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# Improving the Consignment Warehousing Process in the Case Company

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## **Preface**

I would like to thank my supervisor Dr Juha Haimala, for his support and guidance throughout my research. A huge thanks also to Zinaida Grabovskaia, PhL, for her work. Zinaida has been a great help throughout the whole Master's program.

I also would like to thank all other lecturers and my fellow students in the program. The whole journey would have been very hard their without support.

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<p>This study explores consignment warehousing by focusing on improving the consignment warehousing process of the case company. The case company has consignment warehousing issues. A lot of capital is tied up to the consignment warehouses and due to the current consignment warehousing process the case company has large quantities of missing and scrapped hearing aid instruments.</p> <p>This study starts by defining the objective and outcome for the study. The next step is the current state analysis of the case company. By addressing the challenges of the current consignment warehousing process of the case company, the study first concentrates on its most significant weaknesses. The key weaknesses of the case company are supply chain management, warehousing and service level agreements. In order to improve these weaknesses, the study searches for best practice in supply chain management, warehousing, consignment warehousing and service level agreements.</p> <p>For this study, case study is selected as a research approach since the study has a unique context and it will be used to provide context-relevant solution based on a complex picture of what happens in the examined process and why.</p> <p>The outcome of this study is the improved consignment warehousing process in the case company. The key improvements relate to supply chain management, warehousing and service level agreements. These improvements include, for example, the customer relationship management system, a consignment agreement and determining the current service level of the case company.</p> <p>If the proposed improvements are applied, the case company will have, for example, code of conducts and contracts with their external customers and a new consignment warehousing process for their internal customer.</p>	
Keywords	Warehouse, warehousing, consignment warehouse

## Contents

Preface

Abstract

Table of Contents

List of Figures

1	Introduction	1
1.1	Key Concepts of This Study	1
1.2	Case Company Background	2
1.3	Business Challenge	3
1.4	Objective and Outcome	3
2	Method and Material	5
2.1	Research Approach	5
2.2	Research Design	6
2.3	Data Collection and Analysis	8
2.4	Validity and Reliability Plan	10
3	Current State Analysis	13
3.1	Overview of the CSA Procedure	13
3.2	Overview of the Current Consignment Warehousing and the Parties Involved	13
3.3	Description and Mapping of the Current Process	19
3.3.1	Contracts	20
3.3.2	Ordering Process	21
3.3.3	Warehousing	22
3.3.4	Returning	24
3.4	Strengths of the Current Consignment Warehousing Process	26
3.5	Weaknesses of the Current Consignment Warehousing Process	28
3.6	Summary of the Key Challenges in the Current Consignment Warehousing Process	29
4	Existing knowledge for Improving Consignment Warehousing Process	32
4.1	Supply Chain Management	32
4.2	Warehousing as Critical Part of Supply Chain	34
4.2.1	Safety Stocking	35
4.2.2	Warehousing Processes	37
4.2.3	Inventory Control	39

4.2.4	Consignment Warehousing	40
4.3	Service Level Agreement	42
4.3.1	Establishing a Service Level Agreement	43
4.4	Conceptual Framework	44
5	Building Proposal for the Case Company	47
5.1	Overview of the Proposal Building Stage	47
5.2	Findings of Data Collection 2	47
5.3	Proposal for Improvements to Consignment Warehousing Process	51
5.3.1	Code of Conducts and contracts for external customers (a)	51
5.4	New Consignment Warehousing Process for Internal Customer	53
5.5	Defining and Following the Service Level of the Case Company	59
6	Testing of the Proposal	60
6.1	Overview of Testing Stage	60
6.2	Testing of the Suggested Improvements	60
6.3	Final Proposal	65
6.4	Recommendations	66
7	Discussion and Conclusions	70
7.1	Summary	70
7.2	Practical Implications	71
7.3	Evaluation of Outcome vs. Objective	72
7.3.1	Validity and Reliability	72
	References	1
	Appendices	
	Appendix 1. Interview with the CEO of the Case Company	
	Appendix 2. Interview with the Customer Service Manager of the Case Company	
	Appendix 3. Workshop with the CEO and the Customer Service Manager of the case company	
	Appendix 4. Customer Survey: General questions about consignment warehousing	
	Appendix 5. Customer Survey. The Brand Research Survey	

## List of Figures

- Figure 1. Research design in this study.
- Figure 2. A consignment warehousing process from customer's perspective.
- Figure 3. Distribution of internal customers' inventory value in the case company (Data 1, A).
- Figure 4. Distribution of consignment warehouses used by internal customers (Data 1, A).
- Figure 5. Distribution of products in consignment warehouses for external customers (Data 1, A).
- Figure 6. The distribution of inventories (Data 1, A).
- Figure 7. Consignment warehousing process of the case company.
- Figure 8. Integrating and managing business processes across the supply chain (Croxton, García-Dastugue & Lambert 2001).
- Figure Table 9. K-factor in different service-levels (Robinson 2013).
- Figure 10. Typical Warehouse Process Flow (Puneet 2011).
- Figure 11. Key Steps in Establishing a Service Level Agreement
- Figure 12. Conceptual Framework.
- Figure 13. The elements of the Code of Conduct presented to Hospitals.
- Figure 14. The suggestions to the consignment warehousing process for the internal customers.
- Figure 15. Current Internal customers Consignment Statement
- Figure 16. Main warehouse inventory statement.

## List of tables

- Table 1. Case company documents in Data collection 1.
- Table 2. Key stakeholders interviews in Data collection 2.
- Table 3. Surveys in Data collection 3.
- Table 4. Strengths in the current consignment warehousing process.
- Table 5. Weaknesses in the current consignment warehousing process.
- Table 6. Improvement suggestions by the key stakeholders and the author (Data 2, F).
- Table 7. Findings of the improvements from the consignment warehousing testing.
- Table 8. The Strengths and weaknesses of the case company in relation to the other hearing aid instruments suppliers in Finland (based on the results of The Brand Research Survey, April 2016).

## 1 Introduction

Warehousing processes, depending on the company, are typically one of the largest commitment of inventory values and therefore often need improvement. In this study, a consignment warehousing process has become critically important for the company's logistics to make the case company more efficient and profitable. This thesis will focus on improving the consignment warehousing processes for both, internal and external customers.

### 1.1 Key Concepts of This Study

*Consignment inventory* is the inventory that is owned by the supplier, but rests in the possession of the customer. This means that a supplier places some of his inventory in his customer's possession (to a store or warehouse) and allows them to sell or consume directly from this stock. In practice it means that the customer purchases or allows the supplier to invoice the inventory only after the customer has resold or consumed it.

*Consignment inventory* is usually managed separately from the rest of the company's stock. This means that the company has possibility to know exactly what stock is stored at the customer location. Each customer are managed separately which makes it easier to follow up inventories stored at customers.

The key benefit of consignment warehouse for *the customer* is that they do not have to tie up their capital in inventory. This does not meant that there are no inventory carrying cots for the customer as they still have to store and manage the inventory. However, it is not so obvious to find benefits for *the supplier*. Usually the supplier benefits when it has a product or group of products that will sell if they can be placed in front of end-users. In the case company case, it is usually hearing aid instruments that need to be straight away available for the end users. This is why they need to be stocked in retail establishments.

*Consignment warehousing process* includes four main transactions. The first transaction is used to supplement the customer's stock. The inventory still remain in the possession of the vendor. In the second transaction customer is able to take consignment items from

special stock for their use or to sell. The third transaction any consignment items stored at the customer's warehouse may be invoiced with customer's permission. If the items are invoiced they will become customer's property. The optional fourth transaction is the consignment return. Depending on the agreement with customer, consignment items can be returned to the vendor with no cost to the customer or the customer may have to pay for the freight. After vendor has received the items back from the customer they will be returned back to vendor's inventory. If the items are already invoiced the vendor and customer must agree for making possible credit memo for the returned items.

## 1.2 Case Company Background

The case company of this study is Oy Oticon Ab, a company that is fully owned by The William Demant Group (WDH). WDH develops, manufactures and sells products and equipment designed to aid the hearing and communication of individuals. The WDH Group operates globally through three business activities. Main activity is selling hearing aids whose revenue for business activity are 86%. The second activity is the Diagnostic Instruments whose revenue for business activity are 10%. The last activity is Hearing Implants whose revenue for business activity are 4%. WDH also has a joint venture with Sennheiser electronic. Together they develop, manufacture and market hand-free communication solutions, mainly headsets, and sell these products through global network of distributors, OEM manufacturers, retailers and telecommunications businesses. In total, WDH group employs 9 000 people globally.

The headquarters and main warehouse of the case company is located in Helsinki, Finland. Smaller warehouses in Finland are hearing care service points which are located in Järvenpää, Hyvinkää, Tampere, Oulu, Jyväskylä and Lahti. The case company has several retailers in Finland. One of the largest customers in Finland are hospitals. They mainly purchase hearing care services and instruments directly and don't use consignment warehouses. The largest consignment warehousing customers are private clinics and some of the largest hospitals. Also Oticon's own locations use consignment warehousing. The case company also has a lot of private customers all around Finland.

The case company's inventories consist essentially of small stock items as Hearing Aids and Hearing Accessories. Some of the customers have also bigger items for example diagnostic equipment. As typical of a company with consignment inventory, the case



company is an importer for several WDH brands. The company imports Oticon and Bernafon Hearing Devices, Oticon Medical Hearing Implants, Interacoustics Diagnostics Instruments and Sennheiser Communications Personal Communications. It also provides hearing care services in several cities in Finland. The case company has a sister company in Finland, Kuulopiiri Oy, which is also fully owned by WDH group. They have combined operating functions such as marketing, sales, logistics, hearing care services and accounting. All the logistic operations of the case company are controlled from Helsinki. The development of logistics operations and processes are done in the headquarters.

### 1.3 Business Challenge

The business challenge of this study is related to the current state of the consignment warehousing process in the case company. The process is currently vague and due to a poor design it is confusing for the customers with its changing agreements. It is also not a profitable process for the case company, and currently it is binding a lot of company's working capital. As one example, the current process also causes large quantities of scrapped or missing products which cannot be invoiced from customers.

If the process is not fixed, the company will be wasting its capital in the future as well as paying for the retailers' warehousing. If not changed, the case company will also keep taking all the risks for the warehousing. These risks include overstocking, lost products, invested capital and transportations.

### 1.4 Objective and Outcome

The objective of this thesis is to improve the current consignment warehousing process based on the analysis of its current state and suggestions from best practice. The expected outcome of this study is a proposal for the improved consignment warehousing process specifying which factors at the current process should stay, and which are not working and would need to be improved, and how.

The scope of the study includes the consignment warehousing process and the supply chain for imported instruments which are stored in this warehouse. Case company's other warehousing processes, other supply chains and other logistic functions are left out of the scope of this study. This is because the outcome itself is expected to be wide

enough for one study and adding other warehousing areas to this thesis would increase it to a massive amount of proposals.

This study is written in seven sections in which Section 1 describes the business challenge and research objective of the study. Section 2 illustrates the method and material used in the study, research design, data collection and analysis and validity and reliability plan. Section 3 describes the current state analysis which will examine existing strengths and weaknesses of the process. Section 4 introduces the best available knowledge related to the weaknesses which were discovered in Section 3. Section 5 is about building a proposal for the case company. Section 6 introduces the testing of the proposal including an action plan for the case company. In Section 7 discusses and evaluates the main conclusions of this thesis.

## 2 Method and Material

This section starts with the description of research approach and research design used in this study. It gives an overview of data collection and analysis methods. Finally the validity and reliability plan will be described for this study.

### 2.1 Research Approach

For this study, case study is selected as a research approach since the study has a unique context and it will be used to provide context-relevant solution based on a complex picture of what happens in the examined process and why.

In general, case study as a research approach gives the story behind the result by capturing what happened to bring it about, and gives a good opportunity to highlight a project's success, or to bring attention to a particular challenge or difficulty in a project (Palena 2006). Case study is an account of an activity, an event or a problem that contains a real or hypothetical situation and includes the complexities that would encounter in the workplace. Case studies are used to help to see how the complexities of real life influence decisions (UNSW Australia 2013). A case study analysis requires applying knowledge and thinking skills to a real situation. In order to learn from a case study, analysis must be analysing and applying knowledge, reasoning and drawing conclusions. (Kardos & Smith 1979).

According to Kardos and Smith (1979) a good case has the following features. First, it is taken from real life. Second, it consist of many parts and each part usually ends with problems and points for discussion. Third, it should include sufficient information for the reader to treat problems and issues. Final feature is that it is believable for the reader.

In this thesis, a case will be described in a real situation that includes complexities that encounter in the case company. This thesis will be built based on the four features described above based on Kardos and Smith (1979).

According to Palena (2006) the primary advantage of a case study is that it will provide more detailed information than what is available through other methods. Case studies may also allow to present data collected with multiple methods. The case study method is useful for formulation of hypothesis for further study (Kardos and Smith 1979). Through a case study approach, can be formulated and developed a questionnaire and schedule for the future (Kardos and Smith 1979).

Disadvantages of a case study approach to data collection may be that due to narrow focuses, a case study has limited representatives and generalization is hard or impossible. Although case study can be useful information for other similar processes, classification is not possible due to studding a small unit. The method may have also errors of memory and judgement. One limiting factor for executing a perfect case study may be the fact that the method is more costly and time consuming as compared to other methods of data collection.

In this study, the methods such as interviews, analysis of the company database, internal documents and observation, as well as information from literature, are involved in building the solution. In this thesis the improvements as outcome of this study can be applied to real life situations. It may also serve as useful information for other warehousing processes as well.

## 2.2 Research Design

The research design of this study is illustrated in Figure 1. This illustrations shows the Data stages that are taken in the study. It also shows the steps of the study and outcomes produced from all the steps.

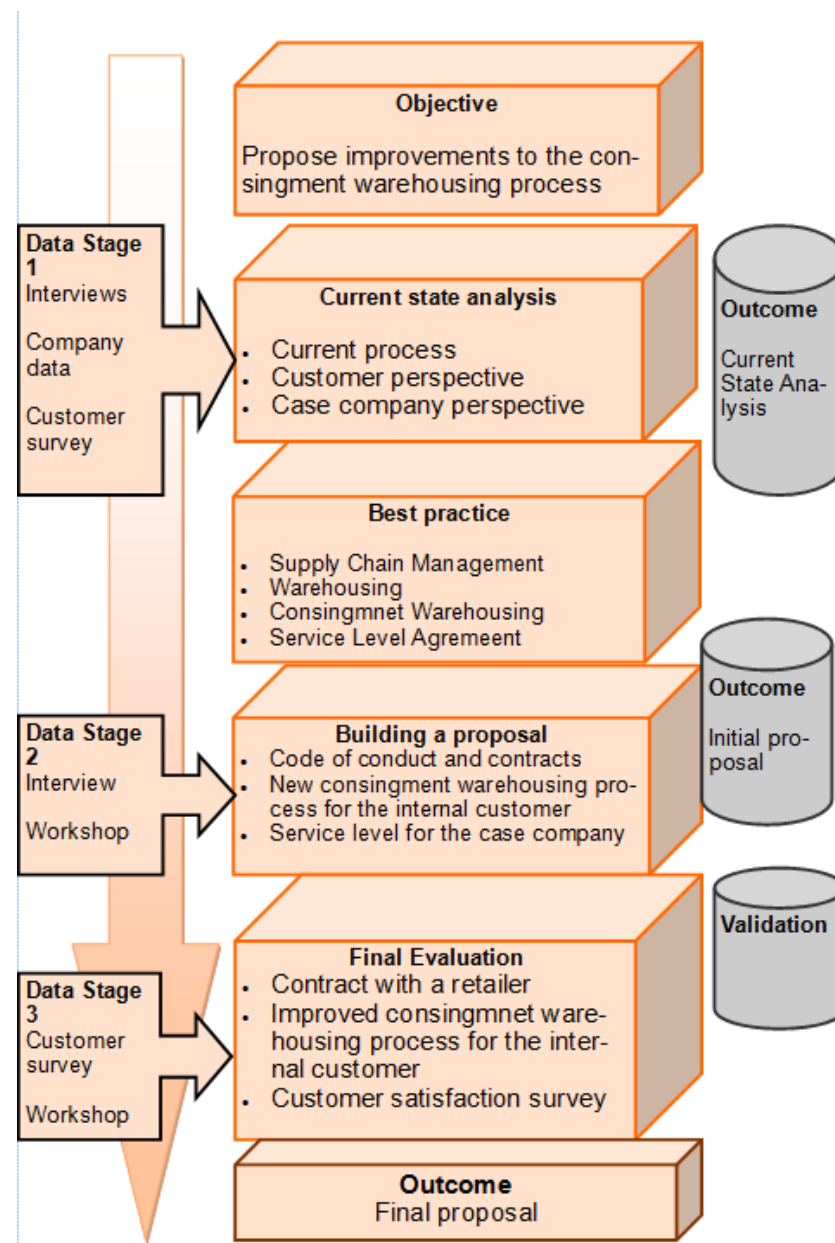


Figure 1. Research design in this study.

Figure 1 shows the steps taken in this study. The first step was to define the business challenge and objective. The objective was defined by having discussions with the top managers at the case company.

After the objective was defined, next step is Data stage 1. The current state of the consignment warehousing process was described and mapped. The outcome is current state analysis. It is performed by analysing the current state of the case company's consignment warehousing process as well as exploring consignment warehousing practises in general. The current state analysis plays the key role in order to be able to be able to

evaluate the data and build up a proposal for improvements. Data Stage 1 is collected by gathering information from the company's database and by interviewing key stakeholders involved to the process. The analysis examines both the customer as well as supplier point of view. The current state analysis answers the question of what are the case company's strengths and weaknesses in the current consignment warehousing process.

In the next step, the theory suggestions were searched form best practice and available knowledge. The practises and existing knowledge are analysed carefully and the best parts are used to improve the consignment warehousing process. The theory part includes information from the company database, other similar cases and best available literature. The outcome is a full data package that gives the best possible ingredients for the next phase.

The next step is building the proposal. The Data for the stage 2 is collected by doing interviews and one-to-one discussions. The outcome of this stage is initial proposal. This stage addresses the question of what improvements this study will propose to the current process. This step's most important role is to present the state of the weaknesses in the current process and propose improvements.

The last step is final evaluation. Data Stage 3 for final proposal is gathered. This data is collected by having one-to-one discussions with the key stakeholders involved in the process. The goal of the discussions is to collect as much feedback as possible. After the feedback is analysed and processed, the testing is made and the final proposal is formed. The outcome of this stage is the proposal for consignment warehousing process.

