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Master Thesis

ALIGNING THE RETURN OPERATIONS OF WARRANTY PARTS THROUGH CUSTOMER SEGMENTATION

Public report

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UNIVERSITY OF TWENTE.

remeha

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Management summary

This research is conducted at Remeha (a heating systems manufacturer) in the field of returns management. The research is about the return process of defect parts that are in the warranty period. The most important trigger for this project is the voice of the customer (VOC). The customers that send returns have doubts about the usefulness of returning all defect parts. Other triggers are process efficiency at Remeha and Corporate Social Responsibility (CSR). The main research question formulated for this research is: *What is the best policy to improve the return process for the different external customers taken into account the internal process at Remeha?*

The most important observations of the problem identification are:

- Some parts are immediately scrapped after the warranty judgment and administration activities. No quality information is gathered from these parts.
- Every actor in the supply chain administrates the same data about the parts.
- High variety in the cycle times for returns from export partners.

Using customer interviews, we found that the perception of the customers about the warranty process is generally good. Wholesalers, large service providers and export partners desire improvements in process efficiency. The small service providers desire a simple process. A special desire from the large service providers is a link between the standard fees with the corresponding part by exchanging a part in the warranty period.

An intelligent web application is proposed in the Return Material Authorization (RMA) module of the new professionals website. The customer obtains authorization to return a part at this new website. The link between the standard fees with the corresponding part is integrated in the RMA module.

The web application includes a gatekeeping model and the Data Matrix (2D barcode) technology. The gatekeeping model is required to avoid unnecessary returns. The model needs a control method to avoid (large) cases of fraud (multi warranty requests for one part). The check on location is the best method to start with. This can be replaced for random check on location if the customer does a good job with the warranty parts. The Data Matrix technology is an adequate method for data sharing. The information from the customer is converted in a Data Matrix. The administration activities are done using Data Matrix scanners when the parts are received at Remeha.

A retrieval model is developed to balance the incoming returns from export partners. The model gives the retrieval times for the seven most returning customers. This results in more manageable batches and more balanced incoming goods. Using this model, the cycle time for export returns reduces from 20.92 days to 11.2 days (46% reduction, based on the data from 2013).

The customers are served as good as possible taken into account the internal process at Remeha with this segmentation for customers (Table 0.1):

Customer	Web application	Gatekeeping model	Retrieval model	Link standard fees with part	Simple process
Wholesaler	✓	✓			✓
Large service provider	✓	✓		✓	✓
Small service provider	✓				✓
Export partner	✓	✓	✓		✓

Table 0.1: Segmentation of customers

The following objectives are achieved by the policy plan:

- Higher customer satisfaction is achieved by:
  - Shorter cycle time, because returns are handled faster (for all the customers).
  - Simple process to start the warranty procedure (for all customers).
  - On average 0.98 Euro per part transport cost reduction for customers using the gatekeeping model.
  - Fast credit for returns that do not come back to Remeha (applies for wholesalers, large service providers and export partners).
  - The link between standard fees and the corresponding part is possible.
  - Wholesalers keep the possibility for customer loyalty.
- More efficient process is achieved by:
  - Reduction of administration activities because of the data matrix technology.
  - Reduction of handling activities because of the gatekeeping model.
  - Reduction of transport, because of the gatekeeping model.
- Higher product quality is achieved by:
  - Better quality information. The RTG employees have more time to analyze critical parts when unnecessary returns are avoided.
- Higher Corporate Social Responsibility (CSR) is achieved by:
  - Less CO_2 emission, because of less transport (and therefore less weight) of pallets. The estimated reduction is 157 pallets per year with the assumption of 35% less returns.

Overall we can conclude that the intelligent web application has advantages for the different customers. The policy plan contributes to excel in customer intimacy (base of Customer Value Proposition in the Remeha strategy house). This results in a broader base to improve the customer relationships and to grow as organization (pillar in the Remeha strategy house). Customer segmentation also fits well with the ambitions to start with partner programs.

The development period of the new module is estimated to be five months. The implementation can start after the completion of the new website. The initial estimated costs for the development of the intelligent web application are 75,000 Euros (fictitious number). The annual operational costs for this system are estimated to be 30,000 Euros (fictitious number) for Remeha. The annual benefits for Remeha are estimated to be 67,900 Euros (fictitious number) by a reduction of administration activities, handling activities, and transport cost from export returns (assuming 35% less returns). The payback period is two year and two months in that scenario.

Preface

This report is to conclude the master Industrial Engineering and Management at the University of Twente. It was after my bachelor thesis my second individual research at an organization and it was again a very interesting and valuable experience.

I would like to thank Remeha for providing the opportunity to perform this master graduation project. I experienced Remeha as a very inspiring work environment and I really enjoyed my time at this company. I would like to thank my company supervisors, Cor van den Heuvel and Peter de Haan for our valuable meetings, critical feedback and their support during this project. I thank also my other colleagues that have a contribution in this research.

Next, I would like to thank my supervisors of the University of Twente, Peter Schuur and Ton Spil for the critical feedback, valuable insights and guidance during this project. Their interest and involvement in my project enabled me to achieve this report.

Finally, I would like to thank my girlfriend, friends and family for their support and interest during my graduation time.

Maikel Brummelkamp

Apeldoorn, June 2014.

Glossary

EDI : Electronic Data Interchange.

End customer : The user of the boiler.

Installer : The engineer who installs the boiler.

Intercompany : Activities that are conducted between two or more affiliates or business units of the same parent company.

NFC : Near Field Communication.

OEM : Original Equipment Manufacturer, manufactures products or components that are purchased by another company and retailed under that purchasing company's brand name.

RFID : Radio frequency identification.

RTG department : Department of returning goods at Remeha.

Service engineer : The engineer who provides service to the boiler.

Service provider : The company who provides service to the boiler.

VB12 : List with standard warranty cases that are not handled at the service department.

VOC : Voice of the customer, in this case the companies that send returns.

Z-Return : The module in SAP that supports the process of returning goods.

Contents

1 Introduction

Effective returns management is a critical part of supply chain management. Many firms neglect the returns process, because management does not believe its importance (Rogers & Tibben-Lembke, 2001). This process can assist the firm in achieving a sustainable competitive advantage. To conclude the master Industrial Engineering and Management at the University of Twente, this research is conducted at Remeha in the field of returns management. This report gives insights about the barriers and preferences of customers and describes a policy plan for returning goods to achieve competitive advantage.

Section 1.1 provides a description of the company and Section 1.2 provides the research topic that is covered in this report. Section 1.3 and Section 1.4 provide respectively the research questions and research method.

1.1 Description of the company

Remeha B.V. is one of Europe's biggest manufactures of domestic and commercial heating systems and hot water systems. Remeha is an abbreviation of "Van **Re**ekums's **Me**taal **Ha**ndel" and is nowadays part of the BDR Thermea group. The company is founded in the twenties and came in 1944 to Apeldoorn (The Netherlands), the headquarter is still located there.

Remeha has around 550 employees and a turnover of around 300 million (2010). Remeha has one production location in Apeldoorn and has sales offices in the United Kingdom, Germany and Belgium. These countries and the Netherlands are the most important selling markets. Remeha has a market share of around 28% in the Netherlands.

The BDR Thermea group contains several companies i.e. Baxi, De Dietrich, Remeha, Brotje Heizung, Baymak and Chappee. The Group has 6.400 employees and a turnover of about 1.8 billion (2013) in Europe. The BDR Thermea group is market leader in the United Kingdom, France, Spain, The Netherlands and Italy. The Group has locations in more than 70 countries.

1.2 Research topic

The main topic of this report is on reverse logistics of defect parts. The challenge is to optimize the return flow regarding customer satisfaction, quality information, transportation cost, packaging cost, administration activities, and in relation with corporate social responsibility (CSR).

This research project combines reverse logistics with a customer segmentation model. This means that we decide for every customer group how to optimize the return flow regarding the aspects mentioned above. The goal is to create a policy plan how to deal with the returns from the different external customers.

Research motivation

There are several triggers to change the return process. The most important one is the voice of the customer (VOC). The customers are companies that send returns (wholesalers, service providers, and export partners). These companies experience that they are not served as good as possible, because they have many activities with returning goods and have doubts about the usefulness of returning all defect parts.

1.3 Research questions

To conduct proper research, research questions need to be formulated. This enables us to optimize the return process regarded to the elements mentioned in Section 1.2.

Main research question

We compose the following main research question for this research project:

What is the best policy to improve the return process for the different external customers taken into account the internal process at Remeha?

Sub research questions

We can divide the main research question in different sub research questions:

1. What is the current situation at Remeha?
    a) *Show the current return process.*
    b) *Map the current problems associated with the return process.*

2. What literature is available about return processes and how do other companies deal with returns?
    a) *Literature about return processes.*
    b) *Return processes at other companies.*

3. What is the division of the different defect parts?
    The different parts Remeha has and their characteristics.

4. What is the division of the different external customers?
    Kind of external customers Remeha has and the number of returns from them.

5. Who are the stakeholders and what are their interests?
    The position and importance of the internal and external customers.

6. What are the barriers and preferences of the external customers?
    Barriers and preferences of the external customers.

7. What are alternatives to improve the return process for the different external customers?
    a) *Possible options to deal with returns.*
    b) *Evaluation of the alternatives.*

8. What is the best possible policy for the return process at Remeha?
    Best policy for the return process.

9. How to implement the new return policy plan?
    Implementation plan.

1.4 Research approach

This research approach enables us to answer the main research question formulated in Section 1.3. It is based on the book Designing a Research Project (Verschuren & Doorewaard, 2010). Section 1.4.1 provides the research goal and research objects. Section 1.4.2 provides the research method.

