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The School of Industrial Engineering and Management

The Department of Innovation Management

Master's thesis

DEVELOPMENT OF SALES INVOICING PROCESS IN INDUSTRIAL SERVICES

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Vantaa, July 28, 2014

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ABSTRACT

The objective of this Master's thesis is to find ways to streamline the invoicing process of the case company. In order to streamline the process, the bottlenecks and development areas of the present invoicing process needs to be identified. The bottlenecks are based on interviews made to personnel. The thesis also offers solutions to overcome the identified bottlenecks.

The problem is the slowness of the invoicing process which should get rid off. The slow invoicing process causes delays in obtaining payments. There are many reasons for the slowness and inefficiency of the invoicing process. One of the biggest reasons is that the information systems are not deployed entirely. It causes additional work for everyone. Practices with the customers affect also to the smooth flow of invoicing. The contracts determine when the customer can be invoiced but also work approvals, missing work orders and customer's own invoicing basis slow the process. The fastest and cheapest solution is to deploy the systems better and do things correctly. Thus duplicated work would decrease and resources would be saved. The work allocation should be modified and the practices with customer should be influenced too. In the future the meaning of IT should be highlighted and new devices exploited.

TIIVISTELMÄ

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Työn nimi: Myyntilaskutusprosessin kehittäminen teollisissa palveluissa

Vuosi: 2014   **Paikka:** Vantaa, Suomi

Diplomityö. Lappeenrannan teknillinen yliopisto, Tuotantotalouden tiedekunta.
84 sivua, 12 kuvaa, 4 taulukkoa ja 6 liitettä.

Tarkastaja(t): Professori Timo Kärri ja professori Juhani Ukko

Hakusanat: Prosessien kehittäminen, laskutus, liiketoimintaprosessit, prosessien virtaviivaistaminen, prosessien pullonkaulat, myyntilasku

Tämän diplomityön tavoitteena on löytää keinoja case yrityksen laskutusprosessin virtaviivaistamiseksi. Jotta prosessi voidaan virtaviivaistaa, tulee tunnistaa nykyisen laskutusprosessin pullonkaulat ja kehittämiskohteet. Pullonkaulat perustuvat henkilöstölle tehtyihin haastatteluihin. Diplomityö tarjoaa myös ratkaisuja tunnistettujen pullonkaulojen voittamiseksi.

Ongelmana on laskutuksen hitaus, joka tulisi saada karsittua pois. Hitaan laskutuksen seurauksena maksun saaminen viivästyy. Hitauteen ja laskutusprosessin tehottomuuteen on monia syitä. Yksi suurimmista syistä on, että tietojärjestelmiä ei ole hyödynnetty kokonaan. Tämä aiheuttaa ylimääräistä työtä kaikille. Käytännöt asiakkaan kanssa vaikuttavat myös laskutuksen sujuvuuteen. Sopimuksissa määritellään, milloin asiakasta saa laskuttaa, mutta myös töiden hyväksyttäminen, puuttuvat työtilaukset ja asiakkaan omat laskutuspohjat hidastavat prosessia. Nopein ja halvin ratkaisu on ottaa tietojärjestelmät paremmin käyttöön ja tehdä asiat kerralla oikein. Tällöin kaksinkertaisen työn määrä pienenisi ja resursseja säästyisi. Töiden jakoa tulisi muuttaa ja yrittää vaikuttaa käytäntöihin asiakkaan kanssa. Tulevaisuudessa IT:n merkitystä tulisi korostaa ja ottaa käyttöön uusia laitteita.

ACKNOWLEDGEMENTS

Table of contents

APPENDIXES

Appendix 1. Task groups of BPM.

Appendix 2. Interview questions to assistants.

Appendix 3. Interview questions to supervisors and project
managers.

Appendix 4. Flowchart from best practice at the moment.

Appendix 5. Flowchart from delayed invoicing process.

Appendix 6. Flowchart from project business.

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ABC	Activity Based Costing
ABM	Activity Based Management
BPM	Business Process Management
BPR	Business Process Re-Engineering
COTS	Commercial-off-the-shelf
IS	Information Systems
IT	Information Technology
TBM	Time Based Management
TQM	Total Quality Management

1 INTRODUCTION

1.1 Background

Invoicing is a very critical operation for companies. If the invoicing process contains delays or mistakes, all the operations of a company can become endangered due to weak liquidity. In addition, the invoicing appears also to the customers of a company and is thus part of the image and company's customer service. (Lahti & Salminen 2008, 73) This thesis handles the invoicing process of a Finnish company providing industrial services for multiple branches of industry.

The management and control of information has become more important. The amount of information has increased and followed by increasing reportage requirements. The requirements towards information have also increased: it should be real-time, accurate (Laamanen & Tinnilä 2009, 12). With the help of information technology, the invoicing can be nearly automated. Information moves electrically from system to system. Today's systems require data to be entered only once and they enable usage of information in real-time and for several users. Companies have transferred from electrical financial administration to digital financial administration but even if all the systems were in place for digital handling of information the definition of digital financial administration does not realize in every company.

The case company aims at improving its cash flow by reducing the amount of operative working capital. For the case company the most significant ways of reaching the target are related to receivables and accrued income. They are result of what kind of and how effective invoicing process the company has. It has been observed that the present invoicing process is partly ineffective and it needs to be enhanced.

The result of slow invoicing is that the cash from the invoices is received after a longer period and thus receivables stay longer in balance sheet deteriorating

working capital. Uninvoiced work and work in progress burden also working capital as a form of prepayments and accrued income.

1.2 Research questions and limitations

The objective of this thesis is to find the bottlenecks of the case company's invoicing process and give development proposals to overcome them. The reasons for why something remains without invoicing and why the invoicing is so laborious and time taking process are also tried to find out.

For this thesis can be presented the following research questions:

- *What are the bottlenecks and development areas of the present invoicing process?*
- *How the invoicing process should be modified?*

Answers for the first research questions are first tried to find from common process management theory and then through the interviews made to personnel. The development proposals are also studied from the scientific books and journals but interviewees' own proposals are also taken into account. The process management theory is concentrated on business processes and more specifically on service processes and on information flow. The presented process management schools are such that they can be applied well on business processes. This thesis uses only term process but it is limited to mean only business process. The sales invoicing as well as the purchase invoicing processes are presented in the theory. The purchase invoicing process is handled in theory because some of the purchase invoices are a basis for sales invoices. The empirical part of this thesis is concentrated only on the sales invoicing process because that is the problematic part of the invoicing for the case company.

Though the target is to reduce the amount of working capital, this thesis handles only invoicing process because it is the most important way for the company to

achieve this target. The account receivables are left out because their collection is not a problem for the company and the terms of payment are defined in contracts. The ineffective invoicing is an important development area for the company.

The company has many different localities but not all units have been interviewed. The chosen units are dissimilar with each other to constitute as wide picture as possible from the case company's invoicing process. In the selection of the units it has also been taken into account if they are known to have problems with invoicing or if they are particularly good at invoicing.

1.3   Methods and data

This thesis includes a case study. The empirical study is formed based on interviews made to personnel. The purpose of the interviews is to understand the research problems more comprehensively. Before the development proposals can be made, problems of the current invoicing process need to be identified and analyzed. The identified problems are such that repeated in interviews and the analysis is made by comparing different personnel groups' interviews to each other and empiricism to corresponding theory and by asking extra questions from problem situations. The development proposals are based on personnel's own view, on the theory and on writer's own proposals. The theory gives guidelines for empiricism. The bottlenecks and the development ideas can be also found through benchmarking. Unit's procedures are compared to each other to find the best practices. Theory found from literature offers solutions to research questions and context on which basis the processes are developed

The suitable research methods for this study are constructive and qualitative methods. Qualitative research method attempts to investigate the subject as comprehensively as possible. It tries to describe an event, understand certain activities, or to give a theoretical interpretation of a phenomenon. Descriptive research method aims at describing the subject until hidden structures or earlier development. A descriptive research method is used in the theory chapters in

order to offer understanding for the subject and to offer base for the empirical part. The constructive approach is a one way to carry out a case study and it aims at solving real-world problems. The constructive approach has been developed in area of business economics. (Hirsijärvi et al. 1997, 202-205) Target is to create a plan how to avoid the emergence of bottlenecks and to develop the invoicing process more effective.

1.4 Structure

The structure of this thesis is presented in table 1. The chapter two and three handle the theory of the process management and development. Chapters four and five form the empirical part of the thesis. The chapter four describes the current state of invoicing and the bottlenecks the personnel have discovered. The fifth chapter presents the analysis of bottlenecks and development proposals to overcome them. The sixth chapter summarizes the thesis.

Table 1. The structure of the thesis.

Chapter	Title	Output
Chapter 1	Introduction	Definition of research problems, objectives and research methods.
Chapter 2	Business Process Management	Definition of business process management and purchase and sales invoicing processes
Chapter 3	Process development	Theory from business process development, typical bottlenecks of processes and ways to streamline them.
Chapter 4	Invoicing in the case company	Presentation of a current situation and its problems.
Chapter 5	Results	Development proposals.
Chapter 6	Conclusions	Conclusions from the study.

2   BUSINESS PROCESS MANAGEMENT

2.1   Processes

Paim et al. (2008, 707) and Hannus (2004, 104) define process as a structured, measured group of activities designed to generate a specified outcome. Trkman (2010, 125), Bai and Sarkis (2013, 284) and Lin et al. (2002, 19) again determine business process as a complete, dynamically coordinated group of activities or logically related assignments that must be carried out to deliver (additional) value to users and in which resources are consumed. Process can concern any part of a company's business but this thesis concentrates on business processes. Figure 1 below illustrates a simple process:
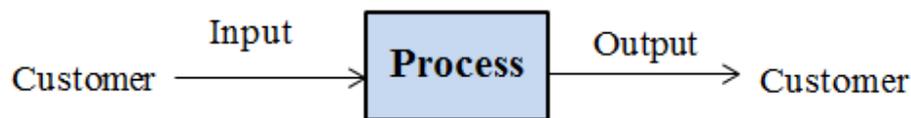
Figure 1. A simple process. (Martinsuo & Blomqvist 2010, 4)

- **Customer:** process always starts and ends to the customer. Customer or user is either external or internal to the organization and it always directs expectations, needs and demands on process.
- **Additional value:** process receives inputs, in which through process additional value is produced. Additional value relates to expectations, needs or demands of a customer and the output may mean product, information, solution, service experience etc.
- **Resources:** process needs and consumes resources – raw material, labor, money, equipment, information. Resources cause expenses and they are always limited. (Martinsuo & Blomqvist 2010, 4; JUHTA 2002, 4)

Processes can be divided to core processes and support processes. Core processes are always connected to external customer, whereas support processes are inside the company and they serve core processes. It should be recognized that not all

processes are equal. There are also other sorts of allocation criteria for processes, for example Lee and Dale (1998, 215) has divided processes in two groups:

(1) "the sort that starts when necessary and finishes sometime in the future;
(2) the sort that is constantly running."

Strategies are actualized through processes and by perceiving and developing operations through processes, performance can be improved. In the execution of strategy, changes in process capabilities like quality, speed, flexibility and efficiency are essential. Operative efficiency and effectivity are often depended on functionality of processes, especially on the functionality of information systems. The efficiency is important to consider because it is not whatever how the inputs are refined to outputs. The activities of processes are improved by the process owner. (Laamanen & Tinnilä 2009, 13, 29)

Three central factors relate to the determination of processes: strategic importance, rate of standard format and coherence. Rate of standard format means that some processes repeat always as the same and in same order and some processes again are more informal and the chain of actions can change along the situation. Coherence refers to a situation where a company has different offices and how likely these offices perform a particular process (only one process model or different process models). (Hannus 2004, 107) It is rarely reasonable to execute same standard process in every office rather carry out a few standard processes and leave a possibility to execute the process as it is the most efficient in every office.

2.1.1 Purchase invoice process

Purchase invoice process contains phases from purchase order to payment of the purchase and to bookings in general ledger. Today the purchase invoices move automatically from suppliers to customers and they are in the database after they have arrived. Almost every customer receives e-invoice. Often purchase order is linked to purchase invoice. When a purchase order is formed, the approval and the

posting phases are usually made at that point. Furthermore purchase invoices and the goods receipt from operative processes are integrated to purchase invoice process. (Lahti & Salminen 2008, 15, 50-51)

Figure 2 presents purchase invoice process according to Lahti and Salminen (2008, 49). They defined the stages of purchase invoice process as following:

- Order and delivery process
- Reception of purchase invoice
- Posting and circulation of purchase invoice
- Inspection, approval and update of purchase invoices to purchase ledger
- Payment
- Reconciliation and deferrals
- Archiving
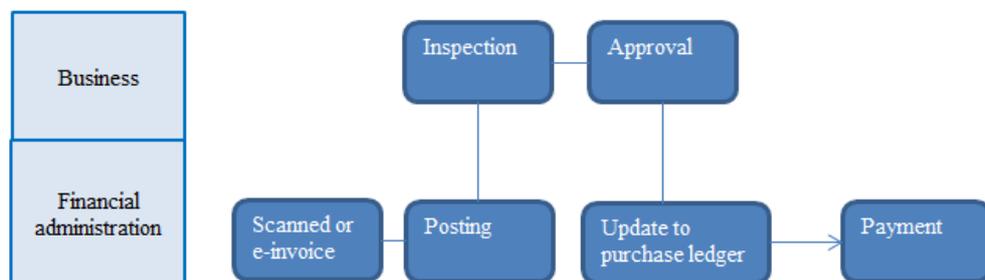
Figure 2. An example of purchase invoice process. (Lahti & Salminen 2008, 51)

Poorly executed purchase invoice process has slow cycle of invoices, invoices disappear, the purchase invoices appear in accounting only after approval cycle and it contains manual work steps and recording. Lahti and Salminen (2008, 72) gave following customs for smooth purchase invoicing process:

- Deploy electrical handling and approval system of purchase invoices
- Archive invoices electronically
- Use assumption and automated posting
- Pay invoices based on contract without approval cycle
- Pay invoices based on order without approval cycle

- Automatize bookings of cost accruals straight from receipt and/or invoices from cycle

Purchase invoices appear in account payables after they have arrived, approved and booked in general ledger. Account payables can be a significant source of external funding for companies. They are mainly short-term debts followed from acquiring factors of production. (Yritystutkimus Ry 2011, 48)

Large amount of payables may indicate financing deficits. Also companies with unpredictable sales tend to lean on payables to improve cash flow. If a company receives credit from its suppliers easy, it also can finance receivables and inventory better. Usually inventory is financed through payables. (Hill et al. 2010, 784-786)

Received credit can also be used as a guarantee of a quality because the customer can verify the quality of delivered goods or services before payment. If the delivered goods or services do not fulfil the agreement, the customer can refuse to pay and return the product. Hence the seller is motivated to deliver acceptable quality and remove faults as quickly as possible. Longer payment period can be granted if the quality of the product is not easy to assess or requires longer period to examine. (Chludek 2011, 565-566; Garcia-Teruel & Martinez-Solano 2010, 406; Niskanen & Niskanen 2000, 491)

The quicker the payables cycle, the faster the company has been able to handle its' payables and benefit cash discounts. The rule of thumb related to payment period of payables can be said to be a little longer than payment period of receivables. Then the credit received from supplier can be used to finance the crediting of customers and part of the running expenses. (Balance Consulting)

2.1.2   Sales invoice process

Sales invoice process includes phases from sales order to invoicing, payment and to bookings in general ledger. An essential part of the sales invoice process is

receivables management: in other words sales ledger and collection activities. The sales invoicing process starts from the preparation of an invoice. The process ends when the receiver's payment is allocated to sales ledger and the booking show in general ledger. At the same time the sales invoice is archived electronically. Figure 3 illustrates sales invoice process. (Lahti & Salminen 2008, 15, 73)
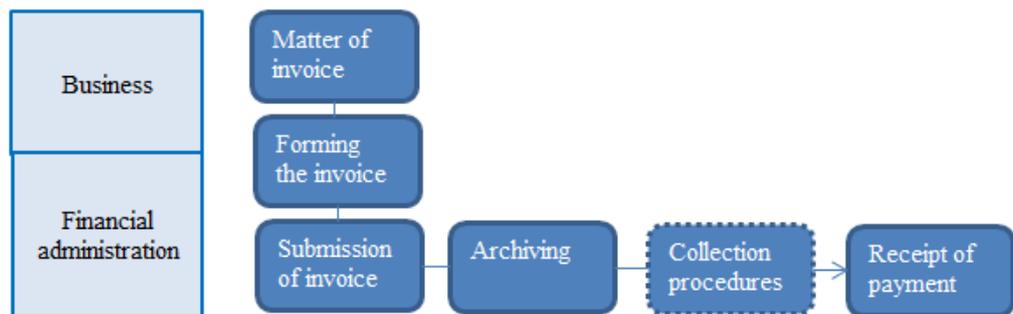
Figure 3. An example of purchase invoice process (Lahti & Salminen 2008, 74)

Invoices need to include certain information like customer's name, delivery and invoicing address, terms of payment, value added tax numbers and customer specific discounts. The customer register is essential part of invoicing module or sales ledger. The value added tax can be fed manually to invoice or there can be rules created in the system how the value added tax can be figured automatically based on invoice data. (Lahti & Salminen 2008, 77)

Before the sales invoice can be send (electronically), the invoice need to be created either manually saving the information to the invoice program or by forming the invoice based on data in the systems. Electrical systems and their exploiting have significant impact on forming the invoice and in terms of efficiency the benefit is usually greater than in actual electronic submission process. Quite often when the electrical systems are in place, manual work is still done though the processes could be automated. In well-organized integrated systems there should be no need to check and save things from other systems to invoice system. (Lahti & Salminen 2008, 77-78)

The invoicing contains more than just the transmission phase of an invoice and its channel. Significant stage is the formation of the invoice. The efficiency of electronic, as automatic as possible preparation process of invoices can be even more significant for the charging company than the channel used to send the invoice. When the forming phase of invoices is electrified, it is important to get the information automatically from starting point to invoice and avoid handling same information many times. The company's business affects what kind of invoicing process it has and what requirements and limits it sets. Customer relationship management relates essentially to invoicing too. (Lahti & Salminen 2008, 73, 78-79)

In separate invoicing process an employee delivers the invoicing material and the biller saves the same information again in the system. In ideal case the person, who has knowledge about invoicing events, saves the information straight to invoicing system or pre-system. Companies have different invoice types depending on what kind of business they practice. Different invoicing processes are cash sales, order based sales, and contract based sales, process invoices and manual invoicing. (Lahti & Salminen 2008, 79)

Companies tend to sell goods and services on credit rather than demand immediate cash payment but this kind of action develops account receivables. (Mian & Smith 1992, 169) A company can benefit from selling on credit to its customers because this way it can accelerate sales. Molina & Preve (2009, 663) find out in their survey that amount of account receivables increases when companies have profitability problems and in case of cash flow problems, they try to reduce their finance in clients via receivables in order to receive more cash that is needed to handle the difficult situation. The amount of account receivables affects on liquidity.

