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Subcontracting Management Process Improvement Proposal for the Case Company

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Preface

Writing this thesis has been an interesting journey and educational experience that has given me the opportunity to strengthen my professional expertise in the field of industrial management as an industrial management engineer. The topic of the thesis - Subcontracting Management Process Improvement Proposal for the Case Company - has given me a great opportunity to combine academic theory with real-life applications, which has truly allowed me to deepen my understanding in industrial management, supply chain management and subcontracting management. The journey has included challenges, but at the same time, those challenges have given me strong feelings of happiness when I have conquered them and learned something new from them.

It must be said that this journey has not been travelled alone and I would like to especially thank my thesis supervisor, Dr. Thomas Rohweder, for supervising the thesis and Sonja Holappa for supervising the professional writing of the thesis. Furthermore, I would like to thank Dr. James Collins for his good advice throughout the thesis and Metropolia University of Applied Sciences for giving me the opportunity to complete my Master of Engineering in Industrial Management degree at their institution.

Finally, I would like to thank my family, my three children and my loving wife for all the support and understanding they have given me to completing this degree.

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Abstract

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The objective of this thesis was to propose an improved subcontracting management process for the case company. The case company had a business challenge in the subcontracting management process because one key subcontractor (subcontractor x) did not deliver parts on time according to the schedule set in the ERP. This caused difficulty in production planning when the parts sometimes arrived late and sometimes too early. Delays had a negative impact on the case company's compliance with its own delivery times.

To achieve the objective of the thesis, the applied action research approach was utilized, and the thesis was divided into four different stages. In the first stage, a current state analysis was conducted to identify the strengths and weaknesses in the current subcontracting management process, based on which the key weakness for the thesis was selected. In the second stage, improvement ideas for the selected key weakness were sought from the relevant literature and based on these, the conceptual framework of the thesis was created. In the third stage, the initial subcontracting management process improvement proposal was created based on current state analysis, literature and stakeholders. In the fourth stage, the validation of the proposed improved subcontracting management process was performed with the help of stakeholder feedback, and based on this, the final subcontracting management process improvement proposal for the case company was created.

As an outcome of the thesis, the case company's subcontracting management process was improved, and subcontractor x's incorrect delivery dates were made to be more accurate in the case company's ERP by improving the information flow between the procurement specialist, subcontractor x, and the production planner with the help of the progress report.

Keywords: subcontracting management, process improvement, supply chain management, progress report

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List of Abbreviations

BOM	Bill of Materials
CPFR	Collaborative Planning, Forecasting and Replenishment
DN	Delivery Note
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
IT	Information Technology
OA	Order Acknowledgment
PO	Purchase Order
PR	Progress Report
Q	Quote
VMI	Vendor Managed Inventory

1 Introduction

Subcontracting management process improvement requires a commitment to cooperation, and this commitment must be approached with mutual benefit in mind. The aim is to create win-win opportunities where both the company and its subcontractor benefit. Cooperation with subcontractors requires a functioning information flow. It is necessary to ensure with the subcontractor that the information flow is working and that the subcontractor is up to date. (Burt et al. 2003, 517.)

1.1 Business context

The case company is a technology company and a global market leader in its field, located in 6 locations around the world. The company was founded in Finland in 2008 and has more than 600 employees and an annual revenue of more than 190 million euros.

1.2 Business challenge, objective, and outcome

The case company has a business challenge in the subcontracting management process because one key subcontractor does not deliver parts on time according to the schedule set in the ERP. This causes difficulty in production planning when the parts sometimes arrive late and sometimes too early. Delays have a negative impact on the case company's compliance with its own delivery times. The objective of this thesis is to propose an improved subcontracting management process. Therefore, the outcome of the thesis is the proposed improved subcontracting management process.

1.3 Scope and outline of the thesis

The thesis is limited to examining the business challenge of one key subcontractor (subcontractor x) in its subcontracting process in the case company and one key product (item A) that subcontractor x supplies to the case company.

Chapter 1 contains the introduction of the thesis, and it clarifies the business context, challenge, objective, and outcome, as well as the scope and outline of the thesis. Chapter 2 explains the project plan, which includes the research approach, research design, and data plan of the thesis. Chapter 3 goes through the current state analysis, and it contains an overview of data 1 collection, description of the current process, strengths and weaknesses of the current process, summary of strengths and weaknesses in the current subcontracting management process, and a selection of the key weakness of the thesis. Chapter 4 introduces the conceptual framework of the thesis, and it clarifies the ideas how to improve information flow with the subcontractor and how to improve processes based on literature. Chapter 5 presents the initial subcontracting management process improvement proposal for the case company, and it includes an overview of data 2 collection, improvement proposals for weakness based on literature and stakeholders, and a summary of the initial subcontracting management process improvement proposal for the case company. Chapter 6 reviews the validation of the proposed improved subcontracting management process, and it contains an overview of data 3 collection, stakeholder feedback and the final subcontracting management process improvement proposal for the case company. The last chapter 7 discusses the conclusions of the thesis, and it includes the executive summary, the next steps and recommendations, the self-evaluation of thesis and closing words.

In the next chapter, the project plan of the thesis is examined. First, the research approach used in the thesis is explained, after which the research design and the data plan of the thesis are reviewed.

2 Project Plan

Chapter 2 examines the project plan of the thesis. First, the research approach used in the thesis is explained, after which the research design and the data plan of the thesis are reviewed.

2.1 Research approach

Applied action research was chosen as the research approach for this thesis. Applied action research approach is used for practical development projects where the researcher is closely involved in the project and it uses mainly qualitative methods, such as interviews and workshops for data collection (Kananen 2013). This thesis is a practical development project where the researcher is closely involved in the project and it uses qualitative methods, such as interviews for data collection. For this reason, an applied action research approach was seen to be the most suitable for this thesis.

2.2 Research design

The following research design is a visualized plan that illustrates the different stages of the thesis with the purpose and outcome of each stage (see figure 1).

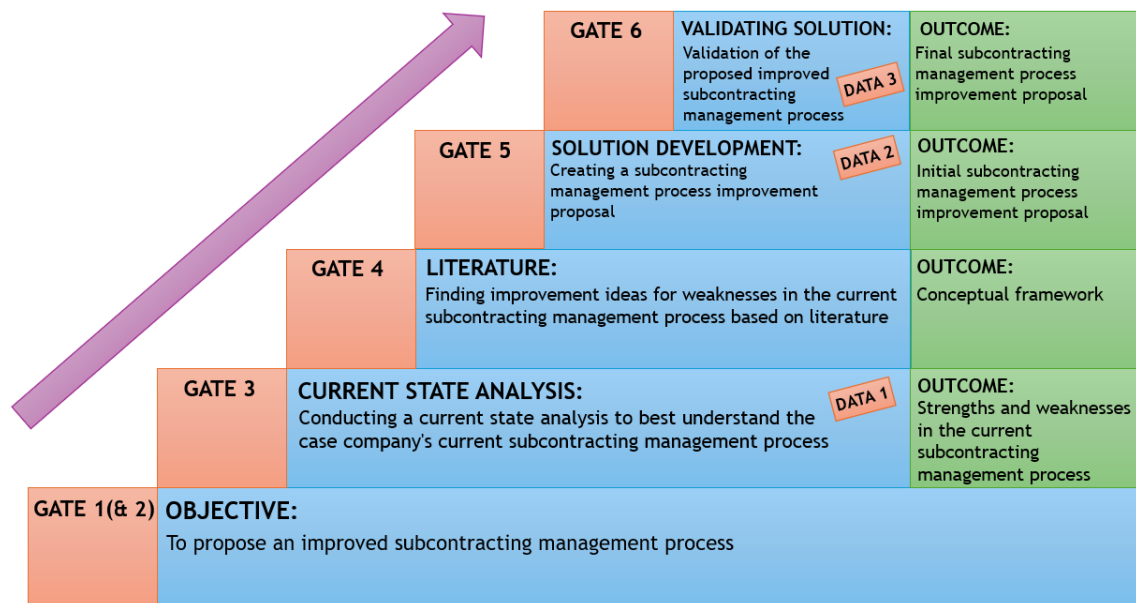


Figure 1. Research design of the thesis

As illustrated in Figure 1, the first step of the thesis is Gates 1 & 2, where the thesis objective is created. In this thesis, the objective is to propose an improved subcontracting management process. The next step is Gate 3, where the current state analysis is conducted to best understand the case company's current subcontracting management process. The outcome of Gate 3 is the strengths and weaknesses in the current subcontracting management process. After Gate 3, the next step is the literature phase at Gate 4, where the aim is to find improvement ideas for weaknesses in the current subcontracting management process based on literature. As an outcome of Gate 4, the conceptual framework is obtained.

