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Improvement of Sales Order Creation Process to Ensure On-Time Delivery

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Insinöörityön tavoitteena oli selvittää case-yrityksen myyntitilausluonti prosessin heikkoudet ja niiden perusteella oli tarkoituksena ehdottaa ohjeet myyntitilausluonti prosessin parantamista varten. Tutkittu prosessi on tarkoitettu case-yrityksen asiakkaalle, suurelle tietoliikenne yritykselle. Myyntitilausluonti prosessi oli tutkittu on-time delivery näkökulmasta.

Insinöörityön tulos oli saavutettu haastattelemalla molemmat yritykset, poimimalla prosessin heikoimmat kohdat ja säilyttämällä prosessin vahvuudet. Case-yrityksen kanssa oli järjestetty palavereita, jossa käytiin läpi aikaansaannokset sekä ehdotukset prosessin parantamiselle. Teoriakappaleessa käsitellään aiheet, jotka auttoivat löytämään kohdeyritykselle sopivat ratkaisut prosessin parantamiselle.

Insinöörityössä esitellään case-yrityksen prosessi ja prosessin jokainen vaihe. Nykytila-analyysin jälkeen prosessin heikkoudet ovat poimittu ja syyt niihin ovat selvitetty. Heikkouksien parantamiseen oli ehdotettu parantaa case-yrityksen ja sen asiakkaan välinen yhteistyö, kehittää henkilökunnan tietämys ja tiedon jakaminen organisaation sisällä. Teorian ja palaverien avulla haluttu lopputulos oli saavutettu.

Avainsanat	Prosessi, prosessin parantaminen, myyntitilausluonti prosessi

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The objective of this thesis was to investigate the weaknesses of the case company's sales order creation process and to propose guidelines on how to improve the process. The results of the sales order creation process investigated in this thesis are for the benefit of the case company and its customer, a large telecommunication company. The aim was to improve the sales order creation process from the point of view of on-time delivery.

The outcome of this thesis was achieved by interviewing employees in both companies as well as identifying the weaknesses and strengths of the process. In addition, workshops were organized in the case company. In the workshops, the achievements and suggestions for the sales order process improvement were evaluated. The theoretical section discusses topics that helped find solutions for improving the sales order process.

In this thesis is described the whole sales order creation process and its every step. After the current state analysis weakness areas of the process were identified and reasons for the weakness were found. For improving these weakness areas there was suggested to work on cooperation between case company and its customer, improve knowledge by training employees and work on sharing information through the organization. With theory and workshops the wanted outcome was achieved.

Keywords	Process, process improvement, sales order creation process

Contents

Abbreviations

ALC	Account Logistics Coordinator
ALM	Account Logistics Manager
EEPT	E-commerce Exception Processing Tool
ERP	Enterprise Resource Planning
NE ID	Net Element ID
SAP	ERP system
SW level	Software level

1 Introduction

In this thesis, the case company is Company X. In this study the sales order creation process of Company X is investigated. The focus of this thesis will be on improving the sales order creation process from the point of on-time delivery. I will be investigating one of Company X's sales order creation processes that is provided for its customer Company Y.

1.1 About the case company and its customer

Company X is a global leader in network infrastructures and in advanced technologies. The company has employed about 100 000 employees around the world in 120 different countries. Company X combines its mobile and fixed network know-how to utilize it for providing supportive software, services and innovative technologies. As a result, sensors and smart devices are able to use networks faster and more effectively. Company X supports its customers in changes to smart and virtual networks in over 100 countries.

Company Y is a big telecommunication company of a new generation. It is also one of the mobile communication inventors and GSM founders. Company Y has about 21 000 employees in 17 different countries. Company Y is continually investing in high quality networks.

The case company and Company Y have a strong connection as Company Y is the case company's customer. The reason to investigate the sales order creation process that is provided for Company Y stems from a number of mistakes in the current process. This is the reason that makes Company Y one of the most critical customers of Company X.

1.2 Business challenge, objective and outcome

The need for this thesis comes from the case company's Supply Chain Management department. The organization is continually receiving complaints from its customers concerning problems with on-time delivery. Further analysis reveals that some of the key issues undermine on-time delivery related to the case organization's sales order creation

process. The problem results in high costs that the company has to pay to customers as compensation for late delivery. Continued late deliveries result in dissatisfied customers. The problem has also an impact on the employees' working hours, because they have to work longer days searching for the problem that has caused the late delivery of an order.

Accordingly, the objective of this thesis is to identify the weaknesses in the process and propose guidelines to the case company for improving the sales order creation process from the point of view of on-time delivery. Company X's sales order creation process that will be studied is provided for case company's customer Company Y. The results of the study will be used for the benefit of Company X and Company Y. In this thesis the research question is as follows: **What changes does a sales order creation process need in order to deliver the orders on time to the customer?**

The outcome of this thesis is guidelines to the case company on how to improve the sales order creation process. The guidelines for process improvement will include supporting presentation that will be presented to the stakeholders. The guidelines will help the company get work done more efficiently thus reducing defects and saving costs. The improved process helps in reducing misunderstandings between the case company's employees and Company Y about on-time delivery which, in turn, will help keep the customers of the case company more satisfied.

1.3 Structure of the report

This report is built in six sections. In the first section the business problem, objective and outcome are defined. The second section describes the method of the thesis and how the thesis was carried out. In this section, the research design diagram shows the key steps of the thesis that helped to achieve the outcome.

The third section describes the current state of the sales order creation process of Company X. In this part, Company X and its customer Company Y are interviewed. The strengths and weaknesses of the sales order creation process are identified and analyzed. For simplifying the analyzing part, the interview data is depicted in one Figure that shows the process and its strong and weak areas. The next section consists of theory

that will help to analyze the data gained from the interviews and build the expected outcome which is an improved process. The theory contains best practices of process definition and process improvement. In the fifth section every weakness area of the process is dealt with relying on theory and case company's comments. The last section contains a short summary of the whole research where the thesis is evaluated from the point of its objective and final outcome. In this section, the practical next step recommendations to Company X are given.

2 Method and Material

In this section, the method and material of this thesis is described. In the first part of this section there is a research design of the thesis. The research design shows how the thesis was executed, which key steps it included and what material was used. The second part of this section describes about method of the thesis.

2.1 Method

In this thesis, the information was collected in the interviews conducted with the case company and its customer as well as workshops and theory related to the subject and the problem solving.

This thesis was carried out as a case study research. The case study research is an experiential type of research that uses different kinds of information obtained from different sources for analyzing a specific occurrence or action in a scoped environment. The case study is an in-depth investigation of some social unit. The social unit gives a perfect, well-organized picture for the case study research. That kind of research is useful if the researcher wants to get good background information of the subject of the research. During the case study research a limited object is investigated with limited material. (Case- tutkimus). In this thesis the material used includes in itself best practices, results of the interviews and workshops. Those materials helped to find the problem in the process, the best way to solve it and propose a possible example of the future outcome. When the problem was found, it was analyzed and discussed with the case company. After a workshop with the company, a new improved process was proposed to the case company.

There are two types of research: quantitative and qualitative research. In quantitative research data is collected in numbers. A good example of a quantitative research is any kind of survey. In quantitative research data can be collected from a big group of people and it can be rapidly processed, for example using some system (Paaviainen, 2012:16). In qualitative research data is collected in verbal format. Qualitative data can be collected from interviews, for example. Comparing to quantitative research, qualitative research is interested in analyzing and understanding the collected data. In qualitative research data

collection is done by interviewing a small group of people, because in that kind of research data analysis is slower than in quantitative research (Paaviainen, 2012:17). This thesis was researched using the qualitative method due to the need for deep information.

There are two types of interviews: open and structured. During an open interview, interviewer and interviewee have a normal conversation. A structured interview has a plan and an order of questions that rely on the subject that the interviewer researches. A semi-structured interview is a combination of open and structured interview. In semi-structured interview the interviewer and interviewee go through the question using a discussion format (Paaviainen, 2012:37). This thesis uses the semi-structured interview type in order to get the best results.

2.2 Research Design

Figure 1 illustrates the key steps that will help the case company to solve its business problem and achieve the outcome.