### 2.3 Data Collection and Analysis

In this study, data was collected in three rounds of data collection. *Data stage 1* was collected for conducting the current state analysis. The data includes interviews, participant observations, analysis of the internal documents, including some numerical data from the internal IT databases used in the case company. *Data stage 2* was gathered for building the proposal for the improved consignment warehousing process. This data included interviews and one-to-one discussions with the key stakeholders from the case company. In *Data stage 3*, the data included a testing session with the stakeholders of

the case company on the proposal for improving the consignment warehousing process of the case company. Based on this Data 3, the final proposal was corrected.

The collected data from Rounds 1-3, including interviews and data from the internal IT databases are shown in Table 1, Table 2 and Table 3 below.

#### *Internal documents and IT databases*

For examining the current operational model, the author processed the company's internal documents and IT databases. These elements included: The current process, current contracts with customers, financial key figures related to consignment warehousing and key figures related to the transportation and storage. Table 1 overviews the case company documentation used in the study.

Table 3. Case company documents in Data collection 1.

Data ID	Data Source	Data Type	Date	Analysis
A	Company ERP system	Key figures	22.2.2016	Section 3
B	Company ERP system	Key customers for consignment storage	22.2.2016	Section 3
C	Company ERP system	Delivery times	1.3.2016	Section 3

As shown in Table 1, data stage 1 analysed relevant information for understanding the current consignment warehousing process of the case company. This data was collected using the company's internal databases and documents.

#### *Interviews, workshops, and one-to-one discussions*

One of the main sources of data collection in this study was the interviews and discussions with the stakeholders. The interviews were used in all three rounds of data collection and included the following data, shown in Table 2 below.

Table 4. Key stakeholders interviews in Data collection 2.

Data ID	Data type	Participants	Topic, description	Date and length	Appendix
D	Interview	The CEO of the case company	Overview of consignment warehousing	11.2.2016 45min	Appendix 1
E	Interview	The Customer Service Manager of the case company	Overview of consignment warehousing	19.2.2016 20min	Appendix 2

F	Workshop	The CEO and the Customer Service Manager of the case company	Improving internal consignment warehouse	21.4.2016 35min	Appendix 3
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As seen from Table 2, totally two key stakeholders were interviewed for this study. The interviews were done by the author. They were done face-to-face and recorded. Afterwards all the recordings were written in Finnish. The interviewees were selected because of their job and considering their role in the process. The details for data sources are given below.

### Surveys

Finally, there were a survey made for this study. The details of the survey is shown in Table 3 below.

Table 3. Surveys in Data collection 3.

Data ID	Data type	Participants	Topic, description	Date and length	Appendix
G	Customer Survey	Consignment warehouse customers	General questions about consignment warehousing	19 questions	Appendix 4
H	Customer Survey	All case company customers	Brand Research Survey	8 questions	Appendix 5

As seen from Table 3, consignment warehouse customers and Finnish hearing care specialists were invited for the survey. Altogether 24 persons responded. The response rate was thus 24%. The survey was done by the author. Questions and results can be found in Appendix 4.

The case company also arranged a Brand Research Survey after the CSA was already done. Finnish hearing aid professionals answered the survey. Altogether 31 persons responded and the response rate was 14%. The Brand Research Survey is attached as Appendix 5 (Data 3, H).

## 2.4 Validity and Reliability Plan

The fundamental cornerstones of doing scientific research are the principles of validity and reliability. Together validity and reliability are the core of what is accepted as scientific proof. By following a few basic principles, all experimental designs will stand up to



harsh questioning and possible scepticism. Validity and reliability plan asks to consider whether what is being studied what is thought to be studied and whether the measures are consistent. (Shuttleworth 2008).

*Validity* is concerned with whether the finding are about what they appear to be about. It tells for example is the relationships between two variables makes a causal relationship or not (Saunders, Lewis & Thornhill 2009). Validity contain the entire experimental concept and establishes whether the results obtained to meet all the requirements of the scientific research methods (Shuttleworth 2008). *Internal* validity tells how an experimental design is structured and contains all of the steps of the scientific research method. *External* validity is questioning whether there are any other possible causal relationships. It is also process of examining the results (Shuttleworth 2008). In the case study, efforts to ensure validity are visible, for example, in considering if interview results can be misleading. This is avoided by making such questions that are impartial and the meaning of the questions is just to get important information about the current process. One of the factors that may have impact on the results is the timing of the data collection. For example, if financial figures are collected in the end of the year, right after inventory, the valuation of consignment warehouse will be much higher than six months earlier in the middle of the year. This threat can be avoided by looking at consignment warehousing inventories over longer times.

As for this thesis the chosen research method was case study, the interviews, authors own observations and specific documentation of the case company will help in understanding the current process in consignment warehousing. The validity of collection methods for survey data can be increased if a clear explanation of the techniques is used and the analysis steps are explained for the collected data. Thus, the data is planned to be analysed with care. Current state is planned to be extended with an external evaluation by case company's stake holders, so that any pre-formulated own opinions will be avoided as much as possible in advance.

*Reliability* can be interpreted as considering that any significant results must be more than just one-off finding and it must be inherently repeatable. For example, if the current state analysis was made by other researchers, they must be able to perform exactly the same experiment, under the same conditions and generate the same results. The pre-condition is essential to a hypothesis establishing itself as an accepted scientific truth. For example, in the thesis will be used a lot of case company's own data. This data is

collected from the company's ERP system. The data at the system is considered to be a reliable source, but there might be some errors or wrongly entered data. This false data must be identified and disregarded. Reliability is a necessary element for determining the overall validity of a scientific study and enhancing the strength of the results. (Shuttleworth 2008).

In this study, validity is planned to be ensured by taking the following steps. The interviews will be done face-to-face and the questions will be similar to each interviewees. The questions are made such way that they just provide valuable information about the consignment warehousing process and does not reflect interviewee's personal opinions, unless they are asked and wanted to be heard. The consignment inventories are analysed from different perspectives. The study demands situations such as current state, inventories before yearly inventory and the situations when the inventories reached their highest and lowest volume.

### **3 Current State Analysis**

This section describes the current consignment warehousing process in the case company. The purpose of this section is to identify strengths and weaknesses of the current process. The process is evaluated from both the customer's and the case company's perspectives.

#### **3.1 Overview of the CSA Procedure**

Short description of the customer's perspective does not give the full picture of the process. In order to see the whole picture and to be able to realize which areas are working well and which are not, need to take a look at each part of the process individually. In the next section, 3.2 will be first introduced which parties that are involved in the consignment warehousing process. Afterwards, will be more detailed description of the whole process. Finally, will be analysed which part of the process are considered as strengths and which as weaknesses.

#### **3.2 Overview of the Current Consignment Warehousing and the Parties Involved**

The case company's current consignment warehousing process has been used for over ten years (Data 2, D). The process itself sounds very simple, but it has several aspects that influence the process so much that it has great importance for all parties involved in the process. Figure 2 shows the whole consignment warehousing process for the customer. First, the customer will make order to the case company. The company will make order to the manufacturer and they deliver products directly to the customer. The customer will keep products in their warehouse or the customer's end user will keep the product through the three-month trial period. Finally, the customer will make decision that they will either pay for the product, keep the product in their warehouse or will they return the product to the supplier.



Figure 2. A consignment warehousing process from customer's perspective.

The customers that use consignment warehouses include: (a) Internal customers, (b) Hospitals and (c) Retailers. Internal customers are case company's own hearing clinics in Finland. Hospitals customers are all hospitals in Finland that have hearing care services. Retailers are case company's external customers who have their own hearing aid clinics across Finland.

The process starts when Finnish internal customers, hospitals or retailers, have a need for a products and they are needed to be stored in consignment warehouses. From hospitals, there usually comes invitation for tenders which includes demands for such warehouse. Retailers usually contact the case company's sales team by phone or e-mail and ask if it would be possible to start using consignment warehouses. Internal customers' warehouse services are agreed upon within the company.

#### *Supplier*

The case company's logistics department handles all the consignment orders. The department is located in Helsinki, Finland. The team consists of nine employees that handle consignment orders, returns and invoices.

#### *Manufacturer*

The factory has got a very big role in the process. The manufacturer is located in Wlocklawek, Poland. Factory receives orders from the supplier and makes direct deliveries to the customers.

##### *A. Internal customers*

According to the customer service manager of the case company, there are three internal customers that use case company's consignment warehouses. These are customers are case company's own hearing care clinics and they are located in Hyvinkää, Helsinki and

Järvenpää. (Data 2, E). Internal customers order hearing aid instruments and hearing aid devices. Internal customers make 10-20 daily orders which include 1-10 instruments or devices (Data 1, A).

### *B. Hospitals*

There are six health care districts in Finland. These districts have 32 hospitals that are potential customers for using case company's consignment warehouses. When this thesis was written, not all the hospitals had consignment warehouses. Some of the hospitals pay directly for the products and keep their own warehouses. (Data 2, D). Hospitals buy hearing aid instruments and hearing aid devices. Hospitals make 1-5 daily orders which each include 1-2 instruments or devices (Data 1, A).

### *C. Retailers*

There are 24 retailers that use case company's consignment warehouses. These are private clinics that might have contracts with hospitals for fitting the instruments to the end users. Also they have their private end users or those whose instruments are paid by insurance company. Compared to retailers, hospitals share from external customer's consignment warehouse valuations is really small. Retailers order hearing aid instruments and hearing aid devices. Retailers make 5-10 daily orders which include 1-10 instruments or devices (Data 1, A).

To characterize the customers further, Data stage 1 examined the key figures from the company's ERP system. Some of the key figures are summarized in Figure 3 and Figure 4.

First of all, Figure 3 below shows the internal customers' inventory value in the case company. As seen from Figure 3, it makes almost half of the full stock value in the case company.

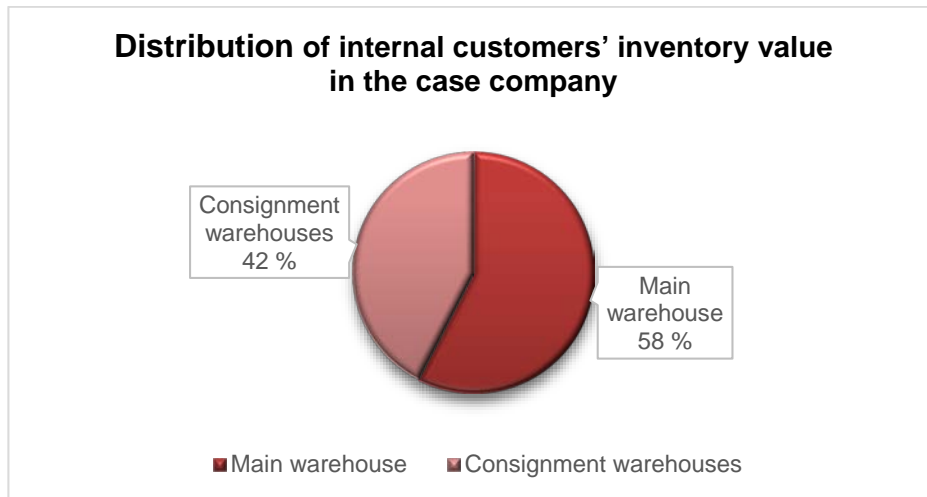


Figure 3. Distribution of internal customers' inventory value in the case company (Data 1, A).

Figure 3 shows that the internal customers' inventory value makes almost half of the full stock value. However, these numbers do not contain inventory value from the external customer's consignment warehouses.

Figure 4 below shows the distribution of internal customer's products between the current consignment warehouses.

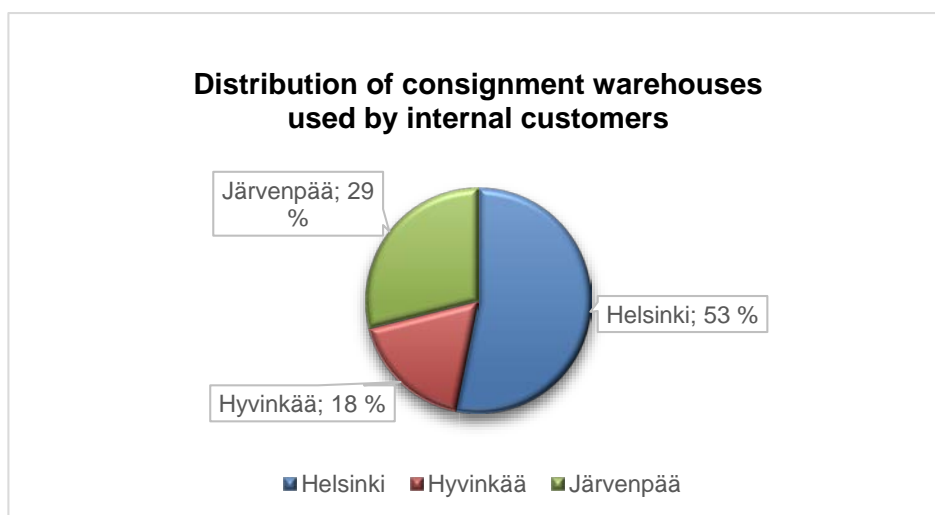


Figure 4. Distribution of consignment warehouses used by internal customers (Data 1, A).

Figure 4 describes of how the products are currently divided between the internal consignment inventories in the case company. Helsinki has clearly the largest consignment warehouse. Headquarter of the case company is located in Helsinki which may explain why the share is so big compared to other hearing aid clinics.

Figure 5 below shows the distribution of products in consignment warehouses for external customers.



Figure 5. Distribution of products in consignment warehouses for external customers (Data 1, A).

Figure 5 demonstrates the difference between hospitals and retailers in their share of products in consignment warehouses. As seen from this figure, compared to retailers, the hospitals' share from consignment warehouse valuations of external customers is rather small.

Figure 6 shows how the largest warehouses of the case company are divided. This distribution contains the main warehouse, internal customers' consignment warehouses and external customers' consignment warehouses.



Figure 6. The distribution of inventories (Data 1, A).

As seen from Figure 6, the external customers' share does not seem to be so large. However, the share of consignment inventories is quite large compared to the main warehouse. Almost half of the capital, tied up to the warehouses, is invested into consignment warehouses. Main warehouse also includes the biggest and most expensive items that cannot be sent to consignment warehouses. The next section will explain why this is and what it may cause it.

Summing up, for internal customers, the consignment warehouses are needed because all the products that are sold from there are first fitted to the customers. After three months testing period the customer will either keep the product or he or she may return it. After the customer has decided between keeping and returning, the products are either invoiced or returned to the supplier. Internal customers may also offer the returned products for other customers as well.

As for the share and size of the customers and their inventories, when the thesis was written Helsinki warehouse had 733, Hyvinkää warehouse had 246 and Järvenpää warehouse had 399 hearing aid instruments in their consignment warehouses. Customer service manager said in the interview that almost half of these instruments are already being tested by the customers and half are being held in physical warehouses. (Data 2, D)

In summary it can be concluded that consignment warehousing process makes an important process for the case company. Internal customers are largest customer of all.



From external customers the share of retailers is enormous compared to hospitals. However as the share of consignment warehouses, compared to all warehouses of the company, is large all customers, using consignment warehouses, are very important.

### 3.3 Description and Mapping of the Current Process

The current warehousing process is divided into several different phases that will be explained phase by phase. All the phases of the current consignment warehousing process are also shown in the process map in Figure 7 below.

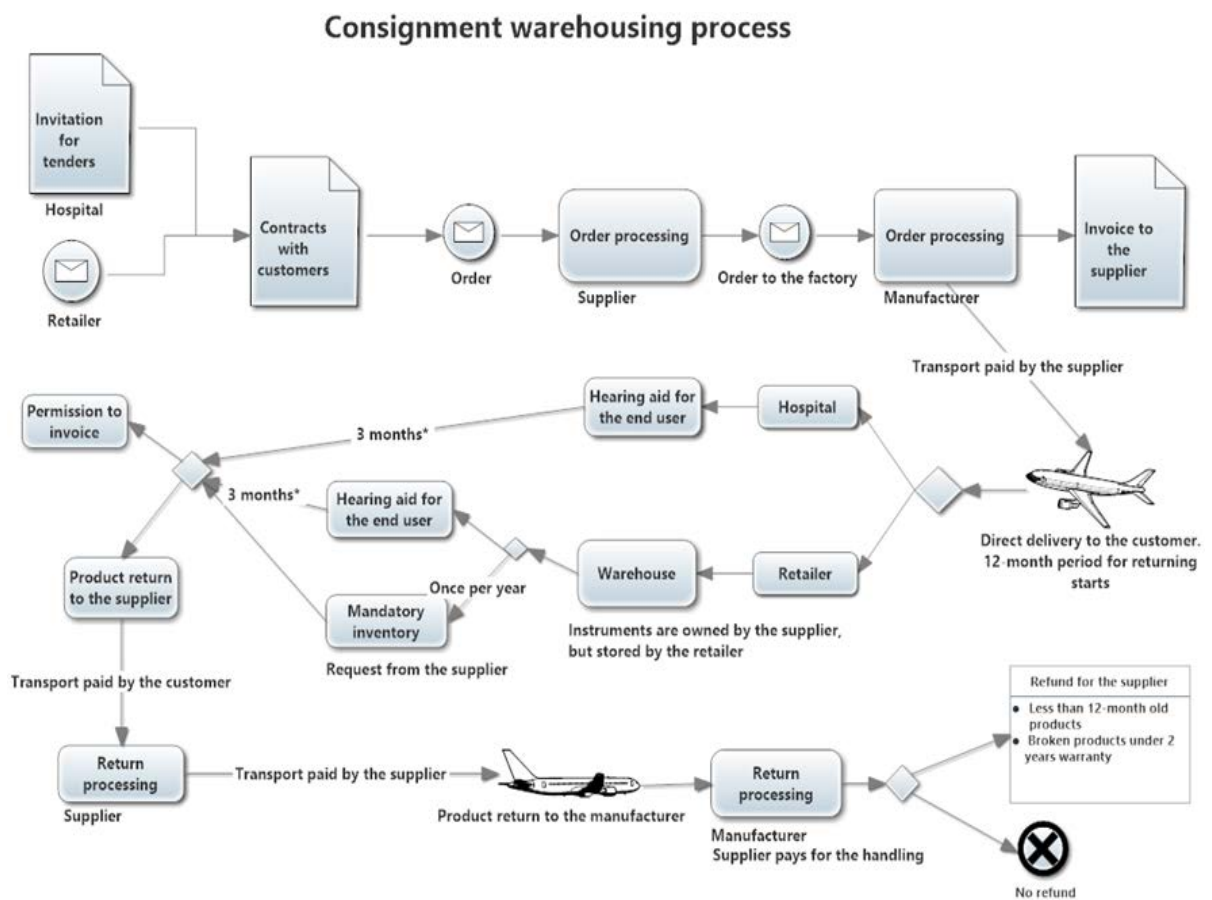


Figure 7. Consignment warehousing process of the case company.