When Gate 4 is ready, the thesis moves to the solution development phase at Gate 5, where the subcontracting management process improvement proposal is created based on current state analysis and literature. The outcome of Gate 5 is the initial subcontracting management process improvement proposal. The final step is Gate 6 where the validation of the proposed improved subcontracting management process is performed. The outcome of Gate 6 is the final subcontracting management process improvement proposal.

2.3 Data plan

The data plan is a plan that illustrates the different data phases of the thesis, including the content, source, informant, timing, and outcome of each data phase (see Figure 2).

DATA PLAN	CONTENT	SOURCE	INFORMANT	TIMING	OUTCOME
DATA 1 CURRENT STATE ANALYSIS	Conducting a current state analysis to best understand the case company's current subcontracting management process	Case company subcontracting process documents Stakeholder interviews	Case company files Production manager Procurement specialist	January 2025	Strengths and weaknesses in the current subcontracting management process
DATA 2 SOLUTION DEVELOPMENT	Creating a subcontracting management process improvement proposal	Current state analysis findings Conceptual framework Stakeholder interviews	Production manager Procurement specialist Case company files and literature	March 2025	Initial subcontracting management process improvement proposal
DATA 3 VALIDATING SOLUTION	Validation of the proposed improved subcontracting management process	Feedback from stakeholders	Production manager Procurement specialist	March - April 2025	Final subcontracting management process improvement proposal

Figure 2. Data plan of the thesis

As shown in Figure 2, the data 1 phase of the thesis is current state analysis. In this phase, the content is to conduct a current state analysis to best understand the case company's current subcontracting management process. The sources used for the current state analysis are the case company subcontracting process documents and stakeholder interviews. The informants of the sources are the case company files, production manager and procurement specialist. The timing is in January 2025 and the outcome is the strengths and weaknesses in the current subcontracting management process.

Data 2 is about solution development and the content of the phase is to create a subcontracting management process improvement proposal based on current state analysis and literature. The sources are current state analysis findings, conceptual framework, and stakeholder interviews. The informants are the production manager, procurement specialist, case company files and literature. The timing is in March 2025 and the outcome is the initial subcontracting management process improvement proposal.

In data 3, the solution is validated. Therefore, the content of the phase is the validation of the proposed improved subcontracting management process. The source used is feedback from stakeholders, and the informants are the production manager and procurement specialist. The timing is in March - April 2025 and the outcome is the final subcontracting management process improvement proposal.

The next chapter contains the current state analysis of the thesis. The chapter first goes through an overview of the current state analysis, followed by a clarification of the description of the current process. After this, the chapter describes the strengths and weaknesses of the current process, after which a summary of the strengths and weaknesses in the current subcontracting management process is made. At the end of the chapter, the key weakness of the thesis is selected.

3 Current State Analysis

Chapter 3 contains the current state analysis of the thesis. The chapter first goes through an overview of data 1 collection, followed by a clarification of the description of the current process. After this, the chapter describes the strengths and weaknesses of the current process, after which a summary of the strengths and weaknesses in the current subcontracting management process is made. At the end of the chapter, the key weakness of the thesis is selected.

3.1 Overview of data 1 collection

In the current state analysis, information was collected from the case company subcontracting process documents and stakeholder interviews. Information about the current subcontracting process was retrieved from the case company subcontracting process documents, and the interviewees were the production manager and the procurement specialist whose area of responsibility is subcontractor x's purchases. The interviews were conducted as face-to-face meetings. First, a meeting was arranged with the procurement specialist, after which the production manager was interviewed. The interviews were prepared with questions and one hour had been reserved for conducting the interviews. Questions were asked, for example: How does the current process work with subcontractor x? What are the strengths of the current process? And what are the weaknesses of the current process? The interviewees were informed in advance of the focus of the interview, and they already knew that the interview concerns the subcontracting process of subcontractor x's item A and the problem of subcontractor x's incorrect delivery dates in the case company's ERP system.

3.2 Description of the current process

The following process map clarifies the case company's current subcontracting process for item A (see figure 3).

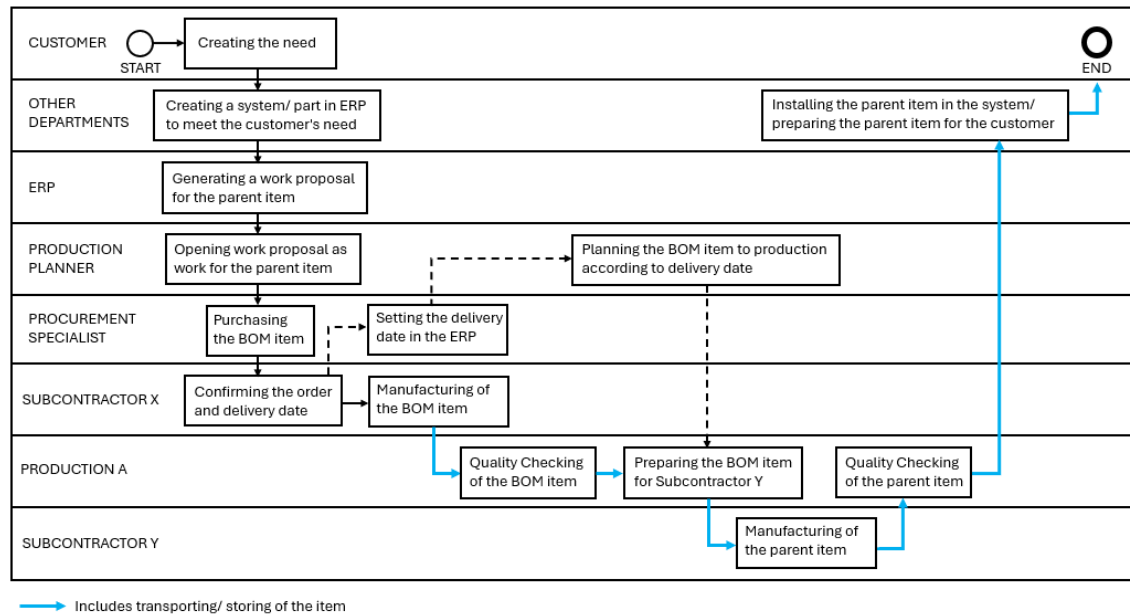


Figure 3. Process map of the current subcontracting process for item A

As illustrated in Figure 3, the process for item A can be seen as originating from the customer who creates the need for it. After this, a system or part corresponding to the customer's need is created in the case company's ERP, which generates a work proposal for the parent item of item A in ERP. When the production planner notices the work proposal in ERP, the production planner opens the work proposal as work for the parent item if the work's need date is within 2 months. When the procurement specialist sees that the production planner has opened work for the parent item, the procurement specialist purchases the BOM item for the parent item from the subcontractor x. When the subcontractor x receives the order, the subcontractor x sends an order confirmation to the case company which includes the delivery date of the BOM item. When the case company receives the order confirmation, the procurement specialist sets the delivery date for the BOM item in the ERP.

When the production planner notices the delivery date of the BOM item in the ERP, the production planner plans the BOM item to production according to the delivery date. In the meantime, the subcontractor x manufactures the BOM item and delivers it to the case company. Then the case company performs quality checking on the BOM item, after which the BOM item is placed in storage or directly into production, depending on production planning. Once the BOM item is planned for production, it is prepared to be sent to the subcontractor Y. When the subcontractor Y receives the BOM item, the subcontractor Y manufactures the BOM item into a final parent item. After this, the subcontractor Y delivers the parent item to the case company. The case company performs quality checking on the parent item, after which the parent item is delivered to another department of the case company for installation into the system or prepared as such for the customer. Finally, the parent item is delivered to the customer.

3.3 Strengths of the current process

When the interviewees were asked about the strengths of the current process, the procurement specialist mentioned that

the current subcontracting process is very straightforward as long as the case company's ERP system is working properly.

The procurement specialist also praised the subcontractor x and said that

cooperation with the subcontractor x is effortless, and the x is always reachable.

When interviewing the production manager, the production manager praised the case company's operations and mentioned that

one of the strengths of the current subcontracting process is the case company's standard-based operations.

In addition to this, the production manager praised the subcontractor x and mentioned that

the professionalism of the subcontractor x is high.