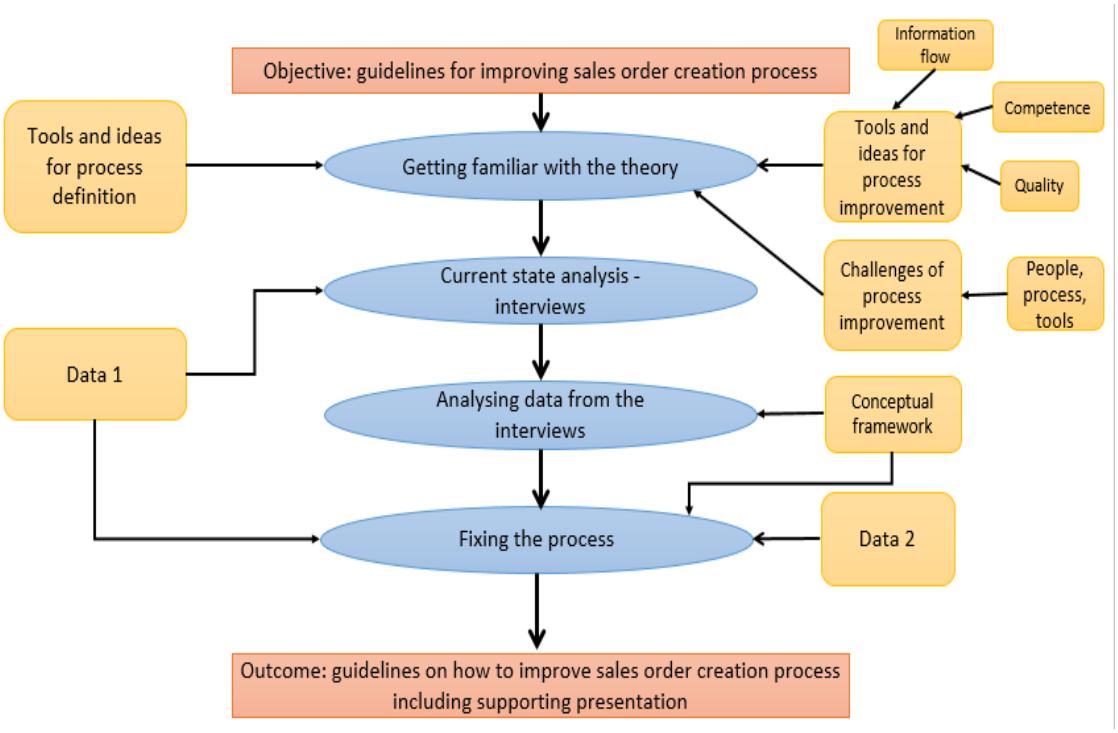

Figure 1. Research design.

Before designing the research, it was important to define the objective and outcome of the thesis. When the exact objective and outcome were defined, the key steps of the thesis were planned.

As Figure 1 shows, there are four parts in the project. In the first part tools and ideas for the process and its improvement are defined by exploring relevant theory. Theory about process improvement was collected from several parts: quality, information flow and competence and challenges of combination of people, process and tools. In the second part the case company's sales order creation process for the company's customer is researched for understanding the current state of the process. Personnel from both companies are interviewed and the process strengths and weaknesses are identified. In Figure 1 this collection of data shows as *Data 1*. The most important part in this step is to keep the process strengths and think about how to improve its weaknesses or turn them into strengths. After defining the current state of the process, theory was selected more specifically based on the weaknesses identified in the process. In the third part of this project, the results of the interviews are analyzed and combined with the theory. In the fourth part the sales order creation process is fixed step by step by keeping the process's strengths constant. In this part it was necessary to do a workshop with the case company for achieving the best result. In this step, the results of the interview data analysis and the findings of theory are combined. In Figure 1, the workshop with the case company is marked as *Data 2*. After the workshop, the comments and evaluation was used to get the best result of an improved process.

As an outcome, Company X gets the guidelines on how to improve the sales order creation process in Figure format. In the Figure, the roles, steps and tools of the process are defined. These steps have been created with on-time delivery in mind.

2.3 Reliability and validity

Reliability means how accurately the desired variable is measured (Paaviainen, 2012:35). In this thesis reliability may be difficult to measure. Despite that, the semi-structured interviews help to get plenty of data and deep analysis of the subject and give a large picture of the current situation. Validity responds to the measurement of desired variable (Paaviainen, 2012:35). Several interviews and a workshop help to prove the

validity of this thesis. The next Figure shows what kind of interviews and workshops were conducted and with whom.

INTERVIEWEE	SUBJECT
Account Logistics Manager Account Logistics Coordinator Data Quality Manager (Company X)	Current State Analysis
Development Manager (Company Y)	Current State Analysis
WORKSHOP	
Account Logistics Manager Account Logistics Coordinator Data Quality Manager (Company X)	Building the proposal

Figure 2. Details of interviews and workshop.

As Figure 2 shows, there were two interviews related to the Current State Analysis. The interviews were carried out with the case company and its customer Company Y. After analyzing the data gained from the interviews, a workshop was arranged with Company X for getting more information about building the proposal for a new process and getting comments from the case company.

3 Current State of the Sales Order Creation Process

This section describes the current state of the sales order creation process of Company X. The business challenge of this thesis is frequent complaints from the case company's customers related to delays in the sales order creation process. Therefore, the objective of this study is to propose guidelines for improving the sales order creation process. The outcome of this study is guidelines for process improvement including supporting presentation. The sales order creation process was investigated to be able to identify the problem areas.

Since the process uses different systems, there are two parts of the process described in two process flow charts to make it easier to understand. The data for the Current State Analysis of the process was collected from interviews that were conducted with Company X and its customer Company Y.

3.1 Description of the current sales order creation process

The sales order creation process is in the beginning of the supply chain management process. As every process it has a process owner who is responsible for its functionality, productivity and any changes. The process includes in itself people and different systems. The sales order creation process involves employees from Company X and also from Company Y. The companies usually make annual contracts, but on some products they have one-by one contracts. One-by one contracts have some exceptions on providing products compared to basic annual contract. The exceptions can be related to the price, for example. At this point, Company Y acts as the process customer that has its own inputs in the process. Different systems make the process possible. These systems are e-mail, SAP ERP (SAP enterprise resource planning) system, EEPT (e-commerce exception processing tool) and BP Open tool. As every process, the sales order creation process has a start and an end. The process starts from the case company's customer who sends an order by EEPT. The last step of the process is the sales order processing in SAP. The main point of the sales order creation process is to prepare all the needed information related to the sales order for starting the preparing for the delivery process.

The sales order creation process of Company X is split in two parts: before and after processing the order in SAP ERP system. The next Figure shows the beginning of the process before processing the sales order in SAP.

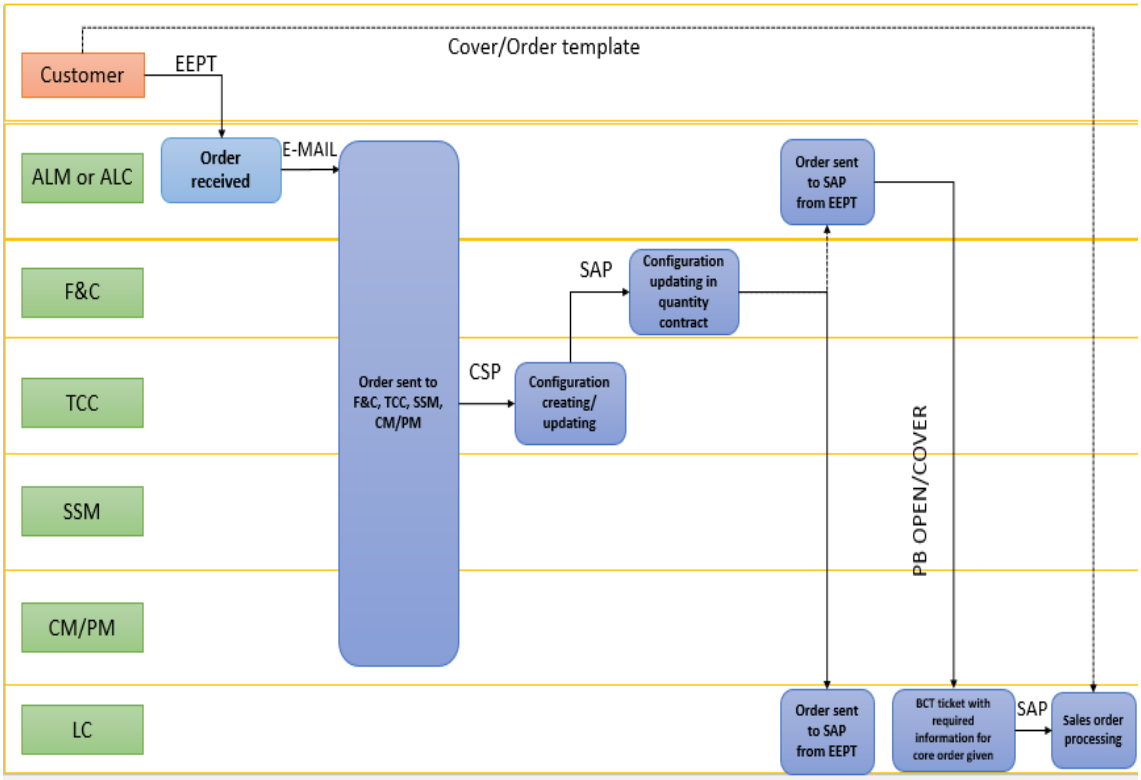

Figure 3. Sales order creation process of Company X.

