theoretical part I will open the ERP system, and orient to Lean management, knowledge management, and digitalization.

What kind of problems do companies have with their ERP systems and how are they solved? How much time is wasted in the office according to the Lean ideology? How to develop the system so that it serves the management of the company, but also the employees? Often employees use the ERP system as they have been taught, and they cannot say what might be a waste of time. Management would like more information but does not know whether it can be obtained from the program or whether software development is expensive.

Company X uses Visma L7 as an ERP system and Company Y uses Lemonsoft. Both companies had been using their ERP system for a long time and it worked, but the management was not quite satisfied with it. The employees filled in the time sheets by hand or Excel, and payroll clerk fed them into the system. Accounting was done in a different system and there was a lot of manual work. Part of the system was not used.

Both considered replacing their ERP system. Because ERP is such a big part of a company's operations, there is a risk of changing it, especially if the program currently serves production. Eventually came the

idea of a year-long project of what I could do for them to improve the ERP system to serve the company better. Including the accounting service was part of the project. In many cases, the company does not have its own expertise in software and the external accounting firm does not know or is too far from the core business of the client company. This is what led to this development project. During the year, existing systems were developed so that all possible benefits of the system were obtained, and it was clarified which functions were used and which not needed.

The purpose of this thesis is to differentiate ways to improve case study companies' processes with modern methods. In this project we will switch all accounting to the same ERP system and explore the possibilities. How to improve the systems use with Lean methods. We want to improve knowledge management and increase digitalization across the enterprise. Although research companies work with different industries and use different ERP systems, are the problems similar and can they be solved in the same ways?

2 ENTERPRISE RESOURCE PLANNING

Enterprise resource planning (ERP) systems are core software programs, which are used to integrate and coordinate information through every business area. ERP programs use a common database and management reporting tools to help organizations manage company-wide business processes. ERP connects all business processes in a company; manufacturing, sales, marketing, logistics and finance. A business process is a collection of activities that takes several inputs and creates output like reports or forecasts that gives value to the customer. Customer can be an external customer or a partner, but customer can also be internal such as a colleague or another department. (Monk & Wagner 2013, 1-3.) American Production and Inventory Control Society has defined ERP systems in 2001 as "a method for the effective planning and controlling of all the resources needed to take, make, ship and account for customer orders in a manufacturing, distribution or service company" (Rashid, Hossain & Patrick 2002). In Davenport's words: Enterprise systems appear to be a dream come true. These commercial software packages promise the seamless integration of all the information flowing through a company—financial and accounting information, human resource information, supply chain information, and customer information. (Davenport 1998.)

Roots of ERP systems come from basic needs. During the 1960s and 1970s manufacturing software advanced to material requirement planning software (MRP). It was based on production-scheduling which gave information for the plant manager to plan production by moving backward from the sales forecast to raw material needs. The 1990s were a hard-economic time that drove ERP development forward. Many companies had to downsize and reorganize at that time. In hard times management is difficult if information doesn't flow. It is expensive for production and customers are more likely unhappy if delivery dates are late. Michael Hammer published the book Reengineering the Corporation: A Manifesto for Business Revolution (1993). This kind of books led managers to begin to view ERP software as a solution to business problems. German company IMB made base to the ERP software already in 1972, System Analysis and Program Development (SAP). Five founders wanted data to be available in real time on screen. It took almost 20 years to achieve those goals. Software was made based on modules that are individual programs, that can be purchased, installed and run separately, although modules use the same database. SAP is still the market leader in ERP software sales. (Monk & Wagner 2013, 22-25.) Rashid, Hossain & Patrick summarizes the historical events related with ERP (FIGURE 1).

FIGURE 1. ERP evolution (Rashid, Hossain & Patrick 2002)

2.1 ERP markets

The market leader in enterprise application software, SAP, has over 400 000 customers and 102 400 employees (SAP Company Information 2021). SAP ERP has been made for large companies. The system deployment can take years and the process can cost 100 million USD (Monk & Wagner 2013, 33). International Data Corporation report from 2019 shows that worldwide revenue in the enterprise applications market grew 7.5% year over year to $224.6 billion. The top 5 enterprise applications vendors in 2019 were SAP (7.7% revenue share), Oracle (5.1% share), Salesforce (5.0% share), Intuit (3.0% share), and Microsoft (2.1% share). (Shirer 2020.)

Several researchers have measured and discussed the introduction of ERP in small and medium-sized enterprises. Gustaf Juell-Skielse refers to Mabert, Soni and Venkataramanan [2000] report, when ERP adoption level was 44% among U.S. manufacturing firms. A few years later, Olhager and Selldin [2000] reported that 75% of the Swedish manufacturing companies had installed an ERP system. Van Everdingen, van Hillegersberg and Waarts [2000] discovered that the Scandinavian countries were far ahead in adopting ERP compared to other EU countries. (Juell-Skielse 2006.) About a dozen ERP systems are available in Finland for medium-sized companies. Some of the systems are industry specific and some are very flexible that can be customized according to the needs of the company. (Lahti & Salminen 2014.)

2.2   ERP modules

SAP ERP has made modules that are used in the same way in different enterprise software.

1. SD – Sales and Distribution module records sales orders and scheduled deliveries. Along with information about the customer, such as pricing, shipping details, and payment terms.
2. MM – Material Management module manages the acquisition of raw material from supplier, material inventory, and product work-in-progress goods to shipping of finished goods to the customer.
3. PP – Production Planning module maintains production information. This module is for planning and scheduled production.
4. QM – Quality Management module plans and records quality control activities.
5. PM – Plant Management module manages maintenance resources and planning.
6. AM – Asset Management module includes company's fixed-assets.
7. HR – Human Resources module includes employee recruiting, hiring, training and payroll.
8. PS – Project System module facilitates the planning and monitoring costs for new research development and marketing.
9. FI – Financial Accounting module records all transactions for external accounting.
10. CO – Controlling module is for internal accounting, which gives more details and supports managerial decision making.

Financial modules (9-10) are specific because all the other modules give information to these. Because all modules are integrated, all the information is valid in real time, which then makes decision making faster in all areas. (Monk & Wagner 2013, 29-31.)

Juell-Skielse's thesis from 2006 shows how much small and medium sized companies in Kista Science City use different ERP modules. Kista Science City is the leading ICT cluster in Europe. City consists of a range of different companies, both big and small, but often with a strong connection to the ICT industry. (Kista 2021.) 95% use financial control and accounting modules, so based on this, one could say that companies often start with finance modules (TABLE 1). Juell-Skielse compared the study results with two previous studies; study A, Mabert et al. shows U.S. result from 2000 and study B shows Olhager's and Selldin's study from 2003. More than 70% of the companies used the ERP package in three or more functional areas. On a functional level, there is a big difference between Kista Science City and the results in study B, where seven modules were used by more than 80% of the companies.

Thus, the companies in study B used more of the functionalities in their ERP packages. The companies in this study are smaller than the companies in study A and B, which also can explain the lower level of adoption. (Juell-Skielse 2006, 17-18.)

TABLE 1. Use of ERP functionality/modules by small and medium sized companies in Kista Science City (Juell-Skielse 2006, 18)

Functionality	Kista Science City (%)	Study B (%)	Study A (%)
Financial control and accounting[5]	95	84,8	86,5
Order entry	71	92,4	87,7
Purchasing	62	93,0	86,9
Distribution/logistics	36	84,8	75,4
Human Resources	31	57,6	44,6
Production planning	31	90,5	88,5
Marketing and sales[6]	26	N/A	N/A
Maintenance	14	44,3	40,8
R&D management	2	34,2	30,8
Other	7	N/A	9,2

2.3 ERP benefits

ERP is an expensive investment but with right pre-implementation planning it will give lots of positive effects. Some benefits will show sooner and some after a long period of time. For many companies, it takes years before they take full advantage of the variety of capabilities of their ERP system. According to Monk and Wagner, ERP contributes to things that can be considered a return on investment:

- When data is stored in one place and moves in different modules, it reduces unnecessary work
- Speeds up data processing
- Improves customer satisfaction and staff satisfaction
- Enables competitiveness
- Reduces costs
- Real-time data improves decision making and increases sales

(Monk & Wagner 2013, 39).

With reference to Juell-Skielse's thesis, studies of Mabert et al. (2000), and Olhager and Selldin (2003) list these ERP benefits from two perspectives: "ERP performance outcomes" and "areas benefiting from ERP" (TABLE 2).

TABLE 2. List of performance outcomes and areas benefiting from ERP (Juell-Skielse 2006, 23)

ERP Performance Outcomes	Areas Benefiting from ERP
Quickened information response time	Availability of information
Increased interaction across the enterprise	Integration of business operations/processes
Improved order management/order cycle	Quality of information
Decreased financial close cycle	Inventory management
Improved interaction with customers	Financial management
Improved on-time delivery	Supplier management/ procurement
Improved interaction with suppliers	Customer responsiveness/flexibility
Lowered inventory levels	Decreased information technology costs
Improved cash management	Personnel management
Reduced direct operating costs	

Juell-Skielse compared the results of his studies, which were very close to the same as the other studies. Information availability is the most important in all studies in different countries and over time. Quality information and financial information are also important issues (TABLE 3). (Juell-Skielse 2006, 26).

TABLE 3. The effect of ERP on benefiting areas, compared to preceding studies. Scale 1–5: "not at all" to "a great extent" (Juell-Skielse 2006, 26)

Area benefiting from ERP	Kista Science City (average)	Study A (average)	Study B (average)
Availability of information	3,8	3,77	3,74
Quality of information	3,4	3,37	3,31
Financial management	3,4	3,11	2,98
Integration of business operations/processes	3,0	3,61	3,42
Customer responsiveness/flexibility	3,0	2,67	2,95
Supplier management/procurement	2,8	2,99	2,94
Inventory management	2,7	3,18	2,99
Personnel management	2,5	1,94	2,06
Decreased information technology costs	2,2	2,06	2,05

2.4 ERP deployment

ERP system deployment projects may take from a couple of months to a couple of years. (Rohit & Khan 2020 [Sankar &Rau 2006].) The exact time depends upon the organization's size, data size, user count, and resources. (Rohit & Khan 2020 [Pelphrey 2015].) Sometimes companies aren't ready for ERP systems and the project fails because the management must fully understand the business processes. Before ERP projects start, companies need to be prepared to change business processes to avoid huge costs for software and consulting fees. Pre-design work and specifications are important. When the ERP system is introduced and data have been stored, a possible reconfiguration will take time and costs are more than expected. (Monk & Wagner 2013, 37-39.)

Why so many ERP projects fail, or suffer from delays? It must be remembered that cost overages and delays are also problems in other IT software projects, not only in ERP projects. However, the company must be prepared for change. Advance planning must be done precisely, and managers must commit to the project. A company has three times the chance of success if they spend up to 17 percent of the project budget on management and employee ERP training. Employees should receive comprehensive training on how to use the system so that it is used properly, and they understand the benefits to the company. (Monk & Wagner 2013, 40-41). In Ly's expert tips for ERP implementation practises, Jennifer Gostisha also thinks companies should invest in training and change management. Change management is crucial to the success of an ERP, new processes and job roles should be introduced to employees over a period of time so that they have time to accept these steps. It's important to engage employees and training should concentrate on business workflows and how these changes affect job roles and the people who do the work. (Ly 2020.)