In both interviews, both the procurement specialist and the production manager praised the subcontractor x and mentioned that

one of the most important strengths in the current subcontracting process is the subcontractor x's flexibility and speed in urgent work.

After the stakeholder interviews, the following strengths of the current process were identified (see figure 4):

STRENGTHS:

The current process is very straightforward with the subcontractor x (as long as the case company's ERP system is working properly)

The case company's standard-based operations

The subcontractor x's flexibility and speed in urgent work

Cooperation with the subcontractor x is effortless, and the x is always reachable

The professionalism of the subcontractor x is high

Figure 4. Strengths of the current process

As shown in Figure 4, the identified strengths of the current process were as follows:

- The current process is very straightforward with the subcontractor x (as long as the case company's ERP system is working properly).
- The case company's standard-based operations.
- The subcontractor x's flexibility and speed in urgent work.
- Cooperation with the subcontractor x is effortless, and the x is always reachable.
- The professionalism of the subcontractor x is high.

3.4 Weaknesses of the current process

When interviewing the procurement specialist and the production manager, both agreed that one of the biggest weaknesses in the current subcontracting process is the incorrect delivery dates for the subcontractor x in the case company's ERP system.

When asked the procurement specialist and the production manager what could be the cause of the subcontractor x's incorrect delivery dates, both mentioned one reason:

the functionality of the case company's ERP and the staff's knowledge of ERP.

The procurement specialist said that

one of the reasons for the subcontractor x's incorrect delivery dates is the information flow within the case company and with the subcontractor x.

The procurement specialist also mentioned that

one of the factors affecting the information flow is that the subcontractor x only has one contact person.

When talking about the subcontractor x, the procurement specialist mentioned that

one of the weaknesses of the current subcontracting process is the subcontractor x's primitiveness and lack of tools.

In the interview with the production manager, the production manager also mentioned that

the weaknesses of the current subcontracting process are the subcontractor x's lack of standard-based operations and quality control, because poor quality increases rush and delays.

In addition, the production manager mentioned that

one potential weakness of the current subcontracting process is also the subcontractor x's production capacity and whether the subcontractor x can keep up with the case company's growth or not.

After the stakeholder interviews, the following weaknesses of the current process were identified (see figure 5):

WEAKNESSES:
Incorrect delivery dates for the subcontractor x in the case company's ERP system
The functionality of the case company's ERP and the staff's knowledge of ERP
Information flow within the case company and with the subcontractor x
The subcontractor x's "primitiveness" and lack of tools (no standard-based operations)
Only one contact person at the subcontractor x
The subcontractor x's quality control (poor quality increases rush and delays)
The subcontractor x's production capacity? (can the x keep up with the case company's growth?)

Figure 5. Weaknesses of the current process

As shown in Figure 5, the identified weaknesses of the current process were as follows:

- Incorrect delivery dates for the subcontractor x in the case company's ERP system.
- The functionality of the case company's ERP and the staff's knowledge of ERP.
- Information flow within the case company and with the subcontractor x.
- The subcontractor x's "primitiveness" and lack of tools (no standard-based operations).
- Only one contact person at the subcontractor x.
- The subcontractor x's quality control (poor quality increases rush and delays).
- The subcontractor x's production capacity? (can the x keep up with the case company's growth?).

The following process map clarifies the identified weaknesses in the current subcontracting process by outlining the weak points of the process in red in the previously presented Figure 3 process map (see Figure 6):

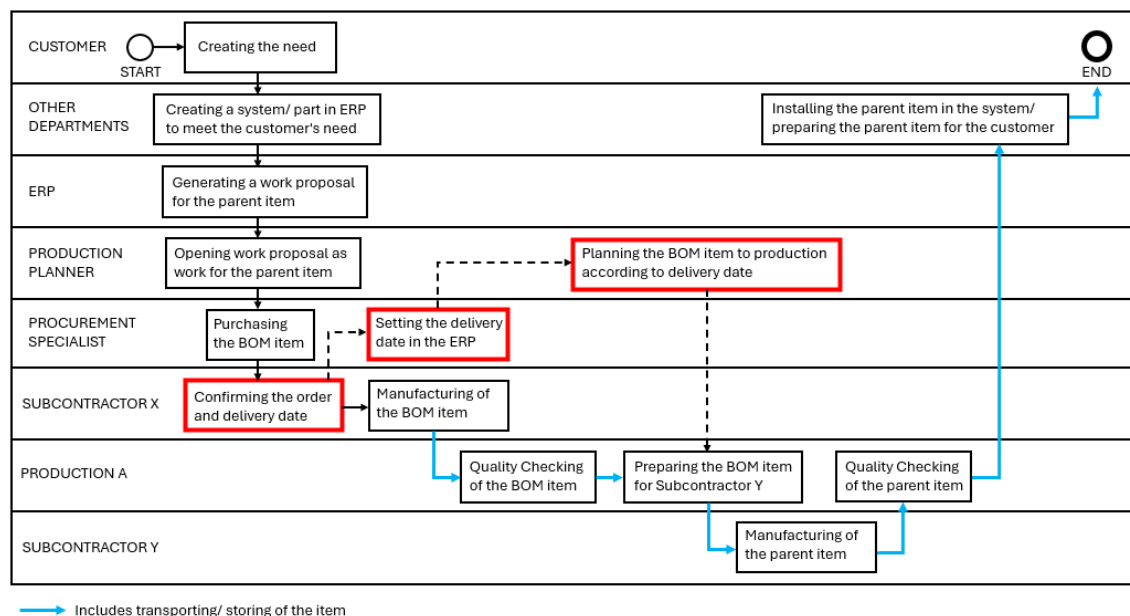


Figure 6. Weak points of the current process

As illustrated in Figure 6, the weaknesses in the current process can be found in the process steps: 1. Confirming the order and delivery date (subcontractor x), 2. Setting the delivery date in the ERP (procurement specialist) and 3. Planning the BOM item to production according to delivery date (production planner).

In principle, the process works exactly as described in Figure 5, where the subcontractor x confirms the order and delivery date, the procurement specialist sets the delivery date in the ERP and the production planner plans the BOM item to production according to delivery date. However, there is a problem at this stage of the process because the delivery date is often not updated if subcontractor x's delivery date changes for some reason. This creates a problem for the production planner who plans the BOM item to production according to delivery date. This also creates a problem for the production operators because when they try to start the planned work, they cannot find the BOM item for the work. In addition, information about the delivery date is often passed on to other departments so that they can plan their own work, and in the worst case, information about the wrong delivery date can even reach the customer.

Another problem with delivery dates is that the subcontractor x's items are always delivered to the case company on Mondays, but for some reason the date in the case company's ERP is often not Monday but some other weekday. This creates a problem, as it is not possible to know whether the items will be delivered on the Monday of the same week for which the delivery date is marked or whether the items will be delivered on the Monday of the following week.

The interviews with the stakeholders reveal that incorrect delivery dates are caused by several different reasons. One reason is the functionality of the case company's ERP and the staff's knowledge of ERP, because if the case company's ERP does not work properly or its users do not use it correctly or in a mutually agreed manner, problems begin to appear already in the early stages of the process when the item parameters are set in the ERP. For example, if the item's delivery time or lead time are incorrect when the item is first set in the ERP, this creates the need for incorrect work proposals for the production planner, which in turn creates a further problem for the procurement specialist who cannot then purchase the item on time. Another example could be that the item parameters are not correct in the ERP for some reason, which is why the production planner does not notice the item's work proposal and does not open the proposal as work on time. As a result, the procurement specialist does not see that the work has been opened and does not purchase the BOM item for the case company on time. There are many more examples, but it is clear that the functionality of the case company's ERP and the staff's knowledge of ERP is one significant reason that can lead to an incorrect delivery date in the case company's ERP.

Another reason for incorrect delivery dates seems to be the information flow within the case company and with subcontractor x, as it appears from the stakeholder interviews that information does not flow well between the subcontractor x, the procurement specialist and the production planner. For example, if the subcontractor x's delivery dates change, the information often does not seem to be communicated quickly enough to the procurement specialist. And on the other hand, if the subcontractor x communicates information to the procurement specialist, the information does not get communicated quickly enough to the production planner. It is also clear that if the subcontractor x does not communicate delivery changes to the procurement specialist, the procurement specialist will not be able to update the information in the case company's ERP and the delivery dates will be incorrect.