As Figure 3 shows, the first part of the process has 7 steps. Each step has a person responsible for getting their own step done well. The sales order creation process starts from the customer of Company X, who sends an order using their own SAP to the SAP system. Company X receives the order by e-commerce exception processing tool (EEPT). The person who receives orders from Company Y is the account logistics manager (ALM) or account logistics coordinator (ALC). After receiving the order, ALM or ALC sends it to the financial and project controller (F&C), technical configuration consulting (TCC), system solution manager (SSM) and care manager (CM) or project manager (PM). This step is done using e-mail. In the next step the TCC creates or updates the configuration. In this step, the TCC uses the CSP-system. After that, the F&C updates the configuration in the quantity contract using SAP. When the configuration is updated, the ALC or logistics coordinator (LC) sends the order from EEPT to SAP. After that, the LC gets the ticket with the required information for the core order given using the BP

Open- tool. The information must contain Net Element ID (NE ID) and Software level (SW level). Every device provided by company X has its own Net element id. If there is no NE ID, it will not be possible to process that order in SAP. When the LC gets all the needed information, he or she processes the sales order in SAP.

The second part of the sales order creation process is done completely in SAP. It is much simpler than the first part, because everybody uses the same system and sees all the needed data in the same modules. The next figure shows the roles and steps involved in the process.

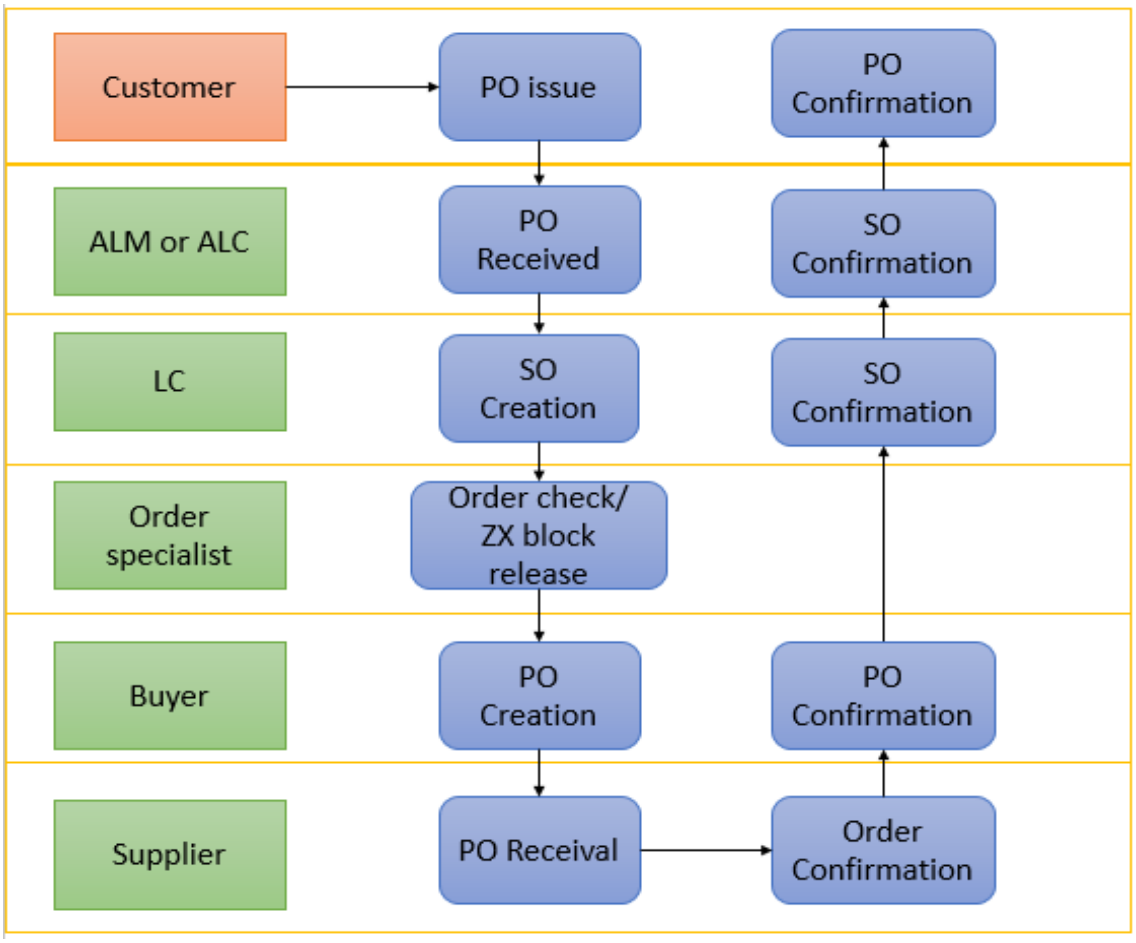

Figure 4. Sales order creation process after order processing in SAP.

As Figure 4 shows, the second part of the sales order creation process is about sales order (SO) and purchase order (PO) creation and confirmation. All steps are done in the SAP ERP system.

This part starts from the customer purchase order issue sent to the account logistics manager or coordinator. After he or she received the PO, the logistics coordinator creates a sales order into SAP. When the SO is created, the order specialist checks the order. If there are, for example, two same or similar orders, the order specialist has to decide what the best option to send these orders would be. If it is possible, then the order specialist either combines these orders or keeps them at the same format as they were in the beginning. After the order format is decided, the buyer starts to create a PO in SAP. The supplier receives the PO and confirms the order. After the order is confirmed, the buyer confirms the PO. The LC and ALM or ALC confirm the SO. In the end, the last step comes back to the customer and he or she confirms the PO. After the customer has confirmed the PO, Company X starts to create the delivery for the order.

The interview with Company X revealed that the normal lead time of the sales order creation process is from 4 to 7 days. There are, however, many issues that can have an impact on the lead time so that it extends to one month or even longer. The next section focuses on identifying reasons that extend the lead time.

3.2 Identifying strengths and weaknesses of the sales order creation process

The data collected from the interviews with Company X and Company Y shows that the sales order creation process has some weaknesses that have to be fixed but also strengths that help Company X to deliver the best value to the customer and make the process work.

What makes the process strong and reliable is that there are not too many people involved in it. The small amount of people makes it easy to communicate and solve problems much easier and faster than if there were, for example, 50 different people in different countries in the same process. Another strength of the process is the same system, SAP ERP. Each person involved in the process is able to follow the order status.

The interview with Company X indicated some weak steps in the process that result in late deliveries of orders required by Company Y. Figure 5 shows the first critical area of the process.

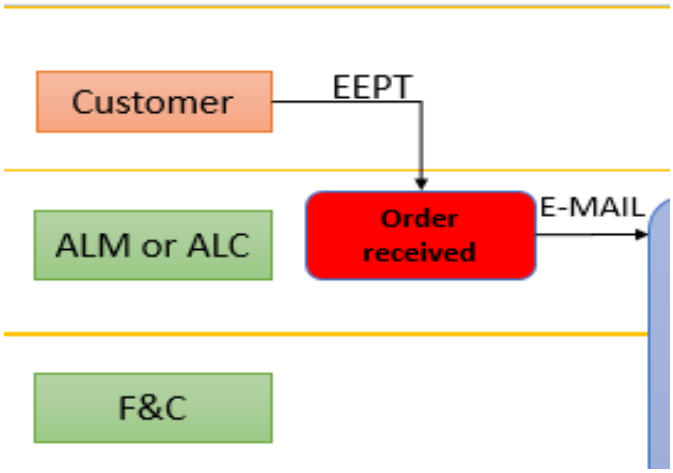

Figure 5. Critical area of the sales order creation process.

As shown in Figure 5, the first critical area is the first step of the process and it is marked in red. At this step, the customer is supposed to send the order using SAP to the SAP system. However, sometimes the customer decides to send the order by e-mail. The problem comes when the ALM or ALC are not able to find the needed e-mail from the long list of other messages. Company Y pointed out at the interview that it is easier for it to send orders, when the orders are fixed and agreed with Company X. The other reason of sending the order by e-mail was the big amount of products. Company Y explained that an order with a few products is easy to add in SAP to the SAP system, but when the order includes over 2 products, it takes a long time to send the order using electronic systems. In e-mail it is easier to list long content for the order. Despite that fact, Company X has to spend some time searching for the order in a big amount of e-mails and add the orders manually in SAP. Disagreements may come when Company X has lost the whole

e-mail. In EEPT the ALM or ALC are able to follow new orders and make next action right away.

Figure 6 below shows the next critical areas that appear in the middle of the whole process, before processing the sales order in SAP.