Researches (Mian and Smith 1992, 169: Deloof 2003, 573) have observed that account receivables form a large share of company's assets and hence they can be in important role when companies face financial problems. Receivables

management should thus be taken into account in every company. To the level of account receivables affects amounts of credit granted to customers and granted methods and terms of payment (Molina & Preve 2009, 663, 684; Garcia-Teruel & Martinez-Solano 2010, 404)

Literature emphasizes the need for a credit policy in every company. The credit policy should be clearly expressed, communicated and understood by everyone who is involved in the process of giving credit. Especially salespersons are in important part when making contracts with customers. Credit management can be improved by paying attention to four aspects: people, policies, practices and processes. Late payment problems are complicated by the fact that companies do not send announcements and invoices on time and in some cases at all. (Paul & Boden 2011, 740-741)

Companies with economic problems need cash, but they aren't necessary able to cut the terms of account receivables to their customers without any effects/harm on their commercial relations. The ability to negotiate payment terms with customers has an effect on company's credit policy, especially in a situation of financial distress. The industry's competitive structure defines the ability to bargain and it can be measured by market power of a company. (Molina & Preve 2009, 670)

2.2 Business Process Management

Processes should be managed and monitored for a company can achieve its' objectives. Business Process Management (BPM) is based on a question how company can create value to customer. Chain of events need to be recognized, modelled, analyzed and set targets for execution and development. Target in the management of processes is to streamline them. Incentives and recompensing connected to achieving objects of process are powerful ways to control the process. The process and its action should be managed already during the operation to guide the process itself like figure 4 shows. (Laamanen & Tinnilä

2009, 6-7, 10; Martinsuo & Blomqvist 2010, 5) Documentation of processes is also important.
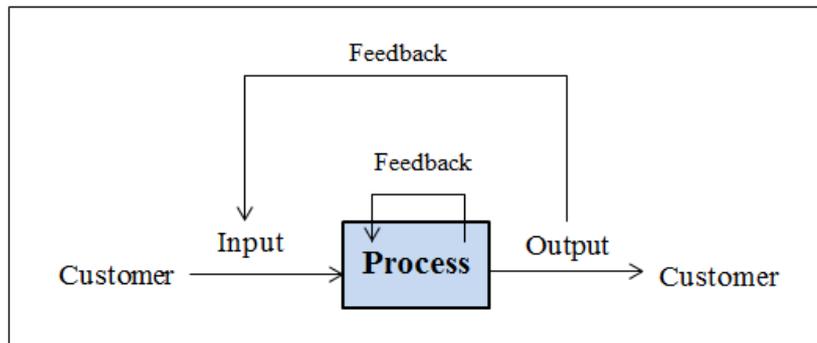
Figure 4. Managing the process through feedback. (Martinsuo and Blomqvist 2010, 5)

There is no one common definition of Business Process Management (BPM), but there can be found some basic principles for BPM from the literature. Vom Brocke and Sinnl (2011, 357) reported that the studies of the concept of BPM ranges from purely information technology driven to a holistic understanding of BPM. When approaching BPM from technical aspect, the focus is on how information systems can support business processes and help to design them. On the contrary, holistic approaches take in also organizational aspects of BPM and understand processes as the central crux of which business is leaded, as long as they are promoted by the people within the organization. (Rosemann & vom Brocke, 2010, 107-108; Jeston and Nelis 2006, 299; Jeston & Nelis, 2008b, 4)

Elzinga et al. (1995, 119) define Business Process management (BPM) as a systematic, structured approach to improve, analyze, control and manage processes with the object of improving product's and service's quality. Necessary tasks for process management can be divided in three groups: processes project requirements, managing the day-to-day processes' execution, and tasks related to promote learning. (Paim et al. 2008, 763) Appendix 1 displays these tasks more detail.

BPM lean on measurement for the performance of each individual process can be evaluated and to verify the direct connection of performance of process with

strategic goals. BPM seeks for best practices to achieve superior competitiveness. (Lee & Dale 1998, 216, 219) Trkman (2010, 126) noticed that companies should align their business processes carefully with the environment and foster the flexibility and constant adaption of core processes. Business processes are the key to promote the competitive advantage. Bandara et al. (2005, 351, 357) and Trkman (2010, 128-129) have identified following critical success factors in business process management:

- the involvement of stakeholders
- maintenance and provision of information
- performance measurement
- top management support
- the connection between organizational strategy and BPM
- connection of business strategy and IT
- communication

Aparecida da Silva et al. (2012, 769) brought out that the lack of standardization can be a hindrance in process management. People are working at the same logical abstraction of the process, but with various names, little integration between the methodologies, techniques and tools used in different areas and diverse visions of the group of activities, products, customers and other components of the process. Correspondingly Lee and Dale (1998, 224) and McCormack et al. (2009, 795) noted that too scarce cross-function communication limits the effectiveness of the management of the processes and emphasized the meaning of understanding of the process across the organization.

Developed supply of information and technology and consolidation of IT tools promote the management of processes. But it should be noted that process management is not only management of IT. Technical side of process management emphasizes such as workflow optimization for example through ERP systems and their ability to support process modeling. (Paim et al. 2008, 701, 705-706; Schmiedel et al. 2013, 44)

2.2.1   Process Management schools

Process thinking often highlights various methodologies and tools, documentation and information systems from different dimensions encompassing process definition, process modeling, process analysis, systematic thinking, focusing on value adding actions, and appropriate developing of performance by improving processes. Process management is more than just process improvements; it can contain important organizational and cultural matters as well. (Bai & Sarkis, 2013, 282)

Typical for these schools is distinction of value adding and non-value adding actions and emphasizing customer oriented and cross functional procedures. Also team thinking relates strongly to these approaches. The differences between these schools are actually about is it a matter of constant improvements or radical renewal. (Hannus 2004, 103) Sometimes small constant improvements are not enough but the situation requires radical re-engineering. After the re-engineering, constant improvements should be continued for the new processes are kept updated.

Bandara et al. (2007, 1242) listed Business Process Re-Engineering, Total Quality Management (TQM), Six Sigma, Lean Management, Time Based Management and Value-Based performance measurements as the process management schools. In addition to these Hannus (2004, 103) mentions also Mass Customization and Supply Chain Management (SCM) to process management schools. The schools which are described more specifically below are such that they can be applied to the case study. Even though most of them have been developed regarding the manufacturing processes of products they have now expanded to consider also services and comprehensive processes of companies.

Total Quality Management (TQM) is customer oriented and oldest process management schools. It has expanded from quality assurance to a comprehensive quality of managing operations and today the focus is more on creating and

exploiting best procedures and management practices. In addition to the properties of the product or service, also reliability of delivery and delivery time are essential components of quality. The quality consists through the differences between expectations and experience of the customer. The customer defines the quality in the end. The key element in improving quality is breaking the traditional way of thinking and mobilization of every person in the company to eliminate waste. The quality handbook is documented part of quality system. (Hannus 1994, 131, 144)

Costs of quality can be divided in two groups: costs resulted from bad quality and prevention costs. Bad quality causes vain work, re-processing and replacements. Prevention costs can be training costs but they can be seen also as an investment. Some companies take into account lost sales as a cost of bad quality too. The whole process need to be adjusted in top condition in every stage. The development of quality goes hand in hand with lead time shortening. For the costs of bad quality of a product or service can be minimized, the error situations should be handled in the earliest possible stage. (Hannus 1994, 133, 138)

Time based management (TBM) is an approach where time is critical resource and central performance factor. The starting point is to customer oriented eye on the core processes. Target is a radical improvement of lead times by eliminating unproductive time (waste). In addition to less time used also quality improves and costs decrease. (Laamanen & Tinnilä 2009, 12) Time is more and more important in today's intense competition. Shorter lead times indicate also faster cycle of capital. Reduction of lead times increases predictability. Short lead times improve flexibility. Just-in-time method (JIT), which belongs to TBM, is based on pull control and it targets to streamline processes. (Hannus 1994, 163-164) The method is quite close to Lean philosophy.

Activity Based Management is expansion of activity based costing into comprehensive approach of operative actions. It concentrates on solving out the costs of processes and affecting on them. The target is to improve the alignment of overhead costs in the direction of value chain so that the costs structure can be

developed. (Laamanen & Tinnilä 2009, 12; Hannus 2004, 113) The school aim to define how and where resources are consumed and used and based on this tries to influence on resource consumption.

Business Process Re-Engineering (BPR) is defined as a fundamental rethink and radical redesign of business processes to achieve dramatic improvements in critical performance measures like quality, cost, service and time. (Budiono & Loice 2012, 34-35, 40) BPR questions the current operative processes and radical redesigns them using IT. BPR emphasizes the role of information technology as an enabler of operations but it has received criticism due to big changes cause difficulties in managing the change. (Hannus 2004, 103-104) Small improvements are easier to carry out.

Lean Management is light and flexible way of acting that means ability to give more value to customer using fewer resources. Everything that does not produce value to customer is waste. According to Hannus (1994, 208) Lean thinking can be seen as an umbrella to other process management schools. Womack and Jones (2005, 1) present that for companies can streamline processes and systems, they need to determine how to configure linked business activities to meet customer demands without wasting time, effort and resources of their own or the consumer. The central idea in theory of constraints is that best possible result is limited by bottlenecks. Development of other phases of the process will not improve the performance unless the weakest link is fixed too. Lean practices contains idea of pull system, agile operation strategy and bottleneck removal to name a few.

The Lean thinking is based on principles to squeeze inefficiencies out of processes, streamlining the processes of consuming and getting material and information flow without interruption - less is more, for both consumer and provider. Lean consumption aim at providing desired full value to consumer from their goods and services, with the highest efficiency and least effort. The key word in Lean consumption is the process. For total costs and wasted time can be minimized and

new value can be created, customers and suppliers must start collaborating. (Womack & Jones 2005, 1-2)

Lean Management divides activities to three groups:
1. Value adding activities
2. Non-value adding but necessary activities
3. Waste

Activities that are waste need to be eliminated and second group of activities should be handled over. The Lean Management system concentrates on improving the whole business systems instead of optimizing single parts of the business. If the improvement is not desirable for the whole company, only for a one local function, it should not be undertaken. (Emiliani and Stec 2004, 630) Lean thinking can be applied also for the information system management due to its generic nature to recognize critical areas of improvement of any process. Lean thinking is also very suitable due to meaning of flows of value since the information flow is essential for information management. (Hicks 2007, 243)

Traditional costing methods consider excess capacity undesirable and rather keep machines busy though it would mean growing unnecessary inventories. Lean thinking is based on eliminating the waste resulting additional capacity. This additional capacity should be exploited with growth strategy: to grow businesses or with new (or previously outsourced) product. The biggest short-term influence of Lean improvement is the increase of available capacity of the company. The extra capacity is beneficial only if it is used to increase the profitability of the company. (Maskell & Kennedy 2007, 61, 69-70)

Value-stream maps are "one-page diagrams depicting the process used to make a product" according to Emiliani and Stec (2004, 622). Value-stream maps can also be called information and material flow maps. Value-stream maps recognize means to get material and information to flow without any interruption, improve competitiveness and productivity, and aid people to execute system rather than isolated process improvements. Value-stream maps can be used in office activities

to understand the flow of material and information, like order entry and financial reporting. With the help of value-stream maps, people can identify waste in business processes, where waste is determined as an activity or behavior that increases costs but does not add value. By eliminating waste, people can focus on value creating activities that customers want and are willing to pay for, thus leading to improved business processes (for example shorter lead times, fewer mistakes and lower costs). (Emiliani and Stec 2004, 622)

2.2.2 Benefits of Process Management

Companies that are capable to meet user requirements can attain competitive advantage over competitors. According to Bai and Sarkis (2013, 281, 284) BPM can accelerate organizational processes, reduce required resources and improve profitability, efficiency, effectiveness and competitiveness. Paim et al. (2008, 763) stated that business process management enables company to adapt fast organizationally. By managing the processes, the company has better control of results, better projection of objectives, costs and performance and thus the set targets are efficiently achieved. (McCormack et al. 2009, 793; Seethamraju and Marjanovic 2009, 921)

Emiliani and Stec (2004, 630) have recognized following benefits of business process management. There can also be found other financial and non-financial advantages in performance, human resource development, and resource allocation and exploitation:

- Short lead-times
- Reduced cost
- High quality
- High productivity
- Improved time-based competitiveness
- Balance of stakeholders' interests
- Customer satisfaction
- Conflicts reduced or eliminated

2.3   Role of information technology in business processes

Suitable information technology (IT) is an essential component and a natural partner for business processes. IT is usually both the enabler and facilitator of changes. IT contains information systems, hardware and communication technology, which provide the necessary information for individuals. By ignoring the role of IT, operations can complicate. Suitable IT capabilities enable particularly effective integration of human, business and organization together. (Bai & Sarkis 2013, 283) The usability of information systems is important because it affects on how people accept and use them.

Lahti and Salminen (2008, 19) defined digital financial administration as a state where every information flow and handling phases of financial administration are automatized and handled in digital form. All the information flows of financial administration should be made electronically with suppliers, customers, personnel and other stakeholders. Practically digital financial management is a process which consists of what people do, organization of work, information systems and technologies and as straightforward operating chain as possible, in which the target of automatization is to eliminate unnecessary and overlapping handling phases. Digital financial administration is flexible and easy and it usually improves the quality of operations and reduces mistakes. (Lahti & Salminen 2008, 21)

IT can play an important role in business process redesign; process improvements should be in terms information technology capabilities can provide. IT can generate process design options rather than just supporting them. (Budiono & Loice, 2012, 34-35, 40; Trkman 2010, 127) Lahti and Salminen brought this out too. In a best case the integrated information systems include all operations of a company and major of the bookings of the accounting is received through integration. For example when the project manager changes the status of a particular part of the project in the project management system, the system could create automatically an invoice from agreed project instalment to customer, and

create a booking from sales to income statement and the booking of account receivable to balance sheet by sales ledger. Additionally from same project event can further generate automatically new percentage of completion deferral and reversal of an old deferral booking. (Lahti & Salminen 2008, 39)

The present technology in use in the company also affects how processes can be supported and managed. Other IT software applies better than others, but acquisition of new technologies is costly. Also personnel's vision of business processes is meaningful. (Aparecida da Silva et al. 2012, 768)

Gurd et al. (2002, 208) regard innovative administrative services as competitive advantage. Digitalization makes possible to handle for example purchase invoices anywhere when a suitable device and Internet connection is in use. The process from order to invoice can be handled much faster. Information in digital form is generally more efficient and faster to handle, transfer, express and store than information in traditional physical form like paper. Thought electrical transactions are widely used, they are partly undeveloped. For example some forms of information are based on formats in which the information cannot be exploited straight in information systems or different systems are poorly connected to each other. (Lahti & Salminen 2008, 18-19)

Information technology diminishes the distinction between consumption and production. Consumers are doing notable amount of work to solve routine problems for themselves and for providers. (Womack & Jones 2005, 2) Hicks (2007, 233) emphasizes the critical role of information and systems for its management in efficient and effective operations. The objective of information management is to guarantee that valuable information is obtained and utilized in the company. The flow of information to the end-user through the processes of exchange, sharing and collaboration is essential and it should be optimized by minimizing waste of the process. (Hicks 2007, 233-234)

Organizations are highly depended on information and the amount of information is constantly increasing and hence by improving its comprehensive management, significant operational benefits can be achieved, for example in overall efficiency, responsiveness and in competitiveness. The management lean on information management systems. Information systems are usually commercial software applications that include a variety of methods and tools to support the particular activities of a company. (Hicks 2007, 234; Riezebos & Klingenberg 2009, 235-236) IT systems form usually a complex entity, often many different applications integrated to work together. That's why it is important to choose these applications carefully or recognize the need for customization.