Incorrect delivery dates can also be considered to be influenced by the subcontractor x's

- "primitiveness"
- lack of tools and standard-based operations
- the fact that the subcontractor x only has only one contact person
- the subcontractor x's lack of quality control
- the subcontractor x's production capacity.

For example, the subcontractor x's "primitiveness" and lack of tools and standard-based operations increase the risk of the subcontractor x's more uncertain production operations, which in turn increases the risk of the subcontractor x's products being late. This, in turn, increases the uncertainty of whether the subcontractor x will report delays to the case company so that the procurement specialist can update the delivery dates in the case company's ERP. Also, the fact that the subcontractor x only has one contact person increases the risk of poor information flow between the subcontractor and the case company. This, in turn, increases the risk that the information is not forwarded from the subcontractor x to the case company and the delivery dates will not be updated.

In addition, the subcontractor x's lack of quality control can be considered to affect the case company's incorrect delivery dates, as lack of quality control increases the risk of poor quality, and poor quality increases rush and delays. Also, the question mark of the subcontractor x's production capacity can be considered to affect the incorrect delivery dates, as this creates uncertainty about whether the subcontractor x can keep up with the case company's growth, which in turn can cause rush and delays if the subcontractor x is unable to do all its work on time in the future. In both cases, the risk is that the subcontractor x's products will be late, which again creates more risk of incorrect delivery dates for the case company.

3.5 Summary of strengths and weaknesses in the current subcontracting management process

The following strengths and weaknesses in the current subcontracting management process were identified when the current state analysis was carried out (see Figure 7):

STRENGTHS AND WEAKNESSES OF THE CURRENT PROCESS	
STRENGTHS:	WEAKNESSES:
The current process is very straightforward with the subcontractor x (as long as the case company's ERP system is working properly)	Incorrect delivery dates for the subcontractor x in the case company's ERP system
The case company's standard-based operations	The functionality of the case company's ERP and the staff's knowledge of ERP
The subcontractor x's flexibility and speed in urgent work	Information flow within the case company and with the subcontractor x
Cooperation with the subcontractor x is effortless, and the x is always reachable	The subcontractor x's "primitiveness" and lack of tools (no standard-based operations)
The professionalism of the subcontractor x is high	Only one contact person at the subcontractor x
	The subcontractor x's quality control (poor quality increases rush and delays)
	The subcontractor x's production capacity? (can the x keep up with the case company's growth?)

Figure 7. Strengths and weaknesses of the current process

As listed in Figure 7, the identified strengths of the current process were as follows:

- The current process is very straightforward with the subcontractor x (as long as the case company's ERP system is working properly).
- The case company's standard-based operations.
- The subcontractor x's flexibility and speed in urgent work.
- Cooperation with the subcontractor x is effortless, and the x is always reachable.
- The professionalism of the subcontractor x is high.

And as listed in Figure 7, the identified weaknesses of the current process were as follows:

- Incorrect delivery dates for the subcontractor x in the case company's ERP system.
- The functionality of the case company's ERP and the staff's knowledge of ERP.
- Information flow within the case company and with the subcontractor x.
- The subcontractor x's "primitiveness" and lack of tools (no standard-based operations).
- Only one contact person at the subcontractor x.
- The subcontractor x's quality control (poor quality increases rush and delays).
- The subcontractor x's production capacity? (can the x keep up with the case company's growth?).

3.6 Selection of the key weakness

Although the weakness "incorrect delivery dates for the subcontractor x in the case company's ERP system" seems to be the major weakness in the current subcontracting process, it can be seen based on the results of the current state analysis that this weakness is also caused by the weakness "information flow within the case company and with the subcontractor x". For this reason, the weakness "information flow within the case company and with the subcontractor x" was chosen as the key weakness to focus on from now on in literature (conceptual framework) and in solution development.

The next chapter contains the conceptual framework of the thesis. The chapter goes through the ideas how to improve information flow with the subcontractor and how to improve processes based on literature. At the end of the chapter, the conceptual framework of the thesis is presented.

4 Improving the Subcontracting Management Process Based on Literature

Chapter 4 contains the conceptual framework of the thesis. The chapter goes through the ideas how to improve information flow with the subcontractor and how to improve processes based on literature. At the end of the chapter, the conceptual framework of the thesis is presented.

4.1 How to improve information flow with the subcontractor based on literature

The primary condition for an effective information flow with a subcontractor is that the partnership has a mutual desire to receive information and work together (Vanpoucke et al. 2009). In the information flow between companies, cooperation is the key. Developing subcontractor relationship requires a commitment to cooperation, and this commitment must be approached with mutual benefit in mind. The aim is to create win-win opportunities where both the company and its subcontractor benefit. Cooperation with subcontractors requires a functioning information flow. It is necessary to ensure with the subcontractor that the information flow is working and that the subcontractor is up to date. (Burt et al. 2003, 517.)

When improving information flow with subcontractors, it is worth focusing on effective communication, as effective communication skills prevent simple problems from becoming complex (Duening & Click 2005, 154). It is good to understand that open communication plays an important role in subcontractor management, because open communication is one of the critical success factors of outsourcing. Information flow with subcontractors requires continuous interaction and regular communication. It is a good idea to agree on reporting schedules with the subcontractor and to communicate to the subcontractor any changes related to the subcontractor process. (Weele 2014, 190.) When improving subcontractors' information flow, the frequency and quality of communication must be taken into account (Johnsen et al. 2014, 117).

Information flow with subcontractors can be improved, for example, by agreeing when organizing the work what information each party will provide to each other, when, in what form and to whom the information will be shared. It would also be a good idea to agree what information will be exchanged between subcontractors. The information flow between subcontractors can be improved so that the company's purchasing policy is informed to the subcontractors as clearly as possible. (Weele 2014: 65, 111.)

Information must be shared with subcontractors in a determined but selective manner. Times, places and agendas must be set for the meetings, and rigid forms must be used for sharing information. In addition, accurate data collection must be required, and information must be shared in a structured manner. (Weele 2014, 355.) Determined but selective information sharing means that any information that can help the subcontractor to understand the needs of the purchasing organization and the current situation better is usually worth sharing with the subcontractor. However, the company must be selective when it comes to sharing information, as overly transparent disclosure always carries risks. It is good to share enough information with the subcontractor, but not too much. (Iloranta & Pajunen-Muhonen 2015, 299.)

Information flow with subcontractors requires trust. In the information flow between a company and its subcontractors, a huge amount of information flows through the companies. Trust between both companies and the personnel involved must be established before the necessary information sharing can take place. (Burt et al. 2003, 518.) By improving information flow with subcontractors, for example by increasing two-way information sharing and expanding the scope of interaction, the company can practically demonstrate trust towards subcontractors (Johnsen et al. 2014, 113). Information flow and trust between subcontractors can be improved through proactive and intensive communication and integrated systems and processes. The company and the subcontractor should proactively provide each other with useful information. (Duening & Click 2005: 160, 165.) Proactive cooperation with subcontractors requires a high level of information flow (Burt et al. 2003, 517–518).

Subcontractor development programs usually proceed through four phases: 1. External accreditation, 2. Reactive problem solving, 3. Systematic development program and 4. Network development. The first phase is the accreditation of subcontractors, and the second phase is reactive problem solving with subcontractors. In the third and fourth phases, the focus shifts to improving information flow. The third phase focuses on the information flow, which flows vertically from the target company to the subcontractor. The fourth phase is characterized by the mutual sharing of information between the target company and the subcontractor, both vertically and horizontally. (Johnsen et al. 2014, 119.)

When improving information flow, it is good to consider three characteristics of information flow, which are 1. level of information sharing, 2. information quality and 3. IT supply chain applications. These three characteristics provide a good description of the three dimensions of information flow, i.e. the volume, content and medium of information shared. (Vanpoucke et al. 2009.)

The level of information sharing is important when it comes to improving information flow with subcontractors, as sharing information among subcontractors can also serve downstream customers more efficiently. The information to be shared may include, for example, information on production status, planning processes, changes in the operating environment and company goals. Information must be shared at different levels, as integration between subcontractors requires common and compatible goals. Information sharing is an important issue in supply chain management. Information sharing can be achieved through various supply chain management practices, such as vendor managed inventories (VMI) and collaborative planning, forecasting and replenishment (CPFR), where a company shares its demand data with a subcontractor. Subcontractors can also share information with customer companies, for example, about production plans and future deliveries. The above-mentioned information flows between subcontractors can lead to, for example, better coordination of inventory levels and better logistics. (Vanpoucke et al. 2009.)