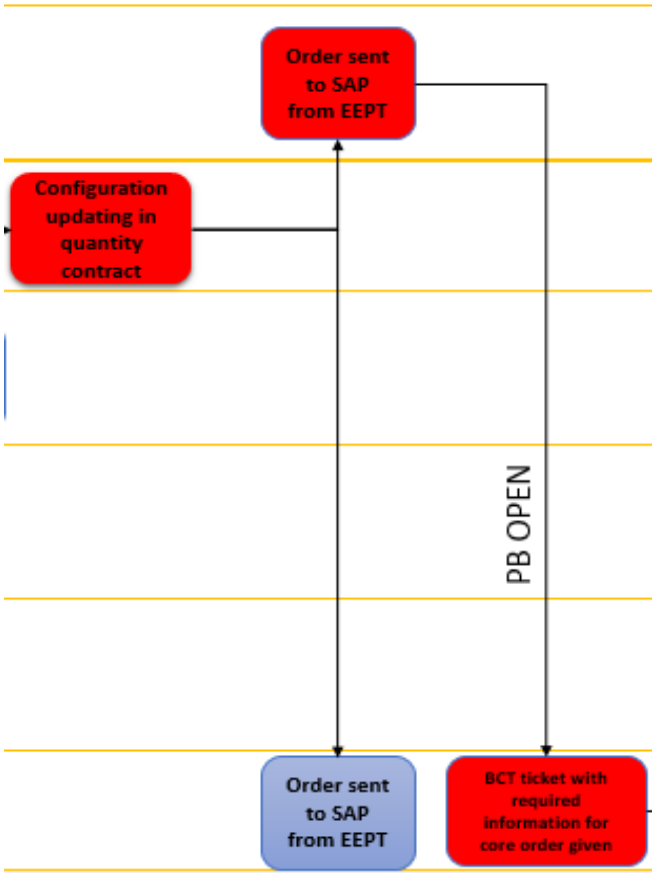

Figure 6. Weaknesses of sales order creation process.

As Figure 6 shows, there are three most critical areas in the middle of the process that have an impact on the lead time of the process. The critical steps are marked in red. The first critical step is configuration updating in quantity contract. The reason this step was determined critical is because of the real quantity required. At this step the required quantity has to always be the same as in quantity contract. If they do not match, then it is a good time to check where the wrong information appeared. The problem usually comes from customer's order data where the customer uses their own codes for the order, despite the agreement between the companies that requires the codes that Company X can identify.

Due to not matching quantity and quantity contract in the previous step, the next critical step is when the order has to be sent from EEPT to SAP. In this step the problem occurs when information that is related to the quantity of the order is impossible to send to the SAP ERP system from EEPT.

The problem in the last step appears when the order does not have the required NE ID or Software level or they are just wrong. This is the reason why the order cannot be sent to SAP. The SAP system does not accept orders without NE ID, but does accept SW level. If SW level is wrong, SAP continues to process the order and as a result, the order contains wrong information.

3.3 Summary of the strengths and weaknesses of current sales order creation process

Regarding the previous chapters, the sales order creation process of Company X has a number of strengths and a few weakness areas. It is easy to keep the process working by using almost the same system and work with a small amount of people involved in the process.

After investigating and analyzing the critical areas of the sales order creation process, it was found that the reason why some areas are critical is the bad information flow between Company X and Company Y. To make the process work well and prevent any issues, it is important for both companies to know how to work with each other and how each company is working independently. An effective information flow keeps the process stable, as a combination of people, tools and process.

4 Good Practices of Process Definition and Process Improvement from the Point of On-Time Delivery

This section defines process as a professional term and as an important part of every business. This section also includes best practices of process improvement. In the first part the term process is defined. The second part discusses tools and ideas for process improvement. As a conclusion of this section, the most important ideas and best practices of process definition and process improvement are put together in order to create the guidelines for sales order creation process improvement.

4.1 Tools and ideas for process definition

According to Laamanen (2001), process is a set of logically connected activities and resources for achieving the desired result. A process consists from activity, resources, artifacts and performance (Laamanen, 2001: 20).

A good process definition helps to understand company's functions. A definition of process is needed for recognizing the most critical steps (Laamanen, 2001: 75). Laamanen (2001) highlights five elements of a good process definition:

1. Contains the most critical issues of the process
2. Shows connection between issues
3. Process definition should help understand the entirety and its own role in achieving the goals
4. Advances teamwork of people who are involved in the process
5. Process definition gives a chance to act flexibly according to requirements of current situation.

The definition of process includes all that is important to a company's success. The most important purpose of process definition is to find the most critical issues and prioritize them in the order of importance (Laamanen, 2001: 78).

A good process definition technique includes six parts. In the first part, the scope of application of the process is defined. This part tells where the process starts, where it ends and where the process is applied. the process can be applied to products, customers or

situations. From the point of process understanding, it is important to identify the beginning and the end of the process (Laamanen, 2001: 89).

The second part identifies the customers of the process, their needs and requirements. In this part, customers' use of the products and services is identified. From the point of process definition, customer is the receiver of the service. While defining the process the proper customer number can be from 3 to 5. The most challenging part is identifying customer needs and requirements (Laamanen, 2001: 89). A good way of identifying these issues can be knowledge about where customers complain the most. Usually an unfulfilled requirement is behind these complaints (Laamanen, 2001: 90).

In the third part the objective of the process is defined. Also, process success factors are defined. At this point, an organizational objective such as customer satisfaction or profit are no good. The point of defining the objective of the process is to find something concrete, such as the role in the company's success (Laamanen, 2001:90). Defining the success factors of the process may be challenging at this stage. The challenge here is to not confuse the whole company's success factor with the success of the current process. The other challenge may be to define some condition factor as a success factor (Laamanen, 2001:91).

The next step is to define input, products and services of the process and how the information of process activities is managed. Because the input of the process may be massive, it is easier to separate it into different groups such as internal information, additional information for other process and information that is delivered to the customers (Laamanen, 2001: 92).

After scoping the process, defining its objective, customer and requirements, it is a useful step to start drawing the process flow diagram. During drawing the process flow diagram, it is important to pay attention to the most critical steps, highlight their importance and set them up as an improvement objects. The process flow diagram should be as critical as possible for making the process objective, steps and meaning understandable (Laamanen, 2001: 92). The next Figure provides a good example of a clear process flow diagram.

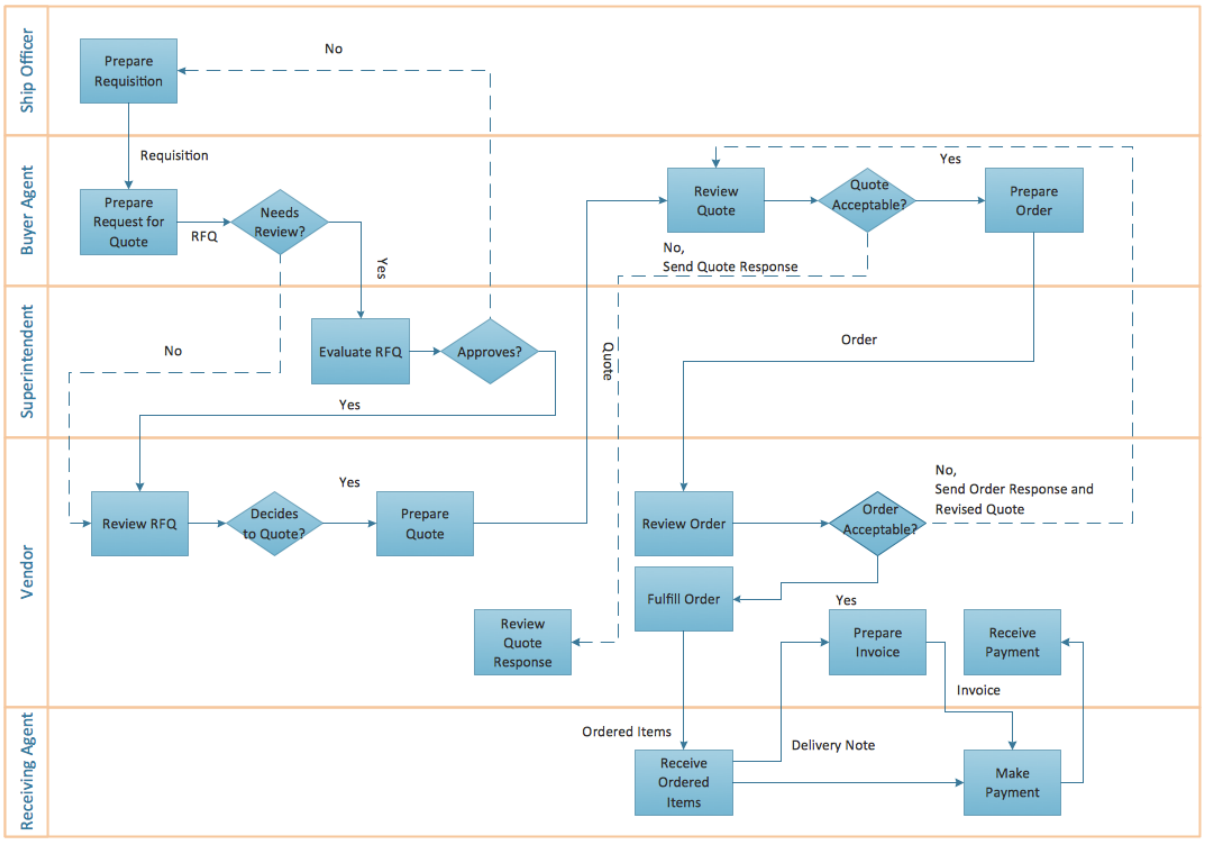

Figure 7. Deployment Flow Chart- trading process diagram.

Figure 7 shows clearly the roles involved in the trading process. Also, it easy to see all actions that are taken in the process.