As seen from Figure 7 above, the current consignment warehousing process begins when a customer has a need for a specific product that can be bought from a consignment warehouse.

*Retailers* usually contact the case company's sales team and ask if it would be possible to use a consignment warehouse. Also the case company's sales team can offer consignment warehouses to retailers. One of the main reasons why retailers use these warehouses is that they need to have all kinds of different hearing aid instruments with different colours and functionalities available in their warehouses. If the instruments would not be in the consignment warehouse, the retailers would have to buy all the expensive instruments into their own stock. This is because they want that the end user has opportunity to receive the hearing aid at the first hearing test. This way the end user does not have to book another time and retailer saves time. This practice is also used in hospitals and case company's internal hearing clinics. (Data 2, D)

Retailer's and hospitals fit instruments directly to the customers and the customers decide within three months if they want to keep the instruments.

*Internal customers* have all their hearing aid instruments located in consignment warehouses. The internal customer of the case company have their own hearing aid clinics which are making outsourcing for the hospitals. Internal customers fit the hearing aid instruments for the customer at the first hearing test. The customer has three months testing period for the instrument. If customer is satisfied with the instrument, the instrument will be invoiced either from hospital or from the customer.

After the need for consignment warehouse is clarified, at the next stage, a contract must be made with customers.

### 3.3.1 Contracts

The customers and the case company must make a contract before any transmission can be done. The current way is to make either verbal or written contracts.

Hospitals usually invite for tenders. Case company's sales team evaluate tenders and prepare a response to them. Hospital tender invitations usually include a demand for consignment warehouses and the case company cannot afford not to offer these. With hospitals, all contracts are done in writing. With retailers, the current contracts are made verbally or in writing. (Data 2, D).

For the consignment warehouses, there are no separate agreements. Agreements for using them are included in offers (Data 2, D). The content of contracts is currently defined by the sales team. When the customer survey (Data 3, G) was made, only 19 % of the respondents had a valid contract with the case company. The rest 81% neither knew about it, nor have a contract for it. The survey also revealed that only 22.7 % of the respondents thought that the contract was clear to them. The rest could not say if it was clear, or said directly that the contract was not clear to them.

Finally, agreements with internal customers are defined inside the case company. These are defined within the sales, customer service and logistics teams.

Contracts between customers and the case company are important as they form a bond between two companies. If both of the companies abide by contracts, unclear situations is much easier to handle. Only few of the customers had a contracts with the case company. A huge part of the customers did not have contracts didn't know about them. Small part of the customers thought that the contract was clear to them. The main problems for the case company are the way of making contracts, the lack of contracts and unclear contracts.

As soon as the contracts are made, customers can place their orders. When they are received, the ordering process begins.

### 3.3.2 Ordering Process

Depending on the customer, orders are done by sending e-mail, mail or calling by phone. In the same working day when the order is received, it is entered to the ordering portal. Order is by sent by Finnish logistics team directly to the manufacturer. As the manufacturer and the case company are part of the same WDH Group, they use the same ERP system. Orders are moved electronically through the system. Some of the ordered instruments need models from end customer's ears and those models are 3d-scanned. The 3d-scans are transferred to the WDH Group's common database where manufacturer can download them.

After the manufacturer has received the order, they start manufacturing or collecting products for the shipment. Shipments are sent directly to the customers. The delivery takes one to six working days depending on the ordered product. (Data 3, G)

When the products are shipped, the manufacturer sends an invoice to the case company. After the case company has paid for the invoice, the products are owned by the case company. The invoice also contains the freight. Case company has a 12-month time period within which they can return the products to the manufacturer. This period starts after the products are received. More about the returning process will be introduced in Section 3.3.4 below.

Even when all the shipped products are owned by the case company, they are stored in hospitals and retailers own consignment warehouses.

### 3.3.3 Warehousing

Warehousing of hearing aid instruments and devices is done differently depending on the type of customers. Hospitals' and retailers' warehouses differ from each other in such a way that hospitals usually already have end users for the instruments they are ordering. Usually the orders that hospitals make are the ones that needs a mould from end users' ear. This mould is 3d-scanned and after the hearing aid instrument is manufactured, according to the end users' ear model, it is sent to a hospital. Hospitals fit the instrument to the customer's ear and do not keep it in their own warehouse. Retailers do this also. Both hospitals and retailers also order BTE- and RITE-instruments, that are not made for certain end users. The difference between retailers and hospitals is that when hospitals order BTE- and RITE-instruments, they usually pay for them directly, Retailers place the instruments to consignment warehouses.

As a result of this difference in use, hospitals do not need given storage time for the products as they do not store case company's products for no longer than three months. Retailer's store their products for longer times. At the moment, it is not defined in contracts that retailers should return products after a predetermined time period.

This timeframe coincides with the typical actions by the customers. According to the survey results, the majority of the customers do not need to keep the products no longer than six months. Only 26.7 % wanted to store the products for less than 12 months. The oldest products had been in their warehouses longer than six months and 61.6 % had been in the warehouse less than six months. (Data 3, G)

Regular inventory counting is important for companies in terms of inventory management. Last inventory counting arranged by the case company was done in November 2015. All the old products were asked to return and they were sent back to the manufacturer. This may explain why 85.7 % of the respondents said that they had only 1 – 10 items in their warehouses. Usually consignment inventories keep growing throughout the whole year as retailers do not return products neither they are not asked to be returned. (Data 3, G)

It is not enough that only the case company makes inventory counting. Also retailers are asked to do inventory once per year. Despite this 27.8 % of the respondents said that they have never done inventory counting. Almost everyone had done inventory because case company asked them to. More than half would be ready to make inventory more than twice per year. (Data 3, G)

It is good for the company if inventory is continuously monitored. The internal customers of the case company have three consignment warehouses. These are revised every two months and checked if there are instruments that have been stored longer than ten months. These instruments are returned to the manufacturer. Inventory for these inventories is made once per year. All the instruments can be tracked by serial number and it can be easily checked if the instrument is in the warehouse or in end users ear. (Data 2, E)

For the end user it is really important that the hearing device is the right one. When retailers and hospitals hand over hearing aid instruments to the end user, he or she has three months trial period. Within this three months, end user must decide if he or she will keep the instrument. If the instrument is kept, case company can send an invoice to the retailer or hospital. The instruments from case company's own inventories are paid by hospitals, insurance companies or the end users by themselves. If the end user does not want to keep the instrument or if hospital or retailer do not want to sell the instrument longer, they must be returned to the supplier.

The meaning of this stage was to present why warehouses are needed by the customers of the case company. The stage presented how the customers of the case company store their products, how often they perform inventory and what kind of shelf life do the products have. The main problems in warehousing of the case company are irregular

and indistinct inventory counting, monitoring of items stored by the customers and indeterminate storage times.

### 3.3.4 Returning

If customer does not want to buy the products, they can return them to the case company. Almost one third of the customer survey respondents said that they return products because the product does not sell and it has been laying on the shelf (CS). Almost 17 % return products because they are broken.

At the moment there is no separate contracts for consignment warehouses which would determine when or in what condition the products can be returned. When inventory is done, the case company asks customers to return products. If the customers do not return the products, the case company will send invoice for the unreturned products. If the customer has not returned the product in time, they will receive an invoice. The request is sent so that customers have two months' time to return the products. It is sent by e-mail or mail and there is clear instructions on how to return products and products need to be returned or invoiced. If the retailer cannot find all the products from their inventory, they are usually invoiced. However there is no agreement about this either. Customer can explain that they have not seen the product, or that they have returned the product already. The products are not invoiced if the customer can explain why the products cannot be found. In every yearly inventory, there has been products that are lost. In year 2015 there were at least 33 items lost. The exact number is impossible to say as the case company does not count themselves all the instruments. The customers of the case company count instruments that are stored in their shelves. Items may be lost because the customers just do not find them from their own shelves or for example if customers does not keep track on which end user is testing which instrument. Some of the customers may have counted all items in the inventory, but the expiration date with some of the items had run out years ago. These items might be so old that they have lost their value.

Normally, return policies demand that the products are unused and packages are in such condition that they can be resold. In these products this is not always possible. The idea of offering consignment warehouses for hearing aid instruments is based on the idea that customer may try the products before making the decision of buying. This is why products that have been stored in consignment warehouses are accepted back even if

packages are damaged or instruments would have been tested by the end users. If instruments are damaged due to the retailers or end users, they cannot be returned and they will be invoiced. This is not usually mentioned in contracts, but this practice has been applied.

Handling of returned products is precise work. When products are returned to the supplier, the logistics team starts dividing them into different classes. All products that have been invoiced from case company more than 12 months ago, are either placed in the warehouse or disposed. The manufacturer will not give any refund for these kind of products (unless they have warrantable failure and warranty is valid). Those products that are not disposed might be sold to some other customers or used as demo items. The most common reason for returning products is that case company has requested items back (Data 3, G). Case company's logistic team separates returned products into three different categories. Category R1 is for unused new instruments. Category R2 is for functioning used instruments. Category R3 is for broken instruments. After all the instruments are categorized they will be sent back to the manufacturer. The freight is paid by the case company.

Inspection of the products is necessary in order to know their current value. The manufacturer will inspect that the products are divided in correct categories and decide how much of the instruments purchase price they will send credit memo for. The refund amount depends on the instruments category, condition and cycle time (when was the instrument ordered and when it was returned). The labour used in the returning process is invoiced from the supplier by the manufacturer.

Non-functioning products must be carefully checked. All the R3 instruments are inspected for manufacturing defects. Normally if supplier discovers some manufacturing defects, they will send instruments for service first. If manufacturer finds these defects, they will check which the problem was and how it will be fixed that it would not happen again.

Customer service and the environment play an important role in today's business world. Manufacturer strives to be as environmentally friendly. They reuse as many parts as they can from the returned instruments. They are also very interested in the quality of their customer service. The case company is asked monthly on how the manufacturer has

performed. Also supplier has an opportunity to make quality complaints about any order that was made.

Product returning process is always difficult and always cause extra work for all the parties involved. The biggest problem of the returning process seems to be that the inventory or return policies are not determined or mentioned in all the contracts. According to the customer survey, 50% of the customer do not know about the return policies. The CEO of the case company mentioned that the sales person should also present terms for the consignment warehousing when making a contract (Data 2, D). The terms form return should be clearly indicated in these contracts.

### 3.4 Strengths of the Current Consignment Warehousing Process

The strengths of the current consignment warehousing process are presented based on the results of interviews, customer survey, and company's database and authors observations.

There are some differences in the strengths related to different types of customers. Strengths for the suppliers are also different than the strengths for the customers. Table 4 demonstrates the strengths in the current consignment warehousing process for internal customers, hospitals, retailers and supplier. Therefore, the party is always indicated for whom this feature of the current process makes this a strength.

Table 4. Strengths in the current consignment warehousing process.

No	Strength	Parties involved	Description of strengths
1	Delivery times	Internal customers, hospitals and retailers	Instruments are quickly available and delivered to the customers.
2	Satisfied end users	Internal customer, hospitals and retailers	End users are pleased with the fact that the products are instantly available
3	Product tracking and invoicing	Supplier and internal customers	Products are tracked with serial numbers.
4	Direct deliveries	Supplier	Direct deliveries from the manufacturer by courier.
5	Low costs and risks	Hospitals and retailers	Supplier owns the instruments. Small instruments are cheap to store.



6	Three month testing period	Hospitals and retailers	Possibility to return products after three months.
7	Product returning	Internal customers, hospitals retailers	Products are returned easily.

As seen from Table 4, there were seven strengths in the current warehousing process discovered from the current state analysis.

*Strength 1* was that all customers appreciate the case company's delivery times. Data found from (Data 1, C) company's ERP system also supports the fast delivery speed. Case company has good international contracts with UPS which supplies products quickly. Manufacturer's processes are well monitored with different KPI's and agreed delivery time's stick to the agreement.

*Strength 2* was the satisfied end users. End users usually want to fit hearing aid instruments or other products quickly. They want the products to be available. When supplier lets hospitals and retailers keep all different kind of instruments and products in their consignment warehouse, the products are available for the end users. Customers will save time when they can fit instruments directly to the end user and they do not have to reserve the second time for the fitting.

*Strength 3* was product tracking and invoicing. This was picked, because supplier and internal customers can track products a lot easier when all the consignment warehousing items are marked with serial numbers. All case company's hearing aid instruments (and some of the other products) have serial numbers, but in normal warehouse, serial numbers are added to ERP after they are sold. Main warehouses inventory list shows how many items can be found from the inventory. It will not show the serial numbers for the items. When product tracking is available, case company have easier job to invoice the instruments or products from the correct customers at the right time.

*Strength 4* is the direct deliveries by the case company. They make ordering a lot easier to the case company. They do not have to store the products or make post any shipments. The order is just forwarded to the manufacturer who will ship products directly to the customers.

*Strength 5* shows that hospitals and retailers appreciate that they have low costs and risks with consignment warehouses. They do not have to buy their own stock and the risk that the product does not sell is left to the supplier. Products that are in stock, are owned by the supplier. This means that supplier is the one with tied up capital.

*Strength 6 and 7* were three months testing period and product return. Customers can fit the hearing aid instruments to the end users and let them test the instrument for three months. The end user may return these instruments to the customer if they do not like it or if they just want to do so. Customer returns the instruments to the supplier (Table 4: Finding 7) or reuse them. Supplier is not entitled to charge anything for the returned products even if they are used and cannot be used anymore.

### 3.5 Weaknesses of the Current Consignment Warehousing Process

The weaknesses of the current consignment warehousing process are presented based on the results of interviews, customer survey, and company's database and authors observations.

Table 5 demonstrates the weaknesses in the current consignment warehousing process. Since weaknesses are related to the types of customers, therefore, the party is always indicated for whom this feature of the current process makes a weakness.

Table 5. Weaknesses in the current consignment warehousing process.

No	Weakness	Parties involved	Description
1	High stock value and tied capital	Supplier	All the instruments in consignment warehouses are owned by the supplier.
2	Contracts	Supplier and retailers	Contracts are not done or they are done verbally. The content of contracts is confusing and incomplete.
3	High costs and risks	Supplier	Supplier owns the instruments and incomplete contracts all the risk to the supplier.
4	Long storage times and lost products	Supplier, internal customers and retailers	Long and undefined storage times usually cause the loss of the products.

5	Unclear process	Supplier and internal customers	The process is unfinished and it is missing regularity
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As seen from Table 5, there were five weaknesses in the current warehousing process discovered from the current state analysis.

*Weakness 1* affects the supplier assets. There is a lot of capital tied up to the consignment warehouses and case company's stock value raises high.

*Weakness 2* relates to the contracts (or the lack of them). This weakness affects both, the supplier and retailers. Supplier does not have any control of their own products, and the retailer is confused if the supplier, for example, asks to make an inventory.

*Weakness 3* is a weakness for the supplier even when it was a strength for the customers. The supplier has to take all the risks for sending products, returning products or losing products. Current state analysis also revealed that if broken product is returned to the supplier, they have to hope that manufacturer gives a refund. Otherwise the supplier will take the loss. Customers do not take loss in any case.

*Weakness 4* points to the long storage times. When storage times are not set beforehand and the control of them is weak, a lot of products may lose or products are kept in warehouses longer than twelve months. After this, the supplier will not receive a refund for the products from the manufacturer. As a result, the retailers' and suppliers' relations may deteriorate if they have to argue about whose fault it was that the product was kept too long in the warehouse.

As seen from the surveys, on top of this list of weaknesses, the overall process is unclear to the supplier and internal customers. This might be because the lack of contracts and rules. This was summarized as *Weakness 5*.

### 3.6 Summary of the Key Challenges in the Current Consignment Warehousing Process

This section summarizes the finding of the current state analysis and refers to the previous subsections in which the findings were inspected. In the end of this section, three

major weaknesses are selected which will be tackled in the next sections. The weaknesses are summarized from the external customer's, the internal customer's and the supplier's point of view.

From *external customers'* perspective, almost all strengths described above affect hospitals and retailers. *External customers* saw the strengths for delivery times, satisfied end users, low costs and risks, three month testing period and product returning process. External customers have many strengths because they do not have any strict rules defined by the supplier or proper contracts for the consignment warehousing process.

From *the internal customers'* perspective, the internal customers strengths were delivery times, satisfied end users, product tracking and product returning. Weaknesses were long storage times, lost products and unclear process. All these weaknesses might be solved if there were defined a clear process with strict rules.

From *the supplier's'* perspective, the supplier's only strengths are product tracking, invoicing and direct deliveries. The supplier is involved in every weakness that was presented in Table 5. The supplier is affected most of all about the high stock value, current contracts, high costs and risks, long storage times, lost products and the unclear process. Long and undefined storage times usually cause the loss of the products. When all the weaknesses are examined in more detail, can be seen that few of them relate to each other. Examining these findings can improve also other weaknesses. On top of that, the process needs to be clear for the supplier and internal customers. It needs regularity and rules to be followed.

*Supply Chain Management* is an essential element to operational efficiency. The case company needs better supply chain management to be able to improve their processes related to consignment warehousing. Better supply chain management might have help on all weaknesses as it is related to all processes in consignment warehousing.

Many of the findings relate to *storages*. Warehousing is one of the key issues in supply chain. The storage time should be determined in a way that the case company is able to send old items back to manufacturer in time and the products are not stored too long that they might get lost in the process. Not all parties involved in the supply chain are aware of how to store products and what responsibilities does warehousing include. Warehousing will be evaluated and looked into in the next sections.

Finally, *service level agreement* or the lack of it is the weakness that affects for all the other weaknesses. In the next section will be examined how service level agreements are formed, why they are important and who should make the service level agreements.

In this study, out of many challenges, the unclear supply chain management, warehousing and service level agreement were selected as the challenges that will be further tackled below, for improving the current consignment warehousing process. These weaknesses were selected because by improving them is possible to improve all the other weaknesses related to consignment warehousing process.

## 4 Existing knowledge for Improving Consignment Warehousing Process

This section discusses best practice for doing warehousing and consignment warehousing processes, and finds models and tools to propose improvement for the case company's consignment warehousing process.