In Tivi magazine's article Kimmo Järvikangas, Director of BearingPoint's ERP Advisory business, explains why ERP projects often fail, and why they are perceived as difficult. Many Finnish companies have up to 20-year-old ERP systems that no longer correspond to today's technical features. The systems will run out of software support services, for example, the software support period of the old SAP system will end in 2027. Several systems no longer correspond to the company's current business. New systems will come alongside acquisitions, but they will no longer serve the new current business model. Systems are adapted so much to the needs of the company that they are difficult to support and develop. According to Järvikangas, the failures of ERP projects are often due to poor management. Studies show that up to 70% of failures are due to poor change management. Nowadays ERP system projects are in the business development projects and not just the IT department. That is why the company's management must

be strongly involved in the ERP project. External consultants can help the client with change management, but they cannot do it on behalf of the managers. Successful ERP system reform requires a good business case in Järvikangas' opinion. The project must be to get the right executives and expert advisors to them. Key personnel should have the power to make decisions and be supported by the management. The project should be the most important task of these people. The success of an ERP project requires absolute commitment. (Kallio 2021.) In Ly's article Andrew Bolivar has similar ideas as Järvikangas. He believes companies should focus on what resources are required to succeed and on time, an experienced project manager or partner can help expand this internal work. The most important measure of success is the visible support of management and the dedication of the necessary resources to meet the requirements of the transition to a new or updated ERP solution. Also, this ERP implementation article emphasizes the use of external ERP implementation experts, which gives the project a better chance of success. The consultant should have a proven implementation method and experience in the company's industry. The goal is to reduce the risk of failure at all stages of the process. (Ly 2020.)

2.5   ERP development

Halttunen, Lehtinen and Lyytinen (2001) conducted a study on the implementation of ERP systems for small and medium enterprises. The development of information systems consists of the development of individual information systems and the development of the overall architecture. Systems development is divided into two different approaches: ISP (Information Systems Planning) and ISD (Information Systems Design). These methods are too complex and heavy in small and medium-sized enterprises. They need to be adapted to the situation to benefit from the development; simple methods are suitable for small businesses. Small and medium-sized enterprises benefit from formal method descriptions. Once the method descriptions have been done well, the elimination of duplication and effective implementation of the plans is best achieved. Systems development requires close cooperation between the system developer and the companies. In cooperation possible errors are detected in time, and operating methods can be changed to better suit the intended use. (Halttunen, Lehtinen & Lyytinen 2001, 165-166.)

Developing an ERP system for companies of this size is cumbersome due to limited resources compared to large companies. However, operations of small and medium-sized enterprises are more manageable. When developing an ERP system, it must be remembered that the business has to be understood holisti-

cally first. Otherwise, building the system will not benefit the company. (Halttunen, Lehtinen & Lyytinen 2001, 158-159.) In small and medium-sized enterprises, development is often hampered by a lack of resources. There is not enough time, money, or the company does not have its own experts to learn new methods. If a company does not have the resources, deployment can be delayed, which causes bad experiences and can even prevent future use. Entrepreneurs should see deployment and learning as an investment that will benefit the company in the future. (Halttunen, Lehtinen & Lyytinen 2001, 167.)

According to the ERP Strategy 2020 survey, as many as a third of the respondents will start an ERP development project this year. The questionnaire was answered by 24 Finnish enterprises (turnover approximately 300 M€ or above) both publicly listed and privately owned. All respondents have identified the need for ERP renewal, and more than half already have a business case. Almost all respondents have already started the ERP renewal process and the majority will follow in the coming 2-3 years. More than 90% of the respondents have a renewal plan and the rest have this on their to-do list. An ERP renewal project will be an expensive investment, and that's why companies need a well-designed plan for it. Companies under the 500 M€ category will invest 0-10 M€ for the project, which is a large investment. Figure 2 shows how much different sized companies are planning to invest to the ERP project. It is easy to see how expensive the investments in ERP deployments and renewals are. (BearingPoint 2021, 10-12.)
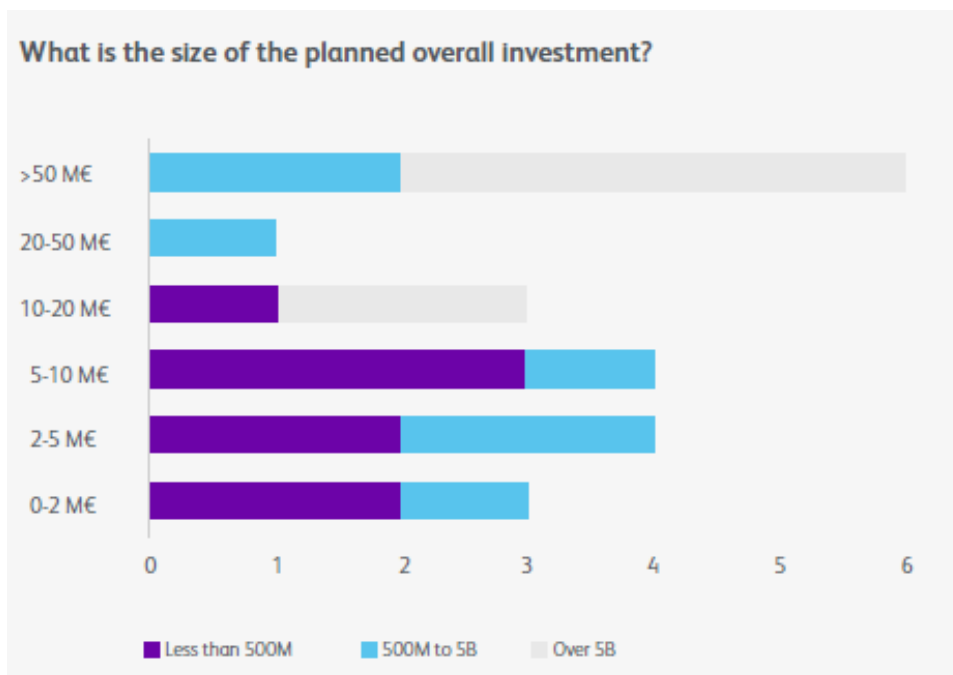

FIGURE 2. Planned investment (BearingPoint 2021, 12)

The ERP renewal projects are planned because of three main factors. Several companies have software that is over 15 years old and considering the duration of an ERP system's lifecycle this will be the main reason for renewal (FIGURE 3). The query in the figure shows that technical lifecycle, lack of development or support, and insufficient technical architecture are the biggest issues in companies. (Bearing-Point 2021, 13.) The IT industry has evolved so much in recent decades that this result is not very surprising.

What are the key business/technical drivers for ERP solution renewal?

	Technical lifecycle reaching end
	Targeted business model not supported
	Unoptimal technical architecture currently
	Need of data to steer business
	Incomplete data in current ERP
	Need real-time data from system
	Need faster response time for business
	Current maintenance costs too high

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Less than 500M   ■ 500M to 5B   ☐ Over 5B
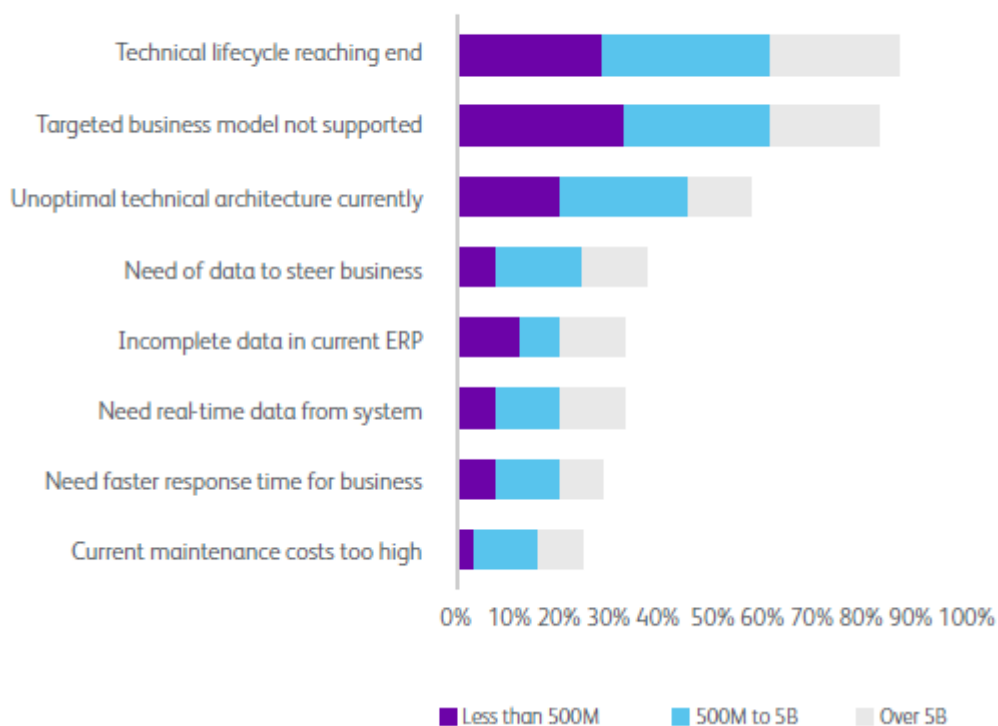
FIGURE 3. Business/technical drivers for ERP solution renewal (BearingPoint 2021, 13)

Hallikainen, Laukkanen & Sarpola have the same kind of survey from 2014, where they collected research from 44 Finnish companies' ERP adoptions. Like BearingPoint's survey this research had the same kinds of reasons. For approximately one third of the companies, the three most important reasons for the ERP adoption were technological reasons. (Hallikainen, Laukkanen & Sarpola 2014.)

ERP system renewal will provide two types of benefits: business related and technical. Business benefits are achieved when the company's processes are harmonized, which increases the consistency of the pro-