The last step defines roles and responsibilities of the people who are involved in the process (Laamanen, 2001: 93). .In this part it is useful to present each role independently. It helps process members to recognize their own role, responsibilities and decisions (Laamanen, 2001: 94).

4.2 Challenges of process improvement

Process improvement is a serious step for a company as big as the case company. In process improvement it is important to know and keep the process strengths. Implementing a new or an improved process is challenging for such a company due to a huge amount of employees that are located around the world and have their own working

cultures. Besides people, many different tools and processes are used in the organization to communicate all the time. Those three parts of organization are difficult to keep together when changing or improving a process.

In any process, it is challenging to get all the people inside and outside the process properly organized in order to achieve all the objectives successfully. For making the process itself work, it is important to have layers of management integrated with the company's key management structure. Tools are also one of the major challenges of the processes. Companies offer their employees tools that help achieve the objectives, but employees usually decide to use their own tools such as white-boards and physical story cards. These tools may help at some point, but soon they do not really help as some situations require more sophisticated, on-line electronic tools. The worst approach that a project manager, for example, can take is to ignore issues that are associated with people, process and tools and hope that they will be fixed by themselves. When weaknesses in some of these factors are noticed, the project manager has to start investigating the problem and fix it (Agile Project Management).

Besides challenges regarding communication between people, tools and process, five more big challenges make process improvement difficult:

- Lack of time
- Not enough knowledge
- Inflexible approaches
- Insufficient commitment.

Lack of time is the usual challenge in every project, such as a process improvement project. The challenge appears due to complicated schedules that leave insufficient time for enhancing the process. Quality is also one of the reasons why there is not enough time. When the quality of the process improving project has been maintained from the beginning of the project, the cycle times get shorter.

Not having enough knowledge is also one of the biggest challenges in process improvement. Regarding Karl Wiegers's investigation (2005), most employees do not develop

their own knowledge by reading literature related to their projects. Wiegers (2005) suggests people should learn by reading articles, discussing them and applying them in the projects.

Process improvement is a beginning of a new work culture. The project team has to start working together in some new way to achieve better results. If someone in the team does not follow the process and still works in the old way without adding something new, process improvement will not succeed. In this case, it is important to motivate people to work together and be open-minded for new possibilities, ideas and implementations. To make it possible, the organization's leaders have to set realistic improvement goals and combine process improvement with the business results (Wiegers, 2005:7).

As discussed in the previous sections, people are the most challenging part in a process improvement project. When there is a process plan available, new approaches are created, people may still be working in the same way without getting interested in changes that require a changes in the way they work. The worst is that people may lose confidence and interest in the whole project (Wiegers, 2005:7). The solution to this problem is the learning curve that is shown in Figure 8 below.

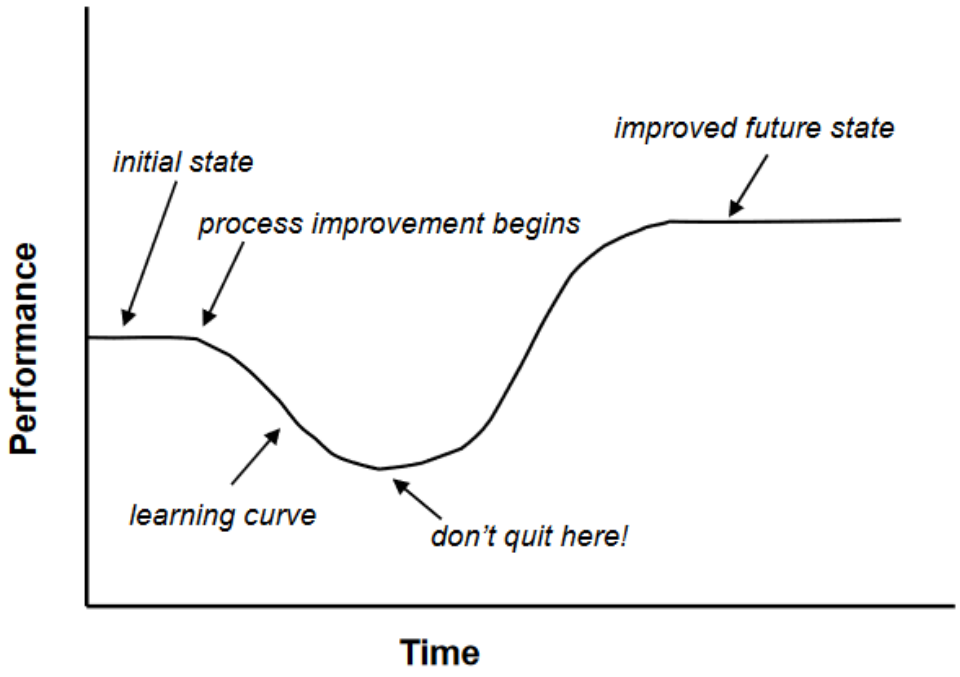

Figure 8. The learning curve. (Copied from: http://www.processimpact.com/handbooks/spi_intro_and_chapter_1.pdf)

As Figure 8 shows, there are always downhills in a project that are manifested in the performance level. When changing something in a known environment such us known work culture, performance gets always hit. The worst possible solution is to give up before the real good results will show up. To keep employees motivated it is important to remind them about real, long-term benefits. After the downhill, improvements of the process itself begin to emerge and also employees get more motivated by seeing the real results (Wiegers, 2005:8).

4.3 Tools and ideas for process improvement

The need for choosing a particular process for improvement must be explained by process improvement objectives. The explanation must include customer and organizational benefits of the improvement. While choosing the process that needs to be improved it is important to pay attention to these issues:

- Essential question related to customer satisfaction
- Potential process that need to be improved is related to the important customer or customer segment
- Selection is related to the critical success factors of the organization and, core services and actions
- Selection is related to the strategy of the organization and its possible changes
- Selection has an impact on many functions
- Selection has an impact on the organization's public image
- Selection has an impact organization's financial operation condition
- Otherwise the process is perceived as important development area

Possible development areas are usually related to issues that appear in processes that involve customer co-operation. These issues are mostly related to knowledge and attitude. In these cases, development is needed in the areas of co-operation, information flow and task organizing (Tuurala, 2010).

While selecting the process that needs to be improved, it is necessary to decide, what kind of improvement it will be. There are two types of process improvement: continuous improvement and radical change. The main difference between these two improvements

is the outcome. The outcome of continuous improvement is not a totally new process. In continuous improvement there are many small changes that keep the process working without allowing high risks of failure. The outcome of radical change is a complete new process. In this case there is a high risk of failing due to a significant amount of changes (Laamanen, 2001:207). The next table shows how continuous improvement and radical change differ from each other by features, change challenge, principles and success indicators.

	Continuous Improvement	Radical Change
Features	• Many small improvements which together receive a big result • Low risk	• Large change • High risk • IT always has a significant role in changes
Change challenge	• How to maintain the stream of continuous improvements? • How to prevent radical changes?	• How to eliminate high risks? • How to get courage to invest enough?
Principles	• Amount of changes is monitored • Amount of changes are connected to rewards • Clear rules of the process are identified and responsibilities are organized for change execution	• There is a small group selected that has power to effect on change execution • Careful risk scoping and plan B • Owners and top management support

Success indicators	• Amount of development ideas • Amount of executed changes • Received returns • Paid rewards	• Exited hard core that is ready to fight despite any barriers • After deep analysis the outcome is getting clear

Table 1. Continuous improvement and radical change (Modified from Laamanen 2001: 207)

As Table 1 shows, continuous improvement is a more reliable option for a process improvement because of low possibility of risks and slow implementation of changes. This study uses the continuous improvement option in order to achieve the outcome of this thesis by moving slowly step-by-step, making small changes in the development areas.

4.3.1 Quality improvement

Quality is a set of features of some whole and these features can fulfill indicated and unindicated needs. Good quality in a project means that the product executed in the project fulfills customer's expectations. Quality management makes sure that the quality plan, quality assurance and quality control help the project fulfill the requirements that are set for it. Quality management in a project environment means all the actions that are needed for ensuring the fulfillment project expectations (Artto et al. 2006: 225).

Quality management appears in three key functions: quality planning, quality assurance and quality control. In projects, quality planning concentrates on identifying quality factors and preparation of the measures they require. The starting point of quality factors are customers' requirements and definition of the project's scope. When thinking about quality planning, it is useful to discuss questions shown below:

- From which quality factors the quality of this project consists of?
- Which are the quality criterion for this project?
- How quality is supposed to develop during the project and how the development appears in quality criterion?
- How good quality will be measured in the end of the project?

- How quality is reported, how quality issues are informed and how they are documented?
- Which responsibilities are related to quality management?
- How it is ensured that employees are committed to achieving a high quality?

(Artto at el. 2006: 227).

Quality assurance is a systematic anticipation that helps to ensure the fulfillment of quality factors during the process. The objective of quality assurance is to ensure the required quality will be certainly achieved. Quality assurance contains tracking, evaluation and anticipation tasks. The requirements of quality assurance for product and project management are: clear specifications, definitions and criteria that can be monitored, following best practice, using own experience, knowledgeable resources and active change management (Artto at el. 2006: 227).