### 4.1 Supply Chain Management

Supply chain is a collection of activities, which are repeated several times throughout the channel through which construction materials are converted into finished products and consumer value is added (Ballou 2004: 7-11). Plants, material sources, and selling points are not usually located at the same places and the channel represents a sequence of manufacturing steps, logistic activities recur many times before a product arrives in the marketplace. (Ballou 2004: 7-11)

Cuthbersson (2011) defines Supply chain management as the management of a network of interconnected business involved in the ultimate provision of product and service packages required by end customers (Cetinkaya, Cuthbertson, Ewer, Klaas-wissing, Piotrowicz & Tyssen 2011: 3-4) Supply chain management includes necessary movement and storage of raw materials, work-in-process inventory, and finished goods from the point-of-origin to the point-of-consumption (Cetinkaya, Cuthbertson, Ewer, Klaas-wissing, Piotrowicz & Tyssen 2011: 3-4). Supply chain management is increasingly being recognized as the rallying point of key business processes across the supply chain (Croxtton, García-Dastugue & Lambert 2001). Effective supply chain management requires a supplier to meet the customer requirements in terms for order fulfillment (Croxtton, García-Dastugue & Lambert 2001: 3-4). Effective order fulfillment might require that logistics, manufacturing, marketing and sales work together and are integrated to each other.

According to Cuthbersson (2011), the core of supply chain management can be divided into eight different key processes. These key processes are customer relationship management, customer service management, demand management, order fulfillment, manufacturing flow management, procurement, product development and commercialization and returns. (Croxtton, García-Dastugue & Lambert 2001). Functions in these processes stay inside a functional silo, but an entire process will not be contained within one function, as seen in Figure 8 (Croxtton, García-Dastugue & Lambert 2001).

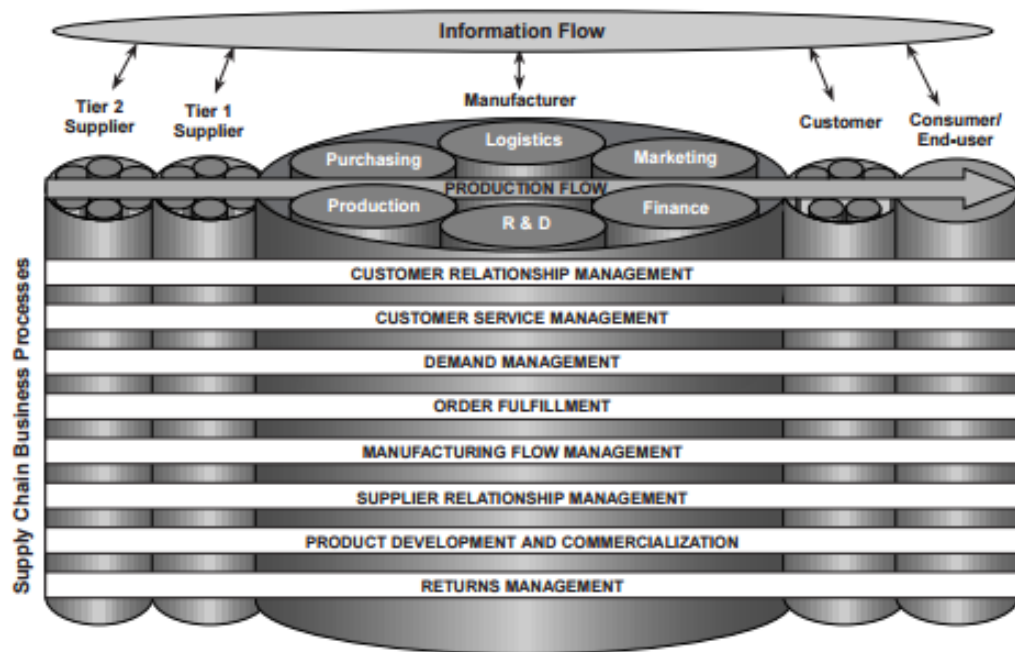


Figure 8. Integrating and managing business processes across the supply chain (Croxtton, García-Dastugue & Lambert 2001).

The eight key business processes, shown in Figure 8, cut throughout the whole supply chain and across firms and functional silos within companies. The silos contain Marketing, Research and Development, Finance, Production, Purchasing and Logistics.

Two important business process in the context of this study are Customer Relationship Management and Customer service. The Customer relationship management process provides the layout for how the relationship with the customer is formed and maintained. Key customers need to be identified by the company's management and customer groups should be targeted as part of the firm's business mission. Customer teams make product and service agreements to meet the needs of key accounts and segments of other customers. Teams work with key accounts to improve processes, and eliminate demand variability and non-value-added parts of the process. All the activities can be measured for example with key performance indicators. In addition, the customer service management process is the company's face to the customer. It provides simple information to the customer, such as product availability, shipping dates and order status. Real-time information may be provided to the customer through interfaces with the company's processes or functions, such as manufacturing and logistics. (Croxtton, García-Dastugue & Lambert 2001).

The most important part of supply chain management for the case company is *customer relationship management*. In order to have working customer relationship management, case company should identify their key customers. The relationship between the case company and their key customers should be in such a level, that they are able to improve processes together. In order to keep the relationships in a good level, the case company should determine working key performance indicators and use them to keep high customer service level.

The next sub-section will be discussing about warehousing, which is one of the most important support activities of supply chains.

#### 4.2 Warehousing as Critical Part of Supply Chain

In this section will be discussed about warehousing. First, will be introduced what are warehouses and why they are needed. Second, will be discussed about the warehousing process. Finally, will be discussed about consignment warehousing.

A warehouse is a core point in a logistics network where goods are temporarily stored or rerouted to a different channel in the network (DHL 2008). Different warehouse types are *supply*, *handling* and *distribution* warehouses. There also might be mixes of these types. Since warehouses are used, for example by importers, exporters, manufacturers, resellers and suppliers, there are many other types of warehouses, for example, display of goods for sale, packing warehouses, distributions centres and consignment warehouses. Warehousing has as important role for the logistical strategies as transportations. Warehousing is a support function for supply chains (Karhunen, Pouri & Santala 2004: 302-304). Packing of the products, shipping and creating the transportation documents as well as receiving products and inspecting the shipments attach transportation physically to warehousing.

In business, warehouses are needed to secure customer services and production activities as far as possible. The warehouses that support company's activities are, for example, raw material and accessory stores, intermediate storage, spare part stocks or waste material inventories. Supply chains features such as large production batch sizes and bottlenecks caused by a lack of capacity, and poorly functioning production control entail



securing stocks, which companies can try to reduce the by developing internal processes. (Karhunen, Pouri & Santala 2004: 302-304)

The warehouses that support customer services in business are, for example, company's product stocks and shop storages. Product stocks form or are necessary, when production runs larger than the current customer demand and the transfer of stocks entirely to other companies, such as wholesales, is not possible. Sometimes it is also necessary to manufacture products in advance in storage for the sales seasons. When customer needs product instantly, product stocks are convenient. Shop storages are needed because the number of products profitably processed, is generally greater than current need for the products. The items that are running out of the shelves, are needed quickly securing the quality of customer service. When products acquisition time is long, and sales forecasting difficult, it is good to keep shop storages. (Karhunen, Pouri & Santala 2004: 302-304)

The consignment warehouses that the case company offers are considered as shop storages. The hearing aid instruments in consignment warehouses are needed instantly by the end user.

#### 4.2.1 Safety Stocking

A warehouse may provide a central location for receiving, storing and distributing products. Once it is time to forward items, each order is retrieved, grouped, packed and checked for completeness before being dispatched to their new location. Warehousing may increase the utility value of goods by providing a means to have the correct products available at the right place at the right time. Order assembly, order consolidation, mixing products or cross-docking can be done in the warehouse and add value to the overall logistics system. As such, warehouses are able to serve as part of contingency plan to ensure that orders are fulfilled and it is done on time. *Safety stocking*, allows business to maintain a predetermined number of items in inventory. This way the risk of running out of stock is minimized. (Lohery 2016)

Figure Table 9 shows k-factors in different service-levels. With the help of k-factor can be calculated safety stocks for products.

K-factor			
80 %	0,8416	91 %	1,3408
81 %	0,8779	92 %	1,4051
82 %	0,9154	93 %	1,4758
83 %	0,9542	94 %	1,5548
84 %	0,9945	95 %	1,6449
85 %	1,0364	96 %	1,7507
86 %	1,0803	97 %	1,8808
87 %	1,1264	98 %	2,0537
88 %	1,1750	99 %	2,3263
89 %	1,2265	99,5 %	2,5758
90 %	1,2816	99,7 %	2,7478
		99,9 %	3,0902

Figure Table 9. K-factor in different service-levels (Robinson 2013).

Safety stock can be calculated for every product. One way to calculate safety stock is by using formula  $V = k * H^{0.5}$ . Where V is the amount of safety stock, k is safety factor (the standard normal cumulative distributive function that can be seen in Figure 9) and H is the acquisition time consumption (which can be calculated by dividing the annual consumption with 12 months and multiplied this with acquisition time). For example in order to know safety stock for product that yearly consumption is 24 500 pcs, the wanted service level is 98% and acquisition time is 1.5 months. Formula for the acquisition time consumption is  $H = (24\ 500/12)*1.5 = 3063$  pcs. The formula for the safety stock is  $2.0537 * 3063^{0.5} = 114$  pcs. (Uitto 2016)

The optimal safety stock is important since warehousing is not free to the companies as the products in warehouses are already paid by the company. Products also tie up company's money, storage facilities cost, handling of the warehouse products costs and company always takes the risk that the value of the products may drop. In worst case scenario the value is zero and the product only causes disposal costs (Karhunen, Pouri & Santala 2004: 302-304). However the retail customers of the case company and hospitals want to determine their own safety stocks. For internal customers of the case company would benefit on calculating own safety stocks for each product they are storing in consignment warehouses.

#### 4.2.2 Warehousing Processes

Almost every warehouse contain key processes which can be seen in Figure 10. The objective of warehouse and warehousing processes is to provide backbone of product being stored, inspected, verified, and delivered from a company to the customer, ensuring the quality.

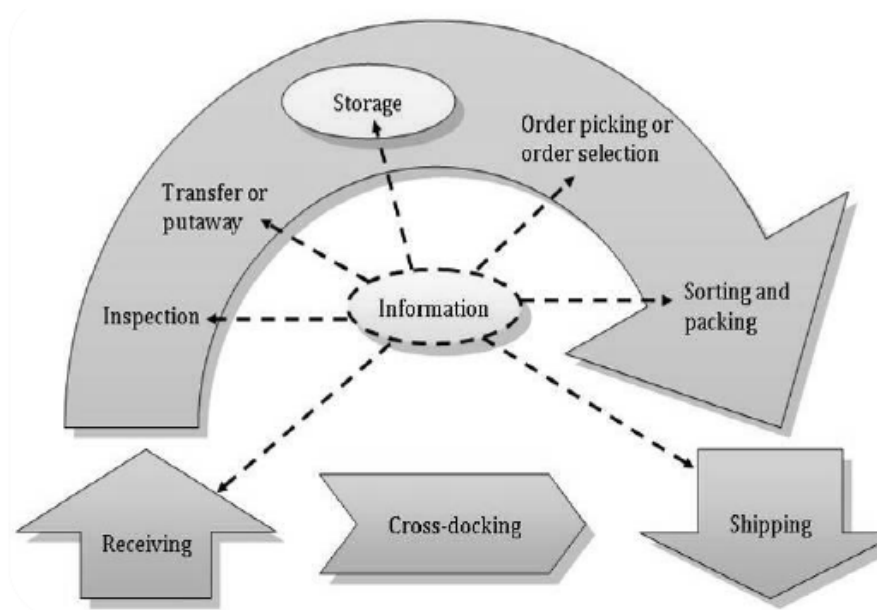


Figure 10. Typical Warehouse Process Flow (Puneet 2011).

As seen in Figure 10, *receiving the products* is usually the first process which starts warehousing. In this process needs to be inspected the products that have been received and take them to the correct spot. Reception of goods is an important partner for buyers, as it will find out if the supplier has delivered all the products or not. Also reception of goods is for its part responsible for flawless inventory accounting (Karhunen, Pouri & Santala 2004: 374-391). Receiving include tasks such as purchase order input into ERP, checking that delivery note matches with received products, checking the possible post-deliveries and inspecting the quality of products and packages. If the amount of received products does not match the delivery note, reception of the goods should contact the shipper (Karhunen, Pouri & Santala 2004: 374-391). The final stage is to put the received products into the shelves.

Among the receiving's, the returned products are usually the ones that causes a lot of extra work. Often the packages that are returned are received with incomplete documents. The documents usually do not explain, what have been returned and why. The

condition of returning products is often poor and the products are messed up in the package. When receiving returning products, must be clarified why the products are returned. After this the products should be found in the ERP. Then can be decided what to do with them. (Karhunen, Pouri & Santala 2004: 374-391)

Warehouse's cleanliness and order are the basis of high-quality operations. Everything should be in order in warehouse, products are properly placed in their own spots in shelves. In order to keep warehouses clean and in order they must be cleaned daily. Also everyone who is working in the warehouse, must take care of general cleanliness. If cleanliness and order is neglected all other activities in warehouse are disturbed and the efficiency of warehouse will drop. Also number of accidents may raise in messy warehouses (Karhunen, Pouri & Santala 2004: 374-391). If warehouse facilities are not in order and unclean, products can be easily lost or products can be damaged. To keep warehouse in order and clean, the cleaning should be started at the very beginning. Business practice suggests that, if shipments comes around the same time each day or week, they should be scheduled in the calendar. If there is no time to stock products in shelves, boxes can be lined up and opened each box separately in order to see what is in them. From there can be made mini stocking pile in each box. Products can be put closer to the correct spot on the warehouse floor and they can be stocked quickly later on (Fain 2014). The bestselling products should be put more accessible. They should be kept near the shipping area to avoid a scavenger hunt that leads to a major slowdown in order fulfilment. Stock layout should be analysed, for example, if items are constantly shipped together, smart idea would to place them together in the warehouse (Fain 2014).

Everyone, working in warehouse, should be informed about the goals and new products. They should know their own role and their speed and dedication on executing various warehouse processes can make or break company's bottom line. Employees might have some ideas on how to improve operations and processes as they spend the majority of their waking hours in the warehouse. (Fain 2014)

All warehousing processes should be documented and the warehouse team members should have continuously training. For example if the warehouse as some kind of technology used to managing and tracking inventory, it is likely that this technology will have ongoing updates. When the updates occur, should be spent some time educating the on the updates and tell them how it affects in their day-to day routines. (Fain 2014)

The internal and external customers of the case company should be informed by the case company of how to properly store the products of the case company. The case company should provide information, for example, about the overall consignment warehousing process, about the warehouse's cleanliness and how to document the warehousing processes.

Identification system and inventory control are one of the most important matters in order to keep warehouse clean and in order. In the next sections will be told more about these.

#### 4.2.3 Inventory Control

Inventory control is a tracking function that ensures through updating of inventory records that the correct product is in the correct place, is moved at the right time to the right place, and is in the right quantity. It places the inventory in the location that satisfies the inventory rotation criteria and provides the lowest storage-pick costs. (Mulcahy 1994: 12.1-12.29)

Inventory control should focus on two different areas: document (purchase-order) flow and stock keeping unit (physical product) flow. *Document flow* means that when the purchasing department issues the purchase order to the vendor, it sets in motion the inventory control activity. The warehouse receiving department receives copies of the purchase and they can prepare for the reception of the order. When the delivery arrives, the receiving employee compares the delivery's bill of lading, date of delivery and product quantities to the delivery date and product quantities on the purchase order. If the quantity matches order quantity, the purchasing department approves and adjusts inventory quantity to the ERP system. *In the product flow*, physical merchandise is received by or delivered to a distribution facility by railroad car, truck, container, pallet, carton or single item. In all types of distribution operations, the vendor receipt is an increase to inventory and the customer order quantity is a reduction to on-hand inventory. (Mulcahy 1994: 12.1-12.29)

Inventory is calculation of the products in stock and comparison of the results to the company's warehouse management system data. The most important task of inventory is to make sure that inventory accounting add up. There are many reasons why inventory accounting does not match. When items have any kind of transactions, the risk for mistakes raises. Items, that have transactions, inventory accounting mismatches will be at

highest point in six months. After this the mismatches do not keep growing as negative and positive mistakes cancel out each other. This is the reason why inventory must be done often enough (Mulcahy 1994: 12.1-12.29). One inventory per year is not enough and it should be done for every item at least as many times as what is the inventory turnover (Mulcahy 1994: 12.1-12.29). Inventory turnover can be calculated by dividing items yearly annual consumption with items average stock (Investopedia 2016). Inventory should also be done when items availability is zero, when there is not enough products to be picked or when lots of products have had to be scrapped (Mulcahy 1994: 12.1-12.29).

Since capital is tied up to warehouses as long as items are not sold, the faster the inventory changes, the faster money becomes available, the less capital will be tied up in stock and the inventory turnover gets faster (Opetushallitus 2010). Warehouse management system is helpful in following the inventories. *A warehouse management system* is a software application that may support the day-to-day operations in warehouse. WMS systems may be standalone applications or part of ERP systems. No matter how simple or complex the application is, the goal of warehouse management system is always the same – to provide management with the information it needs to efficiently control the movement of materials within a warehouse. (Rouse 2009)

Many companies have a lot of tied up capital invested in warehouses and consignment warehouses. This is why inventory control is one of the most important processes in warehouses. All the items, stored in warehouses or consignment warehouses, should be counted regularly and the items that are not moving should be either scrapped or returned. WMS or ERP systems may be helpful with inventory control processes.

#### 4.2.4 Consignment Warehousing

Consignment inventory is inventory that is in the possession of the customer, but is still owned by the supplier. The supplier places some of his inventory to the customer's possession and allows them to sell or consume directly from his stock. The key benefit is that customer does not have to tie up their capital in inventory (Piasecki 2012). Supplier's benefit is that the product or group of products that he believes will sell if he can get them in front of end-users. Consignment warehouses suits well for example new and unproven products, introduction of existing product lines into new sales channels or very expensive products where sales are questionable (Piasecki 2012). The key to all these examples

is uncertainty of demand from the customer's point of view, and a high degree of confidence in the sales potential from the supplier's point of view (Piasecki 2012).