cesses. For almost 70% of the respondents the goal was precisely the harmonization of processes (FIG-URE 4). Harmonized processes are a way to increase business efficiency but also necessary for efficient ERP implementation. In addition, they also allow for more efficient control and more agility of the system. More than 50% of the companies' intentions are to enable new business or operating models with ERP renewal. Companies target to build new ERPs that are more agile and able to adapt to future changes in business models and avoid the current situation. Smaller companies are more likely interested in SaaS opportunity. (BearingPoint 2021, 14.)
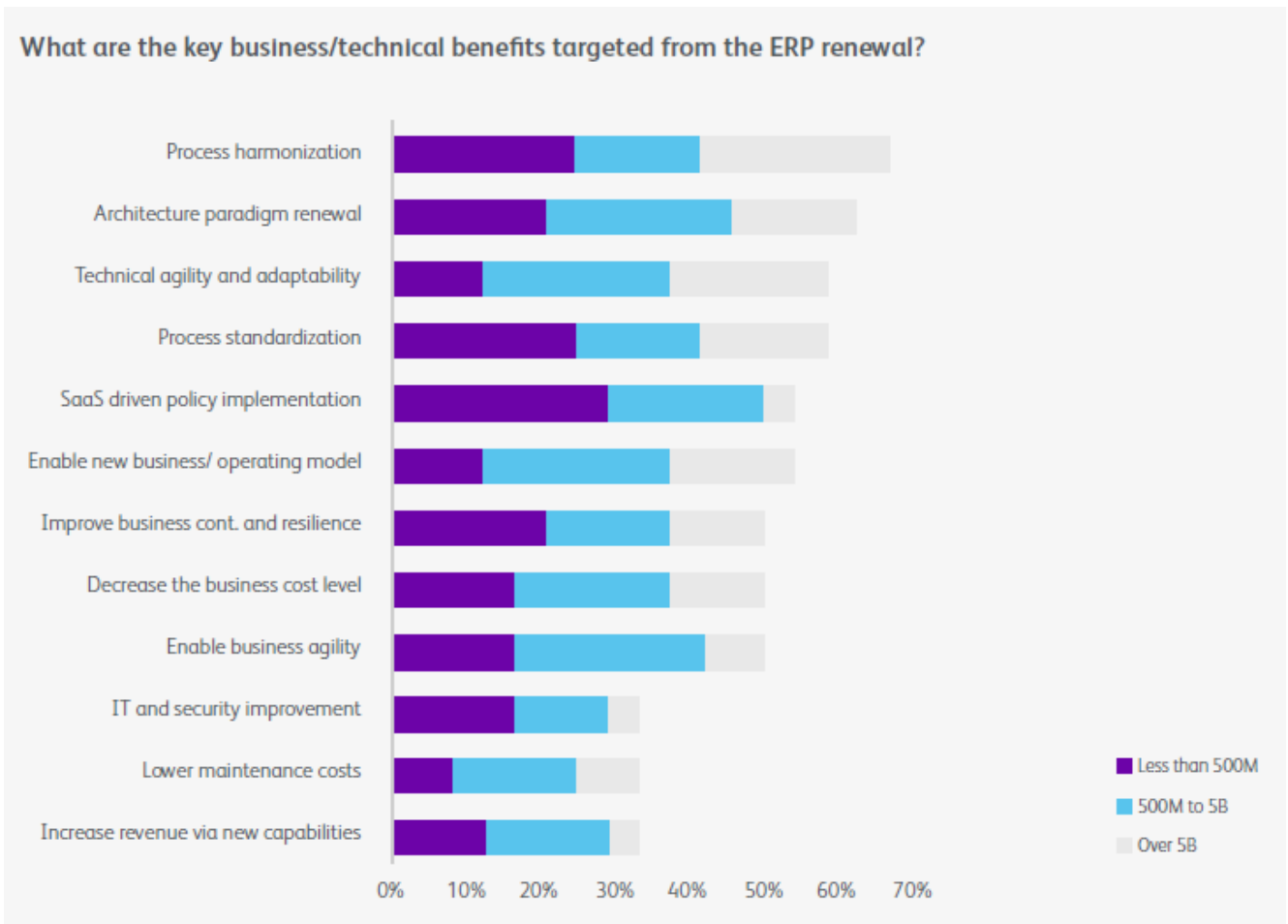
FIGURE 4. Business/technical benefit from the ERP renewal (BearingPoint 2021, 14)

The study also found out which modules companies are moving to the new system. Financing, sourcing, and procurement as well as the supply chain are the most common areas of ERP (FIGURE 5). Funding is not on the list of benefits that companies expect, but funding is part of every ERP module and therefore plays a big role in the migration. It must be remembered that service and manufacturing companies are different, and size of the companies will affect how many domains they are planning to transfer. Sales

and marketing are more important to service companies, and supply chain is the main thing to the man-ufactory industry. (BearingPoint 2021, 15.)
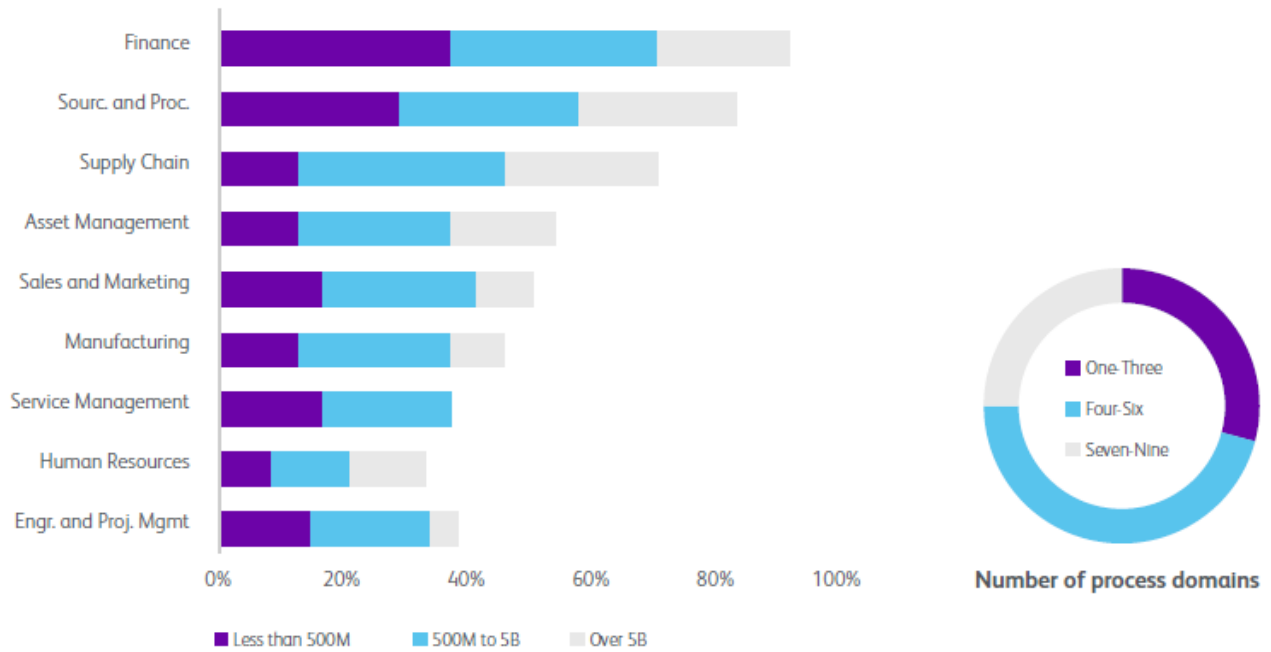

FIGURE 5. Planned process domains in the new platform (BearingPoint 2021, 15)

Based on the responses to the survey, the biggest challenge in ERP reform is insufficient business re-sources (FIGURE 6). ERP project planning, implementation, and deployment requires a large contribu-tion from business stakeholders. The lack of business resources is therefore a significant risk for pro-grams to achieve their objectives. Another challenge is the complex or fragmented ERP landscape. The reform of the ERP system itself is challenging, the complexity of the current situation can bring surprises, slow down the renewal process and cause a reason for temporary integrations. They can significantly increase the duration and cost of the project. Executing ERP strategies do not appear to be a problem among the respondents. (BearingPoint 2021, 20.)
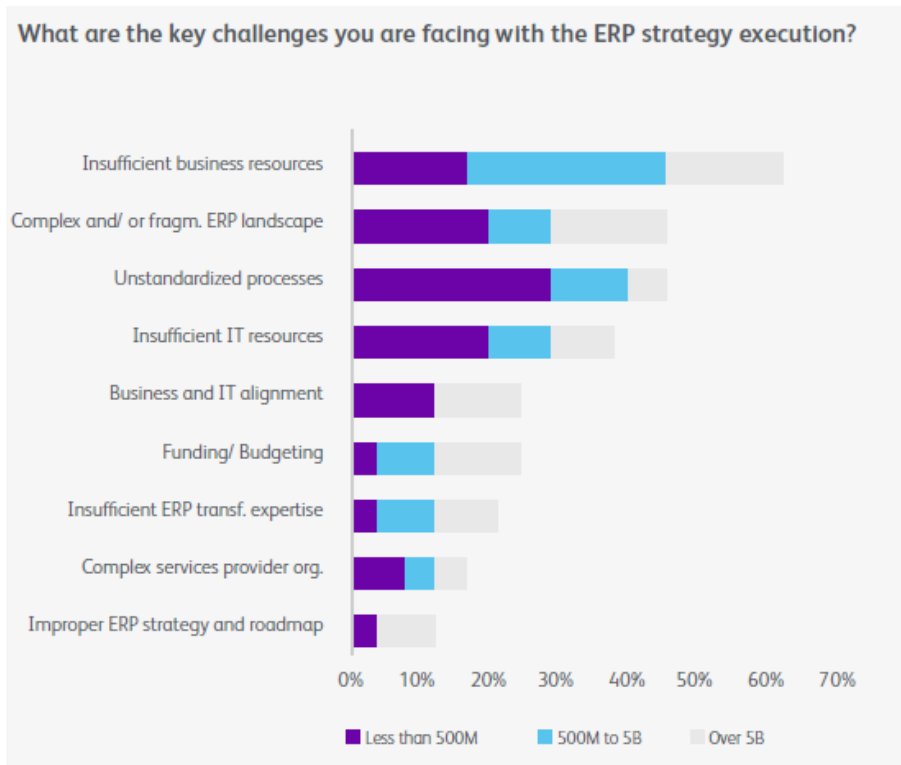
FIGURE 6. Key challenges with ERP strategy execution (BearingPoint 2021, 20)

Most of the companies need most of the external support for program and project management. This kind of ERP project requires good project management skills and capacity, which can be difficult for the company's own personnel. In addition to project management, information on business processes and ERP systems is also needed. (BearingPoint 2021, 21.) As Kimmo Järvikangas, predicted, there will be a shortage of skilled consultants. It can be difficult to find experienced consultants in Finland and elsewhere in Europe. (Kallio 2020.)

Amado and Belfo's studies had very similar observations as BearingPoint's study in Finland. Amado and Belfo (2021) explained that the introduction of ERP systems is still a way for organizations to gain a competitive advantage over their competitors' systems. In Europe, more money is being invested in the introduction of ERP systems. In 2012, the adoption rate was about 22%, rising to 26% in 2013, 31% in 2014, and 36% in the year 2015. In Portugal, the implementation rate of the ERP system in 2014 also decreased according to the size of the company. The adoption rate was 90% for large companies, about 60% for medium-sized companies and even less for small companies, almost 35%. Until recently, the focus of companies was mainly on the deployment and pre-deployment phases of systems. The main problems in ERP projects were related to their lack of customer support and adequate maintenance of the ERP system by the service providers. Its significance began to emerge during the maintenance phase,

which improves the realization of opportunities, namely the reduction of costs and the optimization of services, for both service providers and customers. Information systems' maintenance and support is gradually coming more important and proves to be the basis for their successful implementation. (Amado & Belfo 2021.)

3 ERP UPGRADES

After the implementation, the ERP system leads to the phase of operation and maintenance. Software maintenance means all changes to an existing software system after it is already operational, often distinguishing between corrective maintenance, adaptive maintenance, and product care. (Barth & Koch 2019.) According to a 2005 study by AMR (Advanced Market Research), maintenance that ensures the smooth operation of an ERP system is the most expensive lifecycle stage in ERP applications. More money is spent on post-production changes in most software products than what was used for their initial implementation. Maintenance revenues are very close to revenues from ERP implementation, which means, organizations' ERP systems deployment spent more than $14 billion annually on ERP maintenance (FIGURE 7). Most of the post-production changes are improvements that help refine software. (Zhao 2007.)
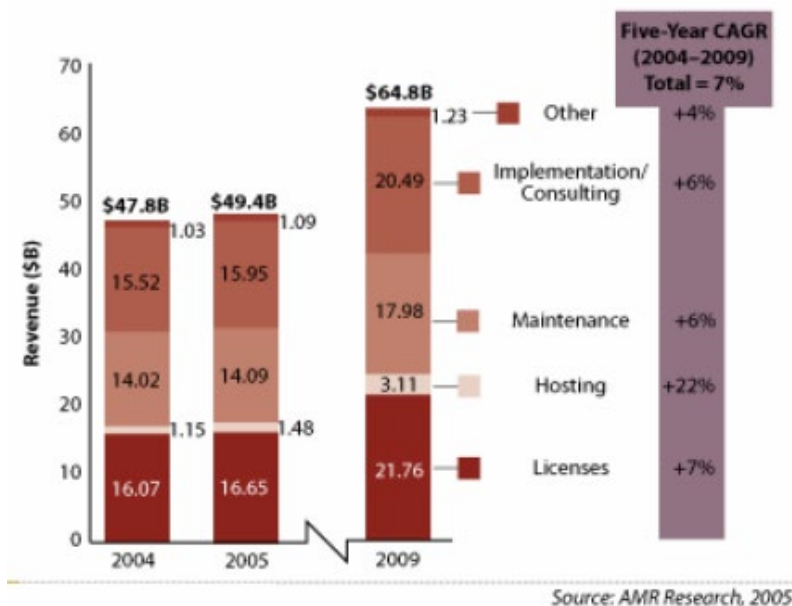
FIGURE 7. ERP Market Size and Forecast 2004-2009 (Zhao 2007)

Glass and Vessey [1999] listed three main maintenance components in an ERP system: customization, extension, and modification. Customization involves in vendor to make the ERP system more efficient for specific organizations. Extension refers to changes made to current systems and new add-ons. Modification is to change the code of the ERP itself, to fit into the companies' own business environment. (Zhao 2007.)