Quality control is about monitoring fulfilled quality and removing quality changes and issues. Shortly, quality control is a corrective and controlling action. Intermediate results of the project are observed and the execution of quality factors are evaluated. The main objective of quality control is to find deflections and their reasons and strive to actively eliminate them (Artto at el. 2006: 228).

Total Quality Control (TQC) means a good practice of quality management. Its fundamental factors are:

- Quality thinking comes from company management: it is a commitment by the organization.
- Company should recognize the most critical quality issues in time and focus enough resources for their solution.
- Company should recognize factors that tell about good quality and with them it should make the key processes measurable
- Quality is created through the information and processes, problems are solved through statistics and monitoring.

(Artto at el. 2006: 229).

PDCA-cycle

Every process improvement requires a description of the process, measuring, analyzing and testing it. Deming cycle is the most used improvement concept in the world. Deming cycle is also known as Plan-Do-Check-Act-cycle. Figure 9 shows what the cycle looks like.

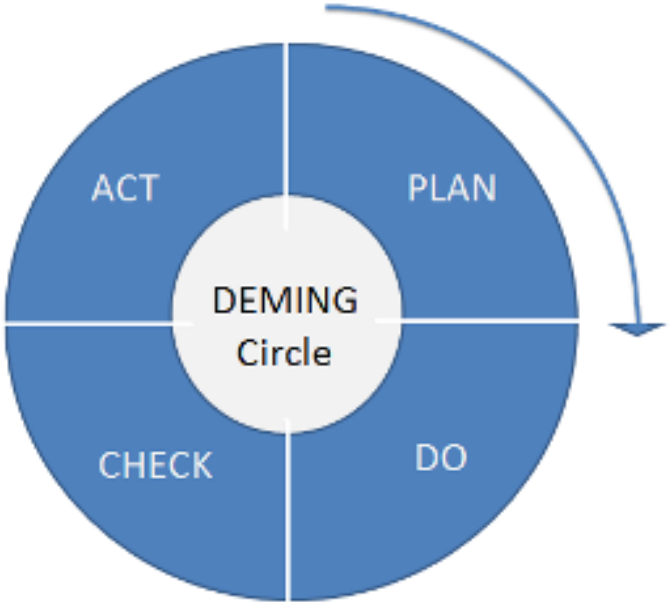

Figure 9. PCDA-cycle. (Copied from http://whatis.techtarget.com/definition/PDCA-plan-do-check-act)

Deming cycle represents the model of continuous improvement of business process management. The PDCA-cycle helps companies to improve the quality and effectiveness of the processes (Margaret Rouse, 2015).The cycle includes 4 stages:

- Plan: plan and set your goals. The main things that are important to know in this part is what has to be achieved, what kind of change is needed and what information will be important for achieving the goals.
- Do: implement required change or test the change in small scale.
- Check: detect impact of the change or the test.
- Act: investigate result. In this part it is important to know what is learnt and what can be forecasted based on the results and knowledge.

(Laamanen, 2001: 210)

The PDCA-cycle is an important method of continuous quality improvement. In the cycle, the improvement appears as an unending process where the connected stages follow each other rising on a higher level of improvement. Different quality approaches are used for searching the development area, for its investigation, understanding, repar and also evaluation of the results gained during the improvement (Tuurala, 2010).

4.3.2 Information flow

Communication improvement in companies usually means enhancing the information flow. The combination of accommodation arrangements, workflow and common training creates a precondition for effective information flow. The company is responsible for making its employees to search for the needed information spontaneously. To make it possible, the company has to create preconditions and desire for its employees to acquire the needed information rapidly and independently (Kvist et al. 1995:40).

Technical tools help to improve information flow in many different ways, such as the following:

- There is a possibility to reach the right person
- There is a possibility to gain information about reachability of needed person and different ways to get your message across
- Time and location do not prevent information flow
- Information about whole is available to everyone
- There is an opportunity to respond on messages rapidly
- Communication channel is easy to use

(Kvist et al. 1995:40).

However, technical tools are not the core of the information flow. While adjusting affairs there is no need for technological know-how. Terminology is a foundation of communication between the employees. Terminology is everything that is related to the real world and it can be identified like human, stakeholder, project, plan, for example. Terminology is the biggest challenge of an information technology system and also its solutions (Ala-Mutka and Talvela, 2004: 138).

The meanings of terminology are acquired in organization. The terminology used has often different meanings and contents in different units and organizations. Problems

come when a common information system that understands terminology only in one way is set in terminology complication. Someone has to abandon their own terminology and accept new ones. Different information systems that are used in different companies often cause problems. Different information systems accept terminology that is familiar to them. The problem may come when information is sent from one information system to another. In that case the system may repel the other system's terminology meaning (Ala-Mutka and Talvela, 2004: 139).

The diversity of terminology appears because different units do not co-operate enough with each other and there are people with different backgrounds in different units and work tasks. Also, the terminology and models related to it have not been managed comprehensively. Every unit have had to define their own terminology and connection between them. However, a good terminology definition is still not enough. Terminology has to be formed as a logic whole, as the terminology model. Finding the right documents is difficult and it takes a great deal of time in organizations. Also, it is very unclear how to recognize the original document among others. The typical solution is to manage documents instead of the actual data management. This is the way to solve the problem, but not the reason the problem occurred. In this case, the reason is unstructured terminology (Ala-Mutka and Talvela, 2004: 140).

Information integrity or the common terminology model of the whole organization helps to transfer, utilize and understand data in different situations. Data usability and accountability are feasible with common terminology. Data usability means utilizing the same data for different purposes, for customer or areas, for example. Data can be utilized in different units for different purposes. Data accountability means that the terminology created in the beginning of a function chain and structure of the terminology move through the chain function to another (Ala-Mutka and Talvela, 2004: 141-142).

4.3.3 Organizational competence

Comprehension of competence in organizations is often mixed with knowledge comprehension. Competence and knowledge are different definitions that maintain each other. Knowledge is about knowing and understanding, *how* the process works, for example. Competence means *applying* knowledge and skills in managing the process, for example

(Sanghi, 2007:9). Often, competence in the process is known as a process input. However, competence in the process is not an input but it has a great role in completing the process (Sanghi, 2007: 16).

Competency management offers employees a clear framework of the needed skills, knowledge and abilities that will help to fulfill their work expectations. A clear framework should include 4-6 most important key competencies for the organization. When there are more than 6 key competencies, it makes it difficult to improve the most needed competencies. The number of competencies must be reasonable and manageable. After identifying the most important competencies the next steps follow:

- Providing a short description of each key competency
- Few examples of behavior to clarify description of competencies
- Providing descriptions of levels of authority (Halogen Software).

After creating the competency framework, it should be cultivated in the organization. There are many different suggestions that can help to share the competency framework around the organization. The easiest way to share the competency framework is creating a handbook of competencies that is available to all employees. The handbook or list of competencies can be posted in some place that every employee can access and regularly visit the place, an Intranet for example. To let employees know what is expected from them, it is simple to provide them with job descriptions where each one can check their own job-specific competencies. If there is a lack of needed competencies, it is necessary to make sure that the organization has different learning paths and activities for competency development. The key competencies must be known in the organization. the organization must ensure that the key competences are included in employee or unit communication, for example. Figure 10 below shows the excellent work performance (Halogen Software).

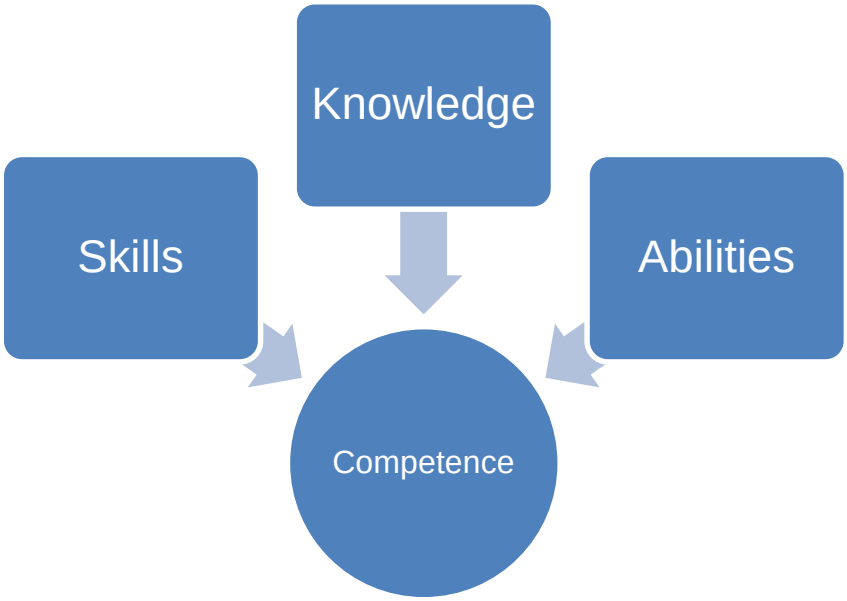

Figure 10. Excellent work performance.