Information quality is important when improving information flow with a subcontractor. In general, the biggest problem with data processing in organizations is not the lack of information, but the lack of clarity of information. Information quality has been described in literature as an important indicator of the clarity and usefulness of information. High-quality information can be described as accurate, frequently exchanged, fresh, containing the right content, error-free, up-to-date, precise, reliable and current. (Vanpoucke et al. 2009.)

IT supply chain applications and information technology (IT) play a critical role in supply chain management, as it enables the sharing of large amounts of information between companies. High system integration enables the reduction of technical barriers and incompatibility between two separate systems, allowing information flow between companies to be more efficient. (Vanpoucke et al. 2009.)

Electronic data interchange (EDI) can be mentioned as one IT supply chain application, which has been considered to benefit companies by offering more information flow speed and by improving partnerships in the supply chain between organizations. (Vanpoucke et al. 2009.)

Studies have shown that IT has a direct and positive impact on information flow and collaboration between companies. Web-based technologies have been considered to facilitate the transfer of information between supply chain partners. It has been shown that standardized systems that improve information flow linked to processes lead to proactive cooperation in subcontractor relationships. The use of IT to assist in information flow has been found to have a direct connection in the coordination of the supply chain between the company and subcontractors. In addition, the use of IT supply chain applications has been confirmed to reduce companies' transaction costs. In the light of the aforementioned studies, it can be stated that IT supply chain applications have positive effects on the company's information flow with the subcontractor. (Vanpoucke et al. 2009.)

When improving information flow with the subcontractors, it must be understood that integration between companies requires joint planning, coordination and sharing of integrated databases between companies. Information flow with the subcontractors can be improved by utilizing various information sharing methods. Traditional information sharing methods include telephone, fax, email, written and face-to-face communication. More advanced information sharing methods include computer-to-computer links such as EDI and ERP. Information sharing support systems that improve information flow can be classified into three different categories: 1. supply chain planning systems, 2. information exchange systems and 3. database collaboration systems. These information sharing support systems are supply chain enablers, as they can significantly reduce paperwork, improve communication, and shorten supply chain cycle times. (Vanpoucke et al. 2009.)

To improve the information flow between subcontractors, companies can use, for example, web-based solutions, social media or their own purchasing websites to communicate their future material requirements or working methods to subcontractors. Companies can also use, for example, their own intranet with primary subcontractors, through which orders between subcontractors and order-related communication can be handled. With electronic communication methods, the possibilities for communicating with subcontractors have improved significantly, and electronic communication methods offer companies enormous purchasing and delivery opportunities. (Weele 2014, 65.)

In a case study conducted in a real production environment, the information flow of supplier company C and customer company D was described as shown in the figure below (see figure 8).

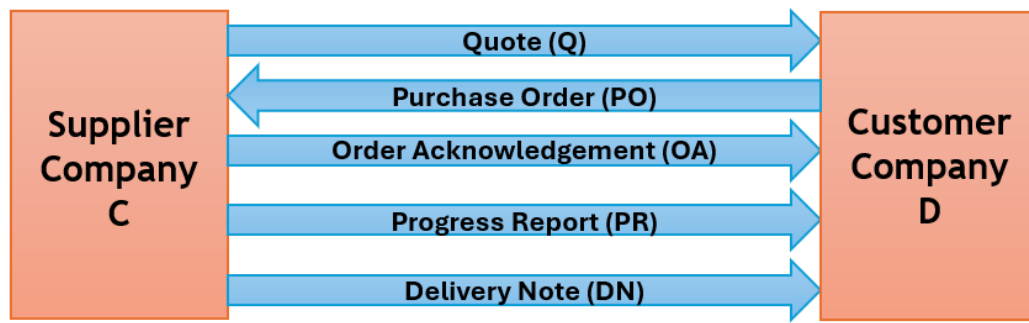


Figure 8. Information flow between company C and customer company D (Sivadasan et al. 2013).

As illustrated in Figure 8, the information flow of the case study works with the subcontractor as follows: company C (subcontractor) sends a quote (Q), from which company D makes a purchase order (PO). Next, company C sends an order acknowledgement (OA) to company D, which confirms the purchase order (PO). In addition, company C sends a progress report (PR) to company D every week. Finally, company C sends a delivery note (DN) to company D and delivers the products to company D. (Sivadasan et al. 2013.)

In the case study, the Quote (Q) information flow contained the price information for the products according to the requested lead time. The purchase order (PO) information flow contained the product description, quantity, and required delivery date, which was sent by the purchaser of company D to the contact person of company C. The order acknowledgement (OA) information flow contained the confirmation of receipt of the purchase order, which included the product code, required quantity, and delivery date, which was sent by the contact person of company C to the purchaser of company D. The progress report (PR) contained information about all unpaid deliveries from company C to company D. The contact person of company C sent a PR notification to company D once a week, which included the remaining products, their estimated delivery date, and the delivery quantity. With the PR notification, company D received early notification of possible delays or shortages in company C's deliveries. The delivery note (DN) information flow contained information about the actual delivery from the supplier to the customer. (Sivadasan et al. 2013.)

4.2 How to improve processes based on literature

Processes can be thought of as being improved in two ways, which are: 1. Process reengineering and 2. Process improvement. Process reengineering is rethinking and redesigning processes to improve the process. Process reengineering is usually aimed at improving, for example, the cost, quality, service or speed of a process. Process reengineering is about reinvention, not incremental improvement. Process reengineering has led to many successes. It is, however, not simple and easy to perform, and it is not suitable for all processes and all organizations. When reengineering processes, it is important to understand that the best understanding of a process and how to improve it is often with the personnel who do the work related to that process on a daily basis. Process improvement is the systematic study of the functions and flows of a process in order to improve the process. The purpose is to find out the "numbers" and understand the process and its details precisely. The starting point is that only when the process is truly understood it can be improved. The philosophy is that every process can be improved and there is always a better way. Implementing a redesigned process is just the beginning of continuous monitoring and improvement of the process. The process should be continuously evaluated and improved to meet changing requirements. (Krajewski et al. 2019: 88–89, 102.)

The work of a doctor is a good example of redesigning and managing process improvements. When a patient arrives at a doctor's office, the doctor tries to locate the patient's illness after a thorough examination. Once the illness has been located, the doctor recommends treatments for the illness based on the diagnosis. A similar approach also applies to the redesign and management of process improvements in general. Once the process has been defined, the necessary data collected and the weaknesses identified, improvement proposals can be proposed for the process. In the improvement proposal phase, it is good to also include people directly involved in the process to provide their ideas. (Krajewski et al. 2019, 101.)

Brainstorming and benchmarking can be used to redesign and manage process improvements. In brainstorming, a group of people knowledgeable about the process suggests ideas for change by saying what comes to mind first, and the person responsible for the process writes the ideas down, for example on a whiteboard, so that everyone can see them. Participants are not asked to evaluate the ideas that arise, as the idea of brainstorming is to encourage creativity in order to get as many ideas as possible, no matter how far-fetched the ideas may be. Benchmarking is a procedure in which a company compares, for example, processes, services and products with those of leading companies in the industry. Benchmarking is used so that companies can learn from other companies how to improve their own processes. (Krajewski et al. 2019, 101–102.)

The A3 report can be used to improve processes. The A3 report is originally a problem-solving tool developed by Toyota and it got its name from the fact that it was originally written on A3-sized paper. The purpose of the A3 report is to provide a basic guide that guides the user to turn everyday problems encountered in working life into successful solutions, while documenting the key steps in problem solving. The A3 report has been found to be an effective tool for improving processes and has also been found to have the potential to significantly increase the learning rate of an organization and act as a catalyst for a continuously improving organization. The A3 report contains various steps that can be used to systematically improve processes. A traditional A3 report contains the following steps: 1. issue statement, 2. background to the problem, 3. current condition, 4. cause analysis, 5. target condition, 6. implementation plan, 7. follow-up plan and 8. results. The A3 report has been found to be a tool for process improvement because it 1. objectively challenges current understanding, 2. addresses the root causes of problems, not just symptoms, 3. takes into account the opinions of the parties and examines the problem from multiple perspectives, and 4. ensures that plans are finalized when the plans are ready. (Sobek & Jimmerson 2006.)