After some time, companies are forced to keep their system up-to-date and perform ERP upgrades in times of rapidly changing business environments, technological enhancements, and rising pressure of competition. (Barth & Koch 2019.) ERP vendors must be prepared to meet the needs of the companies and the ability to integrate with other software. The company has needs that are not included in the supplier's products. Increasing functionality can help organizations develop functions that are not included in their ERP software. Changes to reports or views are often needed. Adding new reports is another general ERP program customization. (Zhao 2007.) Customization will increase costs, extend implementation time, and lead to inconvenient maintenance and upgrades from vendors. Most companies will minimize customizations due to reasons of costs, time, and shortage of professional personnel. (Zhao 2007 [Loh & Koh 2004].)

There are some differences between initial ERP implementation and ERP upgrade projects:

- Upgrade projects can be implemented on a faster schedule
- Implementation projects are larger than upgrade projects. ERP implementation requires more resources and includes more tasks for both IT and managerial issues, whereas upgrade projects are simpler.
- Implementation projects require a longer time
- Upgrade projects cost less than initial ERP projects
- Implementation project has more management support
- ERP implementation takes generally 15 to 32 months, and the interval of the project report meetings of the top-level management is one month. The frequency is the same in ERP upgrade projects, but the projects take only 5 to 8 months.
- Plan and strategy are more critical in implementation projects
- Training takes 30% of the total cost in ERP implementations, but under 5% in upgrade projects because the main delivery method is online self-training
- Business process reengineering (BPR) is one of the critical factors in initial ERP implementation and that is one reason why implementation projects take longer. Often in an upgrade project there is no need for BPR.

Table 4 shows implementation and upgrade project differences clearly.

Topic		Initial Implementation	Upgrade
Project objectives		Seeking perfect business solutions	Complete the project ASAP
Complexity		High	Simple
Project duration		Long	Short
Budget		Costly	Less costly
Organizational Management Support		Top management committee, steering committee	CIO, IS manager, project team manager
Frequency of project report to top management		Once a month (total 15-32 times)	Once a month (total 5-8 times)
Full time project employees		IS personnel, key users, consultants, vendor staffs	IS personnel
Implementation strategy		• Phased implementation (37.5%) • Big-bang (62.5%)	Big-bang (100%)
Training	Time	Long	Short
	Cost	• Up to 30% of total costs	• Less than 5%
	Style	• Instruction-based class training, computer-based in class training (80%) • Self-training (20%)	• In class training (16%) • Self-training (84%)
	Force	Mandatory	Optional
Business Process Reengineering		Critical	None

TABLE 4. Differences between implementation and upgrade projects (Zhao 2007).

Barth and Koch (2019) study critical success factors for small, medium, and large organization ERP upgrade projects in Austria. They interviewed CEOs, CIOs, IT project managers and ERP consultants who had recently carried out ERP upgrades in their respective organizations. Upgrade activities get more attention in organizations, but major upgrades should be treated as development. On average an organization must execute an ERP upgrade every three years, and costs reach between 25 and 33 percent of the initial implementation costs. As an ERP system must be upgraded several times during its life cycle, eventually the upgrading will cost more than the implementation. Unfortunately, many companies don't have their own experience and expertise in this area, as there hardly exists any standards or guidelines for ERP upgrade preparation and execution. Almost all interviewees listed comprehensive project management to be a major factor. Particular attention must be paid to the planning and specification phase as well as the selection of a motivated and skilful project manager. A successfully carried out project depends heavily on external support, as the development of necessary know-how would be economically

nonviable, and organizations can benefit from experiences made by external stakeholders. As interviewees also reported about non-satisfying experiences with external consultants, resources inside the company must be committed and the choice of consultant must be made carefully. The entire ERP team is a critical success factor. The ability to think project-oriented and to show commitment was rated as more important than technical skills. System testing with key users was also one success factor. As ERP upgrade projects are recurring, any mistakes are a chance to improve the upgrade performance for the next upgrade project. Another struggle within an ERP upgrade project is a high degree of individual code modification within an ERP system. (Barth & Koch 2019.)

Companies want a tool to support decision-making that can be extended to a variety of systems that run on separate hardware that can analyse data quickly, with the flexibility to gather data from the ERP system and other systems (Monk & Wagner 2013, 35). Digital initiatives bring changes to organizations such as the ability to work anywhere and anytime and reshape the enterprise experience using modern and cloud-based enterprise applications. International Data Corporation expects the worldwide enterprise applications market to have a five-year compound annual growth of 3.4%, that means revenues will be $265.7 billion by 2024. Public cloud software is becoming more favourable and revenue is forecast to grow up to 56.8% in 2024. Program vendors improve automated lower-level tasks within the application, that will be the key factor in determining market positioning among enterprise applications. (Shirer 2020.)

Jay Allan from FinancesOnline predicts ERP trends; all kinds of intelligent tech and integration will be part of the company's competitive advantage. Artificial intelligence (AI) is becoming increasingly common these days for ERP solutions to have such functionalities built-in, ERP with intelligence tech integration is also known as iERP. Some companies are still not sure whether they must invest in an ERP system. Jay confides that it's worth considering an ERP system, even for smaller companies. Cloud, and technological innovations can help small businesses potentially aid in ensuring business continuity and efficiency amid the pandemic. ERP systems have always been great in terms of collecting and organizing data and now there is more data than ever for companies to collect. It's not just the amount that spiked but also their complexity. There's only so much unstructured data to analyse that businesses need tools for. AI-driven ERP software will solve this problem. Intelligent ERP solutions can also create workflows, reduce errors, and save time. Automatic routine processes can save a lot of time and employees can use this time on more valuable work. ERP together with AI and other intelligent technologies can improve business productivity, efficiency, and bottom line. Companies prioritize the ability to make data-driven decisions quickly, and they seek analytics-based solutions. Companies that take advantage

of analytics are twice as likely to rank highly in terms of financial performance, five times more likely to make time-sensitive decisions fast, and three times more likely to execute those decisions and plans more effectively. Nowadays integrated analytics, reporting, and data visualization capabilities give information in real-time. Management can use this information to make decisions regarding finances or other business aspects. Decision-making is now available at all levels, from the manufacturing division up to the executives. ERP managers will need to focus on learning how to leverage big data analytics. (Jay 2020.)

The financial module is one of the most valuable aspects of the modern ERP system. It provides many finance-related functionalities like general ledger, currency management, payroll management, fixed assets, and cash management. It produces financial reports for various departments. FI module is part of internal and external processes within companies. For example, it records transactions and integrates them with other modules to calculate the impact of spending. With the help of modern solutions, finance professionals are interested in the innovation that ERP systems provide managing quick decision making and plan execution. Smaller companies are moving to cloud based ERP systems, and trends show that ERP systems will be more personalized and vertical solutions to businesses. By Jay we can expect that in 2021 and beyond, one-size-fits-all ERP solutions will ultimately become history and ERP systems will be customized to support the unique requirements of various industries. (Jay 2020.)

4   DIGITAL ACCOUNTING AND FINANCIAL MANAGEMENT

20 years ago, a paperless accounting term was used that is different from digital financial management. In the 1990s there was a term of paperless accounting, and in the 2000s it turned more to electronic financial management. Now it's about digital financial management. There are several ways in which digital financial management can be defined. More concisely, it is automatic financial management. Some describe digital financial management in a nutshell as electronic sales and purchase invoices and electronic statement transactions. Lahti and Salminen (2014) have defined digital financial management to mean the automation and processing of all information flows and processing steps in financial administration in digital form. In digital financial management, all transactions in accounting and its sub-processes are processed and generated as automatically as possible without paper. (Lahti & Salminen 2014, 23-27.)

The rational conclusion is a comprehensive digital financial management philosophy. Digitization is intrinsically linked to the economic development of the whole process moving forward. The aim is to eliminate unnecessary work steps and consolidate the remaining work tasks. Especially the bigger companies are able to use ERP and other systems to automate the manual steps of processes and automate the steps of financial management. The advantage of digital accounting is that all information can be found electronically in the same system. Archiving is electronic and all information is accessible. In accounting, the frequently repeated routine work step is automated. Finland has been a forerunner in electric financial management but has gradually lost its lead compared to other countries. (Lahti & Salminen 2014, 25-29.)

Digital financial management has brought a lot of benefits to companies, and today as ERP systems become more common, even smaller companies are benefiting from automated processes. The biggest benefit is efficiency and speed in the process. An organization typically achieves 30-50% more efficient financial management when transitioning to digital financial management. (Lahti & Salminen 2014, 32.) Once processes are integrated, data does not need to be processed multiple times. The advantage of an ERP system is that all information can be found in the same master data. Digitalisation has made it possible to do financial management regardless of time and place. Faster processes appear in practice in many cases. Automation and digitization of accounting speeds up the completion of accounting and monthly reporting because the main accounting accruals and figure reconciliations are done automatically. Modern systems have the possibility of real-time reporting. Users can find information and reports

fast for themselves when they need them. Company management can make decisions based on real-time information and react more quickly. In large companies, control and accountability requirements are emphasized. Digitalisation has brought relief to this as well. Digitalisation reduces errors because manual work is reduced. Software control data and parameterization can be used to reduce human recording and calculation errors. (Lahti & Salminen 2014, 32-33.) It can be said that today's digital financial management is also an integrated financial management. Effective integration optimizes efficiency in the company. Integration is not just about the company's own IT systems, but about the company's processes and employees, as well as the entire company's value chain. In a good scenario, the accounting process is done automatically. The system control information defines the posting rules for automatic postings. Management reporting systems are typical systems that are integrated into an ERP system. (Lahti & Salminen 2014, 42-43.)

Electronic invoicing has advanced over the last decade. In European scale public procurement aims for a 100% electronic invoicing, that will bring financial savings and reduce environmental emissions. It is estimated that digitalisation will reduce 50% of financial transactions like purchase ledger jobs in Finland. Electronic financial management also has an environmental act. Electronic financial systems save the environment by reducing CO_2 emissions. Transport, electricity, and heat consumption will be reduced, and there will be less need for archiving space. Digitization most clearly reduces paper consumption. (Lahti & Salminen 2014, 29-33.)

Financial management is a big part of a company's processes. Therefore, it also affects the choice of the company's ERP system. Software costs can account for up to over 20% of a company's total financial management costs. The selection and careful implementation of the system can have a significant impact on the efficiency of financial management. (Lahti & Salminen 2014, 34-35.)