There are agreement issues that must be taken into account. Parties involved need to clearly understand the terms of consignment warehousing. The time limit (items must be purchased or returned within specified period) needs to be placed. Customer and supplier must determine policies for freight and return. They also need to agree who is responsible for damage or loss while products are in customer's possession and what are the insurance implications. Consignment warehouse process also needs clear instructions how data is exchanged between parties involved and how miscellaneous transactions are processed (cycle count adjustments, customer returns, scrap). (Piasecki 2012)

A customer and the supplier may agree to a *consignment agreement*. This agreement is entered when *the consignor* (supplier) supplies goods to *the consignee* (the customer). The consignor retains ownership of the goods until they are sold, but they are in the consignee's possession (McKnight 2013). Writing a Consignment Agreement includes three parts. *The first part*, is to ensure that the contracts meets legal requirements. In this part, must be made sure that all parties are legally able to participate. The parties should exchange something of value, for example, the consignee is giving value by displaying and trying to sell the goods, in exchange for a cut of the profits from the sale. In this part must be also discussed about the terms of the contracts and determined if the contract needs to be written down. (Clinton 2015)

*The second part*, is thinking about what should be included in a consignment contract. This part should include, for example, the length of the consignment cycle, explanation of what will happen with any unsold items, the price of the items, payment options and rules of which party is responsible if the item is damaged or destroyed while at the store. *The third and the final part*, is writing the contract. The written document should include, the basic information, contract terms, enough details, clause describing how the contract will be terminated and signatures and date of the contract. (Clinton 2015)

The consignment warehousing processes needs clear instructions. The instructions should determine all policies for freight, warehouse and return. A consignment agreement would be effective method for this. The companies and its customers should also agree about the level of services. The next section will discuss about service level agreement.

### 4.3 Service Level Agreement

Service Level Agreement (SLA) is a negotiated agreement that is supposed to create a common understanding about services, priorities and responsibilities (Intrieri 2015). In logistics it is a contract between a logistics service provider and a customer that determines, usually in measurable terms, what services the logistics service provider will furnish (Robinson 2013). SLAs may include Key Performance Indicators (KPI) and with the help of these, customers can compare the logistics services provider. The KPIs can be, for example, IT agreements, inventory records accuracy, returned material authorization, continuous improvement, mutual inventory management or voice of the Customer (VOC) feedback (Robinson 2013).

SLA can also be thought of as a communication tool. As the value of an agreement is not just in the final product that is sold. The process of establishing an SLA helps to open up communications. An agreement between customer and supplier helps to avoid or alleviate disputes by providing a shared understanding of needs and priorities. If conflicts do occur, they can be resolved better prepared and with less quarreling. But a Service level agreement is not a dead-end document. The parties of the SLA review the agreement to assess service adequacy and negotiate adjustments on a predetermined frequency. An SLA ensures that the both parties use the same criteria to evaluate service quality. (Intrieri 2015)

In order for SLA to be effective, it must incorporate two sets of elements: service elements and management elements. *The service elements* define services by communicating. Elements include such causes as the services provided, conditions of service availability, service standards, such as the time window within which services will be provided (prime time and non-prime time might have different service levels, for example), the responsibilities of both parties, cost versus service trade-offs and escalation procedures. *Management elements* should include definitions of how service effectiveness will be tracked, reporting process, contents and frequency, how service-related disagreements will be resolved, an indemnification clause protecting the customer from third-party litigation resulting from service level breaches (this usually should be already covered in the contract), and a mechanism for updating the agreement as required. (Intrieri 2015)



#### 4.3.1 Establishing a Service Level Agreement

With the help of service level agreement, two parties may improve communications, manage expectations, clarify responsibilities and build the foundation for a win-win relationship. Charles Intrieri (2015) recommends following key steps shown in Figure 11, when establishing SLA.

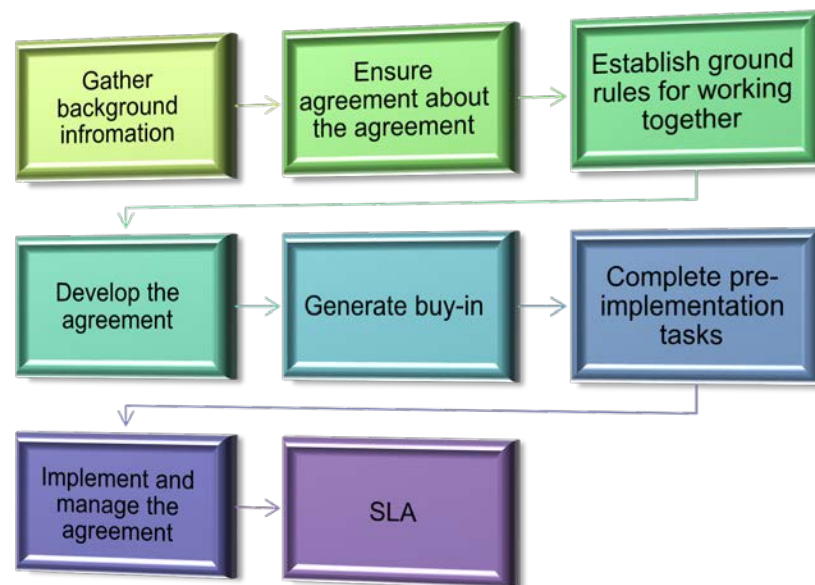


Figure 11. Key Steps in Establishing a Service Level Agreement.

As seen from Figure x, the first step is to gather background information. Both the customer and the service provider need to gathering information so that they both have a solid basis from which to negotiate. Customers should carefully review and clarify their service needs and priorities. Service providers should examine their service history and determine the level of service that they can realistically provide. In the next phase, customers and suppliers should make an agreement of an agreement. This means that the two parties should share a common view about the role of the SLA and what it can realistically accomplish. (Intrieri 2015)

In Figure 11, it is mentioned that customers and suppliers should establish ground rules for working together. Issues to be discussed should include the division of responsibility for development tasks, scheduling issues and constraints, and concerns regarding potential impediments. Parties can also agree about communication styles and presences.

At the next step, customers and suppliers develop the agreement. They create a structure for the SLA document and then discuss, debate, negotiate and try to reach agreement about the contents of the agreement. (Intrieri 2015)

Before implementing an SLA, all members of both parties who have a role in, or responsibility for, the success of the agreement should have an opportunity to review the draft, raise questions, and offer own ideas or suggestions. Generating buy-in improves the quality of the final document. In the next phase, pre-implementation tasks should be completed. These tasks might include, for example, developing tracking mechanisms, establishing reporting processes, developing procedures for carrying out stated responsibilities, communicating expectations to staff or providing pertinent training. (Intrieri 2015)

The final and most important phase is to implement and manage the agreement. This phase includes providing a point of contact for problems related to the agreement, maintaining ongoing contact with all the parties, conducting service reviews, coordinating and implementing possible modifications, and assessing and reporting on how all the parties can further enhance their relationships. (Intrieri 2015)

Companies should be able to determine all the services that they are able to offer to the customers. With the service level agreement companies might be able to improve communications with their customers. Effective communication between the companies and the customers might help in improving the consignment warehousing process.

#### 4.4 Conceptual Framework

The previous sections described the key elements related to this thesis. All the key elements were chosen because they are related to improving the consignment warehousing process. This section presents the summary of the existing knowledge and puts the information into a comprehensive frame to be used as a reference for improving the consignment warehousing process in the Case Company. Figure 12 presents *the Conceptual Framework* of this thesis.

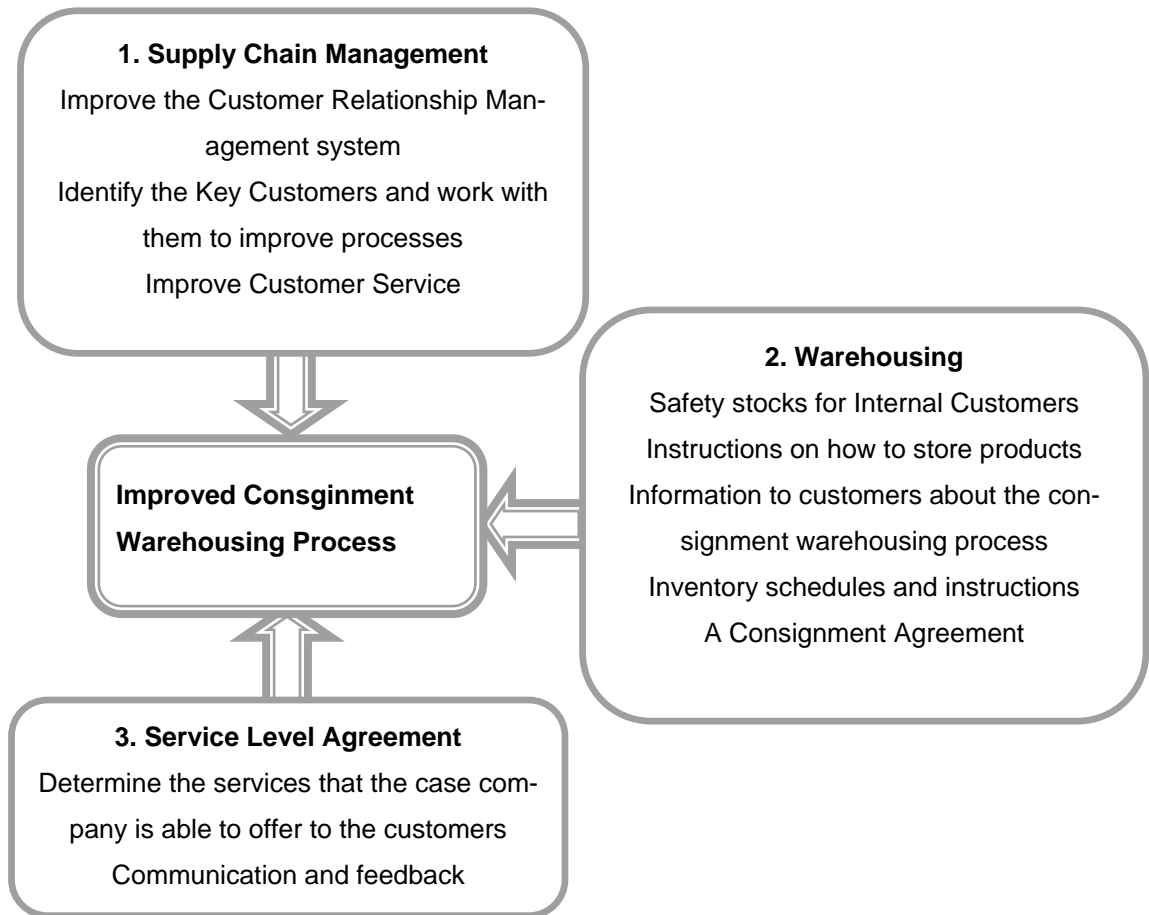


Figure 12. Conceptual framework for this study.

First, *Supply chain management* issues were the selected weakness of the case company. Supply chain management must be in such a level that the case company is able to manage their processes while customers keep satisfied. The key challenge with the key company is customer relationship management. This begins with identifying and working together with the key customers. The case company needs to develop the level of customer service if they want to keep customers satisfied.

Second, *Warehousing* is the most important weakness of the three selected weaknesses of the case company. The case company needs to set safety stocks for internal customers in order to reduce their stock value. The customers of the case company need to have instructions on how to store products properly and how does the consignment warehousing process work. Both, internal and external customers need to have regular inventory counts and the schedule for these should be defined by the case company. Without a consignment agreement with customers, the case company is not able to manage the rules and regulations that have been agreed with customers. The case company

needs to define a framework for a consignment agreement, which can be used when agreeing contracts with customers.

Finally, *Service level agreement* determines the services that the case company is able to provide for the customers. The case company needs to improve communication between customers and start asking feedback. Without feedback and communication, the case company is not able to know their service level and it is impossible to follow any kind of service level agreement.

Without proper supply chain management there will be issues with warehousing. Without service level agreements the case company is not able to receive feedback and without feedback from customers it is really hard to improve supply chain management or warehousing. Together these three form a basis for the improved consignment warehousing process.

## 5 Building Proposal for the Case Company

This section further explores the existing knowledge by continuing from the findings of the conceptual framework. The proposal is taken forward to the top management and in the next section, the proposal will be validated.

### 5.1 Overview of the Proposal Building Stage

With the help of the current state analysis, specific improvement areas were identified. By combining the information from the current state analysis and best practice and ideas from existing knowledge, this thesis presents the proposal for improving the consignment warehousing process of the case company.

Next section 5.2 will first introduce the results of the current state analysis. Afterward, it will remind of the relevant best practice and ideas from the existing knowledge. Finally, it will introduce the suggestions of the stakeholders and the author for improving the consignment warehousing process, based on the input mentioned above. Suggestions of the stakeholders and the author were collected in Data collection 2 stage.

### 5.2 Findings of Data Collection 2

As seen in Table 4 in section 3.4, the CSA revealed that for external customers (retailers and hospitals) there were a lot of strengths. The external customers saw delivery times, satisfied end users, low costs and risks, three month testing period and product returning process as strengths. The reason why external customers have recognized a lot of strengths in the consignment warehousing process of the case company might be because the external customers do not have any strict rules defined by the suppliers or proper contracts for the consignment warehousing process.

Based on the results of CSA, in the current consignment warehousing process, the supplier had most weaknesses of all the parties involved. The supplier is affected most of all by the high stock value, current service level agreements, high costs and risks, long storage times and lost products, and the unclear process.

Out of many challenges in the CSA, (a) the unclear supply chain management, (b) warehousing and (c) the lack of a service level agreement were selected as the key challenges that should be further tackled. These weaknesses were considered as related to all other weaknesses found in the CSA.

The relevant best practice from available knowledge discovered that (a) the supply chain management process needs to improve the customer relationship management system. The customer relationship management system can be improved with the help of the Key Customers by receiving valuable feedback and by improving customer service. For (b) warehousing, the case company would benefit on calculating own safety stocks for internal customers. External customers would need clear instructions on how to store products and information about the consignment warehousing process. One key thing for the external customers would be A Consignment Agreement, which would determine all the rules for consignment warehousing process. The supplier should determine the services that they are able to offer for both, internal, and external customers. The supplier needs to start communicating more with customers. As for (c) the lack of a service level agreement, it was impossible for customer to know about the services that the case company was able to offer. The customers of the case company did not even know much about the whole consignment warehousing process and this tells about the lack of service level agreement.

Based on the outcomes of the current state analysis and conceptual framework, the author and key stakeholders formed a workshop in which was defined key suggestions for improvements for the current consignment warehousing process of the case company (Data 2, F). The following Table 6 describes the improvements to *the consignment warehousing process* to fit into the purpose of the case company.

Table 6. Improvement suggestions by the key stakeholders and the author (Data 2, F).

	<b><i>Issue raised</i></b>	<b><i>Suggestions</i></b>
1	<b>Supply Chain Management issues</b>	<ul style="list-style-type: none"> <li>- Hospitals will not agree on all terms in contracts, that's why the case company can provide Code of Conducts that might be on the side of the agreement</li> <li>- Customer and supplier need to change contact details</li> </ul>
	Contracts with customers	

		<ul style="list-style-type: none"> <li>- Supplier must recognize key customers</li> <li>- Retailers need to accept contracts and they must proceed according to them</li> </ul>
2	<b>Warehousing issues</b>	<ul style="list-style-type: none"> <li>- Safety stocks are necessary to the case company and they need to be calculated for every product</li> <li>- Internal customers' need new process for warehousing including the safety stocks entered into ERP system</li> <li>- The instructions of what is a consignment warehouse and how to store products should be included in the code of conducts (hospitals) and to the contracts (retailers)</li> <li>- Supplier might send a Code of Conduct also with every shipment of products or the key points from Code of Conduct might be listed in a Shipping Note</li> <li>- The contracts and Code of Conduct must make clear what is the maximum time to store products and what are the consequences if products will not be returned in time</li> <li>- Inventory calculation must be done every six months</li> </ul>
	High costs and risks for supplier	
	Long storage times and lost products	
	High stock value and tied capital	
3	<b>Service Level Agreement</b>	<ul style="list-style-type: none"> <li>- The case company needs a statement of what is their current service level</li> <li>- The service level of the case company needs to be clarified through feedback from the customers</li> <li>- The feedback must be also given to the customer service department of the case company</li> </ul>
	Unclear consignment warehousing process for the customers and supplier	

		<ul style="list-style-type: none"> <li>- Only after the own level of customer service has been clarified, the case company is able to make Service Level Agreement with customers and follow their functions and level of service with KPI's</li> <li>- The case company must be more in contact with customers and must be more interested in customers' needs</li> </ul>
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The current issues and suggestions for improvement of the current consignment warehousing process were discussed in the workshop (Data2, F). The workshop came up with three major suggestions for improvements. The first suggestion was (a) to make the Code of Conduct for hospitals and contracts with retailers. The second suggestion was (b) to define a new consignment warehousing process for the internal customer which includes calculated safety stocks which are entered into the ERP system of the case company. Finally, (c) the Case Company should define their service level. The Service Level can be defined by receiving feedback from the customers. After the service level has been determined the case company should define how to serve customers better and which are the KPI's to be followed.

All the raised issues presented in Table 6 were located in different parts of the current consignment warehousing process. The first issues were located at the very beginning of the current consignment warehousing process. Making of the contracts has been a challenge for the case company and it should be improved. As the workshop (Data 2, F) and interviews revealed, it is not possible to make different contracts with hospitals than they are requesting in their tenders. However, it is possible to make a Code of Conduct to the hospitals and use them as guidelines of how to operate with the case company. With retailers, the case company needs to make clear contracts and agree about everything related to the consignment warehousing process.

For the internal customer, the case company needs to have a whole new consignment warehousing process. The case company needs to, with the help of the internal customer, set safety stocks for every product and make the warehouse monitoring more accurate and clearer.



For all, internal customers and external customers the case company needs to improve their service level. They need improvements in their customer service and how to follow the quality of it.

### 5.3 Proposal for Improvements to Consignment Warehousing Process

The following sub-sections will describe three suggestions that might improve the current consignment warehousing process.

#### 5.3.1 Code of Conducts and contracts for external customers (a)

The external customers have never made any kind of separate contracts about the consignment warehouses with the case company. Previous practice also shows that the Hospital Districts will not accept any changes to the contracts that they define in their tenders. Also, the current contracts with Hospital Districts are valid for several years and they cannot be changed during the period. However, the case company is able to provide a Code of Conduct to all different hospital in different Hospital Districts. These Code of Conducts does not bind the hospitals in any way, but those would give clear instructions to hospitals on what to do in different situations, and what are the rules in the contracts. The rules must be also introduced as all the employees from the hospital do not know what has been agreed in contracts. Figure 13 demonstrates what should be included in the Code of Conduct which is presented to hospitals.