1.4.1 Research goal and objects

The goal of this research is to create a policy plan. This plan should describe how to deal with returning goods from wholesalers, service providers and export partners. This includes decisions about gatekeeping for parts and a description how the parts should be returned to Remeha.

This project should yield the following deliverables:

- Mapping the current return process.
- Give insights about barriers and preferences of customers.
- An approved policy plan for the coming five years for the return process.

Some objects are important to get relevant data for this research. The first object is a list with all recent returns from the different wholesalers, service providers, and export partners and the regarding parts. We also use this document to look which parts are frequently coming back.

Documents with cost components regarded to the return process are useful to make a business case for the policy plan.

1.4.2 Research method

This section provides the research method for this project. With these methods we are able to answer the research questions. The methods are described per research question. Figure 1.1 gives an overview of all research methods used.

Following methods are used for answering the research questions:

1. *What is the current situation at Remeha?*

First a description of the return process is made, this is based on interviews with the three departments that deal with returns i.e. RTG, service, and administration. After that the problem identification is described, this is based on the Managerial Problem Solving Method (MPSM) (Heerkens, 2012).

2. *What literature is available about return processes and how do other companies deal with returns?*

The literature study is done with articles found using Scopus and references in the relevant articles. A benchmark is done to look at return processes at other companies and how organizations improve their returns management.

3. *What is the division of the different defect parts?*

The analysis about the defects parts is based on all the returns in 2013. Pivot tables in Microsoft Excel are used to do a representative analysis.

4. *What is the division of the different external customers?*

The same data and method is used to do a representative analysis about the different external customers.

5. *Who are the stakeholders and what are their interests?*

To answer this question the stakeholder analysis of Mitchell et al. (1997) is used as starting point and the interests are coming from interviews with the involved departments.

6. *What are the barriers and preferences of the external customers?*

Interviews and questionnaires are used to know what the barriers and preferences are of the different external customers. These interviews are done with representative external customers to know what they feel as barriers, importance of some aspects and wishes they have for the future.

7. *What are alternatives to improve the return process for the different external customers?*

Literature is used to generate alternatives to improve the return process for the different external customers. These alternatives are evaluated with the wishes from internal and external customers.

8. *What is the best possible policy for the return process at Remeha?*

All the information from the interviews, literature, and the evaluation of the alternatives lead to a policy plan for returning goods for the different external customers. This includes segmentation options and a business case.

9. *How to implement the new return policy plan?*

The implementation plan is made with the implementation policies Remeha already has and with some extensions from literature that has value for this project.

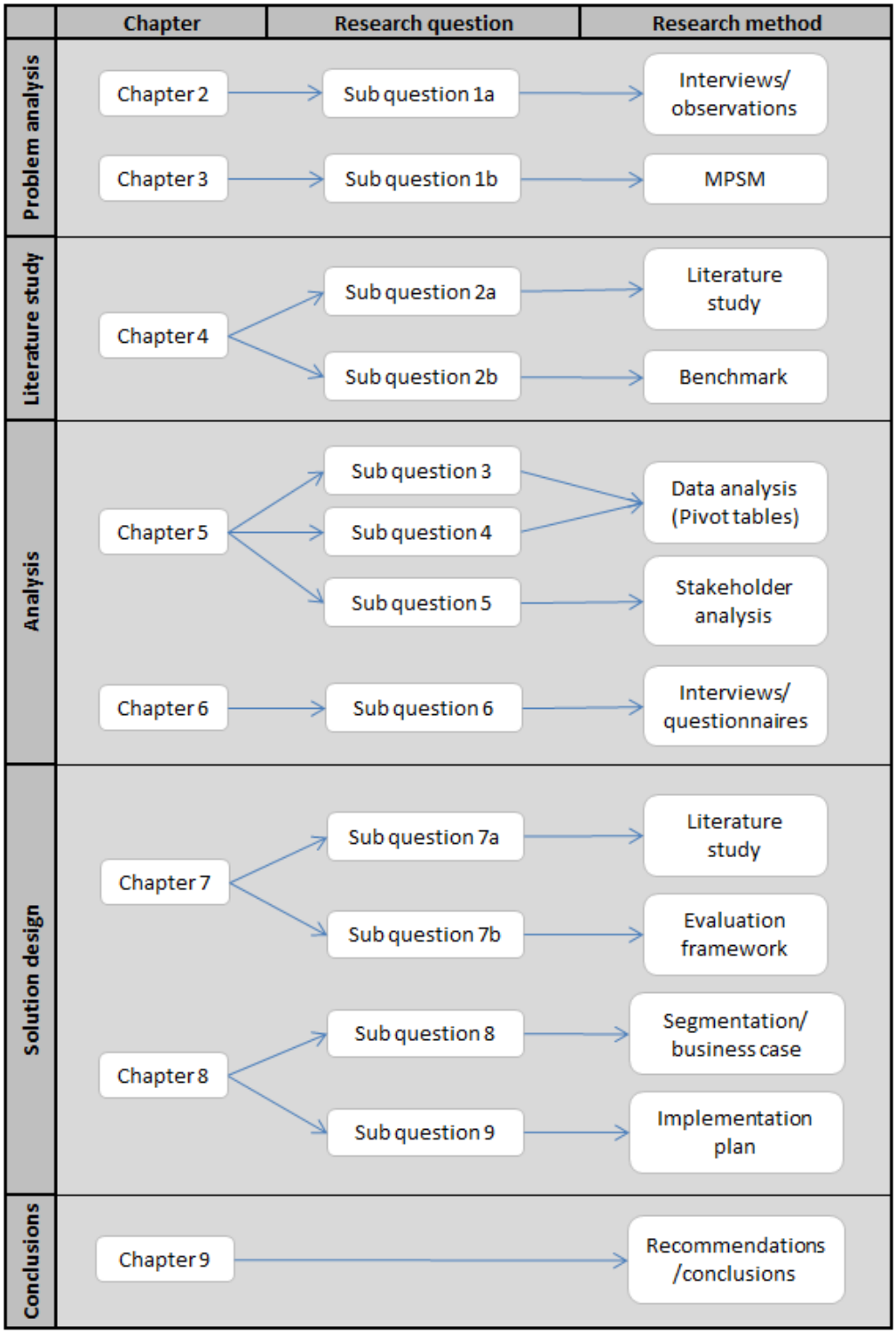

Figure 1.1: Research method

2 Current return process

This chapter provides the current return process. The Remeha policy prescribes that for quality reasons all the parts in the warranty period must be returned. From a warranty perspective Remeha applies the policy that the wholesaler, service provider, or export partner needs to send the defect part back to get a refund or new part.

Section 2.1 briefly provides the returns in the Netherlands, Section 2.2 provides returns from export partners, and Section 2.3 provides returns via service engineers from Remeha. Section 2.4 provides the cycle times and the last section, Section 2.5, briefly provides the recovery options.

2.1 Returns in the Netherlands

Remeha assembles the parts that are bought from vendors. After production, the boilers are mainly sold via wholesalers and installed by local installers. Also the spare parts are mainly sold via wholesalers and used by local installers or large service providers. The user of the boiler is the end customer. This is the end of the forward flow. Figure 2.1 shows the forward and backward flow for boilers and parts.

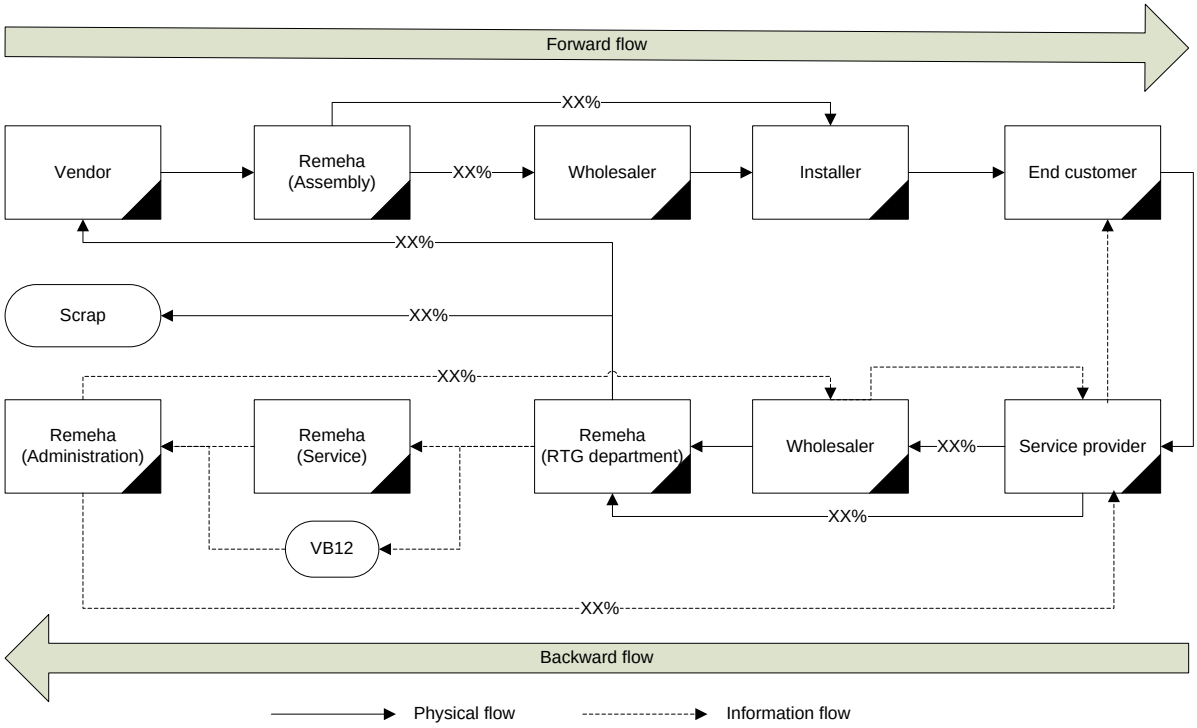

Figure 2.1: Forward and backward flow in the Netherland (Percentages based on all the returns in 2013)

The backward flow starts with the service providers (engineers that provide service to the boiler) that should send their defect parts from the end customer to the wholesaler. The wholesaler sends its parts from the different service providers back to Remeha. The service providers often send their parts directly to Remeha, the reason for this should be investigated.