There are two concepts of accounting: management accounting and financial accounting. Financial accounting is more legal information for external parties outside the organisation. Financial accounting reports focus on the past, describing the whole of the business. Management accounting is for the people inside the organization. Management accounting can report on a part of the company, like give information to the sales or the production unit. It will give information about the future and the past, and it will improve decision making. (Drury 2016, 6-7.) In this thesis, financial accounting was a basic process to fix. The main goal was to focus on the idea of management accounting, that all we did seeks better information that improves the decision-making of the company's management.

5   LEAN

Lean is a Japanese concept based on the Toyota Production System, six important steps to improve enterprise supply chain systems and project management. These actions will reduce production costs, increase capacity, speed up the chain and improve customer satisfaction. Today, the Lean philosophy means more than just a physical product and a happy customer. Lean is a collection of functions and methods to improve business processes. (Plenert 2006, 145-146.)

5.1   Lean thinking

Lean thinking means removing unproductivity from the production process. Production should always add value to the customer. This is done by simplifying processes and cutting down on unnecessary operations. Lean thinking seeks to find unnecessary steps in every process in a company that increase costs and errors but do not add value to the customer. Lean thinking was applied initially for factory manufacturing, but it's also applied to any kind of process such as services or information. (Liker 2010, 27-29.)

"Muda" is a Japanese word that means waste. From waste, the case study of this thesis also establishes efficiency measures. Toyota has listed seven types of unproductive waste:

1. Overproduction – producing more or sooner than is needed by the customer
2. Waiting – stopping or slowing down for work to arrive
3. Motion – unnecessary physical movement
4. Inventory – having more than the minimum levels of material, work in process, and finished goods required to support flow and pull
5. Overprocessing – excessive or unnecessary work
6. Correction – reworking defects and mistakes, inspection and scrap
7. Transportation – movement of work product, information, and materials

It is difficult for companies to see what adds value to a product in the process. (Liker 2010, 27-29.)

5.2   Lean in office

Lean has been in production environments for a decade but in finance it's quite a new concept:

> A change in accounting, control and reporting methodologies are needed, in order to provide operational and management information that supports the Lean improvement activities. Applying Lean principles to the finance processes, such as accounting, controlling and reporting, would be a way to optimize these processes. (Reunis 2011.)

Accounting in firms is still old fashioned which prevents them from being Lean. Lean accounting focuses on delivering value, and total value chain of the product. It is known that finance is full of waste. With these Reunis' tip questions one could discover that there is still a lot of waste that can be removed:

- Are all management reports that are produced actually used for steering the business?
- Are all invoices always processed correctly the first time?
- Do we ever have to enter redundant data (several times)?
- Is all reported information automatically generated from a single source for all reports?
- Are all allocations of costs adding value to the decision-making process?
- Are our budgeting processes seamless, smooth, and efficient?
- Is our forecasting process integrated in our reporting?

Lean finance is important because it can streamline accounting, by efficiently scheduling in urgent accounting. (Reunis 2011.)

What is information waste? Information inventory waste, overprocessing waste, and poor data quality waste. Although information systems provide many benefits, they are often offset by the waste they generate. Data waste has many detrimental effects, such as lost productivity, costly delays and errors, and useless complexity. How this information waste could be reduced? In office information inventory can be clearing your emails and files and deleting software applications that are not in use. Overprocessing is another kind of information waste. By doing more than is necessary, which is noticeable, for example, that more than half of a company's IT software is not used but needs maintenance and support. If process design or operational execution has been failed, it generates bad quality data. It is everyone's responsibility to ensure that the information produced is quality data. (Bell & Orzen 2011, 53-54.)

5.3   Could ERP work together with Lean idea?

Becky Morgan, President & CEO of Fulcrum ConsultingWorks Inc, says on YouTube video "You don't want ERP and Lean systems to get married, you want to each one of them to do what it is supposed to do effectively and don't try to force one on the other." (Fulcrum ConsultingWorks 2014). She means an ERP system and Lean system are based on different theories, and for different purposes. You can have both, but you should not try to get them to do same thing. (Fulcrum ConsultingWorks 2014.)

Lean requires a big change in conducting business, which can run counter to the structure of the ERP system. Companies have invested in a massive ERP installation and are trying to make the two work together on the basic processes. Lean tools are amending all the time and a new paradigm has emerged that ERP vendors don't have to fit to the one-size-fits-all mentality. Companies are choosing applications best suited for their operations and modifying their ERP system. These best components can be integrated, resulting in a superior end-product. A new generation of easy-to-install enterprise extension applications are emerging that might even eliminate the need for full-scale conventional ERP. However, Lean functionality is implemented, the time has come for vendors to find real needs for companies. It's crucial for companies to pick the right solutions and implement them correctly. The benefits of a Lean implementation are real, and an ERP package doesn't have to stand in the way. (Bradford, Mayfield & Toney 2001.)

Executive vice president of Technical Change Associates David Dixon told a story in an article about an entrepreneur who went to Japan to learn about Lean techniques in action and was duly impressed with the results. "But tell me how this ties in with my MRP system.", he asked. His host replied, "It doesn't. Go home and turn it off." (Dixon 2008.) In the article Dixon ponders if there are Lean-friendly, stand-alone applications with links to ERP, and tries to suggest a rational approach to combining the performance improvement potential inherent in Lean and IT. Neither IT nor Lean alone will find the best solutions for the company's goals. Table 5 shows the main fundamental differences between Lean and MRP/ERP (TABLE 5).

TABLE 5. Differences between Lean and MRP/ERP (Dixon 2008)

LEAN	MRP/ERP
Local solutions	Enterprise solutions
Physical process visibility	"Green Bar" reports
Helps with execution	Helps with planning and reporting
Executes with visual Kanban	Executes with work orders
Reduces/eliminates complexity	Manages complexity with IT
Limits transactions	Promotes transactions
Minimizes data needs	Needs lots of data
People measure themselves	Management measures people

One should always understand objectives of both IT and Lean techniques. Six Sigma quality techniques are used to drive errors and defects out of the company's processes. These are high-powered diagnostic and statistical tools with the potential for reducing defects, resulting in a reduction of cost, and improvement of the quality of the item. Lean eliminates non-value-added work and increases productivity.

> The real question is not whether or not to use ERP software. The correct question is: How do I set it up and augment it to support the Lean initiative? The computer is here to stay. So let's get over it! The challenge is to develop IT tools that perfectly support the objectives of Lean. (Dixon 2008.)

For over 40 years there has not been much change in basic ERP software logic. An ERP package completely redesigned to support the Lean environment is long overdue. The marriage of Lean techniques with IT solutions that help to drive waste out of our business processes holds out an enormous promise. Aggressive IT suppliers are currently developing and will continue to develop and adopt these tools. In today's business world competition is fierce, so those who think that Lean and IT are incompatible will eventually leave behind in the competition. In a competitive environment that demands extraordinary performance just to stay in the game, the creative combination of Lean and IT might be solutions for the companies who want to be better. (Dixon 2008.)

6   CASE COMPANIES

The research project has two different companies. Companies operating in different industries and using different ERP software. The section explains the backgrounds of these companies as well as the ERP systems.

6.1   Company X

The parent company was established already in 1985. The subsidiary Company X (later X) was established in 2008, a company that acts as one of the case study companies. The parent company has also another subsidiary in Estonia but the main manufacturing is in Finland. Their brand is known to resellers and consumers. The factory is located in southern Ostrobothnia.

The company's turnover is 3 million euros per year, and it employs around 30 people. X is a Finnish high-quality brand with a selection of sofas and chairs. They use Finnish and Swedish designers. They are renowned for home décor as well as furniture for public buildings.

PICTURE 1. Company X (Company X, advertising material)

X uses Visma L7 ERP system as their main system. Visma was established in Norway in 1996. The company has 12,000 employees and they develop and sell many different software. Visma's ERP systems are already used by more than 30,000 Finnish companies. Visma L7 is an industry specific ERP system. Visma L7 ERP is designed for contracting, energy companies, industry, wholesale and specialty goods trade and property management. Visma L7 general characteristics are based on such factors as products and pricing, currency options, installed registers, numbers and documents sets, parametric library for customizing, information transfers from/to other systems, queries and searches and reporting. (Visma Toiminnanohjausjärjestelmä.)
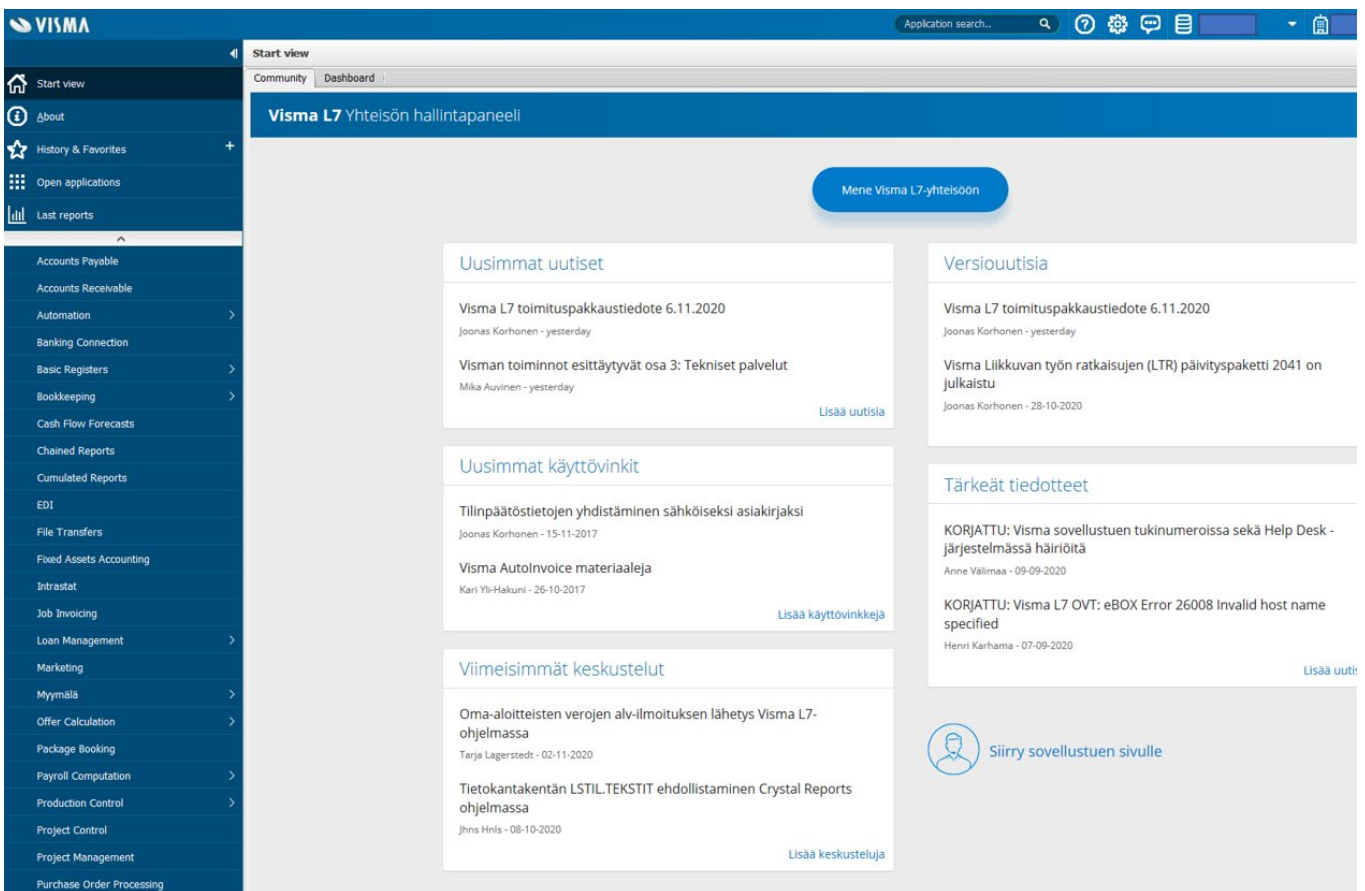
PICTURE 2. L7 user interface

Visma L7 is the main ERP system but it has been updated by a custom-made solution called LTR (Finnish translation: Liikkuvan Työn Ratkaisu). LTR is a web-based purchase invoice approval, working time recording and order management report tool for sales. LTR is easily customizable to the customer's needs with dynamic queries. Visma LTR benefits are based on information flow from people outside the office to office workers. Users access the ERP system via web browsers. Because L7 ERP has an old-fashioned architecture, the LTR program makes it easier to make customer-specific queries about ERP data.