Figure 13. The elements of the Code of Conduct presented to Hospitals.

As seen in Figure 13, the hospitals need to have general information about the consignment warehousing process. They need to understand what the process is and what the meaning of it is.

First, *the contact details* of the case company in Figure 13 means that the customers need to have contact details of the case company. If something goes wrong in the process or if hospitals just need help, they need to know who to contact.

Second, *the rules that were agreed in the contract* mean that they are agreed by both parties (the supplier and the customer) and they need to be followed by both. Sometimes the employees of the hospital do not know or do not remember on how to proceed in certain situations that were agreed in the contract with the case company. Few of the key agreements should be included in the Code of Conduct just for customer's information.

Thirdly, hospitals need *clear instructions* about ordering, warehousing, and returning of the products. They need to know, how to place an order, how to store the products and when and how is returning happened.

Fourthly, *the Shelf life and inventory calculation times* in Figure 13, mean that there must be determined a time that hospitals may keep the hearing aid instruments in the consignment warehouse. After this time is up, they should return the products to the case company. Also, mandatory inventory must be defined beforehand and it must be implemented regularly. When defining how often the inventory counting should be, the case company should consider that they can keep the instruments only 12 months. After 12 months the manufacturer will not give any refund for the instruments.

Fifthly, in Figure 13 is mentioned that hospitals should have *instructions on how to give feedback*. This is really important to the case company. As without any feedback, the case company does not know what is going well and which parts of the current consignment warehousing process needs to be improved. Feedback may be received for example through customer surveys or by contacting the hospitals directly.

Finally, the retailers and hospitals need *general information about the consignment warehousing process*. The hospitals and retailers need to know what the consignment warehousing process is and how does it work. This might be done, for example, by showing them a process map.

The retailers need to have clear contracts with the case company. The contracts should include all the points mentioned in Figure 13. In addition, the contract should include approval of the agreement. The approval can be done for example by sending the contract beforehand to the customer and making them clear that if the customer places an order, they will accept the contract.

The case company needs to determine the key customers from the retailers. If the case company has determined the key customers, the contracts can be made according to the customer level. Key customers who order a lot are able to give feedback and with them, it is possible to improve the supply chain and consignment warehousing process of the case company.

When external customers receive a shipment they could also receive the note that would present key points from the code of conduct or from the contract made with the case company. This way the customer does not have to remember all the details of the contract or the code of conduct.

The code of conducts and contracts with customers are important to the case company. They will improve the tracking and tracing of the products also the inventory control will be much easier and more accurate.

In the next section will be described on how to improve internal customers' consignment warehousing process.

#### 5.4 New Consignment Warehousing Process for Internal Customer

As mentioned in the CSA, the internal customer of the case company is storing all the hearing aid instruments in the consignment warehouse of the case company. These instruments are causing high stock value and they tie capital of the case company. At the moment, the consignment warehousing process with the case company and internal is very simple. As mentioned in the CSA, the instruments in internal customer's warehouse

are revised every two months and checked if there are instruments that have been stored longer than ten months. The reason why this revision is done only every two months is because this must be done manually at the moment. At the moment, there are no safety stocks or limits set to instruments, the one who makes the revision will have to check each instrument separately.

Based on the relevant best practice and suggestions from stakeholders, the new process map was suggested to the consignment warehousing process for the internal customers, Figure 14 below presents the new process map.

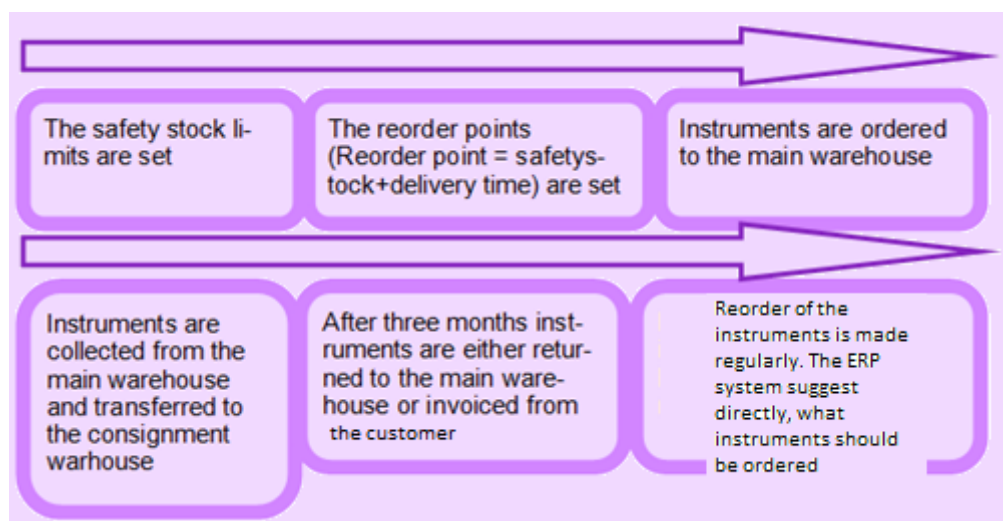


Figure 14. The suggestions to the consignment warehousing process for the internal customers.

As seen in Figure 14, the new process suggests a number of important changes to the current consignment warehousing process.

First, these changes start with setting limits to the safety stock. The limits can be set, for example, by using the formula presented in section 4.2.1. The limits should be set to all of the products. When setting the limits should be also considered that the manufacturer will not give any refund for products older than 12 months. The limits should not be too high and the inventory value would be good to keep as small as possible.

Secondly, the changes continue by setting the reorder points. The reorder points can be set with the help of safety stocks as presented in Figure 14.

Thirdly, the order can be made and instruments can be shipped to the main warehouse of the case company. The instruments are not yet transferred into the consignment warehouse.

Fourthly, when the instrument is fitted to the end user, they are transferred from the main warehouse to the consignment warehouse. The end user can test the instrument for three months before making a decision to keep it.

Fifthly, after the end user has tested for the instrument for three months, he or she should decide either to keep it or return it. If the end user decides to return the product it should be returned to the main warehouse and depending on how old the product is, it can be either returned to the manufacturer or it can be left in the stock. If the instrument has been owned by the supplier for nine months or longer, it should be sent back to the manufacturer. It should be returned because if it is fitted to the next end user after nine months and he or she will return it, the instrument will be 12 months old and the case company will not be able to get any refund from the manufacturer.

Finally, the reordering of the instruments should be made regularly. When the reorder is made through the ERP system, the employee who is making the order is able to see how many instruments are currently in the stock. The ERP system will also suggest on what instruments are needed and how many should be ordered.

Hearing aid instrument packages always have serial numbers and item numbers on them. As the serial numbers and item numbers are also entered into the case company's ERP, it should not be impossible to track the instruments from the ERP and make the revision using ERP. The current consignment statement list of items is presented in Figure 15. This list shows which items are in the current consignment warehouse of the internal customer.

## Consignment Items to be returned

Sales Date	Nimikkeen nro	Kuvaus	Jäljellä oleva määrä	Sarjanro	Eräpäivä
07-01-15	001-002-080-278	MOULD Micro 85	1	P11154290	07-01-16
07-01-15	001-002-080-278	MOULD Micro 85	1	P11154291	07-01-16
15-04-15	100688	ACTO PRO, RITE STG	1	28728518	15-04-16
15-04-15	100688	ACTO PRO, RITE STG	1	28728877	15-04-16
19-11-14	102-81-110-00	SUMO DM, BE	1	204268	19-11-15
23-10-14	103-23-010-00	AGIL PRO, BTE 13 CBE	1	24285478	23-10-15
23-10-14	103-23-010-00	AGIL PRO, BTE 13 CBE	1	24285477	23-10-15
23-10-14	103-23-010-00	AGIL PRO, BTE 13 CBE	1	27110738	23-10-15
23-10-14	103-23-011-00	AGIL PRO, BTE 13 STG	1	24406502	23-10-15
23-10-14	103-23-011-00	AGIL PRO, BTE 13 STG	1	24406501	23-10-15
23-10-14	103-23-012-00	AGIL PRO, BTE 13 SGR	1	16154782	23-10-15
23-10-14	103-23-012-00	AGIL PRO, BTE 13 SGR	1	15857148	23-10-15
23-10-14	103-23-013-00	AGIL PRO, BTE 13 CNB	1	24208582	23-10-15
23-10-14	103-23-013-00	AGIL PRO, BTE 13 CNB	1	24208593	23-10-15
23-10-14	103-38-301-00	HIT PRO, BTE 13 P STG	1	24378362	23-10-15
23-10-14	103-38-301-00	HIT PRO, BTE 13 P STG	1	24378217	23-10-15
23-10-14	103-38-010-00	VGPC, BTE CBE VIGO PRO CONNECT	1	25198038	23-10-15
23-10-14	103-38-501-00	VGPC, BTE 13 STG VIGO PRO CONNECT	1	26195838	23-10-15
23-10-14	103-42-201-00	CHILI SP7, BTE 13 SP STG	1	24403589	23-10-15
23-10-14	103-42-203-00	CHILI SP7, BTE 13 SP CNB	1	24413518	23-10-15
23-10-14	104-23-102-00	AGIL PRO, MINI RITE SGR	1	25030790	23-10-15
23-10-14	104-23-103-00	AGIL PRO, MINI RITE CNB	1	26188508	23-10-15
23-10-14	104-23-103-00	AGIL PRO, MINI RITE CNB	1	26177458	23-10-15
23-10-14	104-23-103-00	AGIL PRO, MINI RITE CNB	1	24482767	23-10-15
23-10-14	104-23-103-00	AGIL PRO, MINI RITE CNB	1	24483391	23-10-15
04-11-14	104-23-106-00	AGIL PRO, MINI RITE DBL	1	23875885	04-11-15
04-11-14	104-23-106-00	AGIL PRO, MINI RITE DBL	1	22985385	04-11-15
23-10-14	104-23-401-00	AGIL PRO, RITE STG	1	24451930	23-10-15
23-10-14	104-23-402-00	AGIL PRO, RITE SGR	1	17423232	23-10-15
23-10-14	104-23-402-00	AGIL PRO, RITE SGR	1	17753718	23-10-15
23-10-14	104-23-402-00	AGIL PRO, RITE SGR	1	24047453	23-10-15
28-10-14	104-38-101-00	VGPC, RITE STG VIGO PRO CONNECT	1	2696085	28-10-15
23-10-14	104-38-102-00	VGPC, RITE SGR VIGO PRO CONNECT	1	24394432	23-10-15
23-10-14	104-38-300-00	VGPC, RITE P CBE VIGO PRO CONNECT	1	23000797	23-10-15
23-10-14	104-38-300-00	VGPC, RITE P CBE VIGO PRO CONNECT	1	22723271	23-10-15

Figure 15. Current Internal customers Consignment Statement.

As seen in Figure 15, the list is long and it have a lot of similar hearing aid instruments in it. Figure 15 is just one page of the list. When the screenshot was taken, the list was 25 similar pages long. All the instruments has to be counted separately and the serial numbers must match the instruments in the warehouse. The counting takes a lot of time and there are a lot of room for mistakes. The list should be easier to go through and there needs to be some changes.

The suggestion which came up in the workshop was to transfer all hearing aid instruments from Consignment Warehouse to *Main Warehouse*. If the instruments are in Main Warehouse, they are not listed separately with serial numbers, but they are listed with item numbers. If the instruments are listed by item numbers the list would be much shorter and the instruments would not have to be counted separately by using serial numbers.

Figure 16 demonstrates how the instruments would be seen in the main warehouse.

No.	Description	Inventory	Base Unit of Measure	Unit Cost	Shelf No.
103-23-010-00	AGIL PRO, BTE 13 CBE		3 KPL		B4
103-23-011-00	AGIL PRO, BTE 13 STG		6 KPL		B4
103-23-012-00	AGIL PRO, BTE 13 SGR		5 KPL		B4
103-23-013-00	AGIL PRO, BTE 13 CNB		2 KPL		B4
103-23-101-00	AGIL, BTE 13 STG		1 KPL		
103-23-102-00	AGIL, BTE 13 SGR		1 KPL		
103-23-301-00	AGIL PRO, BTE 13 P STG		5 KPL		B4
103-23-302-00	AGIL PRO, BTE 13 P SGR		2 KPL		B4
103-23-401-00	AGIL, BTE 13 P STG		2 KPL		
103-23-402-00	AGIL, BTE 13 P SGR		1 KPL		
103-34-021-00	EPOQ XW, BTE STG		1 KPL		
103-34-210-00	EPOQ V, BTE CBE		1 KPL		
103-36-300-00	HIT PRO, BTE 13 P CBE		1 KPL		C1
103-36-301-00	HIT PRO, BTE 13 P STG		2 KPL		C1
103-38-010-00	VGPC, BTE CBE VIGO PRO CONNECT		1 KPL		C2
103-38-012-00	VGPC, BTE SGR VIGO PRO CONNECT		1 KPL		
103-38-300-00	VGPC, BTE 13 P CBE VIGO PRO CONNECT		10 KPL		C1
103-38-301-00	VGPC, BTE 13 P STG VIGO PRO CONNECT		13 KPL		C1
103-38-302-00	VGPC, BTE 13 P SGR VIGO PRO CONNECT		7 KPL		C1
103-38-303-00	VGPC, BTE 13 P CNB VIGO PRO CONNECT		5 KPL		C1
103-38-309-00	VGPC, BTE 13 P SIL VIGO PRO CONNECT		9 KPL		
103-38-500-00	VGPC, BTE 13 CBE VIGO PRO CONNECT		1 KPL		C1
103-38-501-00	VGPC, BTE 13 STG VIGO PRO CONNECT		1 KPL		C1
103-38-502-00	VGPC, BTE 13 SGR VIGO PRO CONNECT		1 KPL		C1
103-38-601-00	VGPC, BTE 13 STG VIGO CONNECT		1 KPL		
103-42-200-00	CHILLI SP7, BTE 13 SP CBE		8 KPL		C1
103-42-201-00	CHILLI SP7, BTE 13 SP STG		4 KPL		C1
103-42-202-00	CHILLI SP7, BTE 13 SP SGR		14 KPL		C1
103-42-203-00	CHILLI SP7, BTE 13 SP CNB		3 KPL		C1
103-42-300-00	CHILLI SP5, BTE 13 SP CBE		1 KPL		
103-42-301-00	CHILLI SP5, BTE 13 SP STG		2 KPL		
103-42-302-00	CHILLI SP5, BTE 13 SP SGR		2 KPL		
104-23-100-00	AGIL PRO, MINI RITE CBE		6 KPL		B4
104-23-102-00	AGIL PRO, MINI RITE SGR		2 KPL		B4
104-23-103-00	AGIL PRO, MINI RITE CNB		4 KPL		B4
104-23-106-00	AGIL PRO, MINI RITE DBL		4 KPL		
104-23-400-00	AGIL PRO, RITE CBE		3 KPL		B4
104-23-401-00	AGIL PRO, RITE STG		1 KPL		B4
104-23-402-00	AGIL PRO, RITE SGR		4 KPL		B4
104-38-100-00	VGPC, RITE CBE VIGO PRO CONNECT		3 KPL		C1
104-38-101-00	VGPC, RITE STG VIGO PRO CONNECT		2 KPL		C1
104-38-102-00	VGPC, RITE SGR VIGO PRO CONNECT		2 KPL		C1
104-38-103-00	VGPC, RITE CNB VIGO PRO CONNECT		2 KPL		C1
104-38-300-00	VGPC, RITE P CBE VIGO PRO CONNECT		8 KPL		C1

Figure 16. Main warehouse inventory statement.

As seen in Figure 16, the serial numbers are not seen and the items are listed by item numbers. This way the items are much easier and faster to count. Also, the main warehouse gives a possibility to use all kind of filters when making a list of the items. Filters can be, for example, unit cost, shelf number (where the current item is located), item type or unit price.

One of the biggest benefits of the main warehouse is that there can be set safety stocks and re-order points. This means that, for example, a product has a safety stock entered as three. When the product is running out and there is only three or fewer products left, the orders handler just have to make reorder and the ERP will automatically tell which products are running out and which needs to be reordered. By using these safety stocks, the case company does not have to do a manual calculation.

In the improved consignment warehousing process, the safety stocks can be set by using excel sheet which can be run into the ERP system of the case company, and they are

set easily. The excel sheet must include, the item number of the product, reorder limit and information if the product is a high runner or slow runner. If the product is a high runner, the order will be handled quickly and the delivery will be faster than if the product was a slow runner.

Safety stocks should be set to all the products. They can be calculated by using formula presented in the Thesis section 4.2.1 Safety Stocking. With the help of safety stocks, the case company can also set reorder points. Reorder points must be set in a way that the stocks never run out of products. This means that the case company must consider the safety stock limit and the delivery time. An easy formula for reorder point is  $R = S + D$ , where R is reorder point, S is safety stock and D is delivery time.

From main warehouse, it is not possible to allocate hearing aids to the end user. As mentioned in the CSA the end user needs to have three month testing period for the hearing aid instrument before the case company can send an invoice to the customer or to the hospital (hospital will be invoiced if the customer is outsourced to the case company from the hospital). If the hearing aid instrument is not allocated it is impossible to send an invoice to the correct end user or hospital. The hearing aid instrument needs to be moved back from the main warehouse to the consignment warehouse. This can be done when the employee is collecting the hearing aid instrument from the warehouse.

The employee, who is fitting the hearing aid instrument to the end user, will collect the hearing aid instrument from the warehouse. When the employee takes the hearing aid instrument from the shelf he or she will barcode Scanner to get the item number and serial number to the ERP system. The transfer from the main warehouse to the consignment warehouse will be made at the same time as the item is collected from the warehouse. This makes it possible to allocate the hearing aid instrument to the end user immediately.

Summing up, the processed improvement to the current consignment warehousing process will make the process more accurate than the current consignment warehousing process is now. Safety stocks and reorder points makes it possible to follow inventories through the ERP of the case company. The employees do not have to make manual calculations and the stock value can be kept as low as possible. The storage times are easier to follow. Also, as the instruments are no longer calculated by looking up for the



correct serial numbers, but they are calculated comparing the item number and the availability of the product, inventory calculation is easier and faster to do.

In the next section will be described on how to define the service level of the case company and how to follow up the service level.