The defect parts are received at Remeha by mail or via a logistics service provider (LSP). These parts are unloaded at a receiving/loading dock at the warehouse. The packages are transported in roll containers or on pallets (in case of more packages from one customer). The roll containers are transported directly to the department of returning goods (RTG department) and in case of multiple pallets, these are stored in the warehouse.
At the RTG department, the defect parts are physically judged and registered. With this information the RTG employees give advice for giving warranty. This is based on the following criteria:

- Warranty period, this is based on the most recent information. Meaning that it is first based on the installation date of the boiler or if this is unknown based on the production date of the boiler plus some additional time (six months). If this is also unknown, then it is based on the production date of the part.
- Material error
- Production error

If the advice is given, the service department decides if the part is refunded or not. This is based on the advice from the RTG department and commercial arguments, e.g. a part that is out of warranty, but has often failed because of a material error or the expected lifetime is longer. Many of the returns are standard warranty cases and are not handled at the service department. These cases are on the VB12 list.

When the decision for refunding is made, the administration department finishes the procedure to send the customer a letter with the judgment and to credit the defect part if this is decided. This is done once a week. For small service providers, the administration department needs to find out where the part is bought. When it is bought at Remeha, they get a higher credit than when the part is bought at a wholesaler. For wholesalers they credit the standard price in the system. This difference comes from the price differences in the forward flow.

2.2 Returns from export partners

In the forward flow for export partners there is one extra actor. This is the intercompany/Remeha /original equipment manufacturer (OEM) (see Figure 2.2). An intercompany is part of the BDR group, an original equipment manufacturer (OEM) is a retailer under purchasing company's brand name and there are companies under the brand name Remeha. From these companies the boilers are sold to wholesalers in that country. Returns from export partners are often received in batches. Remeha receives in most cases an Excel list with all returning goods in advance. The defect parts are received at a dock and are stored in the warehouse when the workload for the RTG department is too high. The further process is the same as in the Netherlands. Remeha has in this case only to do with the intercompany/Remeha/OEM and not directly with wholesalers and service providers in that country.

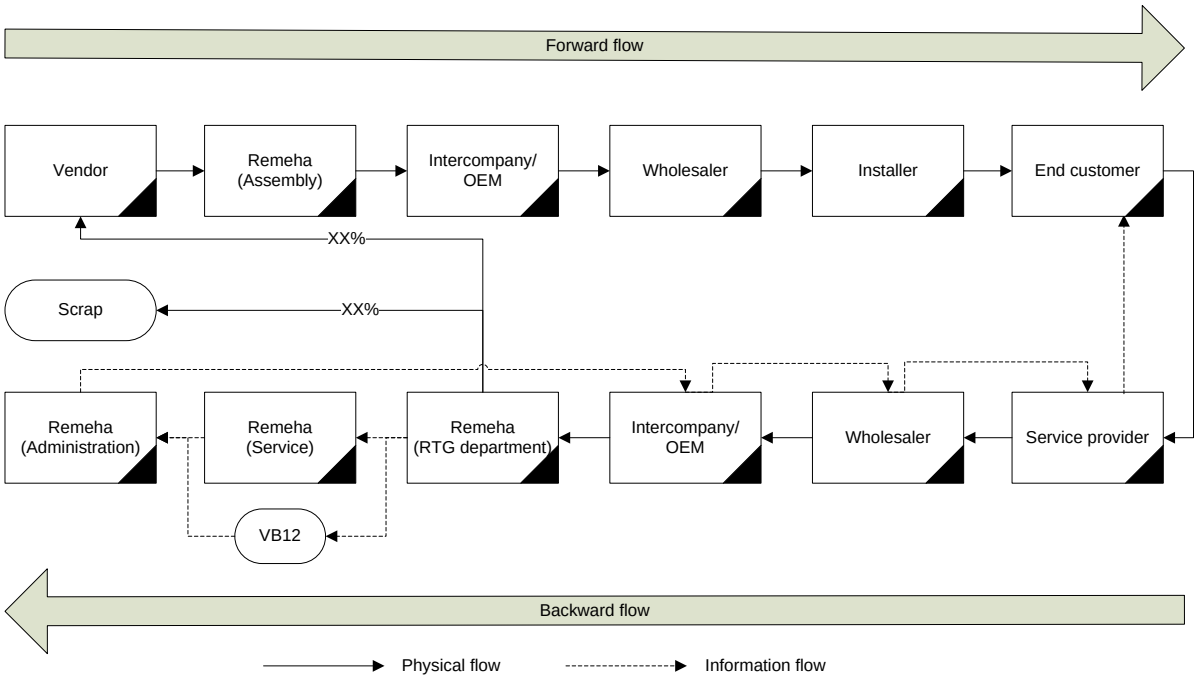

Figure 2.2: Forward and backward flow export countries (Percentages based on all the returns in 2013)

2.3 Returns via service engineers

Remeha has employed 36 service engineers. These engineers go to end customers and solve problems that are in the warranty period (often) and out of warranty period of the boiler. They come back with defect parts that go to the RTG department. After the activities at this department, the service department decides if warranty is given. The financial activities are not necessary, because the service engineers have already replaced the part and do not credit the part (see Figure 2.3). In this process the wholesalers are not involved in the backward flow.

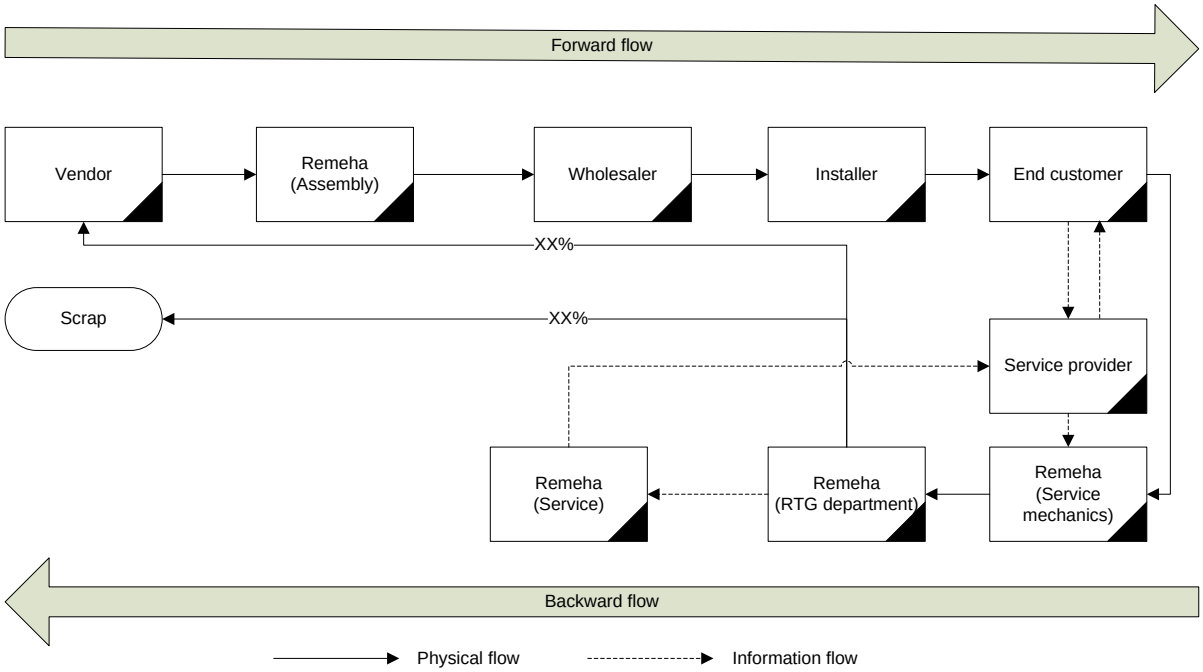

Figure 2.3: Forward and backward flow service engineers Remeha (Percentages based on all the returns in 2013)

2.4 Cycle times return process

The cycle times for physically judge the defect parts are measured each month. The cycle time is defined as the time between receiving and registering the part. The norm for the Netherlands is five days. In 2012 the mean cycle time was below the norm (4.75 days) and in 2013 the mean cycle time was above the norm (7.25 days) (see Figure 2.4). In the last four years only one year achieved a cycle time that was below the norm.