4.3 Conceptual framework of the thesis

The following conceptual framework in Figure 9 was formed for the thesis based on the selected key weakness and literature:

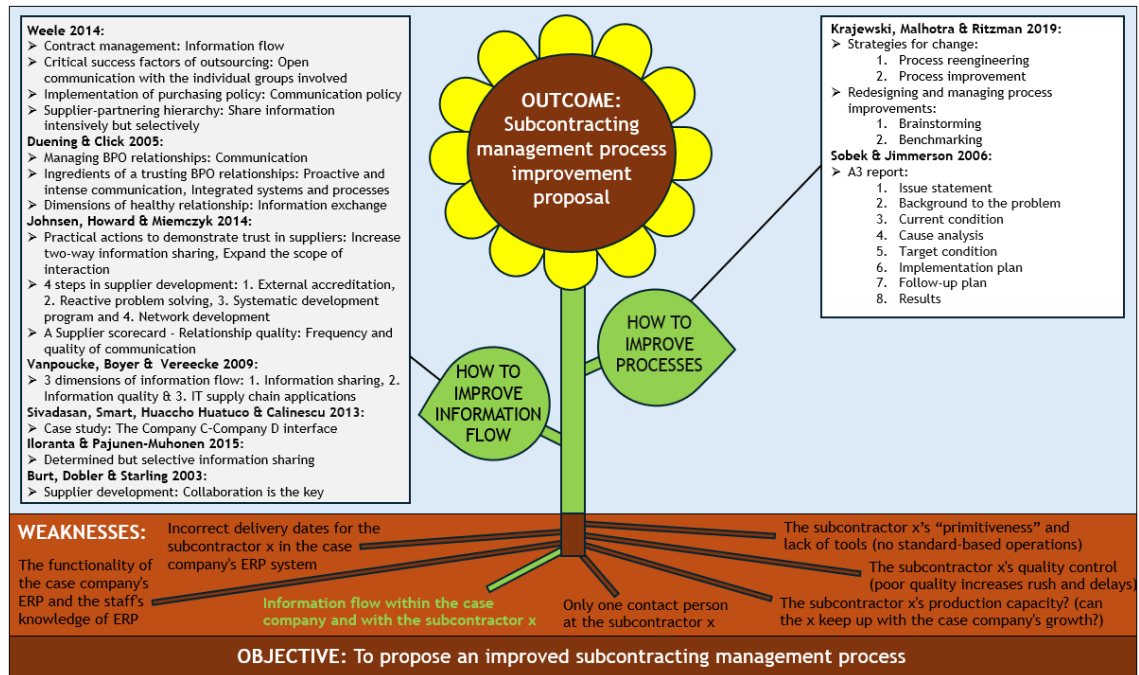


Figure 9. Conceptual framework of the thesis

As depicted in Figure 9, the thesis objective "to propose an improved subcontracting management process" serves as the basis for the conceptual framework. On top of this, all the weaknesses identified in the current state analysis are listed as "root causes" and the selected key weakness "information flow within the case company and with the subcontractor x" is colored in green. On this basis, the conceptual framework is built, which grows into two themes: 1. How to improve information flow and 2. How to improve processes, for which information is sought from relevant literature. The outcome of the conceptual framework is the subcontracting management process improvement proposal.

The next chapter contains the initial subcontracting management process improvement proposal for the case company. The chapter first goes through the overview of data 2 collection, after which improvement proposals for weakness based on literature and stakeholders will be reviewed. After this, the initial subcontracting management process improvement proposal for the case company is presented, and at the end of the chapter, the summary of the initial subcontracting management process improvement proposal for the case company is reviewed.

5 Initial Subcontracting Management Process Improvement Proposal for the Case Company

Chapter 5 contains the initial subcontracting management process improvement proposal for the case company. The chapter first goes through the overview of data 2 collection, after which improvement proposals for weakness based on literature and stakeholders will be reviewed. After this, the initial subcontracting management process improvement proposal for the case company is presented, and at the end of the chapter, the summary of the initial subcontracting management process improvement proposal for the case company is reviewed.

5.1 Overview of data 2 collection

Data 2 was collected by utilizing the literature section of the previous chapter and by interviewing stakeholders, with the help of which improvement proposals for selected key weakness were sought. The interviewees were the production manager and the procurement specialist whose area of responsibility is the subcontractor x's purchases. The interviews were conducted as face-to-face meetings, and the interviewees were informed in advance of the focus of the interview. After the improvement proposals were collected from the literature and stakeholders, the selected improvement proposal was illustrated by adding the improvement proposal to the current process and illustrating the target condition with a process chart.

5.2 Improvement proposals for weakness based on literature

Based on the literature, the following improvement proposals were found for the selected key weakness "information flow within the case company and with the subcontractor x":

- more mutual information sharing
- more joint planning and coordination
- more continuous interaction and regular communication
- more effective communication
- more two-way information sharing
- more proactive communication
- better quality of information
- more system integration
- more web-based solutions
- more sharing of integrated databases
- more electronic information sharing methods
- use of progress report (PR)
- utilization of VMI (Vendor Managed Inventory) & CPFR (Collaborative Planning, Forecasting, and Replenishment).

Information flow within the case company and with the subcontractor x could be improved by increasing mutual information sharing, joint planning and coordination, continuous interaction and regular communication. Information flow could also be improved by focusing more on effective communication, two-way information sharing, proactive communication and better quality of information. In addition, information flow could be improved by increasing system integration, web-based solutions, sharing of integrated databases and electronic information sharing methods. In addition to these, the use of progress report (PR) could be useful, as such has not yet been used in the case company. In the future, the case company could also consider the utilization of VMI (Vendor Managed Inventory) & CPFR (Collaborative Planning, Forecasting, and Replenishment), as the case company has not yet utilized these kinds of opportunities with the subcontractor x.

5.3 Improvement proposals for weakness based on stakeholders

When interviewing the procurement specialist, the procurement specialist suggested that a progress report (PR) could be implemented in the case company.

The procurement specialist said that

we could use online Excel where the information about the upcoming items is collected and subcontractor x could update their own information in the same Excel.

The procurement specialist said that

I could update the delivery dates of the upcoming items in the ERP every time the subcontractor x updates the Excel with their own information and this way we could also make the delivery dates more up-to-date and accurate in the case company's ERP.

The production planner agreed and said that he could use that same online Excel as well as those more accurate delivery dates in the case company's ERP when planning items for production in the future.

The procurement specialist added to this that with the help of the progress report,

the production planner could also better influence the delivery times of the items if any items were urgently needed for production, and in addition to this, the production planner could see the deliveries of reclamation items more clearly.

This sounded good to the production planner, because every now and then some items were urgently needed for production and previously the delivery times for reclamation items had often been incorrect in the case company's ERP.

When interviewing the production manager, the production manager also found the implementation of the progress report useful and reasonable to implement, so it was decided to implement the progress report in the case company.

The procurement specialist had already created an Excel in which the procurement specialist had gathered information about the items purchased from subcontractor x, and it was decided to use this same Excel as the basis for the progress report. It was decided that the procurement specialist would take responsibility for modifying the Excel to be suitable for use as a progress report, and in addition to this, it was agreed that the procurement specialist would be in contact with subcontractor x regarding the implementation of the progress report.

The progress report was decided to contain information about all undelivered items from the subcontractor x to the case company. Information including, for example,

- remaining items
- their estimated delivery date
- delivery quantity
- possible delays or shortages.

As a progress report, it was decided to use online Excel where the procurement specialist and the subcontractor x can update information in real time and which the production planner can use in production planning.

5.4 Initial subcontracting management process improvement proposal for the case company

The following process map illustrates the initial subcontracting management process improvement proposal for the case company (see figure 10). The process map illustrates the target condition of the proposed process for subcontractor x's item A when the progress report (PR) is added to the current process by outlining the improved points of the process in green.