Possibilities of LTR applications:

- Work transaction checklists
- Work supervision tasks
- Production work queues

LTR standard queries:

- Sales orders
- Sales lines
- Production parts
- Production work steps

Purchase orders and lines:

- LTR reporting
- Project reporting
- Sales tracking

(Visma, Raportoinnin työpaja).

6.2 Company Y

Company Y (later Y) was established in 2001. The company offers laser coating-, expertise- and machining services. The main customer areas are in machine building, metal, energy generation and process industry. The factory is in Central Ostrobothnia, and it employs around 20 people.

PICTURE 3. Laser cladding (Company Y, advertising material)

Y uses Lemonsoft ERP system. Lemonsoft is a Finnish company founded in 2006, and it has over 100 employees. More than 6000 companies are using Lemonsoft system. (Lemonsoft Yritysesittely 2019.) Lemonsoft is a modern ERP system that enhances the company's operations in various areas. The data only needs to be saved once, it moves electronically and is easy to find. Lemonsoft ERP system can manage the sales process efficiently, manage inventory functions, and open interface makes it easy to integrate with separate systems. (Lemonsoft toiminnanohjausjärjestelmä.)

Y has been using Lemonsoft for several years. ERP is on their own server and not as a SaaS service, which Lemonsoft also offers as an alternative. Sometimes a system on your own server is causing problems because updates do not come automatically, so there is not always the latest version in use and updating the system costs extra. The basic functions basically work with the modern program, but the management of the company has not been completely satisfied with the software.
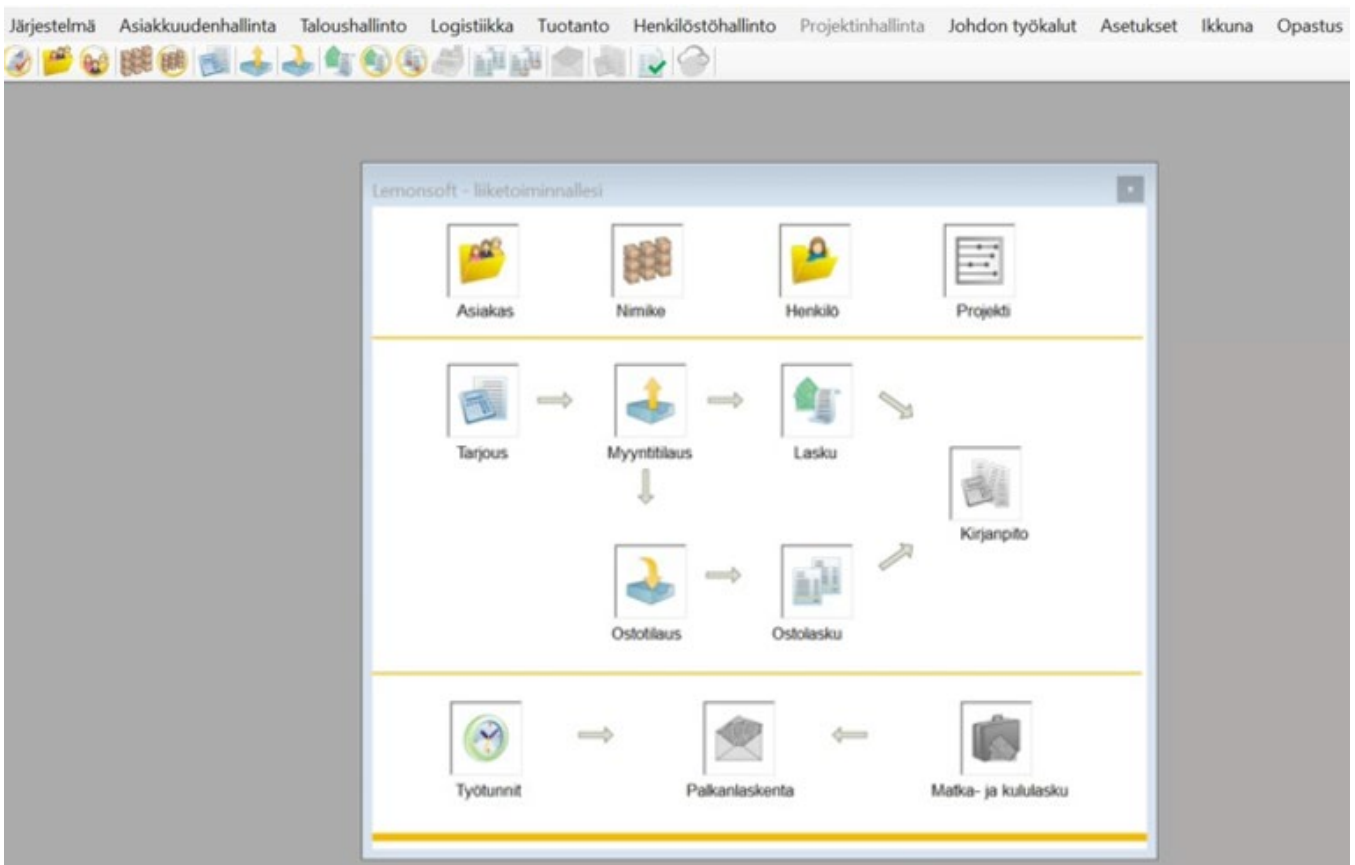
PICTURE 4. Lemonsoft user interface

7   CURRENT STATUS, PROBLEMS AND DEVELOPMENTS

At the beginning of the project, I, my employer, and the managers of the client companies made development targets that should be identified and developed during the year. X has 14 development goals, and Y has 10. Working time was divided between the companies: 70% for company X and 30% for company Y. Because X has many areas for development in the project plan, we made a tentative schedule for it together with the entrepreneur.

7.1   Company X

X has been using the same ERP system for more than ten years and they use an integrated BI reporting application from the same vendor. Also another management reporting application, Accuna, is used through the accounting firm.

The accounting firm did the accounting and payroll. Many things were done by hand, and not all the possibilities of the ERP system were used. I did the company's accounting for the previous 2 years, so its practices were familiar to me. That is why starting a project and planning ERP development work was easy. For example, ERP development cannot be outsourced to a software vendor alone, it requires expertise from inside the company. One must be able to identify the needs, and outline processes that can be improved.

7.1.1   Accounting

The company's accounting had been in the same ERP system for over 7 years. Production, sales invoices and partly the purchase invoice processing were in the ERP system. At the end of the month, several reports were printed and manually entered to another software. Errors often occurred, and it could take a long time to find the problem. The main task of this project was to get the accounting connected back to the ERP system and to remove the old errors from the system. The software support for the accounting firm's accounting system was running out and therefore the project was tightly timed around this issue. The accounting firm was paid according to the hours worked, so manual entry created a lot of cost. Because the accounting was in an external system, the management knew the company's result only a month later. Even then, they only received PDF reports, but were unable to find out the information

behind the numbers. It made it difficult for the management to make decisions, because Visma L7 ERP system is old, and not all reports and functions worked as we would've liked. We considered the option of switching the existing ERP system to another one but decided not to, because the production control worked well, and it was the most important thing for the company. Other needs were developed to the best of our ability.

Accounting is mostly formed automatically from the activities of other modules during the month. Manual entries in the ERP system are a bit slow. But the more functions were automated in the system, the less need was to make documents manually. Because the system had old data and for many years the system had not been used in its entirety, all data and settings had to be checked and updated. In this area, wastage was eliminated as manual accounting ceased.

The ERP system did not have a functional report on products that had been received but for which the expenses from the purchase invoices had not been recorded. This caused the problem every month that the company's gross margin looked wrong. The purchased product was marked with the value of the stock, but there were no costs for it.

X already used Visma's LTR where it is possible to obtain new data queries for an additional fee. We defined the information we needed, and the supplier made us the desired query. Eventually, we received a survey with which the accountant made sure that the purchase invoice for each inventory item received was posted for the same month. Picture 5 shows that the product has been received, but the invoice has not yet been posted. The accountant will process the invoices before finalizing the postings for the month.

PICTURE 5. Purchase order inquiry

7.1.2 Payroll LTR

At the beginning of the project all employees filled own paper sheet from working hours. The supervisor checked the hours, and the office secretary counted the hours together and wrote them down on paper. The papers were scanned and sent to the accounting firm. The payroller manually entered hours into the same ERP payroll systems module and performed the payroll. This took approximately 2 business days. It was sometimes perceived as a problem that an employee would sign up for more hours than he had been at work. The aim was to start developing a payroll process and monitoring system.

We explored a few different system options, such as a screen the employees could use to sign in when coming to work. We saw a few different options and eventually chose Visma's browser-based working time app: LTR Työtapahtumat (English translation: work hours). Although it did not have the desired monitor ready, integration into the ERP system facilitates deployment, reliability, and reduced costs.

LTR Työtapahtumat is a product for recording hours in the browser, regardless of time and place:
- Entries are successful in one go, easily by highlighting the desired time slot on the calendar
- After approval by the supervisor, the entries are transferred directly to invoicing and payroll

- No double work
- The billing cycle speeds up
- Satisfied employees

(Visma Liikkuvan työn ratkaisut).

We discussed various working days and absence needs with the supervisor. I configured the settings and tested the system. The program was designed to make it as easy as possible for the employees. Employees were not eager to start using the system because it had been easy for them to fill out on paper. We made the pictorial guidelines as easy as possible to support a positive employee experience. I trained the employees and made pictorial instructions on how to use the system. I trained the supervisors and introduced software to the employees. Because this phase of the project was delayed, I was not able to train everyone, so it was transferred to the supervisors. In its simplicity, the employee logs into the system and presses "start". At the end of the day, he presses stop and records the working hours for the day. Below is shown a view of one employee's step to mark working time (PICTURE 6).

Tuntitapahtuma

Tila	Kohdistuspvm	Projekti	Alanro	Kustpk	Koodi	Tunnit	Sisäinen kommentti	Hyväksyjän ko
Avoin	3.9.2020	TUNNIT LTR	1002 Valmistus	41 VALMISTUS	0007 TUNTITYÖ ON ▾	11		
Avoin	3.9.2020	TUNNIT LTR	1002 Valmistus	41 VALMISTUS	0400 VRK YLITYÖ 5(▾	2		
Avoin	3.9.2020	TUNNIT LTR	1002 Valmistus	41 VALMISTUS	0410 VRK YLITYÖ 1(▾	1		

Lisää tuntitapahtuma

Toiminnot

Tallenna | Tallenna ja pysy kirjauksella | Tallenna ja kopioi | Poista kirjaus | Lisää liite | Peruuta | Hae mallipohjan tapahtumat

PICTURE 6. LTR working hour entry

The employee is able to view the entries for the period in different views.