As Figure 10 shows, excellent work performance is possible when the skills, knowledge and abilities of the employees are combined together. The combination does not work as an input for competence improving, but as features for completing the competence improving process. To support this, there is specific training available for employees.

4.4 Conceptual framework

Best practices gained from the theory investigated are collected in Figure 11. The Conceptual Framework thus built shows a summary of the theory that was studied and also how the theory was implemented.

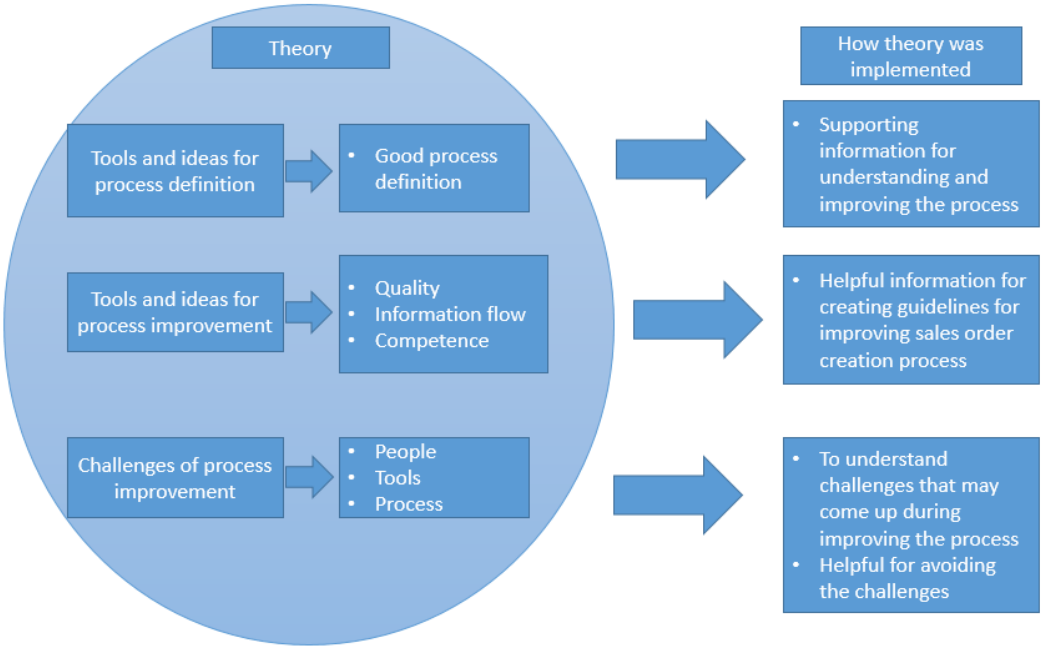

Figure 11. Conceptual framework.

On the left side of the figure is shown what theory was studied and what concrete parts of the theory were used in this thesis. On the right side is shown how the theory was implemented in this thesis and what key thoughts it raised.

After analyzing the results from the Current State Analysis, the theory part was a bit unclear. In the beginning, theory was investigated only regarding processes and their improvement. After a discussion with the lecturer and Company X it did appear that issues of the process are related to more concrete things. After the workshop with the case company the needed theory was identified for this thesis.

Theory about process definition helped understand the process as a whole. The theory included basic information about processes that acted as supportive information for process improvement. Tools and ideas for process improvement is a large set off best practices. The Current State Analysis revealed that the sales order creation process of Company X has weaknesses in for areas. After analyzing the results of the Current State Analysis and workshop with Company X, relevant theory was studied deeper regarding topics such as quality, information flow and organizational competence. These areas were investigated and they were used for creating the guidelines for improving the sales order creation process. While generally studying the theory about processes, challenges emerged that may affect process improvement. These challenges were related to the

combination of people, tools and process. The theory about the combination of people, tools and processes was studied to keep in mind what kind of challenges may appear during the improving of the process. The theory turned out to be very useful for avoiding these challenges.

5 Building an Improved Sales Order Creation Process

This section describes how the sales order creation process was improved and what guidelines for the sales order creation process were given. The last part of this section describes the proposed improved sales order creation process.

After analyzing the results gained from the Current State Analysis of the sales order creation process, weakness areas of the process were studied by reading literature that is related to the current problems of the process. Best practices were studied for grounding the outcome of this thesis, i.e. guidelines for improving the sales order creation process.

The investigation of the current weaknesses in the sales order creation process revealed four weakness areas that caused disruptions in the process. The weakness areas were discussed with Company X and different reasons causing the disruptions emerged. The reasons for the weakness areas were in some places quite similar. Some problems continued from the very beginning of the process to the end. The four weakness areas of the sales order creation process and reasons of weaknesses can be seen in Figure 13.

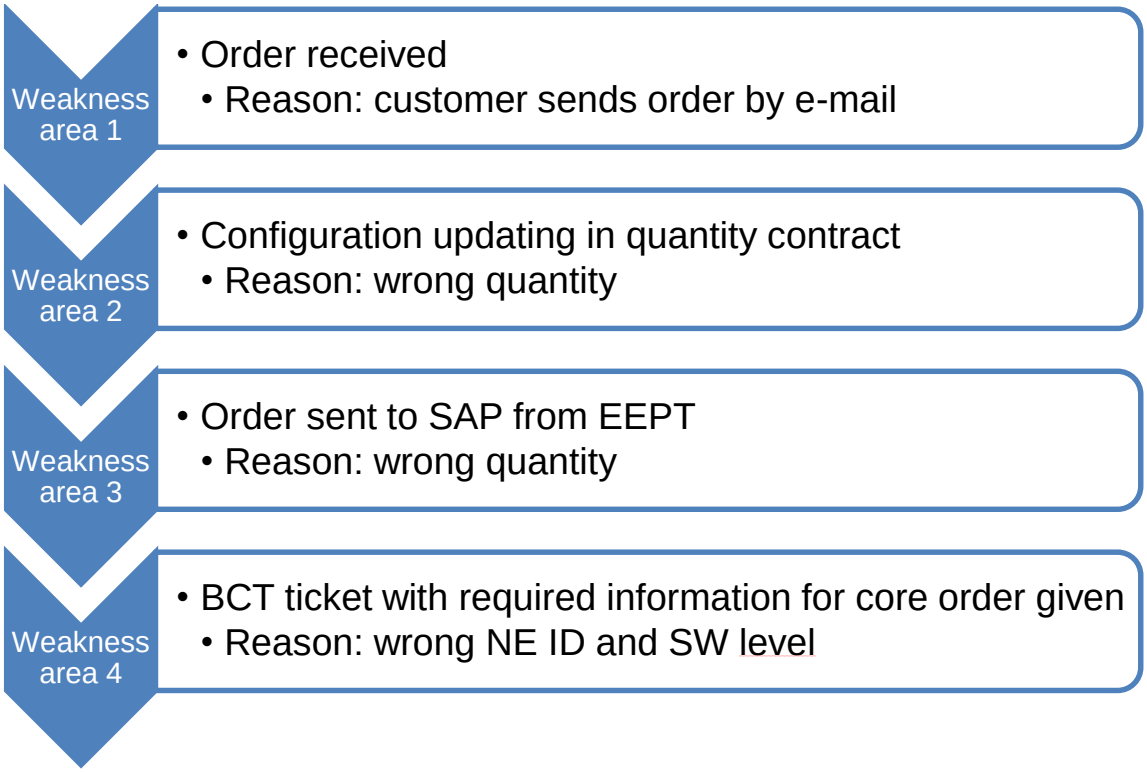

Figure 12. Weakness areas of the sales order creation process.

5.1 Improving cooperation

The first weakness area is in the first step of the sales order creation process when the customer's order should be received by the ALM or ALC by EEPT. the CSA revealed that sometimes the customer sends the order by e-mail that makes the sales order creation process complicated because then the order has to be processed manually. Orders sent by e-mail make it challenging for the ALM or ALC to find the right order from numerous e-mails. In the interview, Company Y explained that sending an order by e-mail is much simpler then sending it by SAP-to-SAP system, if the order is fixed and known by both companies. The other reason was the big amount of information that has to be added to the system. Company Y explained that adding the same order information to the system takes a lot of time. In the workshop with case company it was clear that it also takes a lot of time for the ALM or ALC to add the received order information to the system manually.

Based on the results gained from the interviews and the workshop, a suggestion for addressing this weakness area was to create a written or unwritten fixed order agreement between the case company and Company Y. The agreement should state that fixed orders should be sent by e-mail by Company Y to the case company as a PDF file that contains the codes or names of products that are ordered periodically and also product quantities. The agreement will have a good impact on the case company employees' way of working because they do not have to waste time on searching the orders from countless different e-mails. Information about the agreement has to be shared amongst the employees who are working with the orders. When information is shared and the employees are aware of the change, work with manually sent orders will be easier and the orders will not disrupt the sales order creation process. When Company Y sends the case company the PDF file with the needed information about the order, it is easier for Company X to proceed it forward.