The information management infrastructure includes not only the software, but also people, processes, practices and the information itself. New systems either do not help if the processes behind are not well managed. Reengineering of operative processes usually become relevant when acquiring new systems for the old processes do not necessary support the new system. The IS and processes related to it should be developed as an entity. The information sources and types differ from each other. One aspect for improving information management is to support the business processes themselves. Other improving aspects relate to management of information sources and to the integration of IS infrastructure and assessing the IS infrastructure according to Hicks (2007, 235, 237). Also work is done to increase the value of the information.

3 DEVELOPMENT OF PROCESSES

3.1 Development of processes

The development of processes is always related to other planning and development of the organization. Therefore it is based on the same vision, strategies and policies that guide organizations other activities. Management has to give clear assignments and objectives to process development as well as reserve necessary resources to implementation and deployment stage. (JUHTA 2002, 3)

The objective of development of business processes is to align them with company's strategic goals and to improve customer satisfaction. This can be achieved by developing these processes' quality, effectiveness, availability and by lowering their costs. Process development usually aims at improving the sharing of information and data, effectively deploying IT and reducing overlapping activities and duplicated processes. Important is that constant improvements are continued and that impacts are measured. (Damij et al. 2008, 1135)

Paim et al. (2008, 767) and Aparecida da Silva et al. (2012, 767) listed elements of organizational functions that are important to consider when managing and developing processes:

- Strategy
- Information technology (IT)
- Information and knowledge
- Performance indicators
- People and skills
- Policies and procedures
- Coordination of work and production systems
- Control and audit
- Innovation and improvement

Development of processes has several targets but usually it aims at enhancing the quality of operations and improving service level, managing problem situations and achieving cost savings. In practice this can mean new kind of centralization of things, removing overlapping work stages or adding collateral stages to fasten the lead time. Often measurability of process is wanted to increase, decrease the need for multiple approvals and enhance the usability and reliability of the process. Development leads often to forming new work teams or new way to organize processes. (JUHTA 2002, 3)

The present situation of process should be compared to the objects: does the present process produce outputs compatible to objects? It is not necessary to reform the whole process again, only areas that won't meet expectations. Even though it is worthwhile to reform the whole process in some cases. The extent of process development can vary from broad development projects to continuous developments. Broad development project can include for example deployment of new methods but often the change is about improving some part of the process. (Martinsuo & Blomqvist 2010, 7)

Damij et al. (2008, 1128-1129) emphasized the role IT in development of business processes. The development requires more than just observation, people should learn about processes. If the development requires IT, there should be good specifications on basis. People participating in process should have good understanding of other members' part of the process. For process can be improved, existing problems of the process need to be answered. Usually the development starts from a problem that wants to be solved. (Damij et al. 2008, 1136)

When planning the target process should be kept in mind simplicity and viability. When piloting the new process, should be checked that it answers to the objectives, does all tasks add value and is all information and materiel flows considered. All the excessive tasks, resources, and systems that won't add value, should be left out from the target process. The general phases of the development of processes are presented in figure 5. If the target process is perceived together

with the different parties participating in process, more aspects is likely to found, problems are better understood and participants commit better to the process and its' changes. Feedback received from the process can be used to its' improvement and management. (Martinsuo & Blomqvist 2010, 13-14)
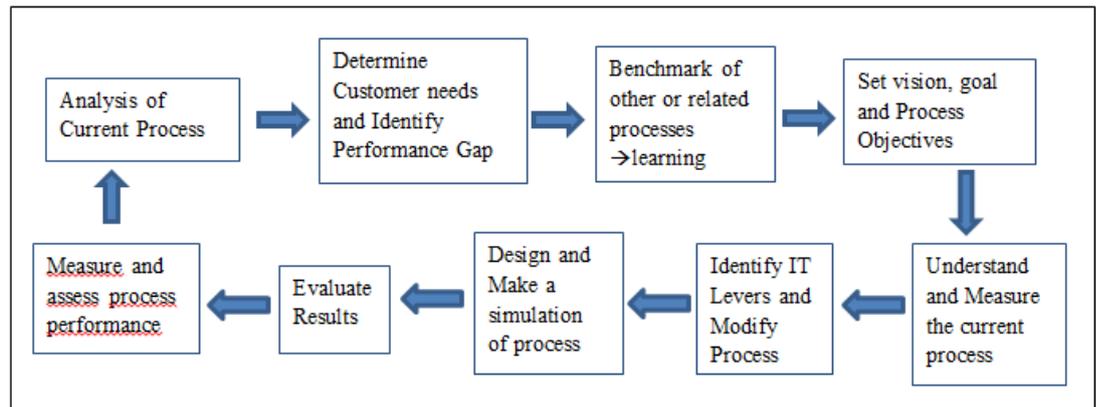
Figure 5. Stages of process development. (modified Budiono & Loice, 2012, 35, 36)

Before a wide scale implementation of new process, it should be piloted in real or in a modeled situation. Thus corrections can be made and flawed process unfavorable consequences can be prevented and it also gives information whether the new process solves any problems which it is meant to solve. The personnel and other stakeholders that participate in process need to be instructed to work according to new process. (Martinsuo & Blomqvist 2010, 7) It is important that the practices of process are documented and performance measurement is aligned with the new process.

Lee and Dale (1998) highlights the meaning of top management leadership in process development due to they are the starting point of any improvement process. Senior management are responsible for the vision, defining strategies, designing processes, lowering hinders and allowing employees to influence. Hence development can be said to be a senior management objective. (Lee & Dale, 1998, 217) In order to support constant improvements, process improvement should form a feedback loop. BPM performance can be assessed through monitoring and feedback from users to see whether it is reaching strategic goals

and objectives. The overall strategy of an organization and BPM need to be aligned to attain long-term success and improved performance. (Bai & Sarkis, 2013, 283)

Process development requires spaces are generated for process-based communication and negotiation, and groups are formed and managed in order to improve integration and flexibility in the company. (Paim et al. 2008, 708) Relevant in process development is changing the way of thinking, create readiness to question and break borders. Developing know-how and generating commitment are also important. (Hannus 2004, 109)

Hannus (1994, 161) determined the central tasks of lead time analysis as following:

- Description and analysis of present operative action with the help of a process map
- Decompressing the operative process to actions and evaluation of these actions:
    - Does the action bring real added value or not to the customer?
    - What is the lead time at the moment?
- Calculating time efficiency of the operative process (total time of value adding actions divided by total lead time)
- Benchmarking
- Work flow optimization by eliminating unproductive actions as much as possible

3.2 Modeling of processes

For the performance can be developed it requires information about present level of performance and about reasons that increase or reduce performance. Process modeling is a way to elucidate present or target process and visualize its' possible problems and needs for development, shorten the time and reduce cost and seek for alternative ways. To depict the current processes different data acquisition

methods can be used: interviews, group work, database analysis, observation, process modeling as simulation. (Damij et al. 2008, 1140; Martinsuo & Blomqvist 2010, 3, 7; Laamanen & Tinnilä 2009, 10-11; Lin et al. 2002, 19)

The modeling of processes starts by defining who the customers and other stakeholders of the process are, what resources it uses, is it core or support process, who involve to the process, what are the previous and next processes, what are the inputs and outputs, what are the value adding activities, and what kind of chain it composes. It is recommendable to draw a map from the process: where it starts and ends, what is its' direction (material and information flows can be described by arrows). It should also be thought that what gives an impulse to start the process or is it a constant process. Documentation ensures the quality, consistency and repeatability of performance.

The present process should start to model from the starting point. The target process on the contrary, prefers to start from the end (from outputs) and proceed to the start (what needs to be done before output is achieved?). It is important to recognize value adding activities, what decisions need to be made and what factors support the process. At first rough description from processes is enough but when it is wanted to dig into process more deeply, a more detailed description is required. A detailed description should separate tasks, the dependency of tasks to each other and roles and responsibilities to perform tasks. Also necessary know-how, tools and systems and other critical matters should be defined. When describing the present process need to be careful to not fall to describe the desired state. (Martinsuo & Blomqvist 2010, 10-11; JUHTA 2002, 5)

There are different description methods to present detailed processes, some of them are established methods and some organization's own, and they serve different processes in a different way. Written report often supports the graphical description. Damij et al. (2008, 1128) presented several business process modeling techniques like flowcharts, data flow diagrams (DFD), TAD methodology and Petri-nets. These can be used to model the present situation and

desired future state. This thesis uses flowcharts. Flowchart is a visual way to display the process. There are also other computer based modeling techniques that enable simulation of processes.

3.3 Bottlenecks of processes

Literature presents multiple bottlenecks that can be found from the processes. Various process management schools emphasize a bit different bottlenecks depending on what has been seen as their initial target group. Many of the process management schools have expanded to a comprehensive management of the whole processes of the company from examining only particular functions.

Lean is based on thinking that waste should be eliminated: specifically activities that absorb resources but create no value. There are eight waste types widely identified in the literature. (Womack & Jones 2010, 15) The wastes are the same for traditional manufacturing company as for a service company though their content differs a bit. Emiliani and Stec (2004, 623) determined wastes for a service company as:

> (1) **Overproduction**: doing work not demanded by customers.
>
> (2) **Waiting**: reviews and approvals.
>
> (3) **Transportation**: transportation of documents.
>
> (4) **Processing**: processing itself.
>
> (5) **Inventories**: data, work-in-process, and completed services.
>
> (6) **Moving**: finding information.
>
> (7) **Defects**: faults in data or documents.
>
> (8) **Behaviors**: behaviors that do not add value.

Queues reflect needless work for employees and reworking incorrect works is even more expensive. (Womack & Jones 2005, 4) Often time consumes to handling errors. In this case the process renewal should be built to once correct principle. (Hannus 2004, 113) TBM analysis often observes that real time consumers are the administrative operations which are why their effectiveness

should be gone through. (Hannus 1994, 163) Many organizations have problems in executing strategies related to efficiency, quality, speed and flexibility. Change realizes slowly and the organization may be stiff. Laamanen and Tinnilä (2009, 15) suggest that one reason for this is that people do not know what in their practical work is critical to success of the organization.

Hicks studied in his survey (2007) what are the wastes of information management and what is their nature. These wastes are presented in table 2. The information (data) itself contains value and the value can be increased in a way it is organized, performed, exchanged and visualized. These actions can also generate waste. Waste related to information usually concern retrieving and accessing information, the activities needed to verify and correct information, generally all additional (unnecessary) actions and any idleness that occurs due to not providing the information to consumer immediately and providing inadequate, non-accurate and non-up-to-date information. (Hicks 2007, 238)

Table 2. Wastes of information management. (Hicks 2007, 243)

	Information management	Information users	Manufacturing systems
1	Flow excess		Overproduction
2	Flow demand		Waiting
3	Failure demand		Extra processing
4	Flawed flow		Defects
5		Mass electronic communication	Transport
6		Legacy databases and file archives	Inventory
7		Gatekeepers/single seat licenses	Motion

In the context of information, it is difficult to define the value from supplier to user due to diverse meaning of information. The customer in this case is the end-user (employee) and the interest is in how the customer can pull value successfully. Therefore waste can be regarded as obstacles that deteriorate the information flow and prevent improvements to realize and customers' ability to pull product (information) and consequently pull value. (Hicks 2007, 239)

Hicks (2007, 239) identified following wastes related to information flow:

1. Flow of information is off due to broken process, unavailability of critical process or the information has not been generated
2. Information is unable to flow because it cannot be identified and flow activated or divided processes are incoherent
3. Excessive information is produced and sustained or excessive information flows, and as a result, the most suitable and accurate information is not easy to identify
4. As a consequence of incorrect information flows, inappropriate downstream activities, corrective actions and verifications may occur

These four sources of waste mentioned above lead to corresponding sort of waste determined below: (Hicks 2007, 241; Edmunds & Morris 2000, 19)

1. **Failure demand**: includes the resources and activities necessary to get through a lack of information. This may contain generating new information and/or attaining additional information.

2. **Flow demand**: concerns the time and resources consumed trying to recognize the information elements that need to flow.

3. **Flow excess**: relates to the time and the resources that are essential to get through excessive information for example information overload

4. **Flawed flow**: contains the resources and activities that are needed to fix or confirm information. It also contains the needless or inappropriate activities that result from its use.

Employees and the organization may not believe that the system offer necessary value or at least they will not realize the potential value to the company. Some hinders may appear because of a lack of understanding of waste. (Hicks 2007, 243) The main obstacles are not always in the type or level of advanced technology adapted, but in the role of humans using and controlling technology. (Riezebos & Klingenberg 2009, 235) Likewise, Ward and Zhou (2006, 191) pointed out that though it is relatively easy to buy appropriate IT solutions, it is difficult for companies to change their operating processes to exploit the benefits of these IT solutions.

Transport appears in information management as mass correspondence or e-mails. (Hicks 2007, 243) Waiting can relate to time that goes from information received by the first recipient till it goes to the end-user. One reason for information delays is insufficient data integrations between applications (Ward & Zhou 2006, 182). Hicks separated issues related to waste categories in table 3:

Table 3. Wastes related to information. (Hicks 2007, 242)

	Case	Effect of waste	Waste category
1	Information exchange	Inability to automatically exchange information and enable value to flow lead in additional processes to overcome poorly functioning processes	Flow demand
2	Manual systems and data entry	Processes are unavailable for information systems	Failure demand
3	Monitoring, control and costing	Information is required but that has not been generated and cannot flow	Flow demand
4	Information flow from customers and/or sales	Information does not flow and processes are not functioning so additional work is needed to attain information	Failure demand and flow demand
5	Functionality of information systems	Inability to perform certain functions to support the	Failure demand

		management and flow of information requires additional resources	
6	Information storage	Unnecessary information is stored – partly because of a lack of understanding of potential value	Flow excess
7	Information availability and accessibility	Time and work are needed to identify information (flow) and unavailability of processes to support the flow	Flow demand and failure demand
8	Information identification, location and organization	Identification of information flows. The level of resources increases as the amount of information increases	Flow demand and flow excess
9	Information completeness and accuracy	Work necessary to verify and/or correct information and the implication of its use	Flawed flow
10	Information duplication	Effort necessary to arbitrate between multiple instances of information	Flow demand and flawed flow
11	Information currency	Out-of-date or inaccurate information call for additional work to verify and/or update information	Flawed flow
12	End-user developed applications over COTS information systems (COTS=commercial-off-the-shelf)	Acquisition of additional resources to overcome limitations of existing process and an effort to minimize cost (waste)	Waste reduction and failure demand
13	Paper systems over COTS information systems	Master records are sustained in an attempt to eliminate waste however they may arise due to failure of existing processes	Waste reduction and failure demand
14	Information systems use, maintenance, implementation and customization	Activities are perceived as a waste by members of the company but undertaking these activities might improve flow and eliminate waste	Value
15	Implementation and operation	Activities are conceived as a waste	Value

	of quality systems	by members of the company because the value to the company is not understood or is lacking	
16	Information systems strategy and planning	A lack of understanding of the value of information and its flow across the company can lead in poorly performing system and possibly to waste	Value and waste

3.4 Ways to streamline processes

3.4.1 Lean Management

Womack and Jones (2010, 22) regard rethinking of work tasks as the most remarkable ways to attain continuous flow of work. Correspondingly BPR consider rethinking of the present processes a good way to find improvements. In order to achieve the continuous flow of designing, ordering and providing of the service, focus must be on the service and its needs, instead of the organization or the equipment. According to Womack and Jones (2010, 10) Lean thinking can be summarized in following principles in order to maximize the flow:

- Determine the value of specific product or service accurately
- Recognize the value stream for each product and service
- Allow the value flow without interruptions
- Let the customer pull value from the supplier
- Reach for perfection

The fifth principle can be supported in the organization by encouraging employees to notice development areas and to make development proposals. Also Emiliani and Stec (2004, 634) identified similar solutions to repair the operations: question the process, encourage system improvement, support improvement opportunities, and recognize and eliminate bottlenecks. Smooth information flow helps to predict future and helps decision making.

In every event where the consumer is forced to spend time for no return in value, the provider should ask how the process can be changed to eliminate wasted time. By removing inefficiencies from the provision stream, solves both providers' and customers' problems. Process rationalization is a key factor in attaining improvements. (Ward & Zhou 2006, 179-180; Womack & Jones 2005, 4)

Traditional mass-production measurements lean on assumption that a company can maximize profitability by maximizing the use of different resources. On the contrary, lean thinking claims that profit is maximized by maximizing the flow (flow of information, material, cash) at the pull of the customer. (Maskell & Kennedy 2007, 61) Ward and Zhou (2006, 179) noted that as Lean focus on excluding everything that is not necessary IT usually does the opposite: it enables larger amount of information, more functions and features; more is better.