PICTURE 7. LTR working hours listing view

At the end of the month, the supervisor approved the working hours, and the accountant transferred the information to payroll. This saved the secretary's working time, as well as the manual work of the payroll clerk.

In Visma's LTR application we made a query, where we can see information from the new working time application. This strengthened the trust between the employer and the employee compared to the former paper shoots.

PICTURE 8. Working time comparison inquiry

7.1.3 Production

I was able to do the accounting development alone or together with a Visma expert. When we started the production development work, we had a discussion with the production manager about what Lean philosophy's waste could be in the production process. It turned out that the fabric cutter and seam- stresses acknowledged the different parts of the same order, each individually, with a computer barcode reader.

Together with the production manager and the Visma expert, we were able to implement a function that helped with this problem. Before starting the work, the production manager bundled the different work steps of the order with an easy command on software and after that it was enough for the employee to acknowledge only one barcode per order. Orders were left hanging in the software unfinished, and the production manager had to manually correct these so that the orders could be delivered to the customer. The working time used for the order also did not look right because the work phase had not been acknowledged as completed. The introduction of bundling reduced the extra work done by employees that did not add value to the product. The production manager did not have to acknowledge orders ret- rospectively. Previously the turnaround time of the products in production was not known, so the sales manager had to evaluate the time spent. This relatively small function made it possible to obtain better information about the time spent on manufacturing the product, which is needed for price calculations, and made the employee's working time more efficient.

7.1.4 LTR management

"Data is the new oil", wrote Michael Palmer in 2006, and it still applies. Companies have a lot of data nowadays. First, they must find the right context and ask the right questions and then start to analyze data. Insight of management and expertise provides opportunities for company growth. (Palmer 2006.) There are many opportunities to utilize data, but the development of analytics solutions requires a big investment from the company. The project must proceed with determination and the goals must be clear so that the development is successful. This is how the company gets valuable information for decision making. (Ilmarinen & Koskela 2015.)

First, we bundled functions that solved our problem in production. But the data could not be used in any way in the ERP system. This was generally one of the disadvantages of the Visma L7. A separate query

was made for this bundling function to the Visma LTR application. With an easy browser-based view, the company's management was able to view the time spent on different work steps with different products. Sometimes companies have a misconception about what is the most profitable product for a company. This survey was able to see if a product is taking more time than expected. Small delays always come, but time filtering can determine if they are recurring problems. For example, if the work of a seamstress constantly takes more time than planned, the features of the product can be considered with the designer. All this information improved management's responsiveness. All work phases in the order became acknowledged and did not complicate the work of the production manager and slow down the delivery of the product.

PICTURE 9. Working time used to manufacture the products

With the second survey, we were able to find out how much time each order had taken up from different resources. By examining these queries, we were able to determine whether product margins are too low, whether a particular order has failed or can be interpreted as having the wrong time calculated for order resources.

PICTURE 10. The time spent on an order

7.1.5 More efficient ERP system

During the project, we also implemented many small things that allowed us to improve the use of ERP. Shortly before the start of the project, the company became obliged to declare Intrastat to customs. The system settings were set to meet the needs of the notification and invoice processors changed in a way that we could make the notification as automatic as possible. Initially, the data had to be collected manually, which took almost a day's work per month. When everything was done, it took about a few hours to make the announcement.

Many companies have a problem that everyone keeps attachments in their own files. Although the ERP system has all the data, often the attachments are missing. We changed our procedures so that all sales announcements, attachments to accounting documents, and everything else are always connected directly to the system for everyone to access.

7.2 Company Y

The initial situation for company Y was clearer than for company X. The identification of needs and development proposals were easily achieved in collaboration with the owners. The project plan (Appendix 2) defined 10 specific development goals. The Lemonsoft ERP system had been in use for them for several years and was on the company's own server. Lemonsoft Oy was able to provide expert assistance in defining the necessary settings in the software. I was able to plan the development schedule myself, and the development was made considering accounting and payroll schedules.

7.2.1 Accounting and fixed assets

The accounting firm did traditional accounting with the Lemonsoft system before, but the use of the system remained deficient. These were the items to be developed in traditional accounting:

- Paperlessness
- Automatic account posting on document
- Periodization of purchase invoices for a certain period of time
- Fixed assets module

Formerly, accounting and payroll documents and materials were printed on paper. The first step was to change the policy so that all the data was stored directly in the system and nothing was printed. This modernized accounting practices and, for example, facilitated the work of the auditor because all information can be found in one place. Before, information was sought from several different sources and it was difficult to provide, because it was not clear where all the information could be found.

Lemonsoft ERP system has a function that can be used for generating additional entries automatically for a certain transaction. It is possible to define an account, set it as a re-export account, and specify a possible percentage of the original amount. This function could be utilized, for example, in the creation of payroll accrual side costs.

PICTURE 11. Automatic accounts

This example describes how an employee's payroll liability entry line also forms other necessary posting entries. This, in line with the Lean philosophy, reduces unnecessary work because recording one line yields 7 more lines automatically. As an example, when 1,500 € is entered for a document into a specified account, it becomes this document:

TABLE 6. Automatic post

	Account	€
Holiday pay debt	4500	1500
	4619	276,75
	4670	7,5
	4680	1,05
	4660	34,5
	4650	11,55
	29659	-276,75
	29659	-54,6

This same function was also used in other regular accounting document entries with regular re-exports.

Another development step was a periodization of purchase invoices. Before, the accountant did not accrue purchase invoices in the middle of the fiscal year because it had to be done by hand which was time consuming, or he was unaware of the possible need for accrual. As development work, different lengths of periodicity were set in the program. The purchase invoice handler can select these options for purchase invoices. This function can also be used by a person other than the accountant. The creation of a few alternative models improves the quality of accounting due to up-to-date accruals, and equalizes the accrual of expenses to accounting monthly.

The most demanding one of these accounting development tasks was the fixed assets module deployment. Because the company is small-sized, no unit monitoring was required. However, this module was available in the Lemonsoft system and improved the accountant's tracking of the company's fixed assets, so it was wanted to be deployed. Fixed assets had been tracked in Excel, but the uncertainty about formulas brought by Excel took a lot of time from the accountant for the financial statements. The transfer of fixed assets to the ERP system speeded up the calculation and data maintenance. Fixed assets could already be created from a purchase invoice whose other necessary information was created in the fixed assets module. The monthly accounting was quickly retrieved from the report, which reduced wastage and added value to the accounting.

7.2.2 Payroll and working hours

Before the project beginning, payroll was a mix of unfinished activities. Employees had already used the logging of working hours but there were shortcomings in the use. The system had been tried for years, but it had not worked. The employee logged in by the access control monitor upon arrival and logged out when leaving from work. All employees filled their own Excel file which was forwarded to payroll. The payroller manually entered hours into the payroll module and performed the payroll. This took an estimate of 1.5 business days.

The settings in the work hour logging module were partially incorrectly set, and there were dozens of setting options. The first was to find out the company's operating methods, needs and payroll rules. We did some research with the company supervisor; I structured the different options and we went through them again. We needed help from a Lemonsoft expert in defining all the settings. Deploying this module was challenging, and we encountered a problem at every stage of the development. How should the hours be logged when you get sick? How are vacations recorded? How is unpaid absence recorded? There were several specific issues that came up on a monthly basis when the employees used the system

and the data was exported to the payroll module. The biggest problem in the past had been the incompetence of an external accounting firm and the lack of a responsible person to solve the problems. This type of waste is very normal in medium-sized companies that have needs, but services are outsourced. Then it is not anyone's responsibility to know and complete things. When we solved this problem, it gave the employees a more productive workplace.

There were a lot of problems in payroll before. The payroll clerk's work had been outsourced to an accounting firm and paid for each hour. The payroller manually entered the working hours from Excel, maintained several of his own excels, and the data in the payroll calculations was often old or incorrect because some data was calculated in Excel to which it had been entered manually. There were errors in the formulas and the data was forgotten to be updated. Not all desired data was calculated. The average hourly earnings of the employees were defined in the payroll module, so the calculation came in minutes. Previously, data was collected from reports into excels. There were often errors in this information that had to be corrected because the formulas were incorrect. Before this took about 1-2 hours, now it takes about 15 minutes to update.

PICTURE 12. The average hourly earnings

The accumulation of working time reductions was also processed in Excel with manually entered data. Together with the supervisor and the business owner, we considered the possibility of making more complex and accurate monthly calculations. Eventually, together with the employees, we decided to fix the automatic calculation and simplify the presentation of the remaining hours.

Previously, the maintenance of the statutory holiday pay debt file was in Excel, where the data was also retrieved in part from the payroll reports of the ERP system. The file had to be updated every month and it was laborious to maintain. It took about a half working day per month. There were a lot of errors that

were corrected afterwards, and it took several days during the year. The owners and the employees were frustrated with the situation. Because the holiday pay debt calculation is statutory, the work step cannot be defined as waste from Lean's perspective. But because the Excel file was filled manually, and the errors had to be corrected afterwards, according to the Lean philosophy that was waste that had to be removed from the process. The complete transfer of this process to the ERP system was an important development. When we got the data of all 25 employees into the system, the number of errors was significantly lower. It took about 4 hours to fill in the file before, now it takes only 0.5 h. This resulted in a significant reduction in working hours and quality improvement in the payroll process.

7.2.3 Project cost reporting

The quality certificate required the company to be able to report sales, costs, and profit on completed projects. Lemonsoft did not receive a report like this from the system. This, too, had been done as an Excel report, and monitoring was time consuming.

When the entrepreneur asked me to collect the data into Excel, we tackled the problem together. Follow-up was mandatory, so it had to be done. The information was therefore necessary. Manual monitoring was clearly wasteful. I made a report model from an existing report, to which I added the desired additional information that was already available in the system. Then I introduced the model to a Lemonsoft supplier and ordered the needed report. We were surprised how hard it was to get quite simple information from a modern ERP system. We went through several meetings with the expert. We tested several different versions of the report, and eventually got a report that served the company's needs. This added value to the company's important quality certification and reduced the time spent on it.

7.2.4 Management reporting and other objectives

The project plan included items such as management reporting, budgeting in the application, cash flow management, and document management. The company no longer used the accounting firm's management reporting or budgeting application. We researched the needs and opportunities of these topics but did not feel that there was currently need to develop these items further.

The quality of the accounting had improved, and management received the newest information on Lemonsoft's results, balance sheets, and ready-made management reporting. At this point, more accurate

hourly records of employees, and more up-to-date accounting, already provided so much information to the management to support decision-making that eventually the importance of certain topics diminished.

8 CONCLUSIONS

The project was closed after a year. We went through the achievements with the entrepreneurs, rejoiced in the successes and discussed what had not yet been done. The project plan had defined 10-14 different points that should be developed or investigated for possibilities. Every point was either developed or at least the opportunity was identified. Not all were considered sensible to proceed with.