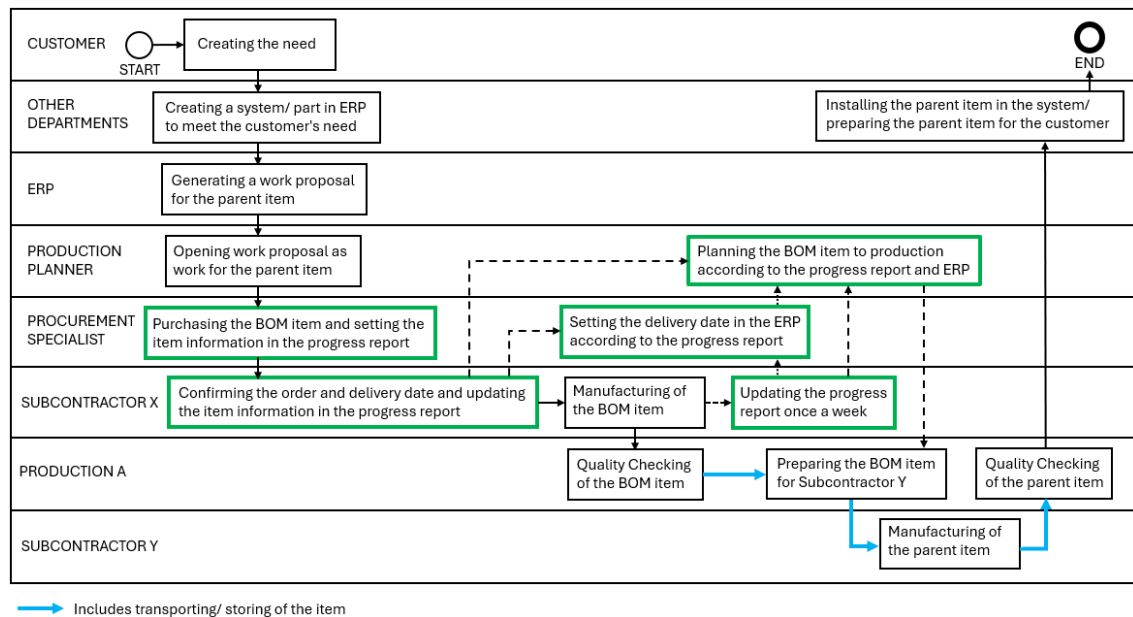


Figure 10. Initial subcontracting management process improvement proposal for the case company

As illustrated in Figure 10, the initial subcontracting management process improvement proposal for the case company goes so that the procurement specialist purchases the BOM item and sets the item information in the progress report. After this, the subcontractor x confirms the order and delivery date and updates the item information in the progress report. In addition, the subcontractor x updates the progress report once a week. When the subcontractor x has updated the progress report the procurement specialist sets the delivery date in the case company's ERP according to the progress report. After this, the production planner plans the BOM item to production according to the progress report and ERP.

By adding the progress report (PR) to the case company's subcontracting management process, the information flow within the case company and with the subcontractor x can be improved, and the incorrect delivery dates of the subcontractor x can be made more accurate in the case company's ERP.

This is because with the progress report, the procurement specialist, the subcontractor x and the production planner can see the same real-time information about all undelivered items from the subcontractor x to the case company, which speeds up the information flow of the item deliveries, including any possible changing delivery dates, between the subcontractor x and the case company.

By adding the progress report to the case company's subcontracting management process, the subcontractor x can update the item delivery dates directly to the progress report, which allows the procurement specialist to see the changes faster and update the changed delivery dates to the case company's ERP more timely. In addition, the production planner can monitor the more accurate delivery dates of the items directly from the progress report and rely more on the delivery dates found in the case company's ERP.

The progress report also enables the case company's other departments to have more accurate information about the subcontractor x's delivery dates when they plan their own work, and best of all, when the subcontractor x's delivery dates are more accurate in the case company's ERP, the case company's customers will also receive more accurate information about delivery dates in the future.

Most importantly, the progress report helps to make the subcontractor x's delivery dates more accurate in the case company ERP, which enables the case company's products to be delivered to the customers on time.

5.5 Summary of the initial subcontracting management process improvement proposal for the case company

The following figure 11 illustrates the summary of the initial subcontracting management process improvement proposal for the case company and how the proposal was formed:

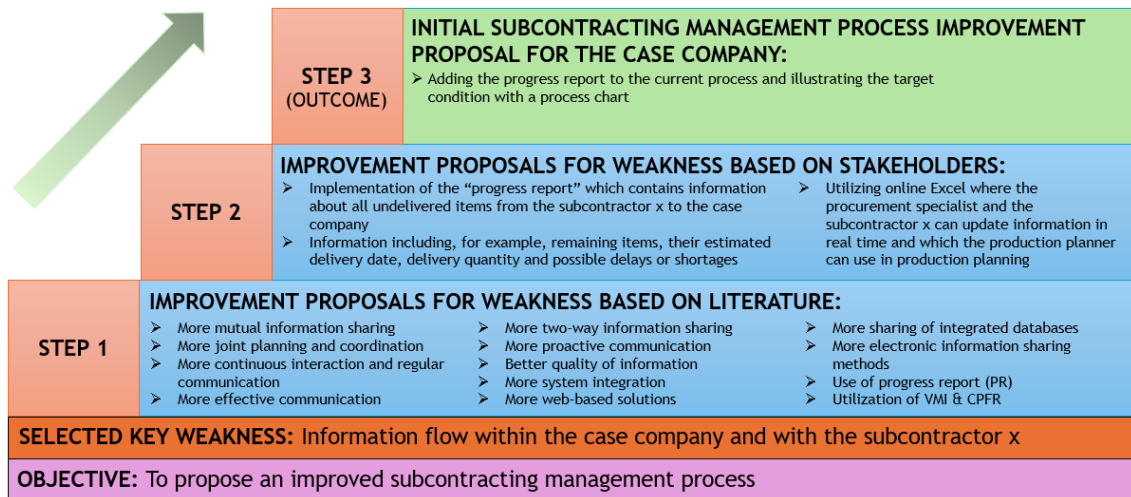


Figure 11. Summary of the initial subcontracting management process improvement proposal for the case company

As shown in Figure 11, the thesis objective "to propose an improved subcontracting management process" and the selected key weakness "information flow within the case company and with the subcontractor x" served as the basis for the initial subcontracting management process improvement proposal for the case company. In Step 1 and Step 2, improvement proposals for weakness based on literature and stakeholders were collected. After this, in Step 3 (outcome), the initial subcontracting management process improvement proposal was illustrated by adding the progress report to the current process and illustrating the target condition with a process chart.

The next chapter contains the validation of the proposed improved subcontracting management process. The chapter first goes through the overview of Data 3 collection, after which the stakeholder feedback is reviewed. At the end of the chapter, the final subcontracting management process improvement proposal for the case company is presented.

6 Validation of the Proposed Improved Subcontracting Management Process

Chapter 6 contains the validation of the proposed improved subcontracting management process. The chapter first goes through the overview of data 3 collection, after which the stakeholder feedback is reviewed. At the end of the chapter, the final subcontracting management process improvement proposal for the case company is presented.

6.1 Overview of data 3 collection

Data 3 was collected by asking for feedback from the stakeholders after the implementation of the progress report. The interviewees were the production manager and the procurement specialist whose area of responsibility is subcontractor x's purchases. The procurement specialist was asked for feedback by message and with the production manager, feedback was discussed face-to-face.

6.2 Stakeholder Feedback

The procurement specialist mentioned in the feedback that after the implementation of the progress report

it has been much easier to follow the deliveries of the subcontractor x and the deliveries have no longer arrived at the case company on random days because the delivery dates marked in the progress report by subcontractor x have been correct.

However, the procurement specialist said that

subcontractor x still has a bit of room for improvement in filling out the progress report, as they don't always fill it out as intended.

The procurement specialist added to this, that

I will be in touch with subcontractor x in the near future and will go over with them again how the progress report should be filled out.

In addition, the procurement specialist said that

it takes me quite a lot of time to fill out the progress report, but the main thing is that it helps production planning and improves subcontractor x's delivery dates to be more accurate in the case company.

When asked for feedback from the production manager after the implementation of the progress report, the production manager said that

it seems that communication has clearly improved between the procurement specialist, the subcontractor x and the production planner.

The production manager also added to this by saying that

it's great that with the help of the progress report it has been possible to improve the delivery dates of the subcontractor x to be more correct in the case company's ERP.

6.3 Final subcontracting management process improvement proposal for the case company

After the stakeholder feedback, it was decided not to make any changes to the initial proposal, so the progress report implemented in the case company also serves as the final proposal of the thesis.