Lean thinking responds to these wastes by providing a way to define value, line-up value-creating actions in the best stream, lead these activities without interruption at any time someone asks for them, and make them more and more effectively. Shortly; less equipment, less human effort, less time and space to meet customers' needs more and more better. Human respect is also essential. (Womack & Jones 2010, 15)

Lean organizations prefer simple visual systems instead of complex systems. Visual systems make it easier to run the businesses for the people in the company. Important starting point is to understand the customer value and the value stream performance. (Maskell & Kennedy 2007, 65) Lean practices tend to standardize the processes and utilize the efficiency from the standardization. Without standardization the processes are too unstable to control effectively. (Ward & Zhou 2006, 195)

3.4.2 Digitalization

Correspondingly to Lean thinking digital financial administration philosophy aims at developing and redesigning financial processes to eliminate unnecessary work

steps (though they could be automated) and to perform the remaining works as fixed as possible. Digitalization reduces also mistakes when systems and connections take care of the major of work phases which are traditionally saved manually. Human recording mistakes and miscalculations reduce essentially. The disadvantage is that mistakes duplicate in masses and depending on system, the correction of mistakes can be laborious. (Lahti & Salminen 2008, 21, 28)

Digitalization is the only way to survive from increasing control and accountability requirements. It improves transparency and makes possible to drill into data. Integration of different systems reduces handling and feeding same information many times and improves and accelerates the information flow. For digitalization can be fully exploited, the information should be taken to systems from their initial source. This means that the data is fed in first systems by employees, customers or other partners. This can also mean that the data is taken from Excel lists if it can be fed in the system. (Lahti & Salminen 2008, 28-29, 78)

3.4.3   Modeling

One way to seek bottlenecks is value stream maps. Value-stream maps can be divided into two types; current state and future state maps. Current state maps describe the current way how material and information are processed. Current state value-stream maps reveal the wastes that exist in a process and distracting information signals. With the help of results of current state map, the consumption of resources (time, human, financial, equipment, space) can be maximized. Future-state value stream maps show the desired future condition, where the necessary improvements are made. Improvements are derived from current state map and by thinking creatively how the process can be improved. Future-state value stream map can be made for a longer time span. (Emiliani and Stec 2004, 623)

Value-stream maps can be used in the field of accounting to specify the process costs of a value stream. Cross-functional teams create value-stream maps of processes they are directly involved. The information provided in value-stream

maps help to calculate current- and future-state process costs and to generate value-stream profit-and-loss statements. It also helps to elucidate the blocks of information flow between key stakeholders (employees, customers, suppliers). (Maskell, 2001; Maskell & Baggaley, 2003).

When modeling the process there are possibilities to simulating analysis if resources used by the task, lead time, labor input and costs can be added to the job description. (Hannus 1994, 32, 52) It helps at recognizing overlapping actions and thus elimination of them.

3.4.4   Other techniques

It is beneficial to consider the whole process instead of focusing only to results because therefore successful results are unlikely to be repeated where as poor results are likely to be recurred regularly. Also the root cause for the errors can be found quicker and counteractions adapted quicker. The first point to improvements is to question the process. Personnel ignore easily the improvement opportunities if they are not encouraged to do that. Individual managers may encourage to local process efficiencies in their own field but then the entity may suffer. (Emiliani and Stec 2004, 630, 634) This highlights the meaning of executive staff. The vision of necessary improvements needs to be common for all managers, to not create conflicts between people in different parts of the company because of simultaneous implementation of competing visions of improvements. That is why it is important to support the flow of information between people.

In value analysis the whole process is looked over to analyze is the action value adding or non-value adding activity. Non-value adding activities are tried to eliminate by streamlining the process and these released resources used to value adding activities or release totally. (Hannus 2004, 111)

Quite same idea is in lead time analysis which main target is to shorten time that goes performing the process. Every stage is reviewed and how much time goes for value adding and non-value adding activities are under analysis. The non-value

adding time is tried to shorten by redesigning of process. One way for this is creating cross-functional teams and by adding apposition in process. (Hannus 2004, 112-113) The flowchart does not reveal the time pass but it expounds the vain activities. Lead time analysis focus on time.

Development of capabilities and thus creating preconditions for success and excellence are central in Total Quality Management. Quality costs are all those costs that would disappear if all would be made right at the first time. (Laatukustannukset 2013, 2) It is better to do everything right at the first time. Unnecessary activities which are secondary to final result need to be given up. These are producing useless documents or feeding same information several times. Target is to make things right at the first time and avoid inspections and correction of errors. (Martola & Santola 1997, 32)

Benchmarking of processes is a one way to improve performance of processes and seek for the best practices. But it should be noted that methods that fit in one case won't necessary bring same benefits in another process. Active personnel and training is also essential.

Process management is based on team working and apposition. Apposition means elimination of unproductive time, shortening of total time and producing information (or service or product) that corresponds to the needs of customers and stakeholders. Tools to apposition are simplifying, standardization, free information flow and tools that support it. (Hannus 1994, 159)

3.5 Measurement of processes

Aparecida da Silva et al. (2012, 767) announced that measurement is important but even more important is the continuity of the measurement, monitoring and process inspection. The general process must be observed and wanted results understood to define what to measure. BPM supports increased responsibility through the results of processes and requirement to monitor processes and

continuous improvement. Measures of processes can be divided to three groups: cost, quality and time parameters. (Lee & Dale, 1998, 220)

The aim of the service provider is simply to make a quality product, ready when the customer wants it, to be done in smooth continuous flow. Appropriate measures to reflect the provider's progress toward these targets include the number of faults (quality), on-time delivery (customer satisfaction) and day-by-the-hour (continuous flow). The value stream should target to smooth flow from material receipt through customer delivery, product cost, profitability and inventory reduction. (Maskell & Kennedy 2007, 67) cost, quality and time are essential. Operations management, strategic priorities and situations determine the design, execution, management and measurement of processes. (Bai & Sarkis, 2013, 283)

Performance measurements support the evaluation of processes. Companies have two main reasons to understand and measure the existing processes before they are redesigned. Problems of existing processes need to be understood so that they will not repeat in the new process. The performance measurement of existing processes is important due to knowing the baseline for further improvements. (Budiono & Loice, 2012, 38-39)

Good monitoring system takes into account both inputs and outputs and process functionality itself with respect to objectives. Good measures characterize the real performance of process and produce reliable, simple and understandable information, work as automatically as possible, and give clear picture, how operations should be developed. Measurement system's principle meaning is to assist the control of process and constant improvement. Process measures usually direct the attention to these measured areas. (Martinsuo & Blomqvist 2010, 16)

Lean organizations prefer performance measurements that reflect the strategy of the company and to motivate to Lean actions. Measurements of the key processes within the value streams enable excellent control of the processes. By measuring

the value stream as an entity, it motivates to continuous improvement efforts of the value stream team. Corporate measurements allow executive staff to monitor the success of the strategy of the company. (Maskell & Kennedy 2007, 61)

3.6   Implementation of new processes

Bai and Sarkis (2013, 281) regarded that there are many potential operational, strategic, organizational and technological factors that affect to success and failure of an implementation of a new process. Development of new procedures often suffers from resistance, this is resistance to change. The successful implementation of a new process model requires overcoming some barriers or restrictions. Literature has presented following main barriers linked to segment, people or company: (Bandara et al. 2005, 352-353, Bandara et al. 2007, 1245; Trkman, 2010, 126)

- Questions related to technology
- The same organizational culture
- Process concept is poorly understood
- Integration between the methodologies, techniques and tools of different areas of business is modest
- The absence of basic process oriented management culture for the whole organization
- Leadership and direct participation of the executive staff is inadequate
- Incentives and rewards to encourage to adapt the new processes are missing
- Necessary resources to process implementation   are missing or mismanaged

Gurd et al. (2002, 207-208) and Paper and Chang (2005, 125) brought out that also organizational variables affect on company's readiness for change. If the improvement area concerns customer service, the customer may have set own restrictions to development project. Culture is one of the biggest barriers for change. If people feel that the change is beneficial to them, negative attitude

towards new processes and procedures will decrease. Administrative changes can lead to new organizational structure.

People's participation is a critical success factor and thus also executive staff has an important role to achieve desired involvement. New processes may generate conflict between those who favor receiving orders and those who favor more responsibilities and in order to ease the possible conflict, support for the transition need to provide. (Aparecida da Silva et al. 2012, 766)

Culture encompasses values, beliefs, attitudes and behaviors in peoples' mind that separate one group of people from another. Invisible values appear in visible actions and structures. The effect of culture-related activities has usually much longer time horizon than activities related to other issues. There is a need to identify areas where intervention is required and resources allocated. The new process model call for a cultural fit for process objectives can be achieved (Bai & Sarkis, 2013, 284; vom Brocke & Sinnl 2011, 358-359, 369)

By assisting cross-functional communication and co-operation in a company, it results as mutual understanding and congruence of strategic direction and goals of the organization. Clear and effective communication at all levels of an organization is required. In order to motivate the movement, executive staff should communicate with employees and the communication needs to be uniform. (McCormack et al. 2009, 794, 803; Bai & Sarkis, 2013, 283-284)

Gurd et al. (2002, 209-210) listed following elements for successful adoption of new processes:
- Leadership skills combined with clear communication of targets and strategies
- Committed management and sponsorship (specially key individuals) with compatible strategies
- Incentives align with company's objectives
- Compatible reporting systems

- Personnel is involved in development from the beginning to indent the people to development project

The company should present operative objectives for functions of the company to make process objectives identical to corresponding business policy and to show direction how these objectives can be achieved. (Cheng et al. 2011, 34) The most challenging in implementing the new process is driving a new approach into the organization and train and indent people to use new work tools and procedures. (Hannus 1994, 146)

In some cases it is possible that the team is not enabling to execute the future state because the change needs simultaneous changes in many functional areas. Reasons may be resistance to change, unfamiliarity of improvement methods, or the fear that the improvements cost too much or take too much time to execute. (Emiliani and Stec 2004, 627)

Setting performance levels, forming a process vision, determination of new processes, plainly defined roles and operational program are important tasks in process renewal. The relevant challenge is implementation and change management related to it. Change management and control face remarkable challenges when developing broad process renovations. (Hannus 2004, 110) Essential is to have awareness of how cultural aspects affect and are affected. The implementation requires more than just having good systems and the right structure in place.

Savvas (2005) reported that cultural resistance is one of the main causes for new procedures failure. This is due to scarce identification of a need for process change or general process thinking of employees. Hence a project's success may depend more or less on a shared mutual understanding of why and how, for example process orientation is benefitted by a new IT system. (vom Brocke & Sinnl 2011, 358)

Approaches that emphasize learning aim at improving people's ability to work with new successful way. This may require new skills and knowledge, new kind of understanding or attitude. If the new way of acting requires new kind of thinking and attitude, change management is in place to guarantee that the change succeeds. If the managers won't change their thinking and action first, the new procedures do not remain. Following principles are good to be aware of: (Laamanen & Tinnilä 2009, 41)

- Person can commit to new procedures and processes only if he is aware, understand and accepts new procedure. In addition, if the new procedure requires development of skills, training is needed.
- Influential person can prevent remarkable changes in organization. That is why their support is required. However, the influential persons do not make the revolution.
- People's reaction is often emotional and it cannot be influenced only by factual basis. Human won't change his action based on information, also time to consider the change and possibility to affect to the change is needed
- People react different way to change, some seek for adventure, some look for security

Paper and Chang (2005, 121) had noticed that implementation of new procedures and processes can fail if training has not invested enough, employees are too tied to old technologies and manners or if the IT does not support new process. They also emphasized the meaning of people's skills, reward system and change ready to IT capabilities. The readiness of change is affected by how people experience the situation.

4   INVOICING IN THE CASE COMPANY

4.1   Presentation of the case company

The case company is a leading provider of industrial services in Finland. The company offers maintenance and investment services to production plants for all industries and business also covers international export operations; prefabricated products are delivered globally. Company supplies technical systems and processes as projects for industry. The business can be divided into two parts: to maintenance business and project business. Business faces seasonal fluctuation to some extent.

The project supplies are based on own design and prefabrication in own workshops in Finland. The company's target is to offer comprehensive maintenance to its partners. The company offers plenty of industrial maintenance services which can be flexibly connected with one contract. Services range from single assignments to comprehensive maintenance of the entire industrial plant. The strategic customer need specifies what kind of services is provided.

4.2   Information systems

The company has one common ERP system for the maintenance and for the project business. The working hour monitoring systems instead are own for these two businesses. The ERP system and the working hour monitoring systems are the most significant systems for invoicing. These systems are presented next. There are also other systems and applications in use, but they do not have such a big role in invoicing. For example O-COUNT is a tool for offer calculation and work planning. Mepco is browser based software for business reportage and analyzing.

M80

M80 is a maintenance system which is used in the Maintenance business. M80 guides and controls the maintenance, inventory, personal event booking, personal

event acceptance and repair, invoicing and sales orders to EMCE. M80 operates in web environment so its' usage requires a computer and an internet connection.

For ordinary employees M80 is mostly working time booking system. The user interface is quite simple as well as the working time booking in M80. Responsibility of the supervisor is to approve staff's hour bookings. The system won't send any email to supervisor that he has bookings to accept but it is agreed that the supervisors should accept their employees' hours once a week because the hours transfer to payroll once a week. The employees book their hours once a week too.

The decision whether a job is to be invoiced from a customer is made in M80. The work numbers are found in M80. It is important that a work order is made because work hours cannot be booked without it in M80 and purchase orders cannot be made if there is no work number, in which the material is ordered.

WorkT

WorkT is used in project services. It works as salaries pre-storage system of officials and employees. Also subcontractors' employees' events can be followed through the system. WorkT is used in work time monitoring: it calculates work time automatically and classifies surpluses, flextime and hourly works. It enables real-time viewing of realized hours and strain of resources. Superiors can check and approve works and projects from user interface.

WorkT includes also reportage properties like work time reportages, payroll administration reportages and subscribers reportages. The employee clocks the day's events through stamping machine, supervisor inspects and approves them, after which they are transferred to EMCE once a week. The problem of WorkT is that as a separate device it cannot be used in every worksite. On the contrary, employees clock themselves in and out through customer's stamping machine in some worksites.

EMCE

EMCE is the ERP system (Enterprise Resource Planning) in the company. ERP system is an information system in companies that integrates different functions like manufacturing, inventory management, supply, invoicing and accounting. The ERP systems can consist from different modules. It aims at increasing efficiency when same system serves different functions and the information is available for everyone. The information needs to be fed only once and the information is available at real-time.

Inventory can be managed through EMCE and it is also the place where invoices are made. The customer specific margins can be recorded and received from EMCE automatically with a click of a button. The different invoicing methods in EMCE are 1) invoice based on sales order and 2) separate sales invoice without a sales order. M80 is an important source of invoicing material. There are several connections to EMCE and from EMCE to other systems. The main connections in light of invoicing are presented in figure 6. The information moves automatically between the systems.
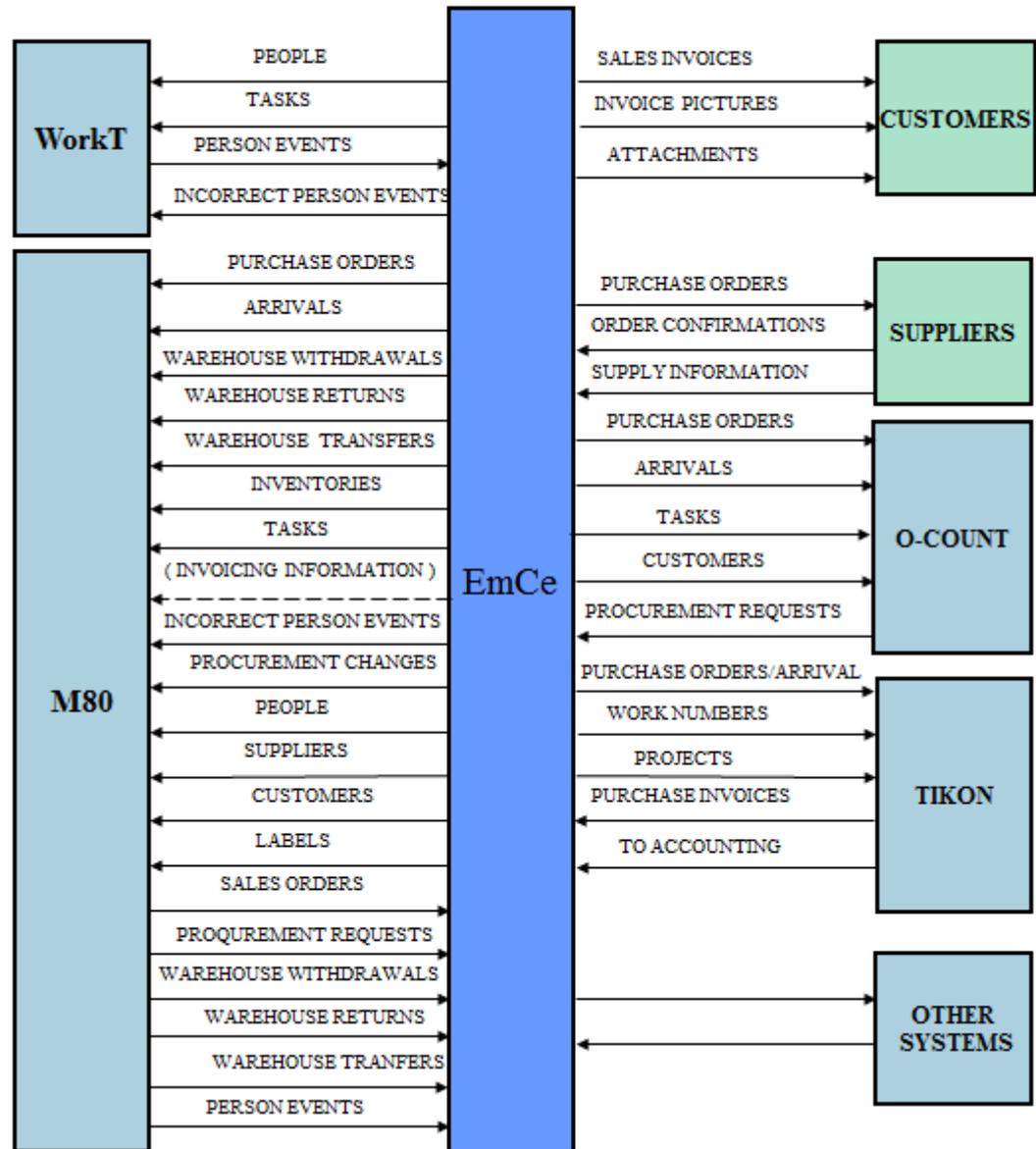
Figure 6. EmCe connection diagram.