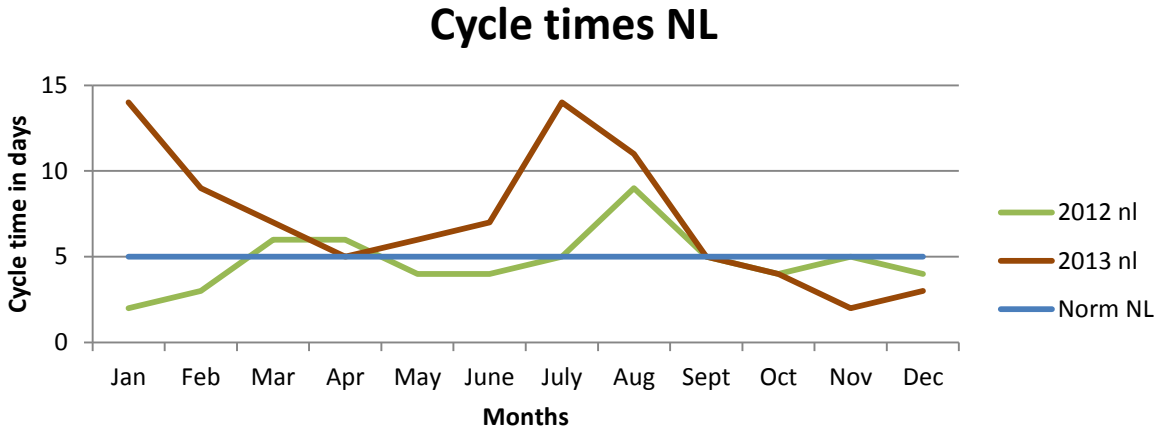

Figure 2.4: Cycle times in the Netherlands

The norm for physically judge defect parts from export partners is fourteen days. The mean cycle time was 14.8 days in 2012 and in 2013 the cycle time was 20.92 days (see Figure 2.5). In the last four years the mean cycle time was above the norm (see Appendix A).

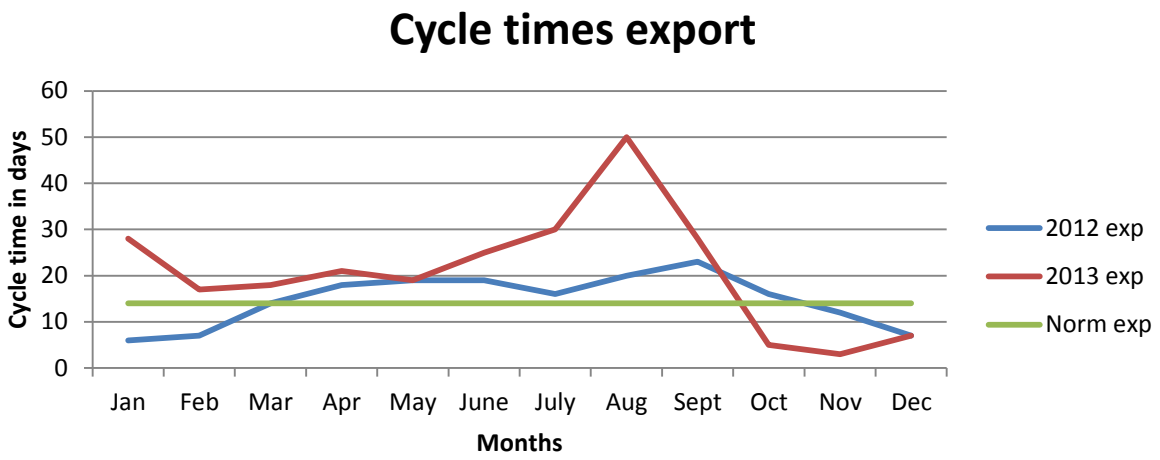

Figure 2.5: Cycle times export

The cycle times for returns from export partners fluctuate from three days to fifty days over a year. It is better to manage the return process to balance the cycle times. The balancing of the cycle time also improves the quality information, because this information is gathered after the stock time at the customer plus the cycle time at Remeha.

2.5 Recovery options

Based on the recovery framework of Thierry et al (1995), Remeha uses two recovery options at the moment (namely scrapping and refurbishing). Most of the returning goods are scrapped (see Section 5.2). Parts are also returned to the vendor (see Figure 2.1). There is a project started for refurbishing a module in the most recent boiler. This probably is expanded in the future with other parts, but this is not in the scope of this project.

3 Problem description

This chapter provides the problem description. This description is based on the Managerial Problem Solving Method (MPSM) (Heerkens, 2012). Section 3.1 provides the identification of the problem, Section 3.2 provides the problem diagram and Section 3.3 briefly describes the identification of the core problem. Section 3.4 and Section 3.5 respectively describes the involved parties and knowledge requirements.

3.1 Identify the problem

For the identification of the problem, we first describe the current situation and then the desired situation for Remeha.

Current situation

There are several triggers to change the return process. The most important one is the voice of the customer (VOC). The customers are companies that send returns (wholesalers, service providers, and export partners). These companies experience that they are not served as good as possible, because they have many activities with returning goods and have doubts about the usefulness of returning all defect parts. Especially the large customers (wholesalers, large service providers, and export partners) have this feeling, because they have most of the returns. They need to package the parts, administrate it in their system, and transport the packages to Remeha. Another aspect is that the service provider or end customer needs to pre-finance the part, because the refund is given after the whole procedure (however a spare part is already bought). These companies mainly ask to support them with the return process to have less involved activities and to avoid unnecessary returns.

Unnecessary transport and packaging exist with the current return flow. For some parts it is not efficient to send it back to Remeha, e.g. a part that has passed their warranty period. The reason for sending these parts back should be investigated. Another aspect is the administration. The service provider should administrate the parts, if it is received at the wholesaler, they also need to administrate it in their system. The same administrative activities are done when it is received at Remeha. This means that three companies administrate the same data about the parts.

Running example: Part X

A practical example is Part X (Figure 3.1) that has problem Y. This part is collected by the service providers, sent to the wholesaler and then sent to Remeha. By receiving, they can read the reason of failure and no further investigation is needed, because it is a known problem. There are already some adjustments done. Conclusion: this part is scrapped immediately.

This means that there is much effort for collecting and transporting, but it has no value for Remeha. Remeha cannot claim warranty from the vendor, because Remeha gives X years warranty and the vendor only gives Y years. Because the parts has a known problem, it has no learning aspect anymore.

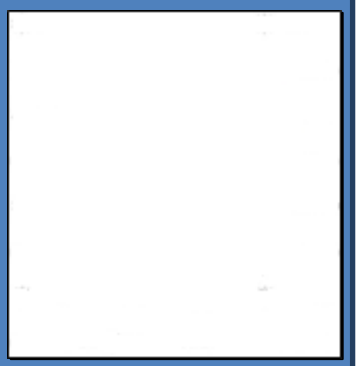

Figure 3.1: Part X

Remeha also has activities with returning goods. The administration activities together with the physically judgment of the parts take most of the time. This leads to a reduction in available time for analyzing defect parts where the quality department can learn from.

Desired situation

The desired situation is that the wholesalers, service providers, and export partners are supported with the return process to enhance customer satisfaction. For Remeha, the quality information is important to improve their product quality and development experience. Reducing costs is not the starting point, but can be reached by changing the return process. The same applies for a higher CSR.

3.2 Problem diagram

The problem diagram (Figure 3.2) contains the problems that are currently present in the return process. Between the problems the relations are placed. The end problem is on the left topside, this has no further causes.