The Figure 12 below is a screenshot of the progress report implemented in the case company (due to sensitive information, item id, supplier item nm, suppl. name & p. unit price are hidden):

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
	Entry Date	Order	Row	Lot	Item ID	Supplier Item Nm	Type	Suppl.Name	Status	Qty Ord.	Qty In	Qty Left	P. Unit	Factor	P. Unit Price	Curr.	Confirmed delivery date	Changed delivery date	Comment
1	26.02.2025	PO43433	10	1			Order		Sent	1		1	pcs	1	EUR	28.03.25		Estimated delivery date 14.4	
2	21.03.2025	PO43843	30	1			Order		Sent	1		1	pcs	1	EUR	31.03.25		Estimated delivery date 14.4	
3	21.03.2025	PO43843	50	1			Order		Sent	1		1	pcs	1	EUR	31.03.25		Estimated delivery date 14.4	
4	24.03.2025	PO43843	70	1			Order		Sent	0,1		0,1	m	1	EUR	31.03.25		Estimated delivery date 14.4	
5	21.03.2025	PO43843	60	1			Order		Sent	0,2		0,2	m	1	EUR	31.03.25		Estimated delivery date 14.4	
6	21.03.2025	PO43843	20	1			Order		Sent	2		2	pcs	1	EUR	31.03.25		Estimated delivery date 14.4	
7	19.03.2025	PO43824	40	1			Order		Confirmed	1		1	pcs	1	EUR	07.04.25		Estimated delivery date 14.4	
8	19.03.2025	PO43825	30	1			Order		Sent For Pol	4	2	2	pcs	1	EUR	07.04.25		Estimated delivery date for 2pcs 14.4	
9	09.03.2025	PO43614	30	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
10	09.03.2025	PO43614	20	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
11	09.03.2025	PO43614	10	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
12	04.03.2025	PO43539	50	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
13	27.02.2025	PO43452	10	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
14	27.02.2025	PO43452	20	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
15	23.02.2025	PO43368	60	1			Order		Sent For Pol	0,2	0,2		m	1	EUR	07.04.25			
16	23.02.2025	PO43368	40	1			Order		Sent For Pol	3	3		pcs	1	EUR	07.04.25			
17	16.03.2025	PO43743	20	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
18	16.03.2025	PO43743	10	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
19	16.03.2025	PO43743	30	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
20	27.02.2025	PO43452	30	1			Order		Sent For Pol	1		1	pcs	1	EUR	07.04.25			
21	27.02.2025	PO43452	40	1			Order		Confirmed	1		1	pcs	1	EUR	07.04.25		Estimated delivery date 14.4	
22	27.02.2025	PO43452	50	1			Order		Sent For Pol	1	1		pcs	1	EUR	07.04.25			
23	19.03.2025	PO43824	20	1			Order		Confirmed	4		4	pcs	1	EUR	14.04.25			
24	19.03.2025	PO43824	30	1			Order		Confirmed	4		4	pcs	1	EUR	14.04.25			

Figure 12. Progress report

As shown in Figure 12, the progress report implemented in the case company contains the following information about the undelivered items from subcontractor x:

- entry date
- order
- row
- lot
- item id
- supplier item nm

- type
- suppl.name
- status
- qty ord.
- qty in
- qty left
- p. unit
- factor
- p. unit price
- curr.
- confirmed delivery date
- changed delivery date
- comment.

The above-mentioned information provides all the necessary information about the purchase, for example, when the item purchase was entered into the system for the first time, which orders it belongs to, which item it is, who is the supplier, what is the status of the purchase, what was the quantity of the order, how many items have been sent and how many have yet to be sent, what is the price of the item, what is the confirmed delivery date of the order and if the confirmed delivery date has changed for some reason, what is the estimated delivery date.

The following chapter contains the conclusions of the thesis. The chapter first goes through the executive summary, after which the next steps and recommendations, as well as the self-evaluation of thesis are reviewed. The end of the chapter contains the closing words of the thesis.

7 Conclusions

Chapter 7 contains the conclusions of the thesis. The chapter first goes through the executive summary, after which the next steps and recommendations, as well as the self-evaluation of thesis are reviewed. The end of the chapter contains the closing words of the thesis.

7.1 Executive summary

In this thesis, the case company had a business challenge in the subcontracting management process because one key subcontractor did not deliver parts on time according to the schedule set in the ERP. This caused difficulty in production planning when the parts sometimes arrived late and sometimes too early. Delays had a negative impact on the case company's compliance with its own delivery times.

The objective of this thesis was to propose an improved subcontracting management process, and the outcome of the thesis was the proposed improved subcontracting management process.

The thesis was limited to examining the business challenge of one key subcontractor (subcontractor x) in its subcontracting process in the case company and one key product (item A) that subcontractor x supplies to the case company.

Chapter 1 contained the introduction of the thesis, and it clarified the business context, challenge, objective, and outcome, as well as the scope and outline of the thesis.

Chapter 2 explained the project plan, which included the research approach, research design, and data plan of the thesis.

Chapter 3 went through the current state analysis, and it contained an overview of data 1 collection, description of the current process, strengths and weaknesses of the current process, summary of strengths and weaknesses in the current subcontracting management process, and a selection of the key weakness of the thesis, which was "information flow within the case company and with the subcontractor x".

Chapter 4 introduced the conceptual framework of the thesis, and it clarified the ideas how to improve information flow with the subcontractor and how to improve processes based on literature.

Chapter 5 presented the initial subcontracting management process improvement proposal for the case company, and it included an overview of data 2 collection, improvement proposals for weakness based on literature and stakeholders, and a summary of the initial subcontracting management process improvement proposal for the case company. As an initial subcontracting management process improvement proposal, it was decided to implement the progress report (PR) in the case company.

Chapter 6 reviewed the validation of the proposed improved subcontracting management process, and it contained an overview of data 3 collection, stakeholder feedback and the final subcontracting management process improvement proposal for the case company. Since it was decided not to make any changes to the initial proposal, the progress report implemented in the case company also served as the final proposal of the thesis.

As an outcome of the thesis, the case company's subcontracting management process was improved, and subcontractor x's incorrect delivery dates were made to be more accurate in the case company's ERP by improving the information flow between the procurement specialist, subcontractor x, and the production planner with the help of the progress report.

7.2 Next steps and recommendations

It is recommended that the functionality of the implemented progress report is monitored in the long term and changes and improvements are made to the progress report if necessary.

As a next step, the case company is recommended to consider possible further development of the progress report in the future also for other items and other subcontractors.

In addition, the case company is recommended to consider the possible further development of the progress report in another program in the future instead of online Excel.

7.3 Self-evaluation of thesis

This section contains the self-evaluation of the thesis, which clarifies the credibility and relevance of the thesis.

7.3.1 Credibility

The thesis can be considered to be credible, as it has been a practical development project, in which the researcher has been closely involved in the project and qualitative methods, such as interviews, have been used in data collection. The credibility of the thesis is strengthened by the fact that stakeholders have been involved in the thesis project and the thesis has included several stakeholder interviews at many stages of the thesis. The credibility of the thesis is also increased by the fact that the thesis has utilized relevant literature as a source of information that has been proven to be good and reliable. In addition, the thesis has included many detailed reports and data collection at many stages of the thesis, which can be considered to confirm the reliability of the thesis.

7.3.2 Relevance

As an outcome of the thesis, the case company's subcontracting management process was improved, and subcontractor x's incorrect delivery dates were made to be more accurate in the case company's ERP.

The thesis can be considered to have answered the business challenge and objective of the work, as the thesis' subcontracting management process improvement proposal for the case company has improved subcontractor x's incorrect delivery dates to be more accurate in the case company's ERP by improving the information flow between the procurement specialist, the subcontractor x, and the production planner with the help of the progress report.

7.4 Closing Words

By adding the progress report (PR) to the case company's subcontracting management process, the information flow within the case company and with the subcontractor x was improved, and the incorrect delivery dates of the subcontractor x were made to be more accurate in the case company's ERP.

This was because with the progress report, the procurement specialist, the subcontractor x and the production planner were able to see the same real-time information about all undelivered items from the subcontractor x to the case company, which sped up the information flow of the item deliveries, including any possible changing delivery dates, between the subcontractor x and the case company.

By adding the progress report to the case company's subcontracting management process, the subcontractor x was able to update the item delivery dates directly to the progress report, which allowed the procurement specialist to see the changes faster and update the changed delivery dates to the case company's ERP more timely. In addition, the production planner was able to monitor the more accurate delivery dates of the items directly from the progress report and rely more on the delivery dates found in the case company's ERP.

The progress report also enabled the case company's other departments to have more accurate information about the subcontractor x's delivery dates when they were planning their own work, and best of all, when the subcontractor x's delivery dates were improved to be more accurate in the case company's ERP, the case company's customers were also able to receive more accurate information about delivery dates in the future.

Most importantly, the progress report helped to make the subcontractor x's delivery dates more accurate in the case company ERP, which enabled the case company's products to be delivered to the customers on time.

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