Tikon

Tikon is the purchase invoice system in the company. Invoices arrive mainly as e-invoices straight to the system but a part comes through outsourced scanning. The Master handlers put the arrived invoices further in the cycle to an approver of the invoice. For most of the invoices there is an order in EMCE: the order is reached in EMCE when the goods have arrived, after which some of the invoices will go to automatic alignment, and some of the invoices are aligned manually. The Master handlers perform the manual alignment.

In Tikon there is an automatic entry and also automatic order alignment for the wholesaler's web orders. Invoices that do not have orders go for so called normal cycle for inspection and approval. The acceptance of invoices based on order is performed when the order is reached. After that the invoices are transferred to the accountancy and to payment on due date. Information moves from Tikon to EMCE every day automatically.

4.3   Different invoice types and contracts

Both sales and supervisors acquire new works. Works acquired by supervisors are smaller and concern singular cases. Large and lengthy contracts are acquired by sales. Contracts made with the customers affect significantly the invoicing as the contracts usually define when the customer can be invoiced. The fixed contracts in which fixed amount is invoiced are easier and there is no possibility to invoice these instalments more often unless the contract is changed. The unit-price work and additional work instead have the possibility to be invoiced more often.

Contracts can be based on partnership or be fixed contracts, single projects, hourly rate contracts or shut down work. The contracts are quite often customer specific. The contracts with customer differ much because the range of services is broad and they can be combined in many ways. The industry sector which customer represents also affects what kind of services they need.

The different invoice types can be divided into four groups. These are presented next. The invoices in categories are not perfectly identical. The customers and work types give their own features to invoices. It is also possible that some invoices can move to another group if invoicing policies are changed. All the invoices are made in EMCE, but the invoicing material comes through different sources.

Project invoicing based on instalments

Project invoicing based on instalments are agreed together with the customer in the contract. Project is divided into instalments which have specific due dates or they are bound to progress of the project. Usually first instalment is invoiced before the works have begun. Instalments invoicing is easy because only a simple sum needs to be charged.

M80 invoicing

M80 invoices are based on realized hours and used material (material belongs always to M80 invoicing) but they can also be made without material invoicing. Works outside the fixed-price contract belong to M80 invoicing. M80 invoicing is done principally always in a same way: the realized hours are booked in M80, of which they are automatically transferred to EMCE once a week. Material rows come from EMCE (material rises to invoice when the purchase order is reached and purchase invoice directed on purchase order) or in some cases straight from IP to invoice. But not all material rises if the purchase order is not made. In this case the material needs to be added separately. Prices are set for the material and work done (prices come mainly from customer specific price lists stored in EMCE) and after this a pre-invoice is sent to a supervisor or project manager. After the pre-invoice is approved the actual invoice is sent to a customer. More invoices could be made as M80 invoicing if some modifications are made to invoicing process.

Additional and modifications works (project)

Additional and modification works are works that won't belong to contract and they need to be invoiced separately. They are an essential part of project's incomes. Additional works are documented in Excel-files by worksites. The Excel-files are also in use of the project manager. Project manager sets the prices for additional works and delivers the invoice data and possible attachments to assistant who makes the invoice and sends it to the customer. Additional works must be always approved in writing by the customer before they can be invoiced. Possible additional works invoices made in hourly-rate need to be attached by

hour paper confirmed by the representative of a customer. Some of the additional works could be prevented with better planning.

Other invoicing

This category contains a heterogeneous group of invoices, both material and made hours. Common for these invoices are that the information moves unofficial routes to the assistant (for example by Excel or papery lists). These invoices have potential to move to other categories by changing procedures and this may be even recommendable (especially to M80 invoicing group). But it is not necessary to delete this invoice group totally because exceptions and single cases always exist.

4.4   The current invoicing process

Company's nature as a service provider and as a project supplier affects significantly to company's operations and the difference to product manufacturer is considerable. This reflects also to the invoicing. Material consumption is slight and the work carried out is in major role in invoices. In case of large projects advance payments and project's instalments are significant source of funding. The progress and extent of project is important to be verified as early as possible to get the invoices further more quickly and that is why the measurement forms an important part of the invoicing.

To define the present invoicing process and possible problems of it, interviews were made to personnel in different localities. For this thesis 29 people were interviewed in eight localities and their representation can be considered good. The interviewees represent different groups of personnel; assistants in administrative services (10 people), project managers (7 people), supervisors (7 people) in worksites and unit managers (5 people). Interviews were made face to face. The interview questions are presented in appendixes 2 and 3. Every interviewee also drew a process map of invoicing process how they see it. From these drawings and people's narrations are formed the flowcharts which are

presented in appendixes 4, 5 and 6. In addition to the differences between project and maintenance's businesses' procedures also these localities' invoicing processes differ from each other. The differences exist due to the nature of works which are different, contracts with customers are dissimilar and customers are dissimilar. People also act in a different way but they are not always aware of how other localities act.

The division of work goes as follows in both maintenance and project business: the assistants make the actual invoice and the invoice material comes from project managers and supervisors. The figure 7 expresses the division of work.
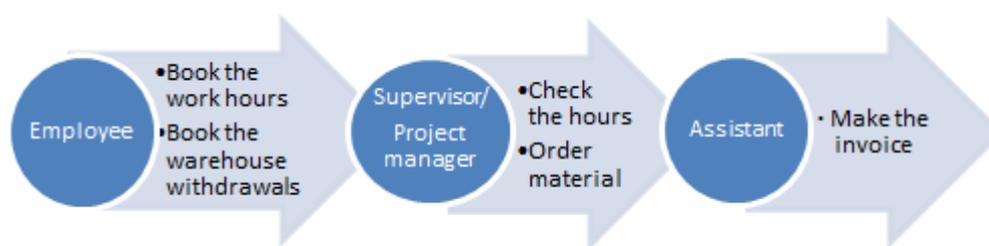
Figure 7. Division of work.

Either assistant, supervisor or project manager takes care of pricing. Division of work varies between localities, but inside the locality the division of work is usually fixed though exceptions appear. The responsibility that everything comes invoiced is on the supervisor. Employees book or stamp their hours to working time monitoring systems by themselves. In maintenance business where the M80 is in use, the hours are booked once week and in project business the employees clock themselves in and out every day. The supervisors inspect employees' work hours once a week. The unit managers do only some or none of the invoicing but they do monitor the invoicing.

The booked hours act as a basis for payroll but also for invoicing in many cases. If the project uses M80 invoicing, the hours come straight from the M80 to EMCE and material from Tikon or from EMCE if the purchase orders are made correctly. M80 invoicing is the target in units but it does not realize in every project. Other invoicing happens too; quite often the invoicing material is collected to Excel by the supervisor. This can be due to customer desires to use its own invoicing basis.

Besides Excel-files, supervisors bring invoicing material on paper which are possibly handwritten.

The project business does not use M80, they receive the invoice material from Excels, WorkT or somewhere else. In some cases the project business uses customer's working time system and the customer sends the information of work hours to supervisor (supervisor also hold own book from employees' work time). Project manager needs to follow the progress of the project so he can charge the project instalments. The main responses of work sites are acquiring enough material, doing the work and the reportage of work.

The invoicing process can be said to be a strategic process to the company for the company aims at improving cash flow. Like the figure 7 demonstrates, the rate of standard format is high: the impulse for invoicing comes when project manager/supervisor sends invoicing material (or in two week cycles) and the invoicing material is collected when the work is done. The coherence instead is low. The methods how invoicing material is collected and invoicing types differ in units.

The three flowcharts from invoicing process presented in appendixes 4, 5 and 6 express currently the best invoicing process in maintenance sector, inefficient case and process of project business. There are also processes between those which are presented. However, it is not worthwhile to present almost thirty different processes. It can be said that there is almost as many processes as operators. The selected flow charts describe the overall situation well enough.

4.5   Problems of the invoicing process

The company has started to follow its invoicing in a daily basis. The invoicing activity does not vary between months though the amount of invoices differs due to seasonal fluctuation. The problem is that the invoicing is still emphasized on the end month like figure 8 also reveals. The last two days invoicing is almost 25 %

of the whole months invoicing. If the term of payment is 30 days and the cash is not received until the next month, the accounts receivables stay in the balance sheet for two months deteriorating working capital. The company has noticed the objectives of invoicing in its incentive program. The unit is rewarded if the net working capital reaches specific result.
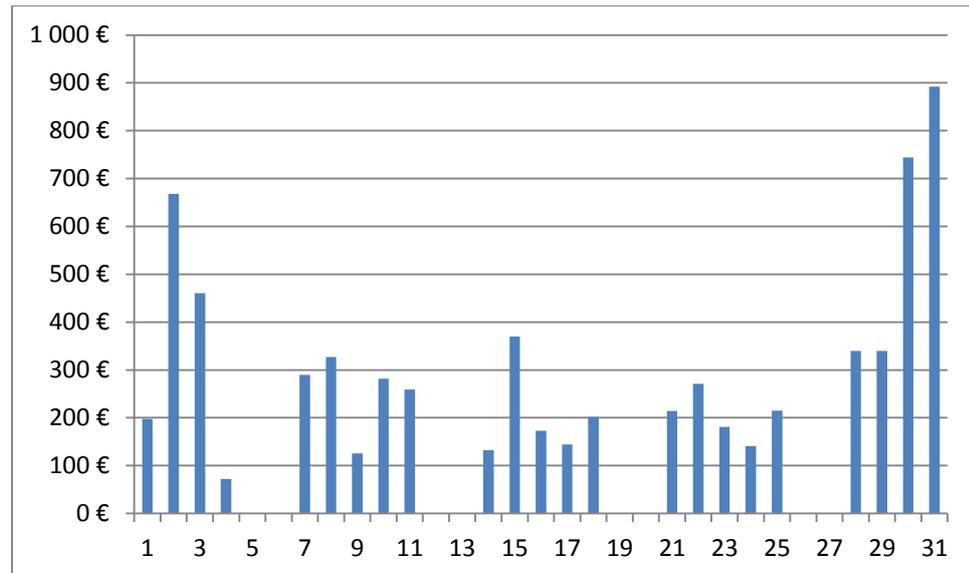
Figure 8. Daily invoicing in the case company from a month period.

The company has also invoicing rate report which tells how big share of employees' hours will be invoiced from a customer. It does not tell whether the hours are actually invoiced, only what are the notes made in M80. All preparation and planning hours should also be invoiced from the customers.

The problems of the present invoicing process are formed based on interviews. With the help of the interviews, report of activities and from personnel's own experience, bottlenecks of invoicing process can be found. The same problems were repeated in different localities and the different groups of personnel were quite agreeing of the bottlenecks. The maintenance and project business are dealt together though their systems differ from each other because the problems are quite the same to these two businesses. The maintenance business also takes care of maintenance as a project. Common issues that the interviewees raised up are presented in figure 9.
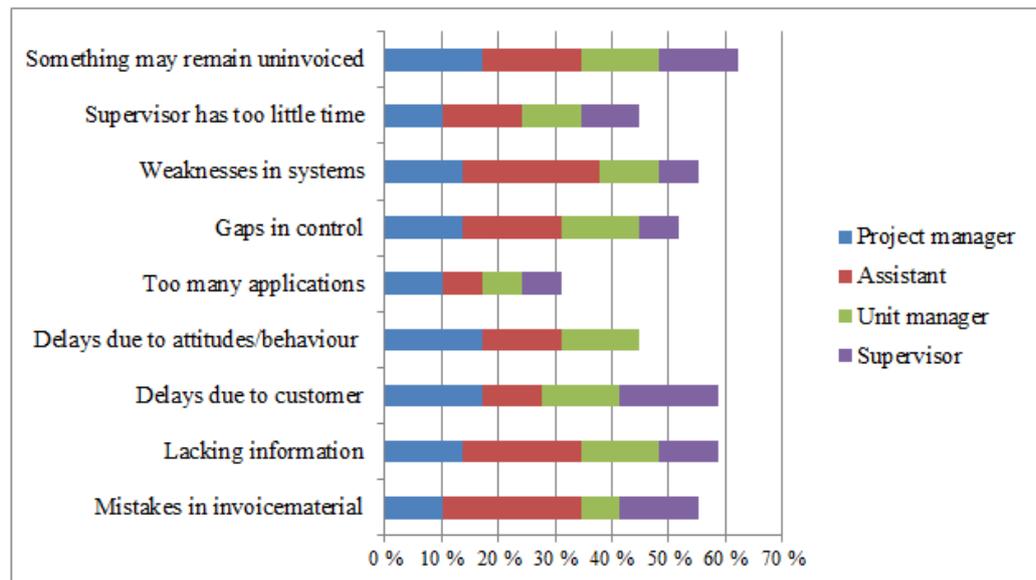
Figure 9. Results of the interviews.

Mistakes in invoicing material

Over half of the interviewees said that the invoicing material contains mistakes. Especially assistants felt this way, some more and some less. This caused inspections and inquiries after the data from the supervisors. The checking takes time and thus causes delays. The project managers and supervisors also felt that the invoicing material could contain mistakes. They felt that these mistakes came due to fault bookings of an employee or customer or own wholesalers. Also false work numbers existed.

Lacking information

Almost every assistant felt that the invoicing material was sometimes lacking information. Material could not be invoiced, if it did not have certain information. Customers can also give notice if they think the invoice is lacking information. Supervisors felt in their own work that material lists received from the employees were missing material, which could lead to that the material is left invoiced if no-one notices. The material took from the inventory did not necessary include price or code which are required for invoicing. The customer may not inform all the

necessary work orders. The lacking information causes additional inquiries and takes time.

Delays due to customer

Considerable amount (58 %) of respondents felt that the customers caused delays. This appeared in approvals of works done; the invoice could not be send if the customer had not accepted the work. Sometimes the approval took time. Some customers also wanted their invoices in specific form and very accurate cost allocations. The additional and modification works must be approved by the customer in writing but if the approval was only spoken, the approval in writing might be delayed. Sometimes the work orders came late which led to that the work hours and material could not be booked. Some customers have their own invoicing basis which they demand to be used.

In some cases the supervisor at worksite brings the papers to the representative of customers for approval or the representative of a customer checks the work on place. If the customer has no time at the moment, the approval delays and as a result, the invoicing delays. The customer can also question the work done and there have been conflicts from additional works; the customer can refuse approving and consider that work belongs to contract. Some supervisors felt the situation conflicting when superiors demanded for quicker invoicing but the customer instead wants only one final invoice instead of many small ones.