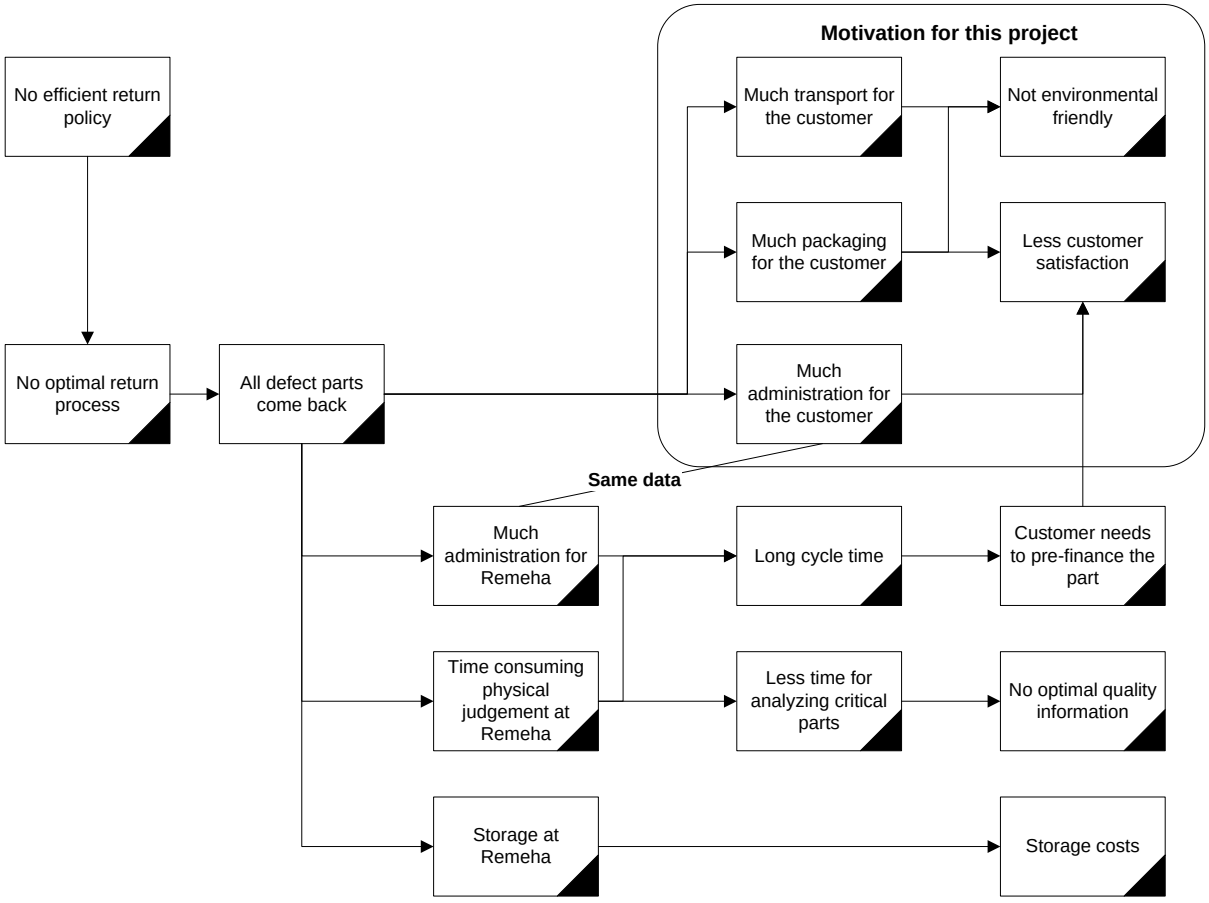

Figure 3.2: Problem diagram

3.3 Identify core problem

The core problem is that there is no efficient return policy. Remeha asks all parts back for quality reasons and warranty decisions. Now other aspects are also important, e.g. improving customer satisfaction, reduction of costs, and corporate social responsibility. To achieve this, Remeha needs an efficient return policy.

3.4 Involved parties

This section briefly describes the involved parties. We distinguish between the departments at Remeha and the involved external customers. The position and power of the involved parties are described in the stakeholder analysis in Section 5.5.

Involved departments

Many departments are involved in the return process. we describe the departments and their relation with the process:

- Logistics: they receive the parts and if it is from export partners, they can store it in the warehouse. This is a physical relation with the return process.
- RTG: this department analyzes the part physical, registers it in the system, and gives an advice for giving warranty. There exists a physical and administrative relationship.
- Service: the service department decides if additional warranty (leniency) is given to the wholesaler, service provider, or export partner when the part is out of warranty. There exists an administrative relation.
- Administration: they send a letter to the wholesaler, service provider, or export partner with the judgment and credit the price of the defect part, if this is decided. The administration department has an administrative relation with returning goods.
- Sales: this department has connections with wholesalers, service providers and export partners and wants to serve them as good as possible. The customer satisfaction is also dependent on the return process. There is no direct relation with the return process.
- Spare parts: The spare parts department manages the spare parts for the wholesalers and updates the VB12 list. They are responsible for the in time delivery of new parts. This is no direct relation with the return process.
- Quality: they want to improve the products. This can be done with analyzing the parts and to do some adjustments (with the vendor). They also have no direct relation with the return process, but are dependent on returning goods.

The R&D management department has an indirect link with the return process.

Involved customers

The customers (wholesalers, service providers, and export partners) return the defect parts and therefore have a direct relation with the return process. They want warranty for defect parts and want fast delivery for spare parts.

Problem owner

The problem owner is the Quality Steering Committee, because they have the main responsibility for the total quality process within Remeha. Large service providers and wholesalers deal with the problems and have ideas to improve it, but cannot change the process.

3.5 Knowledge requirements

There are several requirements that need to be known to create an effective policy plan for returning goods. First, literature that fits in the scope of this project is needed to know what knowledge is available and to know how other companies deal with returning goods.

When these theories are known, knowledge about the division of the different external customers is required. We want to know this, because this is required to serve every customer as good as possible. An important aspect related to this is their position (e.g. importance) for Remeha. Another knowledge requirement is the division of the different parts. If this is fulfilled, barriers and preferences of the external customers are required. With this information, a policy plan should be created.

4 Literature study

This chapter describes a literature study about returns management. Section 4.1 provides a description of returns management and Section 4.2 provides different returns management approaches of different companies. Section 4.3 provides the conclusions.

4.1 Literature about return processes

Section 4.1.1 provides literature about the relation between supply chain management and returns management. Section 4.1.2 describes the strategic and operational sub-processes and Section 4.1.3 describes organizational environments for returned products. Section 4.1.4 to 4.1.6 describes the relationships between reverse logistics with customer satisfaction, quality information, and corporate social responsibility. Section 4.1.7 and 4.1.8 provides literature about warranty logistics and metrics for reverse logistics.

4.1.1 Supply chain management

An article about the relationship between returns, reverse logistics, and returns management is published by Rogers, Keely, Garcia-Dastungue & Lambert (2001) (see Figure 4.1). They state that returns and reverse logistics are part of returns management (Rogers et al., 2001). This means that it is needed to manage returns and reverse logistics to create an efficient returns management.

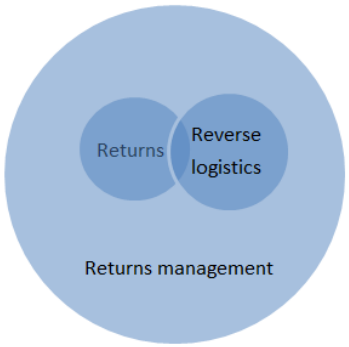

Figure 4.1: Returns management

The same authors proposed a framework about elements of implementation in supply chain management. They mentioned different departments and business processes in a company. Looking at the scope of this project, our focus is on the movement requirements and reverse logistics in the business processes Product Development and Commercialization and Returns Management in the logistics department (Figure 4.2).

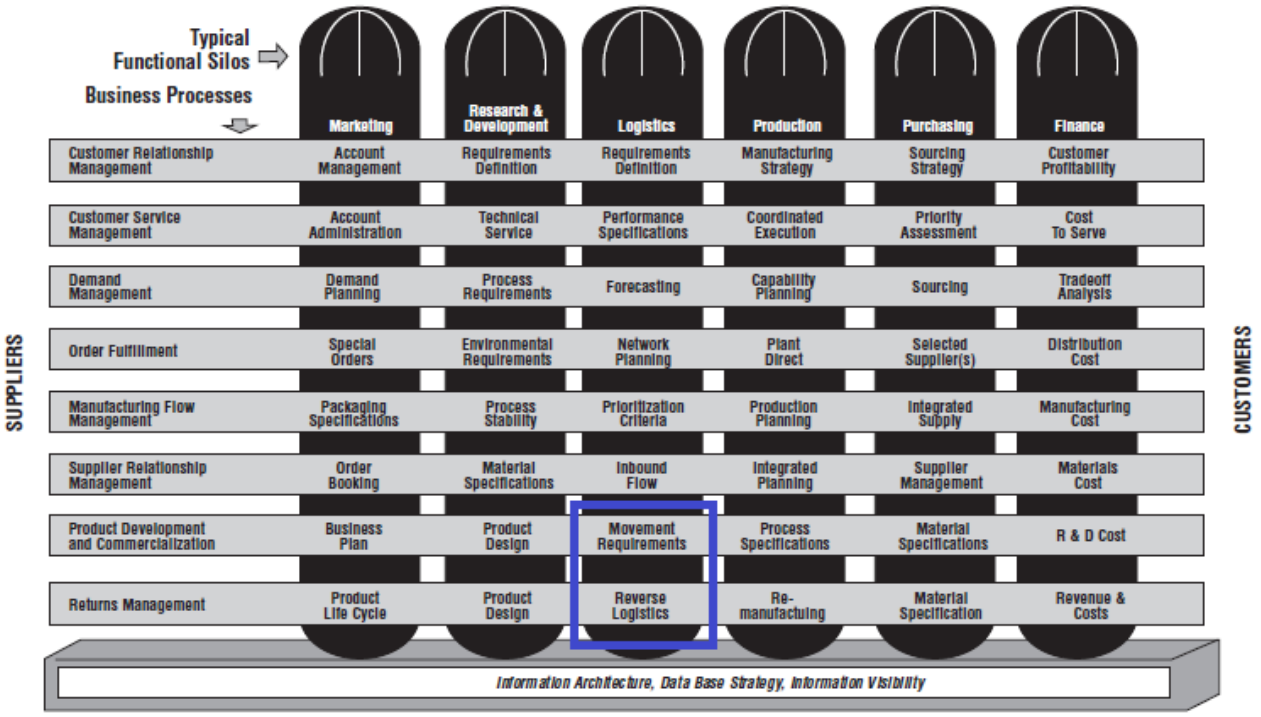

Figure 4.2: Framework returns management (Rogers et al., 2001)

4.1.2 Strategic and operational sub-processes

Effective returns management is a critical part of supply chain management. Many firms neglect the returns process, because management does not believe its importance (Rogers & Tibben-Lembke, 2001). This process can assist the firm in achieving a sustainable competitive advantage. Effective management of the returns process enables the firm to identify productivity improvement opportunities and breakthrough projects.

For every business process showed in Figure 4.2, Rogers & Tibben-Lembke (2001) made a model with strategic sub-processes, operational sub-processes, and the relationships of these sub processes with other business processes. For the returns management, the model is shown in Figure 4.3. The next sections discuss the strategic sub processes and operational sub processes.