As the project progressed, we noticed how the companies' operations and ERP were misused or not used at all. I think this is a big problem among small and medium-sized companies but also in large companies. ERP system is not used or no longer corresponds to the company's needs. Maybe the company no longer employs people who have deployed the system. Often the documentation is very limited and only a few people know why the system is implemented this way. Also, in the software company, people change, and acquisitions change the availability of systems and the quality of development. The success of the project was greatly affected that the person making the improvements knew the companies and was involved in their basic processes. Since I had worked in an accounting firm and had been an accountant for 2 years for these companies, it provided a good foundation for this project. I wasn't comparable to a normal external consultant because I already knew the companies' processes. It laid a good foundation for the project, and the project started quickly.

The companies operated in different industries, their ERP systems were different, but they still had very similar problems and development needs. The biggest need for both was the development of electronic accounting. Although accounting was ERP organized, no external accounting firm had developed things forward. Time-consuming work steps eventually become costly for companies, and they are not even aware of what work steps accounting includes or what could be developed in it. I think this is a common problem when using an accounting firm. However, a small or medium-sized company does not want, and it is not even profitable, to hire its own accountant. In this case, it is difficult to develop this topic if the problem is not identified.

The project schedule was affected by the fact that not all actions could be taken alone and the change in the market situation caused by the COVID pandemic. The cash management, budgeting and income statement reporting included in the project plan were not implemented. If the project had continued, we would have been able to take these things forward better. In a year, we got the biggest and most important things dealt with, but the small things that I could have also helped with remained now at the level of

further clarification. During the project, we discussed with the employer as well as customer entrepreneurs, that many small and medium-sized companies would need this kind of support in ERP development.

In a year, we made the biggest improvements to the ERP system, but the Lean philosophy cannot be just the will of one person. If the project had continued, we would have taken the Lean idea further into production. The optimal situation would be if the person embraced and noticed things that could be done differently in their own work and that would give the company added value.

BearingPoint's ERP Study 2020 Finland wrote about successful ERP renewal:

> It is very important for the implementation to succeed as the ERP system is at the heart of company operations. This success needs to be managed with applicable choices of technology, integrator partner and program resourcing. (BearingPoint 2021.)

In my opinion, this describes the value of an ERP system to a company. In the school entrance exam, I wrote a short article "ERP - The heart of the company". Even then, I had worked as a corporate accountant and an ERP product manager of a software company, and I had noticed that a functioning ERP is one of the main keys to a successful business. When ERP systems work everyone is happy: workers, consumers, and leaders. But when it doesn't work, we have a big problem. Today many companies have to rethink their ERP systems and supply chains. Good ERP systems are cloud service based, so everyone can use them wherever they are. Before there was an idea that ERP systems solve all organisation's supply chain problems. Nowadays ERP companies have a solid data foundation, and they share it with other companies. Before we thought we need just one ERP and it should include everything from order to invoice, CRM, payrolls etc. Now ERP is the heart of the company. It handles the master business. Then you can associate different operators' specific CRM systems. And now when the times are tough, leaders need information on all different kinds of things. They need to know how workers like their jobs, how consumers like to order, cash flow, budget, and so on. Most of the data is found in ERP systems, but it's not the best place to look for it. That's why ERP suppliers started to invent cloud services, where master data of different resources is easy and fast to analyze. The tools of leaders are a competitive advantage that helps make decisions for the future. They need the right data to support decisions. But nothing works if the base doesn't work. Good ERP systems include agile supply chain, make workers happy, and most of all, give consumers what they need.

REFERENCES

Amado, A. & Belfo, F. 2021. Maintenance and Support Model within the ERP Systems Lifecycle: Action Research in an Implementer Company. Procedia computer science. Available: https://www.sciencedirect.com/science/article/pii/S1877050921002477. Accessed: 6.3.2021.

Bart, C. & Koch, S. 2019. Critical success factors in ERP upgrade projects. Industrial Management & Data Systems. Available: https://www.emerald.com/insight/content/doi/10.1108/IMDS-01-2018-0016/full/pdf?title=critical-success-factors-in-erp-upgrade-projects. Accessed: 7.3.2021.

BearingPoint 2021. ERP Study 2020 Finland. Available: https://www.bearingpoint.com/en-fi/our-success/insights/erp-study-2020-finland/. Accessed: 3.3.2021.

Bell, S. & Orzen, M. 2011. Lean IT. New York: CRC Press.

Bradford, M. & Mayfield, T. & Toney, C. 2001. Does ERP fit in a lean world? Strategic Finance. Available: https://www.proquest.com/scholarly-journals/does-erp-fit-lean-world/docview/229806688/se-2?accountid=10007. Accessed: 15.2.2021.

Davenport, D. 1998. Putting the Enterprise into the Enterprise System. Available: https://hbr.org/1998/07/putting-the-enterprise-into-the-enterprise-system. Accessed: 15.2.2021.

Dixon, D. 2008. Opposites attract: Lean meets ERP. Fabricating & Metalworking. Available: https://www.proquest.com/magazines/opposites-attract-lean-meets-erp/docview/229404480/se-2?accountid=10007. Accessed: 15.2.2021.

Drury, C. 2016. Management accounting for business. Andover, Hampshire, United Kingdom: Gengage Learning.

Fulcrum ConsultingWorks, Inc. 2014. Can ERP Systems and Lean Coexist? Available: https://www.youtube.com/watch?v=SRN8OOF8KVQ&ab_channel=FulcrumConsultinWorks%2CInc. Accessed: 1.2.2021.

Glass, R. & Vessey, I. 1999. Enterprise resource planning systems: can they handle the enhancement changes most enterprises require? The Software Practitioner.

Hallikainen, P. & Laukkanen, S. & Sarpola, S. 2014. Reasons for ERP acquisition. Helsinki: Helsinki School of Economics, Department of Information Systems Science. Available: https://www.researchgate.net/publication/220710899_Reasons_for_ERP_acquisition. Accessed: 5.3.2021.

Halttunen, V. & Lehtinen A. & Lyytinen, K. 2001. Tietojärjestelmän kehittämistä tukevat menetelmät pk-yrityksessä. In J. Kettunen & M. Simons (eds.) Toiminnanohjausjärjestelmän käyttöönotto pk-yrityksessä. Valtion teknillinen tutkimuskeskus, 138–168. Available: https://www.vttresearch.com/sites/default/files/pdf/julkaisut/2001/J854.pdf Accessed: 15.2.2021.

Ilmarinen, V. & Koskela, K. 2015. Digitalisaatio. Yrityksen käsikirja. Alma Talent Oy. Available: https://bisneskirjasto-almatalent-fi.ezproxy.centria.fi/teos/IACBGXCTEB#kohta:9((20)DIGITAL-ISAATION((20)PRUEDELLYTYKSET((20)(:9.3((20)JALOSTA((20)DATASTA((20)((c4)LYKKY YTT((c4)((20)/piste:b4. Accessed: 15.12021.

Jay, A. 2020. 10 New ERP Trends & Forecasts for 2021/2022 – A Look Into What's Next. Available: https://financesonline.com/erp-trends/. Accessed: 7.3.2021.

Juell-Skielse, G. 2006, ERP Adoption in Small and Medium Sized Enterprises. Stockholm: Technology at the Royal Institute of Technology, Department of Computer and Systems Sciences. Licentiate Thesis. Available: https://www.diva-portal.org/smash/get/diva2:10252/FULLTEXT01.pdf Accessed: 1.2.2021.

Kallio, A. 2021. Suomen erp-buumi on yrityksille iso haaste – "osaajat loppuvat väistämättä kesken". Tivi. Available: https://www.tivi.fi/uutiset/suomen-erp-buumi-on-yrityksille-iso-haaste-osaajat-loppu-vat-vaistamatta-kesken/d915ac0c-2b87-43d7-b4a1-d40d42363166. Accessed: 1.3.2021.

Kista. Available: https://kista.com/english/. Accessed: 15.2.2021.

Lahti, S. & Salminen, T. 2014. Digitaalinen taloushallinto. Helsinki: Sanoma Pro Oy.

Lemonsoft Yritysesittely. 2019. Available: https://youtu.be/h4Yee8eiU0E. Accessed: 5.1.2021.

Lemonsoft toiminnanohjausjärjestelmä. Available: https://news.lemonsoft.fi/toiminnanohjausjarjes-telma-erp. Accessed: 5.1.2021.

Liker, J. 2010. Toyotan tapaan. Helsinki: Readme.fi.

Ly, A. 2020. The Definitive Guide to ERP Implementation. Available: https://www.better-buys.com/erp/erp-implementation/. Accessed: 5.3.2021.

Mabert, V. & Soni, A. & Venkataramanan, M.A. 2000. Enterprise resource planning survey of U.S. manufacturing firms. Production and Inventory Management Journal.

Monk, E. & Wagner, B. 2013. Concept in Enterprise resource planning. Publishing place unknown: Course Technology Cengage Learning cop.

Olhager, J. & Selldin, E. 2003. Enterprise resource planning survey of Swedish manufacturing firms. European Journal of Operational Research.

Palmer, M. 2006. Data is the New Oil. Available: https://ana.blogs.com/meros/2006/11/data_is_the_new.html. Accessed: 6.10.2020.

Pelphrey, M. 2015. Directing the ERP Implementation: A Best Practice Guide to Avoiding Program Failure Traps While Tuning System Performance. New York: CRC Press.

Plenert, G. 2006. Reinventing Lean: Introducing Lean Management into the Supply Chain, Elsevier Science &Technology. Available: https://www.proquest.com/legacydocview/EBC/274707?ac-countid=10007. Accessed: 4.10.2019.

Rashid, M. & Hossain, L. & Patrick, J. 2002. The Evolution of ERP Systems: A Historical Perspective. Idea Group Publishing. Available: https://www.slideshare.net/prayukth1/evolution-of-erp-systems-28027773. Accessed: 5.3.2021.

Reunis, J. 2011. Lean financial accounting. Available: https://www.everyangle.com/the-why-and-how-of-deploying-lean-in-finance/. Accessed: 11.10.2020.

Rohit, K. & Khan, Z. 2020. A Research Study on the ERP system Implementation and Current Trends in ERP. Sandip University, Nashik, Maharashtra, India. Available: https://www.researchgate.net/profile/Rohit-Kenge/publication/344453940_A_Research_Study_on_the_ERP_System_Implementation_and_Current_Trends_in_ERP/links/5fb792c292851c933f430be9/A-Research-Study-on-the-ERP-System-Implementation-and-Current-Trends-in-ERP.pdf. Accessed: 5.3.2021.

Sankar, S. & Rau, K. 2006. Implementation Strategies for SAP R/3 in a Multinational Organization: Lessons from a Real-World Case Study, Cybertech Publishing.

SAP. 2021. Company Information. Available: https://www.sap.com/corporate/en/company.html. Accessed: 5.3.2021.

Shirer, M. 2020. Worldwide Enterprise Applications Revenue Grew 7.5% to Nearly $225 Billion in 2019, According to IDC. Available: https://www.idc.com/getdoc.jsp?containerId=prUS46724220. Accessed 13.3.2021.

Van Everdingen, Y. & van Hillegersberg, J. & Waarts, E. 2000. Enterprise resource planning: ERP adoption by European midsize companies.

Visma. Liikkuvan työn ratkaisut: Työtapahtumat esite.

Visma. Raportoinnin työpaja diat.

Visma Toiminnanohjausjärjestelmä. Available: https://www.visma.fi/toiminnanohjausjarjestelma/. Accessed: 5.3.2021.

Zhao, F. 2007. An empirical study of enterprise system upgrades. The University of Nebraska. Degree of Doctor of Philosophy. Dissertation. Available: https://www.proquest.com/dissertations-theses/empirical-study-enterprise-system-upgrades/docview/304827646/se-2?accountid=10007. Accessed: 12.3.2021.