Delay due to attitudes/behavior

The unit managers raised the point that delays and more work occurred if the supervisors did not act according to agreed procedures. This meant usually that material orders were made past the system. Some supervisors felt it easier and faster to make the purchase order by a phone call (or visit on-site on a wholesale) but as a result, more work was required when the order needed to be fed in the system later. Allocation of purchase invoices also gets more laborious: after time passes it can be hard to remember what orders were for which work and there is a possibility to even forget the whole order. The material is invoiced when the

supervisor has time to walkthrough the material acquisitions. This may take some time. When ordering through the system, the system requires determining for which work the order was made and then the information moves automatically from system to system and to the assistant and cost allocation is made in connection of order. Figure 10 shows two existing purchase invoicing process at the moment reveals the vain work done when things are not made straight to systems and purchases are not made correctly in EMCE.
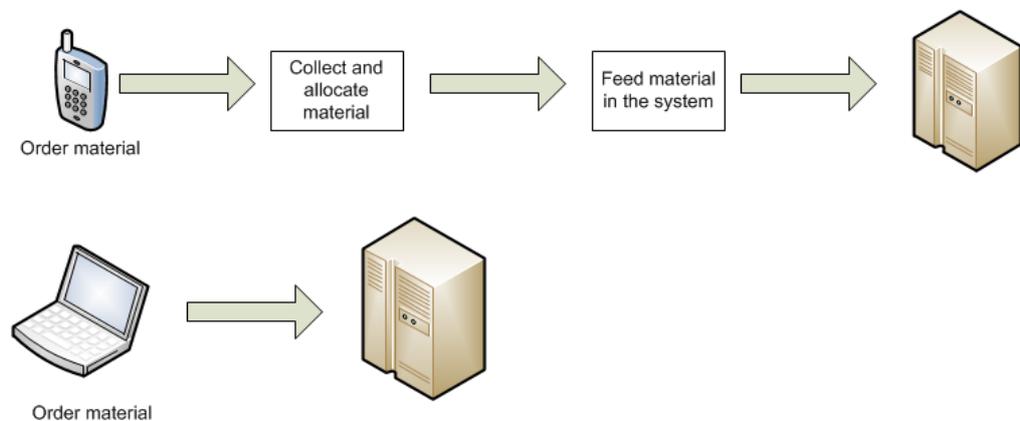
Figure 10. Two purchase invoicing processes.

In the best practice at the moment, the supervisor makes the purchase order with computer (or smartphone) giving the work numbers for order at the same time. This process is much faster and not so laborious. The same thing realizes when an employee goes to a wholesale to buy material and the supervisor has given the necessary work numbers for the order. There are contracts with wholesalers that the purchase invoice goes straight to Tikon and the work order can be added to an order and the confirmation from order is send to supervisor.

The assistants thought that they could invoice more often and earlier if the project managers and supervisors would deliver the invoice material. Some of the supervisors and project managers delivered the invoice material usually in the end of the month. The assistants felt that the collection of invoice material was made in a hurry and doubted whether a person can remember everything from a month period especially if the invoice material is not in a good order. Some of the assistants felt constant reminding unpleasant. They also thought that the project

managers/supervisors should shift on M80 invoicing but they did not do so because they did not want to.

The approval of employees' hours can hold up but it is not necessarily supervisor's fault. Every supervisor stated that some employees book their work hours on time, but there was always a few employees who booked their hours only in the last minute or late though it was agreed that the work hours are booked once a week. Hence the supervisors need to rush these employees which some of them felt frustrating. There was a suspicion that all the employees did not remember to book all the work or inventory withdrawals.

Weaknesses in systems and too many applications

55 % of interviewees thought that the systems contained some weaknesses. For assistants the weaknesses were mainly slow connections. Some supervisors also thought the connections are too slow. This caused frustration and prevented the smooth running of the work. Slow connections can cause that people avoid the usage of systems. Other thing that the supervisors and project managers mentioned was that the two systems (EMCE and M80) do not discuss with each other in case of arduous work. They also considered that the systems did not serve them right or found the systems difficult. Some interviewees felt the use of M80 laborious and time-consuming.

About third of the interviewees felt that there were too many applications. Many of the interviewees hoped that everything could be made only with one or two systems. Too many applications made the tracking more laborious when staff took different reports from different systems and compered them to each other. Too many numbers of applications can result in that all of them are not managed properly and it does not make work flow optimal.

Gaps in control

Most of the respondents considered controlling as poor. Some interviewees saw that there is no way how they could verify that everything is invoiced. Some of

them however felt that they can reliably check whether everything is invoiced from different reports or systems. Dissatisfied employees felt that it is laborious to try to check things from different sources that everything is invoiced. The nature of the work and what systems are in use affect this. One reason why control could not be made reliably was that if material was taken past the systems, it cannot be verified almost anywhere. Overall everyone considered that monitoring could be developed.

Supervisors have too little time

The supervisors felt that the biggest problem why invoicing is delayed in a time of shutdown was a lack of time. The reportage requirements have increased considerably in recent years. At the same time work time has not increased. The amount of work is increased but resources have not. One reason for late invoicing is that the invoicing is based on the final measurement. Some supervisors felt that making the final measurement is laborious.

Something may remain uninvoiced

As much as 62 percent of interviewees doubted or knew that something remained without invoicing. Every assistant regarded that they invoice everything that comes to them and did not see it possible that something could remain uninvoiced by them. If everything is done correctly material and hours raise to invoice. The purchase invoices which are intended to be invoiced from the customer rise to the invoice in EMCE if the purchase order is allocated to purchase order. Posted purchase invoices won't raise automatically, the assistant needs to insert a new row to the invoice. If no-one tells about the matter, the posted purchase invoice may remain in the depths of the program but this is not fault of the assistant.

Every unit which did not have inventory bookkeeping had the problem that the material from inventories did not necessary end up to an invoice. The material should be booked in a separate paper (or Excel) and the pricing should be specified separately but the employee might forget to book the inventory withdrawals. Usually the inventories were project residues, no material was

ordered directly to inventory (exceptions may exist). The units which had an inventory bookkeeping had no similar problems. However, the personnel did not see the inventory bookkeeping necessary (where the bookkeeping missed) because the amount of inventory was so small and no direct orders were made in the inventory. They also thought that the upkeep of different labels would be laborious.

One reason why something can leave uninvoiced is that people are not always aware of what belongs to a contract and what is additional or modification work. Additional works need to be invoiced separately and if the personnel suppose that work done belongs to contract they do not book the work in additional work file.

Other comments related to invoicing

People felt it convenient that the assistant and supervisor or project manager work at the same unit. They considered it as an advantage that eased co-operation. Positive is that many people concerned the M80/system positive. The assistants felt the M80 invoicing as more laborious than Excel-files but they preferred it more. They felt that it was more reliable for they checked almost every invoice row and the information were better managed. They did not check the data from other sources (like Excels) so carefully.

Other invoicing forms a big group of invoices. Though every employee in the maintenance services book work hours to M80, the M80 invoicing was not used. This was due to customers who demanded the use of their own invoicing basis (Excels) or the supervisor/project manager who did not want to use M80 invoicing.

Some interviewees complained about poor planning. Poor planning affects mainly project managers and supervisors. It causes waiting in the work sites if not enough material is ordered and it is likely that the amount of additional works increases and the extent of project changes. The management and measurement of project emphasizes.

In case of single works, customer sends a work order and the work is done on that basis. Sometimes the work is agreed for example by face to face or by email and then the work is done. The problem is that hours cannot be booked without a work order and purchase orders cannot be allocated without a work number. The official work order from customer can come late.

Summary of bottlenecks

The assistants did see barely any problems in their own invoice tasks, the possible problems occur due to project managers or supervisors. The typical problems with invoicing process and invoicing material experienced were:

- Lacking information (every assistant agreed to this)
- Flawed information
- Agreed procedures are not obeyed
- Handwritten documents can be unclear
- Pricing (the assistants, who participate in pricing)

The biggest problems and reasons for delays that the supervisors and project managers experienced were:

- Customer wants to approve works before invoicing
- Customer demands the use of own invoicing basis
- The use of M80 is laborious and time consuming
- The allocation of costs is difficult
- Final measurement is laborious
- Too little time
- The employees forget to book things

Some supervisors felt it difficult and laborious at forming a new work number for every single work. For example an employee could have five different work numbers during the day, even a half an hour work required own work number even though the same customer was in question. This is not the case in every unit and the employees can have continuous work numbers but some customers want

every work to be separated. In some cases every work needs to alsohave own work order.

4.6   Wastes of invoicing process in light of theory

The invoicing process is a service process and it is important how well the information flows. The invoicing process receives and produces information all the time, but the relationship of input and output is not in balance in every unit. The starting point of an invoicing process is a customer and it ends to a customer too. It can be examined also as an internal process where the starting point is an employee and ending point the assistant. The process should be effective and real-time and have quality.

Queues of invoicing reflect that invoices are not forwarded on time. Vain waiting time existing in the case company's invoicing process is waste. Many of the process management schools (chapter 3.3) consider incorrect works as the worst form of waste. The mistakes are in information instead of a product in invoicing process. It is not that costly to correct information as it is to correct products. But also false information can have price as it consumes both assistant's and supervisor's time and this time could be otherwise used for other purposes. Though Activity Based Costing is not used, with the help of ABM, price for the time that goes for solving mistakes and lacking information can be calculated.

Employees of the case company do not believe or/and understand the value what information systems give to the operations of the company. The understanding of waste is faint. The main obstacles are not the systems, but people using the IT systems. The company has not managed to exploit the IT systems wholly because the operating processes are in varying degree align with the IT processes.

In a perspective of wastes in Lean, following wastes of service process exist in invoicing process:

- **Waiting**: reviews and approvals.

Customer wants to approve works, which can take time. Work orders can also come late. Waiting generates when assistant sends pre-invoice to supervisor and supervisor returns the pre-invoice.

- **Transportation**: transporting documents.

In some cases the supervisor brings the papers for customer's representative for approval though they could be sent by email.

- **Processing**: processing itself

Booking first on paper and later feeding the same data into the system, assistant asking after invoice material.

- **Inventories**: data, work-in-process, and completed services.

People keep "invoice inventories". The invoicing material is already available but it is not sent forward

- **Moving**: finding information.

Searching for information from different systems and sources like paper.

- **Defects**: faults in data or documents.

Invoicing material contains sometimes faults.

- **Behaviors**: behaviors that do not add value

People do not act according to agreed procedures, attitudes are against information systems.

The starting point of processes is a customer but sometimes the impulse to work comes from work site and the customer is not necessary informed of the additional work beforehand. The worksite used M80 as their system and the assistant made the invoice in EMCE. There is little confusion when same things are named differently in these systems.

Hicks (2007) had identified several wastes of information management. The wastes related to information flow in case company are failure demand, flow demand and flawed flow. These wastes are specified more detail in table 4.

Table 4. Wastes of information handling

Information exchange	The information is not in systems so it is not automatically available for the next party. For example the whole invoicing data is held by the supervisor or project manager and the assistant receives the information when the supervisor/project manager delivers the information by paper or by email.
Manual systems and data entry	The data is collected on papers in which the assistant needs to feed the data again in the systems. If the data is only on papers it is just known by the owner of the paper and the information cannot be reached easily by second parties.
Monitoring, control and costing	The problem of monitoring, control and costing is partly caused from manual systems. If the information is not available in the systems, it is hard to monitor and control what has remained without invoicing.
Information flow from customers	The customer may send work orders late or the acceptance of work lists take its time.
Functionality of information systems	Some interviewees considered present information systems poor or connections slow. They thought that the user interface could be simpler for ordinary employees and that the relation of input and output was not in balance.
Information availability and accessibility	The information does not flow; the collection of invoicing material requires time and effort. The invoicing is based on final measurement and this measurement is in some cases made on paper.
Information identification, location and organization	The information flow is not smooth at the moment; work is needed to change the location of the information.
Information duplication	Same information is handled many times; due to papery lists information need to be fed again though in Excels or systems the information is ready to use.

Information systems use (maintenance, implementation and customization)	All the supervisors or employees do not understand the value of the usage of information systems. They consider their usage as waste though it would help the information flow. This appears when people make actions past the systems. They consider that it is easier to agree from a work by email or face to face or make a purchase order by phone. But when the work or material needs to be invoiced it would be much easier that the information would be already created and not collect the data from several sources.

5   RESULTS

Invoicing is an important part of business activities. The strategic target of the case company is to improve the cash flow but the present invoicing processes and contracts with customers won't support this target. The present invoicing process won't even serve every unit's needs. The interviews exposed that localities in which the invoicing went well did not have any shutdown works. The object for invoicing process is a lead time reduction. For the lead time can be reduced, bottlenecks need to be removed from the process. The case company provides services and often these services are supplied as a project. Time is thus important basis for invoicing. There is several development areas related to contracts with the customers, allocation of works, commitment to process and also to technology. Target is to invoice more often and real-time.

Standardization of contracts and procedures should be targeted but it is not always possible. It is complicated because of tough competition in the market and that is why the case company does not have so much room for negotiation. The nature of works also differs due to distinct customers. The customers represent different branches of industries which is why they cannot be offered similar contracts. It is quite clear that only one process model cannot be used in invoicing due to different nature of works. But some standardization could be made: in similar works the procedures should be the same in every locality. The same procedures in every locality help also the assistants and other personnel to substitute their colleagues, for example in a time of vacation. In addition if people move from place to place (like supervisors and secondment men), the policies are also same. The sales should try to agree about common frameworks for contracts: what is the target time of payment, when the customer can be invoiced or is the customers' approval for invoicing necessary. Everyone should target on process example presented in appendix 4.

It is not meant that people should strictly obey one particular process; people can differ from the process if it serves everyone in the team and everyone agrees about

it. However everyone should be aware of this kind of change of procedures. Invoicing process should be light and flexible. The procedures used in different units should be shared with other units to find best practices. Benchmarking is a good way to seek for development areas and best practices; the comparison is now made inside the case company. There can be already found some better operating models in some units.

5.1   The analysis of bottlenecks

The interviewees' descriptions and the flowcharts reveal that the invoicing process encompasses unnecessary work steps. For information flow would be smooth, the waste should be removed from invoicing process. The waste delays and makes invoicing more laborious. The waste exists due to people not acting according to official process. In order to get people to act according to official process is needed to know why people won't act according to it. There are many reasons for this: supervisors do not have enough time, they do not have right equipment at the moment or customer has not delivered necessary work orders. People's behavior affects it too. Not every person has invoicing under good control.

The definition of digital financial administration does not realize in the case company at the moment. The company has necessary systems for everything could be handled digitally but the problem is that people have not exploited the systems entirely. Some additional equipment would also be needed. Papery lists are still used which leads to that people make overlapping things. It is a tremendous work for both supervisor and assistant if they both book the measurements for example of a shutdown. The assistant's time would be spared if the supervisor would book things straight to the system. The paper lists cannot be submitted to customer but the assistant has to feed that data again in the system. People do not make enough work orders/numbers which makes the management of invoicing material more challenging.

Some supervisors felt that they could not give up for booking things on paper since they had to get the customer's approval in writing for those papers before the invoice could be made. Some supervisor brought the papery lists from works by themselves instead of email if the customer's office was near. Some customers had adopted this kind of procedure but it should be considered whether or not this kind of moving of papers and getting approval is worthwhile. Supervisors defended the bookings on paper because they considered it faster and it was not possible to book things on computer in every place like when measuring the works of a shutdown in worksite.

The invoicing process contains unnecessary waiting in several points. Waiting is one of the biggest forms of waste in invoicing. Many of the supervisors said that they collect information from worksites every day and work hours are also booked once a week but this information does not transfer to invoicing as often. Sometimes the invoice could already be sent but the supervisor or project manager has not delivered the invoicing material forward. Delay forms also when the project manager checks occasionally the additional and modification works, not when the additional work is saved. The walkthrough of additional works was dependent on the project managers own activity. The time lag can be even two weeks. In small projects the additional works are usually invoiced in the connection of a last instalment.

Both assistant and supervisor/project manager felt the pre-invoice as a good thing because faults and missing material existed. For example the supervisor may notice by comparing pre-invoice and hour list from M80 that employee's hours were booked on contract even though they should be invoiced separately. But why this fault is not noticed when the work hours are booked by the supervisor? Usually the pre-invoices are checked during the same day but sometimes it can take two to three days.

The longer the customers' acceptance from the additional work stretch, the harder the acceptance is to get. The protocol is that additional works need to have

customer's acceptance before the work is made but this does not fulfill every time due to people are not aware of the extent of the contract or the approval of the customer is only verbal. The acceptance needs to get in writing. A part of the project managers and supervisors regarded that contracts left too much for interpretation. In addition to delays in delivering work orders and giving approval due to customer, also contracts with the customer can constitute an obstruction. There were cases where the invoicing was agreed to happen once in a month or when the work was ready.

People and their behavior form one bottleneck. Some employees and supervisors felt that invoicing and booking of information is not their job and some of the employees even refused to book work hours by themselves. Weak IT skills were a major factor to explain why systems are not used so much. The IT systems are also considered poor or unwanted. Because of the unavailability to use computer until in the office and because of missing work orders people preferred to book on paper. Some employees and supervisors regarded paper systems much more than information systems. People should commit to existing processes better. Nevertheless the future's need for change requires more IT skills and reportage and usage of IT have come to stay.

The operations in maintenance business consist of pure maintenance and piping business. M80 was acquired for maintenance in the first place but later piping business joined it too. Piping business has difficulties in exploiting M80 which may occur due to M80 has not been developed from the needs of piping business. But more significant reason for problems is that piping business uses also customers invoicing basis (Excel). M80 is used only for employees' work time booking but not as a basis for invoice like in case of M80 invoicing.