## 5.5 Defining and Following the Service Level of the Case Company

The quality of service is important to the case company if they want to keep customers satisfied. The case company first need to determine what is their level of service and what kind of services they are able to offer to the customers. As mentioned in section 4.3, the Service Level Agreement is a negotiated agreement that is supposed to create a common understanding about services, priorities, and responsibilities.

The recommendation to the case company is to define and follow the service level of the company. The case company might be able to follow up, what kind of services they offer and what is their level and quality of the services.

SLAs may include Key Performance Indicators (KPIs) and with the help of KPIs customer can compare the service providers. SLA can be also used as a communication tool. The process of establishing an SLA helps to open up communications.

The key in determining the current service level of the case company is to communicate with the customers and receive feedback from them. This feedback can be received, for example, by arranging customer surveys or just by being in contact with customers and ask them how is the case company operating and what should be improved.

It is impossible to improve the consignment warehousing process without the help of the customers. The process cannot just be improved to help the supplier, it must be improved in order to help all the parties involved in the consignment warehousing process. This is why customer's feedback is one of the most important things in improving the consignment warehousing process.

## 6 Testing of the Proposal

This section discusses the findings and results of the improved consignment warehousing process testing. It analyzes the results which form the thesis research, builds the final proposal for improving the consignment warehousing process and establishes an action plan for suggestions for improving the consignment warehousing process of the case company.

### 6.1 Overview of Testing Stage

The suggestions for the improved consignment warehousing process described in section 5 were tested by the author and the process stakeholders from the case company. The author made three different tests. The first test was implementing a consignment warehousing contract to the external customer of the case company. The second test was to test the improved consignment warehousing process with the internal customer. The final test was to arrange a customer satisfaction questionnaire for the external customers of the case company.

There are no validation part with the stakeholders in this thesis. The stakeholders were aware of the tests and they also helped with the tests. The stakeholders were involved in the workshop and they helped to plan the tests. Because of the fact that they were so much involved in the test, the author did not see necessary to make validation after the testing.

Another customer survey (Data 3, H) was made in the testing section. The customer survey was made because it was supposed to find out what is the current service level of the case company and what areas should the case company develop.

Results from the testing stage are discussed below.

### 6.2 Testing of the Suggested Improvements

All the testing was done by the author with the help of the stakeholders and the testing results were discussed in a one-hour meeting with the stakeholders of the case company. The results are summarized in Table 7 below.

Table 7. Findings of the improvements from the consignment warehousing testing.

	<b><i>What was tested</i></b>	<b><i>Implementation</i></b>
1	<b>Contract with a retailer</b>	<ul style="list-style-type: none"> <li>- Contract was sent to the customer of the case company before the customer had made any orders</li> <li>- In the contract was mentioned that when customer makes the first order they accept the terms of the contract</li> </ul>
2	<b>Improved consignment warehousing process for internal customer</b>	<ul style="list-style-type: none"> <li>- The improved consignment warehousing process was tested in Helsinki in the main warehouse of the case company</li> <li>- Testing included: calculating the reorder point, making of a reorder, collecting the instrument from the warehouse and testing the functionality of the reorder point</li> <li>- A Consignment Agreement with external customers</li> </ul>
3	<b>Customer satisfaction survey</b>	<ul style="list-style-type: none"> <li>- Customer satisfaction survey was sent to the hearing care professionals across Finland</li> <li>- The survey was called The Brand Research survey</li> <li>- The strengths and weaknesses were analyzed after the survey.</li> </ul>

As seen in Table 7, the first test was to test sending a contract to a new retailer of the case company. The contract included (1) contact details of the case company, (2) clear instructions about ordering, warehousing and returning of the products, (3) pre-determined time of how long the products can be stored, (4) information about inventory calculation, and (5) general information about the consignment warehousing process.

During *the test-sending of a contract to a new retailer*, the retailer received the contract before they had placed an order. In the contract, it was mentioned that the customer will accept the contract as soon as they place the first order. The customer has made the

first order and the contract between the external customer and the case company is valid. The case company has not received any feedback from the customer about the contract. However for both, to the case company and to the customer, the contract was easily made and as they both have now a copy of the contract, they are able to follow it. The consignment warehousing process starts by making the contract between the customer and the case company. Now when the contract has been made, the whole process is improved and there should not be any lack of clarity between the case company and the retailer.

The second test in Table 7 was to test *the improved consignment warehousing process for the internal customer*. The test was done in Helsinki in the main warehouse of the case company. The test started by calculating safety stocks and reorder points for a hearing aid instruments that were in consignment warehouse. The instrument was transferred from the consignment warehouse to the main warehouse. When the instruments were in the main warehouse, the author tested how to implement a reorder. The reorder was done through the ERP system of the case company. The ERP showed how many instruments must be ordered and the instruments were ordered easily. When the order arrived from the manufacturer, the instruments were placed directly into the main warehouse. The author also tested how to transfer the ordered instruments from the main warehouse to the consignment warehouse with the help of the barcode reader.

The second test was a success. After the reorder points were set, the case company would have been able to reduce the stock from 733 instruments to 359 instruments. This means that the inventory value of the case company would have been reduced by 49%. It was a lot easier to look up how many instruments are in the inventory and how many instruments should be ordered. The author saved more than one hour of time when he made inventory calculation. The inventory calculation was made by calculating the using item numbers and calculating same item numbers together instead of using serial numbers and calculating all the items separately. Reordering with the improved model was a lot faster than making a consignment order for all the instruments separately. With reorder, the ERP system directly suggest what hearing aid instruments should be ordered and how many. This saved about half an hour of time when making an order.

The second test showed that supplier does not have to tie up capital as much as earlier to the internal customer warehouse. The stock does not have to be kept as high as it was in the CSA. The ERP system and using of the reorder function makes it easier to

follow the warehouse inventories and consignment warehouses are only used for the hearing aid instruments that are tested by the end users. When the hearing aid instruments are tested by the end user, there are only two options. Either they are returned to the main warehouse, or the case company will send an invoice to the end user. The consignment warehouse value will as low as possible and the high costs and risks of the supplier are reduced. Also, the tracking of the products will be much easier as the consignment warehouse only has hearing aid instruments that are already allocated to the customers. The second test showed that there were a lot of improvements to the consignment warehousing process. The improvements affected to the inventory control and to the ordering system.

The third test was to implement a customer satisfaction survey. It was called *the Brand Research Survey* (see Appendix 5) which was made after the CSA. This was anonymous customer survey which included questions about the hearing aid suppliers in Finland. The survey participants were the hearing care professionals across Finland. The survey was sent to 217 persons and altogether 31 of them answered the survey, which make the response rate of 14%. The main point of the branch research survey was to find out how does the case company stack up in comparison to the other suppliers in Finland.

Based on the results of the survey, the overall rank of the case company was not very satisfying. The case company was placed in the fourth place out of seven suppliers in the grading of the suppliers. The grading was done by asking overall grading from the customers. With the help of the Brand Research Survey, the case company identified the direction, and the strengths and weaknesses of the case company related to. The strengths and weaknesses of the case company identified from the Brand survey are presented in Table 8.

Table 8. The Strengths and weaknesses of the case company in relation to the other hearing aid instruments suppliers in Finland (based on the results of The Brand Research Survey, April 2016).

<b>The Brand Research Survey</b>	
<b>Strengths</b>	<b>Weaknesses</b>
The quality of the hearing aid instruments is good.	The communication and customer service are not working properly
The fitting software is easy to use and logical	Customers do not receive enough information about customer training
The quality of repairs and services is good	The trainers of the case company do not help quickly enough

As seen in Table 8 and from Appendix 5, the survey did not include any questions about the consignment warehousing process. However, the survey gives feedback about the customer service level of the case company. The feedback is the only way to know how the customer is served and the quality of customer service that the case company is providing. The case company should make more of the similar kind of customer surveys and questionnaires. When the case company makes the customer surveys and questionnaires regularly the case company will receive valuable information about what parts of processes or services have improved and what parts should be improved.

After the service level of the customer service has been clarified, the case company will be able to make a Service Level Agreement with customers. After the SLA is made, it should be followed by pre-determined KPIs by the case company. SLA might include, for example, the list of services that the case company is able to offer, information on how to handle problem situations and precise contact details of the case company.

The customer service team, the sales team and the trainer's team should be more in contact with customers if they want to maintain customer relationships and if they want to know in which level their quality of customer service is. Customer satisfaction surveys should be arranged regularly and the KPIs should be followed by the case company.

### 6.3 Final Proposal

The final proposal for the improved consignment warehousing processes is based on Data 2 results which were presented in Table 6. The section 6.1 was used to evaluate which of the suggestions presented in Table 6 would work for the case company. The final proposal for the case company suggests the next steps that the case company should do.

The study suggests that for the issues with *supply chain management*, the case company should start making contracts and/or code of conducts with the external customers. As mentioned earlier in the thesis, the hospitals will not accept any written contract for the consignment warehousing processes. However, the hospitals can receive a code of conduct that would include all the necessary information about the consignment warehousing process. This would make the process clear to the customer and to the supplier. The code of conduct should include the contact details of the case company, rules that have been agreed in the contract with hospitals, clear instructions about logistics services, shelf life and inventory calculation times, instructions on how to give feedback and general information about the consignment warehousing process.

Retailers should receive a similar contract as the code of conduct was to the hospitals. The test number one showed that the customer can agree on the contract by making the first order. The contract can be modified according to the customer level. The customer level should be determined by the case company and all the key customers should be recognized.

Both retailers and hospitals need to have clear instructions on how to perform an inventory calculation and when it should be performed. The instructions for inventory calculation can be filled in with the contracts or to the code of conducts.

Next, in relation to *the improvement of consignment warehousing process for the external customers*, warehousing issues are fixed by making contracts and code of conducts. One of the key issues in a contract or in a code of conduct is the Consignment Agreement. The warehouse issues of the internal customer need more input. The whole consignment warehousing process of the internal customer needs to be changed and improved. Internal customers need new ordering system, safety stocks and reorder points for the instruments, new inventory control system and internal training for the new process.

The final proposal for the case company is to set the *service quality levels and determine KPIs* that would help following the quality level. The case company needs to have customer surveys regularly, the employees who are involved with the customers need feedback about how they are managing with the customers and the case company need to do corrective measures if the service level quality is too low.

After the case company knows their levels of service quality and has determined their KPIs, the case company is able to make service level agreements with the customers. Customers will get more professional perspective about the case company, if the case company provides a list of services that they are able to offer. Also, customers might be more satisfied if they know that the case company is following their quality of services and continuously improving their services.

With the key suggestions that were presented in this section will help fixing the weaknesses found in the CSA and presented in Table 5.

The following section describes the list of recommendations for the case company of how to start improving the consignment warehousing process.

#### 6.4 Recommendations

This section suggests a list of recommendations for the case company, which will present how the consignment warehousing process can be improved. The list of recommendations can be followed step by step as it is written in a chronological order.

##### *A. Making contracts with retailers and providing code of conduct to the hospitals*

As seen in the consignment warehousing process map, the whole consignment warehousing process starts with a contract between a customer and the case company. However, the case company is not able to make their own contract with hospitals. This is why the case company needs to make a code of conduct to the hospitals. The code of conduct must include at least all the information mentioned in Figure 13.



The contract can be made with the retailers. The retailers need to have a clear contract which they are bound to and they have to according to the contract. The contract with retailers needs to be agreed by the retailer and the case company.

The contracts and code of conducts made with all the customers, but especially for the key customers. The key customers can be recognized by finding out which customers order a lot of hearing aid instruments. The contracts and code of conducts with the key customers are the most important ones and there cannot have anything unclear content in them. The case company should communicate with the key customers and ask how the current consignment warehouse process is working for them. If there are any improvements to be made, they must be agreed with the key customers.

*B. Implementing the improved consignment warehousing process for the internal customer*

The improved consignment warehousing process for the internal customer needs to be implemented for the case company. The implementation should start by defining and calculating the reorder points for every hearing aid instruments that are sold by the case company. After this is done, the current stock in consignment warehouse should be transferred into the main warehouse. The instruments should be transferred back to the consignment warehouse always when they are tested by the end user. If the end user decides to buy the hearing aid instrument, the instrument will be invoiced from the end user by the case company. If the end user decides to return the instrument, it must be transferred back from the consignment warehouse to the main warehouse.

The instruments must be easily collected from the main warehouse. The collection must be done by using barcode scanner which will help to transfer the hearing aid instruments from the main warehouse to the consignment warehouse.

The reorder can be and it should be done weekly. The ERP system of the case company makes the reordering easy. The reorder function of the ERP system suggests what instruments should be ordered and how many. The inventory of the case company's internal customer would keep up to date all the time and inventory calculation would be done always when the case company is reordering products.

For the external customers, the consignment warehouse inventory counting should be done every six months. If the inventory counting is done regularly and every six months, the risks of out of date products is a lot smaller and also there might not be that many lost products. All the instructions and information related to the consignment warehousing process must be entered into a Consignment Agreement. This agreement should be included in a contract made with retailers or in the code of conduct that is presented to the hospitals.

### *C. Service Level Agreement with the external customers*

As mentioned earlier in the thesis, the service level of the case company is not measured and both of the surveys showed that the current service level is not at a very high level.

In this step, the case company must determine their service levels. The case company must define how they are able to serve the customer throughout the whole consignment warehousing process. It is impossible to know if the consignment warehousing process is working properly or not, if the case company does not get any feedback from the customers. The only way to get feedback from the customers is to be in contact with customers and ask for the feedback.

The service level can be determined, for example, by making a wide survey for the key customers that were determined in the previous step. After the survey, the case company must determine the KPIs that will be followed. The survey must be done regularly and the KPIs must be followed continuously. With the help of the customers, the case company will know what services they are able to provide and what services would be good to offer. Also, the case company will get valuable information about the consignment warehousing process. The customers can give feedback, for example, about the storage times, inventory calculation times and methods, delivery success and about communication.

The feedback that is received from the customers needs to be shared with all the employees of the case company that is involved with the customers. All the employees involved in the consignment warehousing process might be able to present ideas and proposals of how to improve the process.

The next section of the thesis concludes the outcome of the thesis and presents the managerial implications and steps forward.

## 7 Discussion and Conclusions

This section presents and discusses the main conclusions for this thesis. The first part of the section presents the summary of the thesis. The second part discusses the practical implications of this thesis. Finally, in the third section, the outcome and objective of this thesis are evaluated.

### 7.1 Summary

This thesis focused on improving the consignment warehousing process of the case company. The starting point of the thesis was the business challenge that identified that the case company had consignment warehousing problems. The starting point was that the consignment warehousing was not profitable for the case company. The case company was suffering from large quantities of scrapped products, from a confusing process and from unhappy customers. The objective of this thesis was therefore to improve the current consignment warehousing process in the case company.

To reach this objective, Section 3, the current state analysis, analyzed and revealed the strengths and weaknesses of the current consignment warehousing process of the case company. The main weaknesses were identified as: (1) high stock value and tied capital for the supplier, (2) lack of contracts between the case company and the customers, (3) high costs and risks for the supplier, (4) long storage times and lost products, and (5) unclear consignment warehousing process. In the thesis, it was discovered that all the weaknesses were related to three major issues of the case company. First, the supply chain management had improvements to be made. The biggest issue in supply chain management was the unclear or missing contracts with customers. Secondly, the warehousing process was unclear for both internal and external customers. Finally, the service level of the case company was at an inappropriate level.

To search for possible solutions to these problems, Section 4 researched the best available knowledge related to supply chain management, warehousing and service level agreements. Section 4 gave valuable information for Sections 5 and 6 by merging the identified best practice into a conceptual framework for improving these problems in a proposal. For developing an improvement proposal, the author and the key stakeholders of the case company had a workshop. In the workshop, the author introduced the weaknesses of the current state analysis and the best available knowledge from Section 4.

The participants of the workshop planned together on how to proceed into the proposal building, Section 5 and Section 6, how to validate it.

The author proposed that the case company should start making contracts or code of conducts with customers, the internal customer should change completely their consignment warehousing process and the case company should start listening to the customers and taking feedback from them.

In Section 6, the Final proposal and a list of recommendations were introduced for the case company. The list of recommendations was formulated by the author for the case company and included three steps that could be followed in a chronological order. The first step was to make contracts with retailers and code of conducts for the hospitals. The second step was to improve the consignment warehousing process for the internal customer. The second step also included more information about warehousing which should be included in the contracts with retailers and to the code of conducts which are sent to the hospitals. The final step was to improve the service level of the case company. This was one of the key steps as the consignment warehousing process cannot be improved without the help of the customers. The gap in communication between the case company and the external customers is not tolerable.

## 7.2 Practical Implications

The outcome of this study is to improve the consignment warehousing process in the case company. The key improvements related to supply chain management, warehousing and service level agreements. If the suggestions of the thesis will be implemented by the case company, following of the list of recommendations presented in Section 6.3, the following next steps will assist in the implementation.

The first step to the case company is to recognize their key customers and to make the code of conduct for the hospitals and contracts with their retailers.

The second step to the case company is to build a new consignment warehousing process for the internal customer.

The third and final step is to contact the external customers and receive feedback. The case company must form KPIs that will be followed regularly.

### 7.3 Evaluation of Outcome vs. Objective

The objective of this study was to improve the consignment warehouse of the case company. The intended outcome was an improved consignment warehousing process of the case company. The outcome of the study might improve the overall consignment warehousing process in the following ways.

If the case company performs the list of recommendations which was presented in Section 6.3, the whole consignment warehousing process of the case company should become clearer and the consignment warehousing process of the case company might become profitable for the company as the stock value might not be as high as it is now.

If customers of the case company know more about the consignment warehousing process and the process is made more efficient for the case company, there might not be that much lost or scrapped products. Customers might also be much happier if the case company is communicating more with the customers and is more interested in the customer satisfaction.

#### 7.3.1 Validity and Reliability

As seen in Section 2.3, this thesis included steps planned to ensure the validity and reliability of the study.

As for ensuring validity the data sources included internal company documents, face-to-face interviews, workshop with the stakeholders, customer surveys, authors own observations and testing of the suggested improvements. To avoid work to be biased by the author, the author continuously communicated with the key stakeholders and the top management of the case company. The stakeholders and the top management were not only met in face-to-face interviews and in the workshop, but they were also constantly informed about in what stage the thesis is and what are the next steps. The stakeholders and top management had their own ideas and thoughts and these were considered in the thesis.