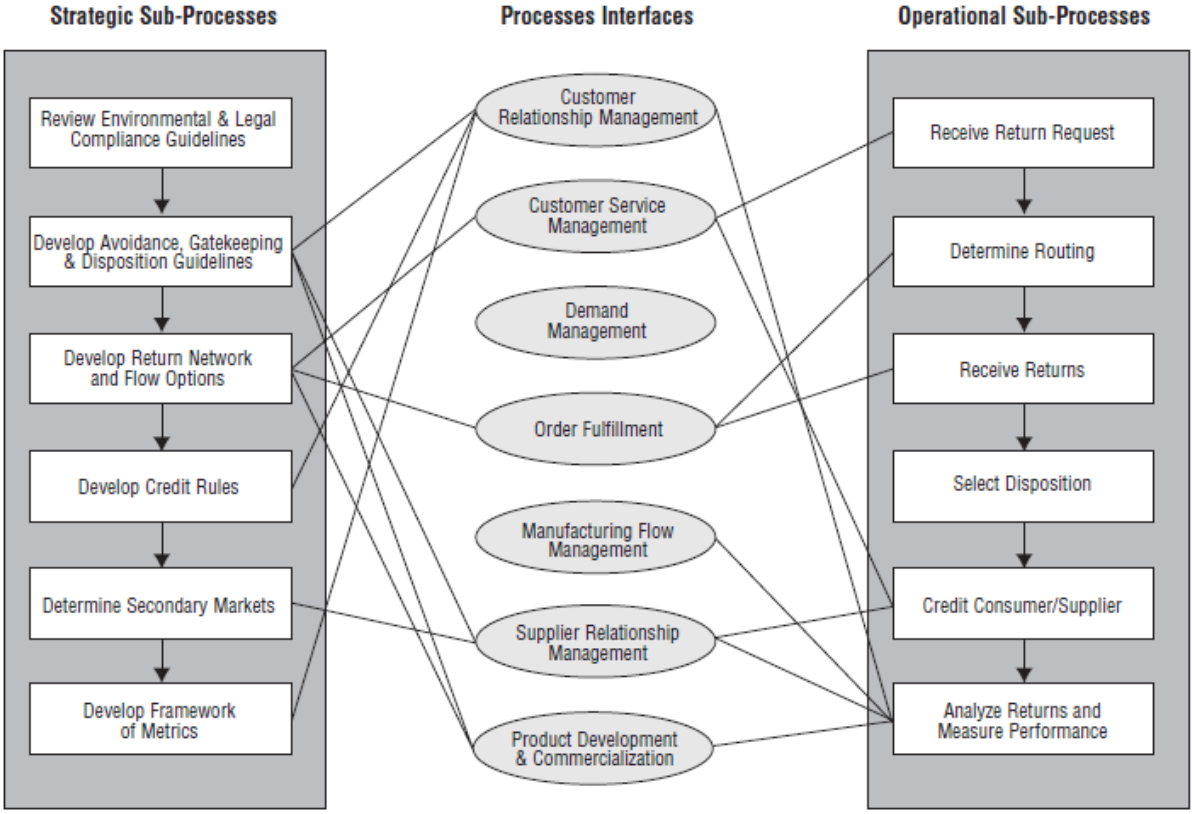

Figure 4.3: Returns management (Rogers et al., 2001)

Strategic sub processes

An interesting sub process is the develop avoidance, gatekeeping, and disposition guidelines (see Figure 4.3). The returns avoidance means manufacturing and selling the product in a manner such that returns are minimized. This avoidance can be derived from improved quality or better instructions to the consumer as to how to properly operate the product. Gatekeeping is the screening of defective and unwarranted returned merchandise at the entry point into the reverse logistics process (Rogers & Tibben-Lembke, 1998).

Improved gatekeeping is a critical factor in making the entire reverse flow manageable and efficient (Rogers et al., 2001). It assures that only products that should be returned to a specific point in the returns network are indeed returned to that point. Disposition guidelines define as clearly as possible the returned items ultimate destiny. Typical disposition options include return to supplier, refurbish or remanufacture, recycle, and landfill. The company can examine potential secondary markets including Internet-based auctions or retailers that specialize in returned goods or “seconds”.

Another interesting sub process is the development of return network and flow options. During this stage, the company develops plans for transporting and holding returned products until they reach their final disposition. For some firms, products may be routed to central returns centers where returned items are consolidated and examined. The company also determines what transportation programs the firm will employ. Developing the returns network requires input from customer service management, order fulfillment, and supplier relationship management (Rogers et al., 2001).

Operational sub processes

At the operational level, the returns process is about managing the day-to-day return activities. These processes describe the received return request, routing in the organization, the received returns, the selection of disposition, the credit to customers, and analyzing the returns. The last activity should be used in the ongoing strategic returns process to help develop avoidance guidelines.

4.1.3 Organizational environment for product returns

Returns Management Inc. (2011) made a model about organizational environment for product returns. Their goal is to make profit from returns. The goal of maximum value can be stated in many forms. However, business executives can drive the results to either provide highest profitability or lowest cost based on their own situational needs.

The complexity of the returns process is not simply the physical return flow of products, but includes the interactions within the business arena needed to manage and properly account for the returned product as illustrated in Figure 4.4. Returns management opportunities can be further impacted by visibly managing the conflicts that arise due to differing departmental goals and priorities (Returns Management Inc, 2011). Third party suppliers can be enlisted in this effort, for example, carriers and 3PL providers can provide visibility to the returns channel when the company cannot.

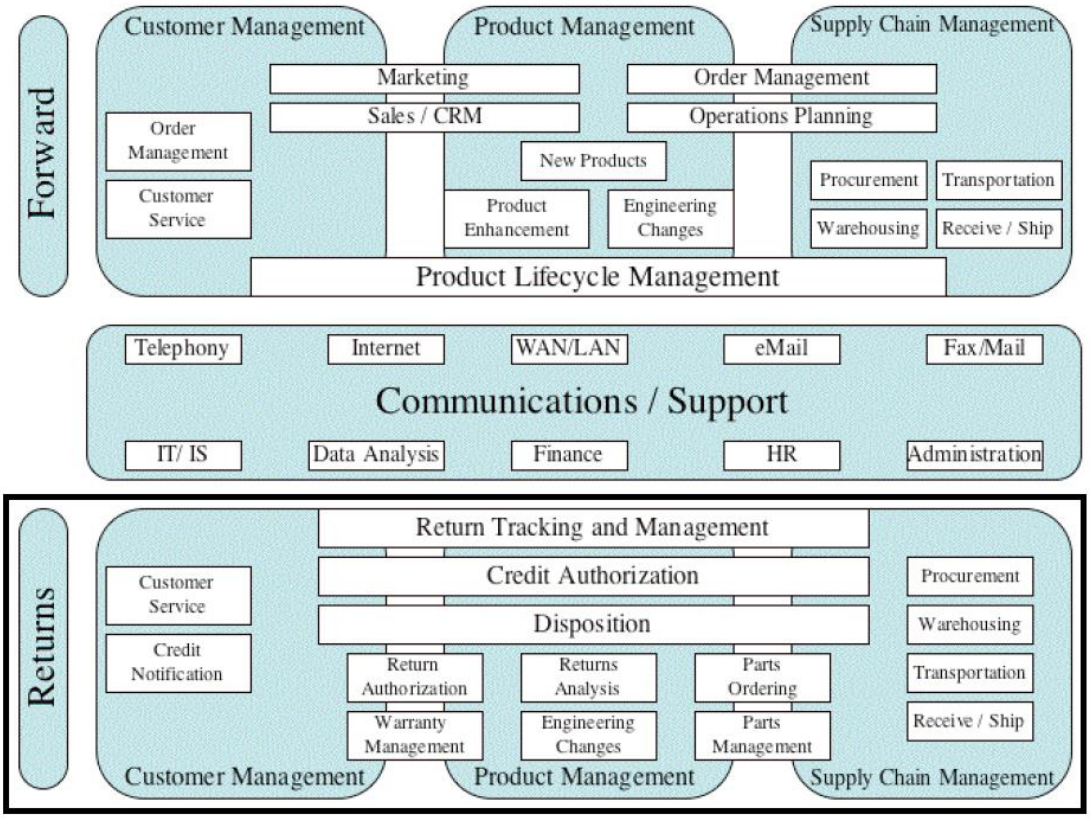

Figure 4.4: Organizational environment for product returns (Returns Management Inc, 2011).

4.1.4 Customer satisfaction

Customer dissatisfaction can arise due to poor performance of the purchased item and/or the quality of warranty service provided by the manufacturer (Murthy, Solem, & Roren, 2002). In both cases, this results in a negative impact on the overall business performance. This could be either due to the dissatisfied customers switching to a competitor or loosing potential new customers due to negative word-of-mouth effect.

There are several dimensions to service quality and many of these are intangible and can vary significantly from customer to customer (Murthy, Solem, & Roren, 2002). However, other dimensions are more tangible and can be objectively assessed. These include response time to attend to a warranty claim, the time for rectify a failed item, delays resulting from lack of spars, workshop resources etc. Through effective warranty logistics the negative impacts resulting from these can be minimized.

Amini and Retzalff-Roberts (1999) state that proper management of warranty logistics is needed not only to reduce the warranty servicing cost but also to ensure customer satisfaction. The authors state that customer dissatisfaction has a negative impact on sales and revenue. They suggest that reduction in cycle time of providing refunds and exchanges to customers as a way of enhancing customer service quality.

Giuntini (2007) mentions that companies need to make it easier to return goods by providing adequate return packaging and simplifying administrative activities, pictorial documentation and return transportation. The company can also visit the customers to educate them on importance of timely returns or trigger them to want to return the products. The company should emphasis that they want the products back and do not want to invoice the customer for no returned materials.

4.1.5 Quality information

Quality and reliability are important for Remeha. Petkova, Yuan, Ion & Sander (2004) did research about information flow structure that facilitates fast feedback from product users. They conclude that field feedback is an essential tool for product improvement.