Attitude towards invoicing – Likert scale
The Likert scale measures the attitudes towards invoicing. As the figure 11 points out, the personnel mainly did not consider invoicing difficult. The simplicity in the use of systems affects whether the invoicing was perceived difficult. Almost

every assistant felt that they can use EMCE well. Instead the supervisors themselves or employees did not always consider the usage of different systems easy which is why about third of the interviewees partly agreed that invoicing is difficult.
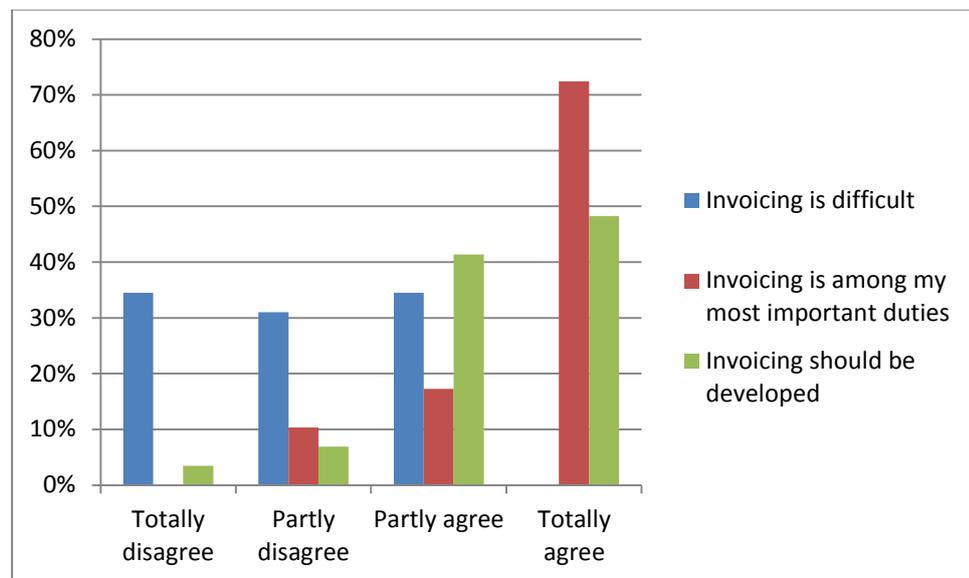
Figure 11. Attitudes towards invoicing - Likert-scale

Over 70 % of interviewees considered invoicing as one of their most important work tasks. This expresses that the personnel realizes the importance of invoicing. The figure 11 points out that almost everyone agrees that invoicing should be developed. This indicates that the invoicing process is not at good state at the moment and there is readiness for a change.

5.2 Solutions proposals

The value of the invoicing process to customer is that the invoices come on time, they have all necessary information, they are accurate and visually explicit and contain good cost allocations and thus are easy for them to use. For the case company the value is generated when unnecessary work steps are eliminated, the process is effortless, fast and reliable. For the users things that add value to process are that the systems are easy to use and they do not require too much working time.

The target for process improvement is that the supplier and customer have consensus of expectations set for process and that the invoicing process would be smoother and quicker. Reduction of lead time is important. The mistakes slow the process though they are not the biggest delay. Development should be made together with the customer. Best practices should be implemented wider. The figure 12 brings out the development proposals divided to actions that can be made immediately and to actions which require money or more work and development to fulfill. These actions are reviewed more detail in chapters below.

Actions in the near future
- Purchases are made correctly
- People obey the agreed process
- More accuracy in actions: no mistakes and material and work are booked
- Assistant to shutdowns

Actions further in the future
- Acquisition of bar code reader to inventory
- Acquisition of tablet PCs
- Inventory bookkeeping in every unit
- Increasing the capacity of personnel IT skills
- Contract with customers to support early invoicing

Figure 12. Development actions.

5.2.1   Emphasis on Quality

Lacking information and mistakes in invoicing material could be overcome if the quality of operations would be emphasized. Faults in invoicing material slow the process and causes vain work. Once correct-principle should be utilized to decrease the amount of faults in invoicing material. Human errors always appear but they should not appear often like now occurs in some places. Company could create model of internal customer. It is expertise to respect the employee of a next work phase. The assistant's time should not run on solving mistakes or finding

missing information. Lacking information can be said to be fault too, it causes vain research work and leads to delays. People should be aware of what information is necessary to report in invoices.

Mistakes occur due to different reasons: there is not enough time, systems are not experienced enough simple, invoicing is seen laborious, and because of carelessness. The pre-invoices could also be abandoned if people would make everything with care from the beginning. Not every supervisor and project manager receives pre-invoice because they have been accurate enough when forming the invoice. Handling of pre-invoices can cause a short delay to invoicing.

5.2.2   Co-operation with the customer

The delivery of work documents on place could be replaced by handling things electrically or even give up for approvals. At least in situations where there is a strategic partnership with the customer, the approvals should not be necessary. It could be pondered if the customer could see the same data from works (excluding prices) in a real time together with the case company. This kind of open book system could increase the trust between the parties and result less conflicts of works done and less approvals. The exchange of information should be clear and the customer stays better aware if they get information constantly instead of one big report/invoice once a month. If the works are gone through before the work is started, the approval when works are done should be unnecessary. When the customers make an order, they should know what they have ordered. The additional works are separate. If the project is based on offer and the work fills the original offer, the acceptance of a customer should be unnecessary. Term of payment is given too, so the customer has time to evaluate the quality of a service.

The approval methods should be solved anyway as they can delay the invoicing and can cause conflicts with the customer. Strategic partnerships with customers can be a solution for approval procedures. Deeper co-operation can strengthen the trust between parties. The information sharing should be transparent. Open-book system and real-time sharing of information could indicate that there is nothing to

hide and that the bookings are reliable. The customers could follow cost information from M80 as it is a web-based system and a specific customer surface could be developed in M80. A few customers were using Arttu, a sister system of M80. But in the most of cases the customer has its own systems and the company its own.

It is unlikely that the customer would want to give up for accurate cost allocations but the customer should give better the basis for these cost allocations meaning mainly work orders. The use of different invoicing basis should be developed, some customers had better invoicing basis than others. If the case company cannot use its own invoicing basis that EMCE or M80 produces, the customer's invoicing basis (Excel) should be as good as possible.

If the cash flow is wanted to improve, terms of payment should also be developed. The shorter term of payment can be achieved by marketing a small discount against prompt payment. Although the collecting of receivables is not a problem for the case company.

For the company in order to invoice more often, it should also try to affect on contracts made with the customer. Correspondingly the company should develop co-operation also with its own subcontractors and suppliers. There are already well-functioning co-operation with some wholesalers and these practices should be expanded in the way that the handling of purchase invoices is as effortless and smooth as possible. Sometimes the purchase invoices from suppliers and subcontractors come late and thus they cannot be invoiced from customer either. That should be developed too.

5.2.3 Changing of attitude

In order the information systems to be utilized effectively especially ways of acting and attitude towards IT need to be changed. Technology develops constantly and people have to develop with it. The units should found out whether additional training is required in their unit and what kind of training is necessary.

The incompetence reflects to attitudes and resistance to use the systems and shows inconvenience in the systems usage. The negative attitude of supervisor may reflect to employees which can make them feel it difficult. Every superior should show a good example to employees starting from the supervisors and ending to unit managers. If there is incompetence or the systems feel non-functional despite of know-how, actions need to be made.

Among the personnel were ideas how things could be developed but they did not forward those ideas. Staff should be encouraged to develop things and to make development ideas. People felt that the present incentive program was not working well or it did not stimulate to invoice. The company should ponder its' incentive program again. Active and committed personnel are also benefit for the company. There could be organized a development box where staff can put development ideas and the realized ideas would be rewarded some way. If the development idea is important to staff but won't go through, management should explain clearly why the idea won't fulfilled. Working incentive system should be organized together with the personnel so that elements for constant improving are obtained. It is important to attain atmosphere of constant improvement, so that people would not work in inoperative conditions and people would actively intervene to non-functional procedures.

At the moment the reportage in the beginning of the month motivates people most to invoice though early invoicing has been highlighted. The invoicing is focused on end of the month in some units. Though people are told to invoice more often and that is their duty, all the people do not invoice often enough. People should be motivated to invoice on time. Management by key results could be exploited to motivate people to invoice more often. Prompt supervisors and project managers could be rewarded and the reward principles could be in company's incentive scheme. The prompt employees could be noted in units or exemplary units mentioned to other units. The company could make ranking lists from the units. The communication is in important role in supporting more frequent invoicing process. The communication need to be extended until employees. The unit

managers should accost project managers and supervisors whose invoicing delay. The project manager/supervisor and unit manager should solve together why earlier invoicing is not possible and try to correct the situation. If the project manager's or supervisor's invoicing still delays in spite of corrective actions he should be taken to accost again. It is quite unlikely that projects would cycle in month periods, the end month invoicing is only a habit and the invoicing is made only when it is a must. Timely invoicing could also be bounded to output/performance based salary component. Though supervisors and project managers are in a different position in case of prompt invoicing for some customers enable faster and easier invoicing than others.

5.2.4 Changes in practices

If the company wants to invoice more often, it should consider whether to change the present two-week cycle in invoicing to invoicing once a week. This is supported by the fact that the work hours transfer once a week to EMCE. By concentrating invoicing in two week cycles, efficiency advantages can be achieved. In some units this could be pondered. Technically it is possible to invoice more often but if the people won't support that target, it is not possible. The biggest factor in invoicing is people and how they behave. People should be motivated to invoice more often. The previous week's work hours are usually booked on Monday (possibly Tuesday) and the supervisor inspects them at Tuesday. Work hours transfer to EMCE every Wednesday. There are really no possibilities to tighten this time schedule because the supervisor needs time for inspection.

The supervisors and project managers told they collect information almost every day but this information is not necessary collected in systems. Things should be booked as quickly as possible so people do not have time to forget things. The additional works were not handled immediately. It is probably not worthwhile to check additional works every day, but once a week could be recommended.

The supervisors and project managers should not use their busy time on booking employees work hours. If the employees have problems with work time booking, they should be given extra training and give clear instructions of the usage of working time monitoring system. The employees did not book inventory withdrawals to EMCE; they booked them to paper, Excel or in M80's comment field, whereas supervisor booked it to EMCE. If the inventory bookkeeping would be in M80, the ordinary employees could book them straight. Many supervisors trusted only their own bookings and measurements and only supervisor could make purchase orders. However there were cases where also employees could measure their work or make purchase orders based on work number. The supervisor wants to hold all strings in his own hand because he might experience employee's bookings unreliable. If the employee would book his work hours every day, he would still remember what he has done, but when booking work hours once week, there comes the advantage of serial input.

The contracts with customers should be explicit; complex contracts should be avoided as it is neither customer's nor supplier's advantage and the contracts should not leave too much for interpretation. Additional works may leave without booking or the approval may delay if people do not know what additional work is. The situation should be clarified with own personnel and also with the customer. In order that the additional and modification works go smoothly, some projects should review the contract better and clarify the unclear points together with the customer. Every employee in the work site should also understand what the additional works are. When the contract is made with the customer, project managers should open the usually emerging issues and go through this list for the additional works can be better managed and went through. There should be clear processes how additional works are handled. The process exists at the moment but people differ from this.

5.2.5   Allocation work

One reason for delays is that the invoicing is quite often based on final measurement, the measurement data is not produced through the project. The final

measurement is laborious and that is why it would be easier for everyone if the measurement data could be produced on real-time along with the project. The measuring should be eased. The real-time measurement could be possible if ordinary employees could participate in it or if there would be some tools that make it easier and more reliable. The real-time measurement would indicate faster if the extent of project grows. If the extent of project increases too much, it complicates invoicing and does not give good picture for customer either. This could be prevented also with better planning.

The company faces fluctuation of demand; the highest demand is in summer. The invoicing process should be such that the demand peak won't cause disarray of invoicing. Personnel of course have more work on the time but the higher demand should not delay the invoicing. Tasks should be flexible so that the people who know and can do it best and fastest take care of the task.

The assistants didn't experience their own job description in invoicing as a problem and they thought that it runs well. Based on interviews, the invoicing does not delay because of assistants for they make the invoices as soon as they get the invoicing material and in agreed two weeks cycles. Although the assistants' job description was ok, it would be worthwhile to consider if their work could be automatized more and use these released resources to relieve the work burden of supervisors like Lean philosophy also suggests. In some places there was a little experience of this: the assistant had gone to worksite in a time of shutdown for a few days and helped to collect the invoice material resulting that the invoicing happened on time and the work burden of supervisor also diminishes. This and other assistants felt this kind of procedure good. This solution is not necessary possible in every place. The assistant may have lots of other work tasks that won't allow her to go away or then there is overlapping between the shutdown.

If the amount of faults decreases and people fully exploits the systems, everyone's time will save. The Lean philosophy suggests that released resources are used to other purposes. The supervisors suffered from lacking time so they will benefit

this time saving. However the time saving would not affect so much on supervisors and project manager as it would affect on assistants. The assistants could use this released time to help the work of supervisors. They could for example find new work numbers based on work orders for the supervisor who is not at the computer all the time. The job description of assistants could get closer of a project assistant but at present this is not probably possible

5.2.6 Information systems and technology

Weaknesses of the systems could be reduced if the systems could be developed and additional training given for the users. Some interviewees complained about slow connections; the possibility to speed up systems or network should be examined. It should also be solved if the EMCE could be developed in a way that it would produce invoices automatically and thus reduce the work done by the assistants. In the present situation the supervisors/project managers feed in the hours, work numbers, project numbers and used material, categorize additional works from contract and price the work. The employees book the work hours; the work done by the assistant should remain quite small but now the assistant's work input can be notable. Almost automatic invoicing demands that everything is done correctly and through the systems. This won't solve the whole problem because the possible delays occur due to supervisors and their lack of time and practices. The company should investigate whether project instalments could be invoiced automatically from EMCE by note of a project manager. The more automatized invoicing would save assistants time.

Most of the personnel felt that they can use the company's system well or satisfactory and they also regarded the systems at least satisfactory. The major problem thus is not the systems but rather the people and their practices. Part of the interviewees regarded additional training to systems advisable either to themselves or to other personnel group. Modification and development of systems to be more user-friendly or more practical is also important. The role of IT should be higher. The IT creates more possibilities than restrictions though some of the interviewees felt information systems as restrictive for operations.

Industry has introduced several instruments and new technology to produce information from its processes. However, in the maintenance and project business the generation of information is based on that people book the information on computer or to paper. Maintenance and project business also have potential to use new technology and systems. New mobile devices or even computers can improve the reportage and it is recommended to add mobile devices to work sites. Especially supervisors would benefit from them as they are moving a lot and they are not in front of the computer all the time. The mobile devices should be such that they are durable enough to be used in work sites. If some of the employees could use these kinds of devices, they could book their work hours straight to the system after doing the work and they would not have to wait to check them from supervisor's papers once a week. The supervisor would remain just the checking phase. The use of mobile devices could make the usage of different system almost unobtrusive, the use would happen along the work, not until at the office.

The possibility to use bar code reader in material management should be strongly considered. This would require bar codes to material (and their upkeep) but they could be constituted when the material is acquired. The problem in some places was that all employees did not always remember to book the material from inventory and therefore it remained uninvoiced. The bar code reader would at least speed up and ease the material booking and the possibility to incorrect bookings would decrease. This would be also beneficial to assistants when they would not have need to find out what the possibly unclear bookings are anymore or to feed the inventory withdrawals again into the system. This would require that the bar code system is able to integrate with the other systems. Some of the respondents knew that this kind of systems are in use in some places but they did not see it practical due to major part of material was handled in meters like pipes. That is why the bar code reader should have a display where also the number of meters could be fed.

It should be investigated if the system could count the price for example for a quarter pipe by itself streamlining the pricing. The acquisition price can act as a suggestive price later and this would also help the work of pricing. Some answerers namely felt the pricing difficult. Prices could be informed by euro per meter. It would also be good if the system could constitute a contribution margin by itself based on which customer is in question.

The Project business did not have as encompassing system as M80 in the maintenance business. That is why they book additional works in Excel files. Excel is a good and practical tool but is not sufficient for large projects. It sufficient and convenient for small projects. In case of large projects the work site saved the additional and modification works on Excel in network station in which the project manager could use it too. The problem of Excel is that several people cannot use it at the same time, people can save data on top of it and it can be deleted or it could disappear. The control of large Excel file is also difficult. The project business should consider if it could acquire some project management system. One project manager wished that projects could be compared and analyzed more to each other, in order to know where the projects have been successful and where not and what causes it. Benchmarking would be a good way to raise the profitability of projects and it would promote the learning from projects. The new system could aid this analyzing. Best practices should be shared for other project managers too.

The units felt that there was only little information about how other units operate. Especially assistants felt that it would be interesting to get to know how their colleagues deal with invoicing and whether they had some own tips in the use of EMCE. The situations in units were quite unique so their operations cannot be compered directly to each other. In the future a meeting between all the assistants and also with the EMCE technical support person could be arranged. Workshops could be organized where people could search for development ideas and ponder together with the technical support how the system could be developed.

5.2.7   Controlling and improvement of invoicing degree

An issue that wondered the company was that how to ensure that everything gets invoiced. In order to answer that question it must be studied why everything won't get invoiced. Reasons for why something leaves without invoicing are:

- People book works belonging to the contract thought it is matter of work outside the contract
- Not everyone of the subcontract employees are accurate about works and may do something extra when customer asks
- People forget to book the inventory withdrawals
- People forget to book the work done in own workshop
- The information is not managed well (information is spread around)

Over half of the interviewees felt the control difficult. They could not say with certainty how much is left without invoicing because not all the things are in the systems. Even if everything would be in the systems, most interviewees felt that they should take different reports from different systems and compare them to each other, which was felt inconvenient. The case company should investigate how the control reports could be developed in a way that the uninvoiced could be seen only from one report. This would decrease the feeling that there are too many systems. In terms of control, all the data should be in some systems so the uninvoiced work could be tracked.