As for ensuring reliability the first customer survey was implemented in the very beginning of the thesis. The customers answered alone to the survey and they were able to

give their honest truth for the survey. The second customer survey which was implemented after the current state analysis was made completely anonymously. The customers did not know who is behind the customer survey and they answered anonymously. The best existing practice was selected from various different sources that were collected for the thesis. The literature sources included books and sources from the internet.

In the end, the thesis might not only improve the consignment warehousing process of the case company, but it might also improve other processes of the case company as well.

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## Appendix 1: Interview with the CEO of the Case Company

Details		
<b>Name of the informant</b>		<b>Informant 1</b>
<b>Position of the informant</b>		<b>The CEO of the case company</b>
<b>Date of the session</b>		<b>10.2.2016</b>
<b>Recorded</b>		<b>10.2.2016</b>
	<b>Question</b>	<b>Field notes</b>
<b>1</b>	Are you familiar with the consignment warehouses of the case company?	"I know the process and the company has been using them as long as I have been working in the company (10 years). All the competitors of the case company use the too."
<b>2</b>	How does the consignment warehouses differ from normal warehouses?	"The case company owns all the products in consignment warehouses until the customer gives permission to invoice. So the case company is responsible for the products, wherever they are"
<b>3</b>	You mean that the case company takes all the responsibility?	"Yes. ITE (in-the-ear) instruments used to be also in consignment warehouses and their parts as well. Hospitals used to build their own ITE instruments from these parts. Nowadays these parts are no longer in consignment warehouses"
<b>4</b>	Can you describe the current consignment warehousing process?	"All customers are well-established hospitals or other customers. They order instruments to the consignment warehouses from us. The client then uses the goods (eg. To fit the end-user in the ear hearing aid) and give us a billing authorization."
<b>5</b>	Does the customer ever return products?	"Policies vary very much. The problem is that there is no written agreements about the inventory, invoicing or returning policies in the consignment warehousing process. It has been very difficult process without the contracts"
<b>6</b>	Is there any contracts?	"There are some contracts, with a mention that deliver goods in the consignment warehouse. Thus in the contracts has not been detailed instructions on making inventories or other things. These are only valid in some medical circles. They have incorporated the terms of the agreements that we have to give stuff to consignment warehouse. In other hospital districts, contracts, billing takes place immediately (ie. is not used for the transfer of stocks). Within the hospital district may also have a variety of hospital-specific practice, although it is a common contract.  In practice, it seems to me that each consignment warehouse keeper should have its own agreement. Each hospital should

		<p>have eg. Someone accountability person (contractual partner) the supply of warehouse operations.</p> <p>This has sometimes been attempted with a small circuit. There were three different hospitals in the same hospital district. I tried to go with each hospital individually agreed between, but they did not want to make individual contracts, but wanted to comply with the contract.”</p>
7	So, the contracts should have a frame, but they should be also done for every customer separately?	“Yes.”
8	Does the current consignment warehousing process work?	“Yes, it might have been worked, but not as well as it should be. If there will be any financial losses, we take all the losses and the customers do not have to pay for anything. This is because we do not have any detailed agreement about who is responsible and for what.”
9	Where do the losses come from?	<p>“For example if customer have had our products for three years and they have not returned them. They send us the products back and we don’t do nothing with them. The reason for this is that we might have missed that the customer has the products and the customer just has not cared to send the products back earlier.</p> <p>The other example is that the customer has opened the packages and tested the instruments. Eventually the customer did not want to keep the products and they are returned to us. We cannot sell them anymore as they are used products.”</p>
10	You mean that the supplier takes all the responsibility?	“Yes.”
11	What do the customers think of this?	“They probably do not even think about this as at the moment they do not have to care about it. “
12	Do you think that the customers do not know what the consignment warehousing process is?	I’m sure that some of them know, but they don’t think that they should return old products and the products should rotate Maybe there is lack of information, but it also might be the lack of contracts. The contracts should be made so elegantly that the customer does not have to suffer from It and both the supplier and the customer would be happy with it.”
13	Are you familiar with the contracts that the competitors of the case company makes with their customers?	“We think, that our competitors do not have contracts either. We have noticed some shipping notes with instructions and terms. We are not using anything like that.”
14	Could you specify what competitors does the case company have?	“The world’s largest producer of hearing aids Phonak, which does a good job. We are a bit bigger supplier in Finland but globally they are larger. They have a slightly different strategy

		<p>than Oticon cable and form of ownership in Finland is different. Also we have other 8 different competitors and all of them use consignment warehouses.”</p>
<b>15</b>	How many customers does the case company have?	“Six Hospital districts, with 32 public hospitals and about 24 retailers.”
<b>16</b>	What kind of products do you send to consignment warehouses?	<p>“A typical product is built-ear hearing aid. It is due to the fact that it is a unique instrument, and it is manufactured to fit your ear. The customer receives the instrument and test it for 3 months and this time the instrument is at least in the consignment warehouse. Again, there are exceptions, want us to send invoice immediately. For us is more suitable that they will be invoiced immediately.</p> <p>There are other Hearing instruments as well. Also, tools could be put to consignment warehouses. In the future we might be able to keep instruments in the consignment warehouses of the hospital and send invoice directly to the end user, but this is not has been confirmed yet.</p> <p>In addition to hearing aids are BTE and tools such as communicators, ie. speech amplifiers. Outside of hospitals, private operators, for example, Seinäjoki Kuulopiste have our consignment warehouses, because they cannot afford to invest tens of thousands of euros to their own storage. The instruments, however, should always be found in a warehouse and they should be those that the end-user wants. It can be said that the retailers fit our products and we charge them (either from the retailers, hospital or directly from the end user).”</p>
<b>17</b>	Who is responsible of making the contracts?	“Depends on the contracts. The sales person should make the contracts for consignment warehousing processes. One good way would be that we would make contracts with the yearly price update list which is made with each customer.”
<b>18</b>	Does the mother company of the case company have different kind of consignment warehouses?	<p>“There is. The largest market is the US, and there all traders are private operators, larger or smaller chains (1 - 2000 retail chains). They have exactly the same storage transfer operation, ie. the Group has tied up a lot of capital to the consignment warehouses. However, this is a common practice in the field of hearing care.</p> <p>On the other hand, if you think about why we have distribution costs of hearing aids is so large. They are higher than the production costs, so they are related in part precisely these large warehouses where the capital is committed.</p>

		It is noted, however, if the retailer is not allowed to have consignment warehouses, they will change the supplier immediately.”
<b>19</b>	Anything more to add?	“I do not see it as a bad thing that we have tied up capital in retailers and hospitals warehouses. I just see as a bad thing there are mistakes, for example, products will not be invoiced, or they go broke etc. I would like to increase the use of consignment warehouses, but it must be done carefully and in a controlled manner.”
<b>20</b>	Does the case company have any advantage, if they do not keep their own warehouse at all?	Maybe not, the hearing aid instruments are small and cheap to stock. Sometimes the customers are asked directly if they can send our products from their consignment warehouse to other customer’s consignment warehouse. This way the instrument has never been in our warehouse and it has not caused any costs for warehousing.”

## Appendix 2: Interview with the Customer Service Manager of the Case Company

Details		
<b>Name of the informant</b>		<b>Informant 2</b>
<b>Position of the informant</b>		<b>The Customer Service Manager of the case company</b>
<b>Date of the session</b>		<b>17.2.2016</b>
<b>Recorded</b>		<b>17.2.2016</b>
	<b>Question</b>	<b>Field notes</b>
<b>1</b>	Who are you and what is your role at the company?	"I am the customer service manager of the hearing care services. My role is to make sure that hearing care services work as cost efficiently as possible."
<b>2</b>	Are you familiar with the warehousing processes?	"Yes, from most of the parts."
<b>3</b>	Do you know what the consignment warehousing process is?	"Yes."
<b>4</b>	Is your team using consignment warehouses?	"Yes we are. My team uses consignment warehouses and we are the internal customer. We have consignment warehouse all around Finland."
<b>5</b>	Could you describe the consignment warehousing process from the perspective of the internal customer?	<p>"From our point of view, at the moment we have to use our own resources to check how many instruments we have in our internal consignment warehouses. We are losing the instruments and some of the instruments are not invoiced. We have tried to minimize the losses by new counting system.</p> <p>The manufacturer of the case company demands that we should return all instruments that are older than one year. That is why at the moment we return all the instruments that have been stored for more than ten months. We always order similar instruments in replacement of the returned ones"</p>
<b>6</b>	Why are you using consignment warehouses?	<p>"They are kept in the consignment warehouse instead of main warehouse, because at some point they anyways need to be transferred to the consignment warehouse. When the instrument has been fitted to the end user it should be invoiced or returned within two to three months and this is why the instrument cannot be kept in the main warehouse. We would not be able to track the instrument (which end customer has to instrument).</p> <p>Basically we use consignment warehouses as an intermediate position."</p>

7	How many instruments you think you have in consignment warehouse?	“I think, there are about 600 hearing aid instruments and 300 of them have been already fitted to the end user.”
8	What are the strengths of the consignment warehousing process?	“With the serial number, we can track where the hearing aid instrument is (which end user has it).”
9	What are the Weaknesses of the consignment warehousing process?	“The current process is a bit too much. Our stock value is high as we are keeping too much instruments in our warehouse. At the moment we cannot see directly from the consignment warehousing report that which of the instruments are fitted to the customer. We only see all the instruments and we have to guess which of the instruments are fitted to the customer and which are still in the warehouse.”
10	How well does the consignment warehouse serve you at the moment?	“There is not to complain, our employee is counting instruments very well. I know that some of our locations have way too much instruments in their consignment warehouses. The process itself is needed, but nothing is as stupid as the products that are laying in the warehouse without use.”
11	Do you know how does the returning of the products work?	“We are checking every two months, what instruments should be returned. All instruments that are ten months or older, are returned. Other returns come directly from end users. These are used instruments that are either reused or sent back to the manufacturer.”
12	How many returns does the internal customer make?	“Last March – April (2016), we returned about 12 instruments from Helsinki and 3 instruments from Hyvinkää. We did inventory counting in the end of the year 2015 and that’s why the inventory did not have that many instruments.”
13	What can you tell about the consignment warehouses of the hospitals and retailers?	<p>“The hospitals have only few instruments in their consignment warehouses, although most of the instruments that are in our consignment warehouse are invoiced from the hospital.</p> <p>The retailers have a lot of instruments in their consignment warehouses and the case company does not understand how much money they tie up. There are no contracts with the retailers and we should take all the instruments back from them at least every six months. We should make our rules clear to the retailers.</p> <p>The sales team is responsible of making contracts with the retailers.”</p>



### Appendix 3: Workshop with the CEO and the Customer Service Manager of the Case Company

<b>Details</b>	
<b>Name of the informant</b>	<b>Informant 1 and Informant 2</b>
<b>Position of the informant</b>	<b>The CEO and The Customer Service Manager of the case company</b>
<b>Date of the session</b>	<b>20.4.2016</b>
<b>Recorded</b>	<b>20.4.2016</b>
<b>Supply chain management</b>	
<b>Issues and field notes</b>	<b>Actions</b>
<ul style="list-style-type: none"> <li>- One of the biggest issues is that the case company does not have a clear process that the customers would understand</li> <li>- The case company can make some contracts with retailers, but not with the hospitals</li> <li>- With hospitals the case company might be able to make some kind of code of conduct</li> <li>- The case company could also be able to make some kind of instructions for consignment warehousing process</li> <li>- The customers also want that the case company is in more contact with them</li> <li>- The case company should visit the customers more often and introduce our processes for example consignment warehousing process</li> <li>- If the case company wants to be more in contacts with the customers, maybe the case company should determine, who are their key customers and how to contact them</li> </ul>	<ul style="list-style-type: none"> <li>- Testing of the contracts / code of conducts</li> <li>- New objectives for customer service and handling of the customers</li> </ul>
<b>Warehousing</b>	
<b>Issues and field notes</b>	<b>Actions</b>
<ul style="list-style-type: none"> <li>- The case company needs safety stocks</li> <li>- The case company needs to know what products are moving and what are just lying on the stock</li> <li>- The case company needs to send instructions about warehousing to the customers as well</li> </ul>	<ul style="list-style-type: none"> <li>- Testing of the consignment warehousing process for the internal customer</li> <li>- Thinking of what should a contract or code of conduct include and how could it be made with customers</li> </ul>

<ul style="list-style-type: none"> <li>- Maybe the instructions and a consignment agreements (or part of it) might be able to fit into the shipping note</li> <li>- The case company must reduce their inventory</li> <li>- The internal customer needs a whole new consignment warehousing process</li> </ul>	
<b>Service Level Agreement</b>	
<b>Issues and field notes</b>	<b>Actions</b>
<ul style="list-style-type: none"> <li>- The case company needs to have feedback from the customers</li> <li>- Small things influence in hospitals, and they need to be able to give feedback to the case company</li> <li>- The results of the brand research were not good and a bit scary</li> <li>- The case company needs more communication and better customers service</li> <li>- The services that the case company should be always available and it should be high-quality</li> <li>- The case company needs to determine KPIs which can be followed</li> <li>- The consignment warehousing process should be improved in the way that the service level does not suffer (it should improve)</li> </ul>	<ul style="list-style-type: none"> <li>- The Brand Research was done</li> </ul>
<b>Final conclusions</b>	<p>Shortly: The consignment warehousing process can be improved. First, The improving should be started by defining contracts and code of conducts with customers. The new process would be implemented into the contracts. The case company can test the process with their own internal customer. Secondly, the new improved process should be launched. Finally, the improved process should be measured with KPIs and the service level should be continuously monitored.</p>

## **Appendix 4: Customer Survey: General questions about consignment warehousing**

### **The questions**

1. Are you familiar with the consignment warehousing process?
2. Do you have any of the products, owned by the case company, in your consignment warehouse?
3. Do you have a valid agreement or contract with the case company related to the consignment warehouses?
4. Is the consignment warehousing process clear to you?
5. Do you see consignment warehouses as necessary?
6. How often do you order products to the consignment warehouse?
7. How long does it take to receive the products?
8. How many items do you have in the consignment warehouse?
9. How long have the oldest products been in the consignment warehouse?
10. How long would you like to keep the products in the consignment warehouse?
11. How often have you done inventory counting for the products in the consignment warehouse?
12. If you have done inventory counting, why have you done it?
13. How often would you be ready to perform inventory counting?
14. Are you familiar with the returning process?
15. How often do you return products from the consignment warehouse?
16. What is the most common reason for returning products?
17. How satisfied you are with the current consignment warehousing process?

### **The answers**

1. **Yes (19), I don't know (1), No (2)**
2. **Yes (8), I don't know (2), No (12)**
3. **Yes (4), I don't know (111), No (6)**
4. **Yes (5), I don't know (11), No (24), Other (2)**
5. **Yes (11), I don't know (3), No (8)**
6. **I don't know (4), Other (15)**
7. **1-2 working days (3), 3-4 working days (6), 5-6 working days (4), other (6)**
8. **1-3 months (5), 4-6 months (3), 6-12 months (3), longer (2)**
9. **1-3 months (4), 4-6 months (5), 6-12 months (4), longer (2)**

10. Never (5), Once a year (10), Twice a year (1), More often (2)
11. Own initiative (3), By the request of the case company (9), Other (1)
12. Once a year (8), Twice a year (4), More often (7)
13. Yes (10), No (10)
14. I don't know (9), Other (8)
15. Broken product (3), The product does not sell (5), The inventory time is full (6), Product is too old (0), other (4)
16. Yes (10), No / I don't know (10)
17. Very unsatisfied (1), Unsatisfied (1), I don't know (8), Satisfied (10), Very satisfied (0)

## Appendix 5: Customer Survey: The Brand Research Customer Survey

### Research information:

In March 2016, total 217 hearing care professionals were asked about the perceptions of hearing care suppliers in Finland.

The study was conducted Rianno Oy and it was made with an electronic questionnaire (link in the email).

A total of 31 defendants, of whom 94% were hearing care professionals and 6% for rehabilitation counsellors.

The response was 14%. Due to the low response to the amount of research is indicative

### The results:

- ▶ K1: Technically-advanced hearing aids
  - ▶ 1. Phonak (4. Oticon)
  - ▶ 2. Widex (5. Bernafon)
  - ▶ 3. GN Resound
- ▶ K2: Hearing aids design and modern color schemes
  - ▶ 1. Phonak (4. Bernafon)
  - ▶ 2. Widex
  - ▶ 3. Oticon
- ▶ K3: Wide selection of hearing aids for all kind of hearing losses
  - ▶ 1. Phonak (5. Bernafon)
  - ▶ 2. Widex
  - ▶ 3. Oticon
- ▶ K4: Fitting program is logical, and easy to use
  - ▶ 1. Phonak (4. Bernafon)
  - ▶ 2. GN Resound
  - ▶ 3. Oticon
- ▶ K5: The end users are happy with the hearing aid instrument
  - ▶ 1. Phonak (4. Bernafon ja Oticon )
  - ▶ 2. GN Resound
  - ▶ 3. Widex
- ▶ K6: Communication and customer service is working well
  - ▶ 1. Phonak (4. Bernafon)
  - ▶ 2. GN Resound (6. Oticon)
  - ▶ 3. Widex
- ▶ K7: The services are high quality
  - ▶ 1. Phonak
  - ▶ 2. GN Resound
  - ▶ 3. Widex, Oticon, Bernafon
- ▶ K8: The deliveries are on time
  - ▶ 1. Phonak (4. Oticon)
  - ▶ 2. GN Resound (5. Bernafon)
  - ▶ 3. Widex
- ▶ K9: We get enough information about trainings etc.
  - ▶ 1. Phonak (4. Bernafon)
  - ▶ 2. GN Resound (6. Oticon)
  - ▶ 3. Widex
- ▶ K10: I quickly get help
  - ▶ 1. Phonak (4. Bernafon)
  - ▶ 2. GN Resound (6. Oticon)
  - ▶ 3. Widex
- ▶ K11: The contracts and forms are high quality
  - ▶ 1. Phonak (5. Bernafon)
  - ▶ 2. GN Resound
  - ▶ 3. Widex, Oticon
- ▶ K13: Which of these instruments would you fit to your family member
  - ▶ 1. Phonak (4. Bernafon)
  - ▶ 2. GN Resound (- Oticon)
  - ▶ 3. Widex

#### K14. Overall score

- ▶ Phonak 74 %
- ▶ Widex 26 %
- ▶ GN Resound 23 %
- ▶ **Oticon 16 %**
- ▶ **Kuulopiiri 13 %**
- ▶ Hansaton 10 %
- ▶ Siemens 6 %