Brombacher (1999) developed an analysis that verifies the deployment of the information via techniques like Maturity Index of Reliability (MIR) in order to guarantee that the generated information really reflects the business processes as operated by the company. The MIR concept was developed for assessing the maturity of reliability management in the business processes of organizations developing high volume consumer products.

Brombacher (1999) uses this method to measure the quality of the reliability control loop of the organizations developing and operating a product. He made four different levels for this:

1. Quantification: the business process is able to generate quantitative information, on a per product basis, indicating the number of failures in field and production.
2. Identification: the business process is able to determine the primary and secondary location of failures:
    - Primary (organization): location of the cause of the failure within the business process (Development, Production, Operation etc.).
    - Secondary (position): location of the failure within the product (Hardware, Software).
3. Cause: the business process is able to generate a detailed information for all dominant failures on root cause level. This can be translated into repairs/modifications in current products and anticipated risks for future products.

4. Improvement: the business process is able to learn from the past in installing business processes and working methods to anticipate reliability risks for future products and eliminate these risks as part of a new product creation.

Looking at the situation at Remeha, they belong in level 4. Remeha is not only able to learn from previous events in such a manner that possible differences between prediction and actual performance are well controlled, but is also able to continuously adapt their business in such a manner that they anticipate on potential problems. For example: Quality information is collected and an investigation is started if the failure rate is too high. This is investigated for the root cause and modifications are done through the R&D management department.

4.1.6 Corporate social responsibility

Reverse logistics is a direct manner to decrease environmental and social impact. By managing returns a company can react to challenges facing social environmental impacts.

To decrease the environmental and social impact, green logistics comes into focus. Green logistics is defined as efforts to measure and minimize the environmental impact of logistics activities (Rogers & Tibben-Lembke, 2001). There are many activities to which both reverse logistics and green logistics can be applied. An activity such as packaging reduction could be included in green logistics, but not in reverse logistics. Figure 4.5 shows the differences and similarities between green logistics and reverse logistics.

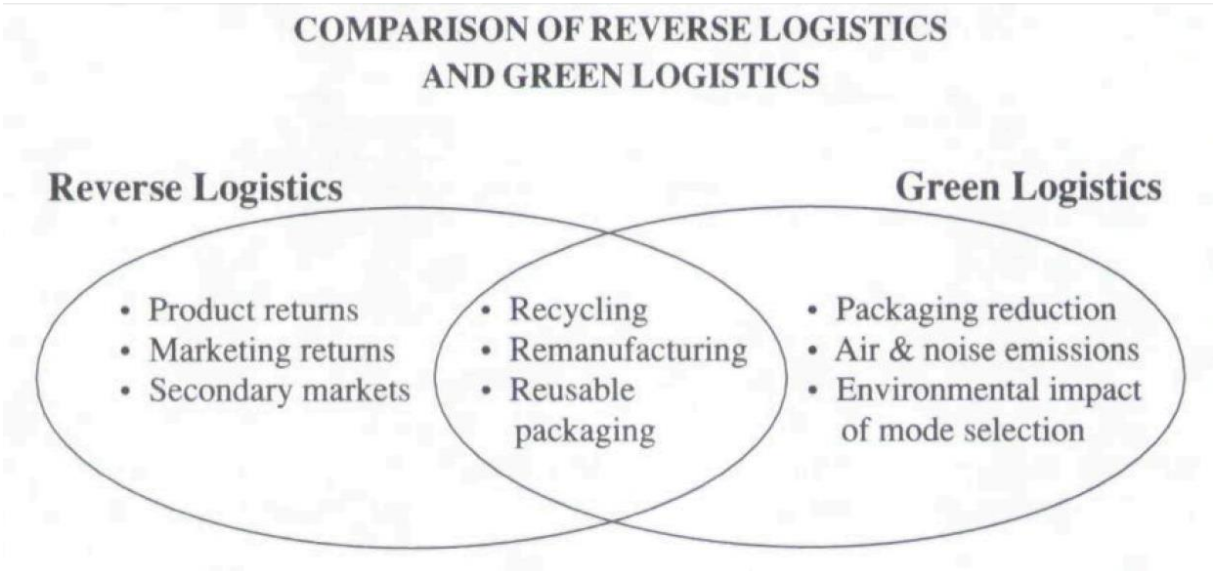

Figure 4.5: Comparison of reverse logistics and green logistics (Rogers & Tibben-Lembke, 2001)

4.1.7 Warranty logistics

Warranty logistics deal with all issues related to warranty servicing. As mentioned earlier, warranty logistics does not only have a significant impact on the warranty servicing cost but also on customer satisfaction. Proper management of warranty logistics is very critical for business survival and success (Murthy, Solem, & Roren, 2002).

The authors mentioned several issues, using the three levels of decision making (strategic, tactical, and operational):

- Strategic:
  - The number of service centers and their location.
  - The capacity and manning for each service center (to ensure desired response time for customer satisfaction).

    - Whether to own these centers or outsource them so that the service is carries out by independent agents.
- Tactical and operational issues:
    1. Transportation of the material needed for warranty servicing.
    2. Spare parts inventory management.
    3. Scheduling of jobs.
    4. Optimal repair/replace decisions.

Murthy, Solem & Roren (2002) also discussed several other issues of importance in the context of product warranty logistics:

1. Customer satisfaction
2. Dispute resolution
3. Use of loaners
4. Product recall
5. Data collection and analysis

The strategic, tactical, and operational issues together with the five issues mentioned above are the main challenges facing operations researchers within the area of warranty logistics.

4.1.8 Metrics for reverse supply chains

In this section a distinction is made between customer satisfaction, process, and cost performance indicators.

Customer satisfaction performance indicators

Amini & Retzlaff-Roberts (1999) had the objective of enhancing customer service quality. They use the following indicators for continuously improving the return process:

1. Cycle time of customer receipt of refund or exchange.
2. Convenience of sending a return. The time involved in returning an item and the cost involved of a returned item are part of this.

Process performance indicators

Yellepeddi (2006) propose a methodology for evaluating the performance of reverse supply chains in consumer electronics industry. The author formulated the following performance measures (Table 4.1) for the reverse supply chain:

Performance Measure Classification	**Performance measure**
Gatekeeping	Value of returns entering Reverse Supply Chain (RSC) per unit of time (RV) Gate keeping effectiveness (GE)
Sorting and storing	Warehousing effectiveness (WE) Carrying cost performance of returns in a Centralized Return Centers (CRC) per unit of time (RC)
Asset recovery	Recovery Efficiency (RE) Recovery Rate (RR) Environmental Conformance Effectiveness (EE)
Transportation	Overall vehicle effectiveness (VE) Return good total transit time (RT)

Table 4.1: Performance measures for reverse supply chain (Yellepeddi, 2006).

Cost performance indicators

The cost performance indicators are adopted from the cost elements determined by Tibben-Lembke & Rogers (2002). These authors compared the forward and reverse supply chain. The relevant costs for Remeha are:

1. Transportation costs involved in returning an item.
2. Inventory costs involved in returning an item.
3. Sorting, quality diagnosis costs involved in returning an item.
4. Handling costs involved in returning an item.

4.2 Return processes at other companies

In this section we look at return processes at other companies. Section 4.2.1 provides a return process at a apparel organization, Section 4.2.2 provides return policies in the automotive industry and Section 4.2.3 provides return policies in the electronic industry.

4.2.1 Apparel

Amini and Retzlaff-Roberts (1999) provide an overview of the various types of reverse logistics and describes a reverse logistics reengineering study for a major direct marketer of apparel and other goods. The primary objective of the study is to enhance customer service quality by reducing the cycle time of providing refunds and exchanges to customers. A secondary objective is to enhance the internal efficiency of processing returned items.

The authors propose the innovation of the shipping time that is removed from the customer transaction by having customers call first and use a scannable postage-paid label. Customers first call to indicate what they are returning and specify the details of the desired exchange or refund. The return label would have been provided with the order. When the carrier receives the package, the label is scanned and the information is transmitted to the direct marketer. This allows the information to be separated from the merchandise at a much earlier point in time so that the customer transaction can be completed without the delay of waiting for the package to arrive.

When the package arrives at the returns center all that remains is to reconcile the transaction and do the usual merchandise preparation. Information on the scannable label would allow the package to be sorted prior to opening it, based on the product line.

Customer cycle times are substantially reduced for customers who use the new process, due to removing the delay of shipping time from the customer to the returns center. Customers who use a credit card can receive credit in only a few days. For other customers, who request a check or exchange, the cycle time involves an additional three or four days due to the need to ship or mail the request to the customer. These reduced customer cycle times along with the postage paid return label represent a significant increase in customer service.

Results from a simulation model showed that reengineering of the returns center would indeed improve efficiency and productivity and would require only about 65% of the current staffing level.

4.2.2 Automotive

Looking at the return policies in the automobile industry, we see some differences. Ford has a return policy that includes nearly all parts above a specific value. These parts are sent back to Ford regardless their condition. At Volvo the dealer has to sort and inspect the goods before they are sent back to Volvo, if the product is not maintained or not cleaned properly the dealer gets a penalty (Khalil & Olofsson, 2008).

Daugherty, Richey & Hudgens (2003) show that when relationship commitment between manufacturer and customer is high, important benefits accrue in terms of customer relations and economics. By working to develop both trust and relationship commitment, firms could reap big rewards. For example: if both trust and relationship commitment are present, it could be that the manufacturing firms would have to do less monitoring. Less monitoring of returns means fewer resources would need to be committed. Significant resources in the form of time and money could be saved. An equally important consideration is reverse logistics cycle time for customers. With close, positive relationships founded on trust and mutual commitment, it might be possible to streamline or reduce steps and time involved in returns authorizations. Customers could immediately get returns back into the system. The reverse logistics goal of value reclamation could be accomplished faster.