The agreement should help both companies to cooperate easier and more effectively because both companies will be aware of fixed orders, their quantities, and companies will save each other's time and make the process more effective.

5.2 Improving the knowledge

The CSA indicated that the second weakness area is the step where the configuration should by updated in the quantity contract. The reason that causes disruptions in this area is the wrong quantity. The same disruption continues to the next step where the order is sent from EEPT to SAP. In this area, challenges start when the order's quantity was added in the wrong way in the quantity contract. Quantity added in the wrong way means that a wrong amount of a specific item is ordered. Since Company X creates many different orders per day, employees do not check the quantity of every single order. However, the logistics coordinator or at least the order specialist has to notice the mistake of added quantity and fix it. If the logistics coordinator or order specialist lets the order with the wrong quantity go forward, the customer of the case company will get the wrong kind of order.

These kinds of mistakes come from the logistics coordinator's and order specialist's knowledge that is applied in a wrong way. According to Sanghi (2007), knowledge is about understanding *how* something works and competence is about *applying* the knowledge in the right way. In this instance the case company's logistics coordinator and order specialist in the sales order creation process do not apply the knowledge well about adding quantity in the right way. The solution that was suggested to Company X is to create instructions about how to add the order quantity to SAP. The instructions should be studied together with the logistics coordinator and order specialist even if they claim they know the content of the instructions. In this case, knowing and understanding is not enough. It is important to follow the instructions continually so that mistakes can be eliminated.

Company X could arrange a meeting or training for the logistics coordinator and order specialist. The instructions should be explained clearly. Company X should also explain to the employees the main point and the value that comes from the instructions and following them. When the training or meeting is over, it is necessary to share the information with all employees that are involved in the process.

5.3 Improving information flow

The last weakness area in the sales order creation process of the case company revealed by the CSA was just before sending the order to SAP. Wrong Net Element ID and wrong Software Level cause disruptions that do not let the order proceed forward to SAP system. The SAP system does let the order forward even if there is a wrong SW level but it does not let the order proceed if there is a NE ID that is already used. The logistics coordinator has a right to create a NE ID extension if some NE ID is already used. An extended NE ID causes troubles with the order that confuses employees who have to proceed the order after getting it in the SAP. Also, an incorrectly added or fully missing SW level disrupts progress of the process. The SW level has to be added as a single number. SAP does not accept a SW level if it is added like this “SW level: 1”, for example. When there is a wrong NE ID or missing SW level, people who process the order forward have to stop the order and check all the needed information related to it. If the order has a wrong NE ID, it has to be fixed to the right one. If the order has an incorrectly added SW level, it has to be fixed. Similarly, if there is no SW level at all, it has to be added to the order.

Mistakes in this area are caused by ineffective information flow about what NE ID the user can use and basic information about how to add the SW level to the SAP system. The suggested solution for this weakness area was to provide instructions separately for the NE ID and for SW level. The instructions about the NE ID should contain information about the old, new and extended NE ID. Also, instructions should explain in what kind of situations Ne ID can be extended. This will help the employees prevent mistakes and create the extended NE ID. The instruction about the SW level should clearly explain how to add the SW level to the SAP system. The instructions should also explain that the SW level added in the wrong way disturbs the other employees’ work because they must fix the wrongly added item.

Instructions about NE IDs and SW level must be shared among the employees who are working with them. In addition, any changes about the old, new and extended NE ID should be shared immediately by e-mail to the employees. Another solution for keeping employees aware of changes are meetings and workshops. They will help employees stay up to date and work more efficiently. For new employees that are starting to work with NE IDs and SW levels, it is necessary to organize training where the trainers are

going through every detail of what NE ID can be added to SAP, when they can be extended and what the right way to add the SW level to SAP is. Well shared information will have a good impact on the sales order creation process itself.

5.4 Summary of the proposed improve sales order creation process

Based on the results from the CSA, guidelines for the sales order creation process improvement were proposed. The process has four weakness areas that caused disturbance in cooperation, knowledge and information flow. The next Table shows each weakness area, reason for the weakness and improvement suggestions.

Weakness area	Reason	Improvement suggestion
Order received	• Customer sends order by e-mail	• Agreement about fixed orders
Configuration updating in quantity contract	• Quantity	• Instructions and following them
Order sent to SAP from EEPT	• Quantity	• Instructions and following them
BCT ticket with required information for core order given	• Wrong NE ID & SW level	• Instructions for NE ID: old and new NE ID • Instructions for SW level: how to add to SAP

Table 2. Improvement suggestions for weakness areas of sales order creation process.

As Table 2 shows, the first weaknesses appeared in the first step of the process, when Company X receives the order from Company Y. Usually Company Y is supposed to send orders by EEPT. In this case, the reason behind this weakness was that Company Y sometimes sends orders by e-mail. This approach disturbs the sales order creation process because the order can be lost in the endless amount of e-mails and the order

must be dealt with manually which is time-consuming. The agreement that was proposed as a solution, should explained that fixed orders should be send by e-mail by Company Y to the case company as a PDF file that contains the codes or names of products that are ordered periodically and also product quantities.

The next two weakness areas in the process were caused by the same reason, i.e. the wrong quantity. The solution that was suggested to Company X is to create instructions about how to add the order's quantity to SAP. These instructions should be learnt and also followed by the logistics coordinator and order specialist.

The last weakness area was in the middle of the process when the logistics coordinator gets a BCT ticket with the required information for core order given. The information has to include the right NE IDs and SW level. If it does not, the order will not proceed forward to SAP system. The suggested solution for this weakness area was to provide instructions separately for the NE ID and for SW level. The instructions about the NE ID should contain information about the old, new and extended NE ID. Also, in the instruction about the SW level should be clearly explained how to add the SW level to the SAP system.

If thinking about the people, process and tools triangle, it is easy to notice that all issues of the sales order creation process are related to the people part. These issues manifest as weak cooperation and, poorly shared knowledge and information throughout the organization. In this case, guidelines given for the sales order process improvement should help people improve their inputs for making the process work more efficiently.

6 Conclusions

6.1 Short summary of the whole project

In this thesis, the sales order creation process of Company X was investigated from the point of view of on-time delivery. The objective of this thesis was to identify weaknesses in the current process in order to create guidelines to the case company for improving the sales order creation process. The sales order creation process of Company X that was studied is provided for the case company's customer Company Y. As an outcome of this thesis, guidelines were created for the case company on how to improve their sales order creation process. The guidelines for the process improvement include a presentation.

The first step in this investigation was setting the objective. After that, theory about process definition and process improvement was studied. The Current State Analysis was made by interviewing personnel from Company X and Company Y. After defining the current state of the process, theory was selected with a special focus on the weaknesses in the process. Then the results for the CSA were combined with the theory. The next step was to fix weakness areas in the sales order creation process. In this part it was necessary to arrange a workshop with the case company for achieving the best result. Then, the results from the interviews, workshop and theory were combined. In the second workshop, the improvement suggestions were presented to the case company. After the presentation, Company X made some corrections to the given improvement suggestion. Based on the corrections, the improvement suggestions were modified to create the final guidelines.

6.2 Immediate practical next step recommendations

The company should implement the guidelines using Deming cycle. Deming cycle should be a simple way to achieve small goals by continually improving the process step by step. According to this thesis, the case company has three goals to achieve: improve cooperation with its customer Company Y, improve the knowledge of employees and information flow within the organization. These improvements should be followed up with the guidelines offered by this thesis. With the PDCA-cycle, it is easy to set the key goals, implement or test the change, detect the impact of the change and learn from the results gained during continual improvement.

6.3 Evaluation of the thesis

In the beginning, the outcome of this thesis was supposed to be an improved sales order creation process. After getting familiar with the process itself and many discussions the case company's personnel and thesis instructor it became clear that improving the whole sales order creation process in such a short time can be very challenging and there may be a risk that the result will not be reliable. After the discussion, it was decided that a more reliable outcome of this thesis would be achieved by studying what guidelines could be offered to the case company on how to improve the sales order creation process.

Theory was the most challenging part of this thesis. After analyzing the results from the Current State Analysis, the theory part was a bit unclear. In the beginning, theory was investigated only regarding processes and their improvement. After a discussion with the lecturer and Company X it did appear that issues of the process are related to more concrete things. After the workshop with the case company the needed theory was identified for this thesis.

The research question of this thesis was: What changes does a sales order creation process need in order to deliver the orders on time to the customer? The final outcome provided clear answers the research question. The sales order creation process needs strong cooperation between Company X and Company Y, needed knowledge and continually shared information flow that will have a positive impact on the process efficiency to deliver the orders on time to the customer.

The whole project proceeded very well despite the little change in the outcome. It was very interesting to investigate the sales order creation process and get familiar with the opinions of both companies included in the investigation. It was very easy to work with the personnel of Company X. The account logistics manager, account logistics coordinator and data quality manager were there to help every time when some detailed information about specific issues was needed. They also gave good ideas, advice and continual feedback that helped to achieve the best possible result.

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Sales Order Creation Process of Company X