Monitoring is important but it is hard to develop it if there is lacking information for it. The supervisors or unit managers own feeling is not enough. If the information is not in the systems, it is hard to point out that something is left invoiced. That is why information (like inventory withdrawals) should be in the systems. Purchases past the system can remain without invoicing and they reduce the management of invoicing process. Also the already posted purchase invoices can be hard to catch for invoicing. Hence it is important to make things correctly.

Especially units which did not have the inventory bookkeeping felt that material left from the inventory without invoicing. Inventory management is an important part of material management. As a service company, the amount of inventory is small and for this reason also the supervisors did not feel the bookkeeping necessary. It may also be that when the inventory is not controlled, people do not feel it as important. Even though it is not the meaning to buy the material to inventory separately (upkeep of inventory costs), it should be considered whether it would be reasonable to buy some labels to inventory, for example material that has secure demand but long delivery times. Some employees stated that the upkeeping of different labels is laborious. On the time of buying the product however has had a label, code and a price. Tan here should be no need to feed those informations again. However, the inventory contains quite expensive material, which supports the bookkeeping.

The information of inventory withdrawal would move automatically if the withdrawal is made by system bringing the information faster to assistant. Now the assistant needs to wait that possibly hand written papers are delivered to her and feed the information to EMCE. Due to bookkeeping, the awareness of what exists in the inventory would improve; the supervisor could check the inventory situation anywhere from a computer (possibly from smartphone) instead of that someone checks the situation in place. The codeless items from inventory should be minimized and it should be solved how they could be managed better.

More responsibility from control should be given also to (some) employees. The supervisors stated that they cannot be aware of what every employee is doing because for example in a time of shutdown there are so many employees that it is impossible for supervisor to follow everyone's work. There are also employees in different work sites and the supervisor cannot be in every place. If the employees would report more of their works, hidden works would raise up, like in case when the employee does additional work supposing it belongs to contract. In the present situation the additional work would not come up. Not necessary all employees

need to participate on reporting but some reliable individuals' role could be developed to help the supervisor.

Booking on old work numbers must be given up. Clear rules should be made up for when the work number can be closed and for not keeping the work numbers open too long. There has been a case where a two year long project was booked mainly to one work number, which makes the control harder. There are also cases where some small works are always dumped to a particular work number (even if they were different projects) or works are booked first to an old work number because new work number has not been founded yet. This can also delay the invoicing when tricking with work numbers. It is also unclear whether or not all new works come shifted from old work number to a new one.

5.2.8   Measurement of change

In order to identify whether the target has been reached, it has to be measured. The company had collected data from the amounts of daily invoicing. If the invoicing would happen more in real-time, the invoicing should be more stable in daily level. If there are 20 work days during the month, the invoicing of each day should be around five percent. Of course variation occurs but it should not emphasize that much on the end month. The visual bar graph expresses the level of invoicing only with one look which is why it is easy to use.

Other measure which could be used is the cycle time of prepayments and accrued income. Only their amount cannot be used for the level of sales affect on that. Because of that the cycle time is more functional. The cycle time can be calculated similarly with other cycle times: prepayments and accrued income are divided by sales multiplied with 365 days. If the company manages to improve its invoicing, the cycle time of prepayments and accrued income should decrease.

These two measurements suits better on basis of reward because they measure more accurate the level of invoicing than the present level of net working capital.

The net working capital is affected by many other factors that it has not motivated invoicing so well.

6 SUMMARY

This study aimed at finding the bottlenecks and development areas of the invoicing process of the case company. The Lean philosophy suits well on solving the problems of the invoicing process. The Lean philosophy among other things strives at maximizing the flow of information and cash which is the target of the case company. By optimizing its invoicing process, the company receives cash quicker but for the cash to move quicker, also the information in which the invoices are based on should move quicker.

The processes need to be managed for the wanted results to be achieved. Sometimes the process cannot achieve its targets and thus it needs to be developed. The development is not an easy task: it requires information about the present level of operations and the implementation phase usually faces change resistance. The amount of resistance can be decreased by clear communication and training, the executive staff also needs to commit to process.

The interviews revealed that people have not exploited the information systems entirely. Some of the interviewees felt them inconvenient and laborious like the invoicing. That is why they collected the data on papers and either delivered these papers to assistant or fed the data in the system by themselves. Neither had all the unit managers committed to usage of information systems which is one reason why the systems were not exploited so well.

The interviewees felt also that the customers caused delays to invoicing. Some of the customers wanted to approve the works before they could be invoiced and work orders came late. Some customers also demanded the usage of their own invoicing basis and very accurate cost allocations. The very accurate allocation of costs was difficult if there were not enough information for the basis of allocation and it also increases the amount of work.

The supervisors were very busy and sometimes the invoicing was not under good control. The bad control was mainly due to systems were not being utilized and the purchases were made past the system. In terms of sales invoicing process, also purchase invoicing process needs to be well-functioning for the problems in there can recur in sales invoicing process. The control could be improved if the supervisors and project managers would take a routine to check the invoicing every week.

The information technology and systems have a prominent role in developing the invoicing process and their role should be emphasized. People should more actively exploit information systems and technology. The usage of information systems would quicken the invoicing process and it would not require any additional time. New mobile devices should also be taken to use. The supervisor should book measurements from worksites straight to the system. This is possible if they use a tablet PC in the worksite. The task to get people more favorable of IT is hard. Some of the employees have lacking IT skills. Possibility to automatize invoicing more should be found out.

Reduced amount of faults and abandonment of hand written papers would save assistants time. The assistants could use their saved time in helping busy supervisors for example in a time of shutdown. Some employees could also participate in helping supervisor in his tasks like in measurement of work. With aid of this, invoicing could be made more real-time.

New information systems and the development of present systems are unsure and even if the company would acquire or develop systems, it would take time and money. If new systems are acquired, also the processes should be reviewed. A cost of the development of IT is a restrictive factor. The fastest and cheapest way to attain improvements is to start using the existing systems, make purchases invoices correctly and pay attention to the quality of operations. Critical is to influence the attitudes on the field. Even though the development proposals

presented in this study would be fulfilled, the development work must not be left there. The key thing for development is active and participating personnel.

The company should continue measuring the daily amount of invoicing. The measurement gives information about how the company is proceeding in its development. The results of measurement should be exploited in recompensing for it affects to motivation and to people's commitment to develop the invoicing process and act according to agreed process.

The money from services can be received more quickly if the company enhances its present invoicing process. The future research could concern about how money could be received faster by changing contracts for example by offering discount for prompt payment. Also the possibilities to standardize the contract basis to gain the advantages of standardization could be studied.

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Appendix 1. Task groups of BPM.

Table 5. Task groups. (Aparecida da Silva et al. 2012, 768, Paim et al. 2008, 706-707)

Task groups	Description
Designing process	Task related to: • Understanding the internal and external environments in relation to business strategy • Setting strategy, objectives and attitudes to assist change • Understanding, selecting and prioritizing processes and tools • Establishing the strategy and ensuring sponsorship for change • Forming process teams • Understanding and modeling processes to apply in the present situation • Determining an prioritizing present problems and solutions to them • Determining management policies and implementation processes • Understanding and modeling processes for the future situation
Manage day-today processes	Task related to: • Implementing processes and changes • Supporting the process realization • Monitoring and controlling the execution of processes • Carrying out short-term changes • Getting work done appropriately and on time, as expected and planned • Dealing with flow of objects (information,

|	
	people, materials, capital, equipment, ideas and knowledge).
Promote evolution and learning	Task related to: • Recording performance of processes • Executing the benchmarking process • Recording and controlling the efficiency of processes • Evaluating the deviations and performance of processes • Learning about the measurement process • Understanding the trajectory of processes through actions that enhance process predictability • Understanding the relationship between the promise and performance and how to achieve what was promised. • The knowledge of the historical basis of performance is the key for learning. The historical performance data about processes can be advanced due to information technology. Benchmarking is also in this group. (Paim et al. 2008, 707)

Appendix 2. Interview questions for assistants

1. What applications do you use in invoicing?
2. How many years have you used EMCE?
3. Where and how do you get the invoicing material? How often?
4. Are there any problems with the invoicing material?
5. How do you ensure that everything that can be invoiced is invoiced? (Every material, every work hours) What do you think, does everything come invoiced?
6. Are the supervisors/project managers active in terms of invoicing?
7. Do you think you benefit of all the features of the applications? Do you think the project personnel use the applications well?
8. Do you think the co-operation with project personnel is easy?
9. How many people participate in invoicing in your area?
10. Are there any differences between the amounts of work required in different invoices? What are the different invoice types?
11. How many hours/minute you use in invoicing in a week or in the month?
12. Is there any seasonality in invoicing? Why?
13. Are there any problems in the invoicing related in the use of EMCE/M80?
14. What are the main difficulties with invoicing (e.g. invoice material too dispersed)?
15. What actions does the invoicing require from you? (describe the process)
16. How the invoicing and the whole process could be developed?
17. Respond using scale: absolutely agree, partly agree, disagree, totally disagree
    a. Invoicing is difficult
    b. Invoicing is among the important work tasks for me
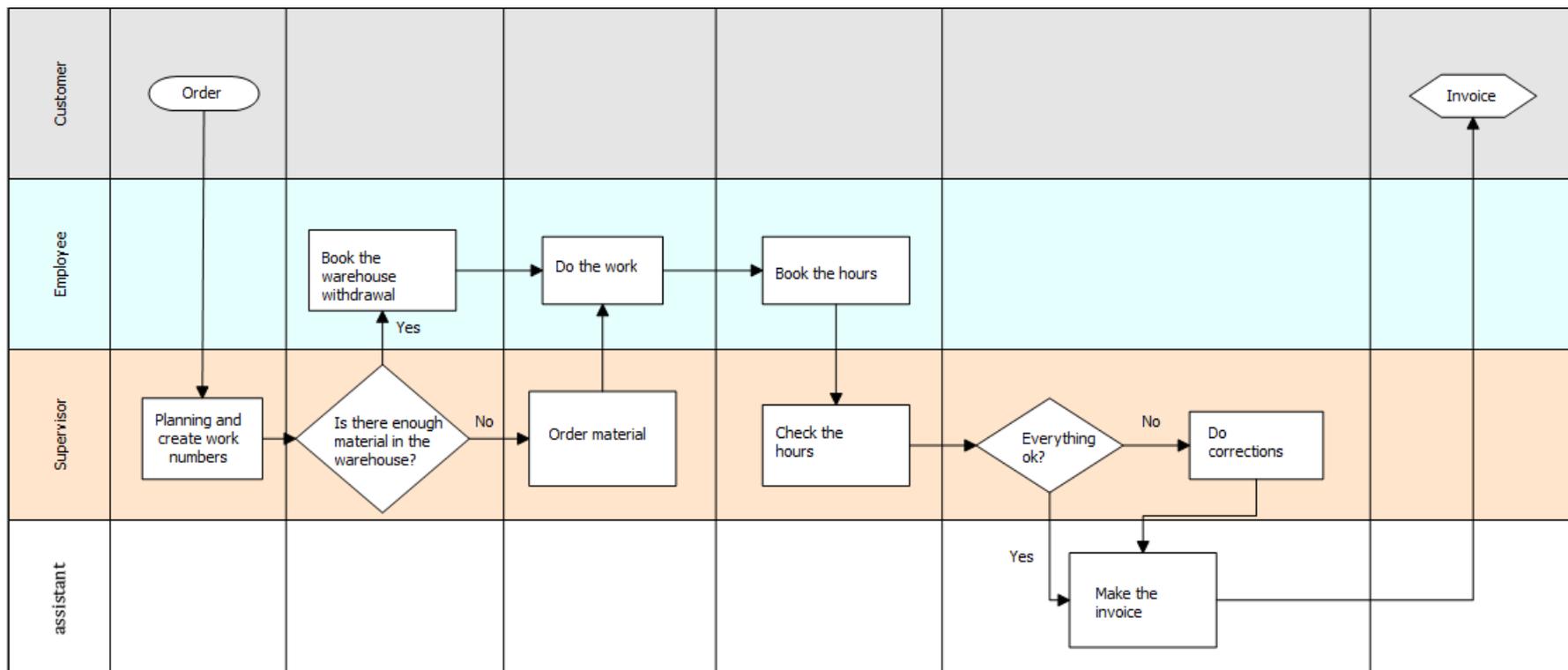   c. Invoicing should be developed

Appendix 3. Interview questions for supervisors and project managers

1. What applications do you use in collecting of invoicing material?
2. How many years you have used EMCE/M80?
3. Do you think you benefit of all the features of the applications?
4. Where and how do you get the invoicing material? How often?
5. How often do you deliver material to assistant? How quickly after the work is done?
6. Are there any problems with the invoicing material? Is some invoicing material more difficult to collect?
7. How do you ensure that everything that can be invoiced is invoiced? (Every material, every work hours) What do you think, does everything come invoiced?
8. Are the employees active in terms of working time booking? Do they use M80 well?
9. Do you think the co-operation with the assistant is easy?
10. Are there any differences between the amounts of work required in different invoices? What are the different invoice types?
11. How many hours/minute you use in collecting invoicing material in a week or in the month?
12. Is there any seasonality in your invoicing? Why?
13. What are the main difficulties with collecting invoicing material (e.g. invoice material too dispersed)?
14. Are there any problems in the invoicing related in the use of EMCE/M80?
15. What actions does the invoicing require from you?
16. How invoicing and the whole process could be developed?
17. Respond using scale: I absolutely agree, I partly agree, I disagree, I totally disagree
    a. Invoicing is difficult
    b. Invoicing is among the important work tasks for me
    c. Invoicing should be developed

Appendix 4. Flowchart from project business.
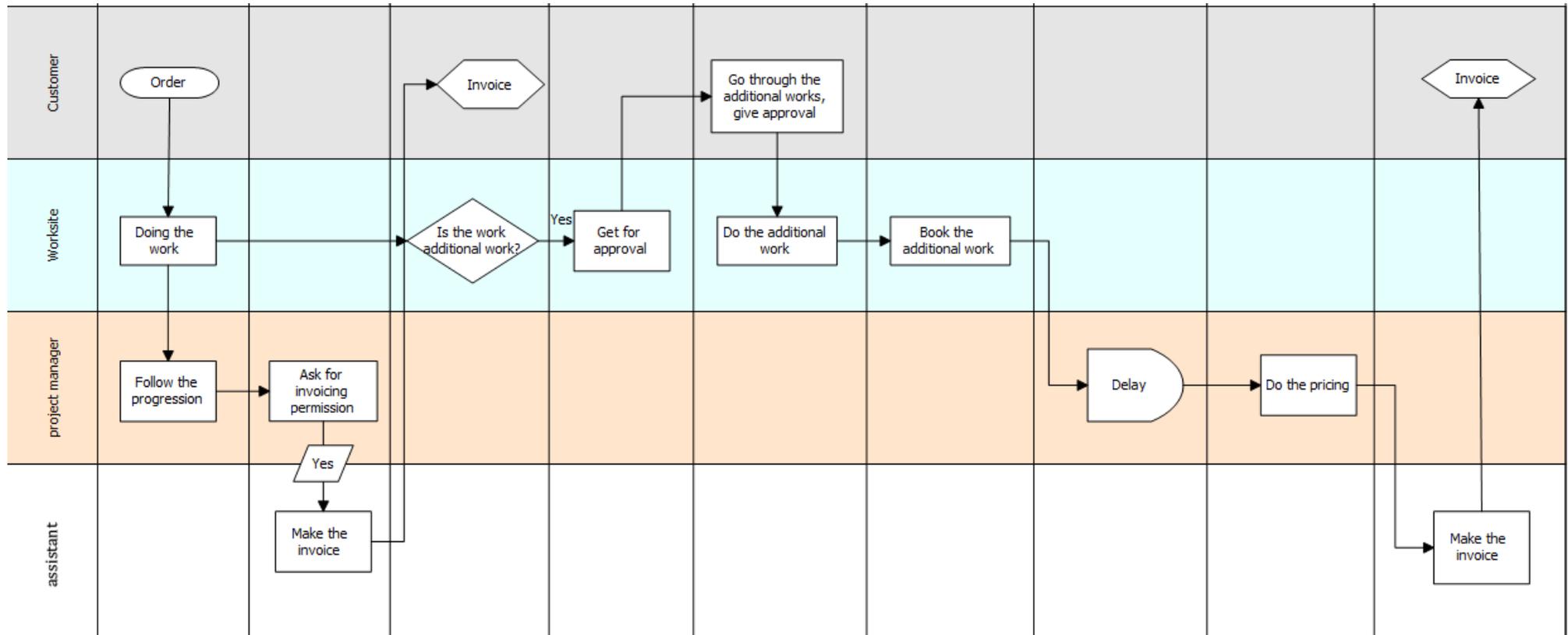
Appendix 5. Flowchart from best practice at the moment.

Appendix 6. Flowchart from delayed invoicing process.