Working to develop trust and longer-term commitment is likely to impact customer satisfaction for two reasons. First, a positive climate is created. Second, as stated previously, overall reverse logistics performance improves.

4.2.3 Electronics

Krikke, Kokkinaki & Van Nunen (2003) illustrate their work about IT-application with real life case studies. The features for handling the return flows that stands out in the solution followed by Philips DAP is that (i) no separate logistics infrastructure is created for returns (although dedicated departments are created), returns are integrated in the forward flows and (ii) following the control of the forward flow, returns are handled centrally.

Kulkarni, Parlikad, McFarlane & Harrison (2005) examine the benefits of information provided by RFID systems in decision-making during product recovery stages and consequently, in product recovery management as a whole. Networked RFID systems can provide an automated and efficient approach for capturing and delivering complete item level product information in an accurate and timely manner thereby bringing both decision as well as process improvements during product recovery stages. Advantage is that the information is provided in an early stage, so decisions can be made fast.

4.3 Conclusion

We found that effective returns management is a critical part of supply chain management. This process can assist the firm in achieving a sustainable competitive advantage. There are several strategic processes determined for the return process. The returns avoidance means manufacturing and selling the product in a manner such that returns are minimized. This avoidance can be derived from improved quality or better instructions to the consumer as to how to properly operate the product. If such a climate can be created, a continuous improvement cycle can be determined.

Improved gatekeeping is a critical factor in making the entire reverse flow manageable and efficient. It assures that only products that should be returned to a specific point in the returns network are indeed returned to that point. This process also has attention in this research, because the goal is to support the customer with the return flow.

Proper management of warranty logistics is needed not only to reduce the warranty servicing cost but also to ensure customer satisfaction as customer dissatisfaction has a negative impact on sales and revenue. A reduction in cycle time of providing refunds and exchanges to customers is a way of enhancing customer service quality. The company needs to make it easier to return goods by providing adequate return packaging and simplifying administrative activities, pictorial documentation, and return transportation (Giuntini, 2007).

The Maturity Index of Reliability (MIR) is used to analyze the quality information. We found that Remeha is not only able to learn from previous events in such a manner that possible differences between prediction and actual performance are well controlled, but is also able to continuously adapt their business in such a manner that potential problems will be anticipated.

Corporate Social Responsibility (CSR) is also an aspect to take into account. This can be done with the concept of green logistics. There are many activities to which both reverse logistics and green logistics can be applied. An activity such as packaging reduction is only included in green logistics to enhance CSR.

In the benchmark we saw an example of cycle time reduction due to removing the delay of shipping time from the customer to the returns center. In the automotive industry companies apply policies based on value and inspection of the parts at the dealer. Usage of the forward flow for returns and RFID technology are used for the return process in the electronic industry.

5 Analysis of the different customers and parts

In literature we found that improved gatekeeping is a critical factor in making the entire reverse flow manageable and efficient. It assures that only products that should be returned to a specific point in the returns network are indeed returned to that point. This chapter provides an analysis to investigate if gatekeeping is possible at Remeha. The analysis also includes the origin of the parts.

We do an analysis based on all the returns in 2013. The returns are provided in an Excel file with in total XXX lines with all the part characteristics, such as customer, defect, warranty etcetera. First we need to filter this data, because there are returns that are not relevant in this project. Section 5.1 describes this selection briefly. Section 5.2 provides an analysis about the defect parts in the boiler and Section 5.3 provides an analysis about returning parts from export partners. Section 5.4 provides an analysis about the external customers. The last section in this chapter, Section 5.5, provides a stakeholder analysis.

5.1 Filter settings

In the pivot tables we filter on the following settings:

- Group: We are only interested in field returns. There are also returns from the production line, but these parts have not reached the customer.
- Code: We filter the returns in the Netherlands and from export partners, these parts are coming from the customer. Parts also come back from production, Service (own service engineers), and the transport company Beekman.
- Good stock: We do not want good stock (parts that go back to the warehouse), so we filter them out.
- Reason defect: There are many options, such as defect warranty, new, not ordered, rebuilt, wrongly delivered etcetera. We are only interested in the parts with the reason defect warranty. This is the most frequent reason for defects.

If we filter with these settings, we have XXX returns left to analyze with a total cost price of € XXX.XX.

5.2 Analysis parts boiler

The different defect parts in the boiler are analyzed in this section. We first analyze the parts that are returned frequently to get an indication of the return rates and what value it has. The actions done with the parts are analyzed afterwards.

5.2.1 Parts in general

We are interested in the parts that are often returned and the value of these parts to see what the division is of the defect parts. The top 10 parts that are returned is (Table 5.1):

Table is not available in the public version of this report.

There are in total 852 parts in the list. Doing a Pareto analysis, we see that 7.6% of the parts have 80% of the returns. A Pareto graph is shown in Figure 5.1, the parts with five returns or less are out of the figure.

Graph is not available in the public version of this report.

With the Pareto analysis, we can conclude that a small number of parts have a high number of returns.

5.2.2 Scrapped parts

If we want to avoid unnecessary returns (gatekeeping, see section 4.1), we first need to know what is done with the parts. If parts are returned to the vendor, they need to come back. Scrapped parts are under certain circumstances candidate to not come back to Remeha. The fifteen parts that are scrapped most frequently are selected (see Table 5.2). The top 15 is as follows:

Table is not available in the public version of this report.

We can see that there exist parts where it is not by definition necessary to send it back to Remeha. For these parts the wholesalers and service providers did much effort, however, Remeha only registers the part.

Running example: Part X
Out of the analysis we can also see that many Part X have no value for Remeha. Remeha gives longer warranty than the vendor and the problem of the part is solved. So these parts are scrapped.

5.3 Returning parts from export partners

In Section 2.4 we found a high variety (between three and fifty days) in cycle times for returns from export partners. The relation between the received and handled goods per month is shown in Table 5.3. If the received goods are ascending, the cycle time increases. When there are some months with less received goods, the backlog can be handled. After that the cycle time is low (see the months October, November, and December in Table 5.3).

The received goods varies much in quantity per month (in March 1212 parts and in September 322 parts). This is due to the reactive form of receiving goods. The export partner often decides when they send the warranty goods. If several export partners send warranty goods in the same week, the cycle time is high.

Table is not available in the public version of this report.

In Table 5.4 the shipments are shown from the fourteen export partners with the highest number of returns. The mean number of returns, max number of returns, and number of shipments are shown. The mean number of returns varies much in quantity per export partner. Customer X and Y send shipments with many returns. The RTG department needs on average two weeks to handle the shipments from Customer X. If there are shipments just after a shipment with many parts, the cycle time is high.

It is desired that the mean number of returns are lower for some export partners and that the received goods are more balanced. Advantages are that the cycle time will be shorter and it is easier to determine the required capacity at the RTG department.

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5.4 Analysis external customers

Remeha has external customers in the Netherlands and Europe. We distinguish between national and export customers, because the customers are very different. The national customers are often wholesalers and service providers, while the export customers are intercompany/Remeha/OEM. In Figure 5.2, we can see the origin of the returning goods.

Graph is not available in the public version of this report.

5.4.1 Customers in the Netherlands

In the Netherlands are in general two types of customers: wholesalers and service providers. The top 10 customers that have returns in the Netherlands is shown in Table 5.5.

Table is not available in the public version of this report.

We see that two wholesalers are the largest customers for Remeha in the case of returns, but there are also a lot of large service providers. Looking at the division of wholesalers and service providers, we see that XX% of the returns come from wholesalers and XX% from service providers (see Figure 2.1). Keep in mind that the numbers from the wholesalers are combined data. Large service providers, such like Customer X, are not in the list, because they manage their returns via wholesaler X. The reasons for direct sending returns or via the wholesaler are not known. This should be investigated using customer interviews.

The Pareto analysis shows that 19.2% of the customers have 80% of the returns. We can conclude that a small number of customers have a high number of returns. In Figure 5.3 a Pareto graph is shown, customers with five returns or less are out of the graph.

Graph is not available in the public version of this report.

5.4.2 Export partners

There are in total XX export customers. This is in comparison with the Netherlands (XX customers) a small number. The biggest customers are (Table 5.6):

Table is not available in the public version of this report.

These five customers (XX%) have XX% of the total export returns. The behavior of export customers to sending the parts back is totally different from national customers (see Section 5.3).

5.5 Stakeholder analysis

In this section we describe the stakeholder analysis. With this analysis we identify the different stakeholders and their position. In the second section we describe the stakeholders in our case and what type they are.

5.5.1 Description analysis

We want to know who the important customers are for Remeha regarded to the return process. With this information, we can weigh the different wishes from the different stakeholders. We use the stakeholder analysis of Mitchell et al. (1997). The definition of a stakeholder is: *any group or individual who can affect or is affected by the achievement of the organization's objectives* (Freeman, 1984).

Classes of stakeholders are identified by the following attributes:

- The stakeholder's power to influence the firm (the probability that one actor within a social relationship would be in a position to carry out his own will despite resistance (Weber, 1947)) .
- The legitimacy of the stakeholder's relationship with the firm (a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions (Suchman, 1995)).
- The urgency of the stakeholder's claim on the firm which needs to meet two conditions:
    - A relationship or claim must be time-sensitive.
    - A relationship or claim must be important to the firm (Mitchell, Agle, & Wood, 1997).

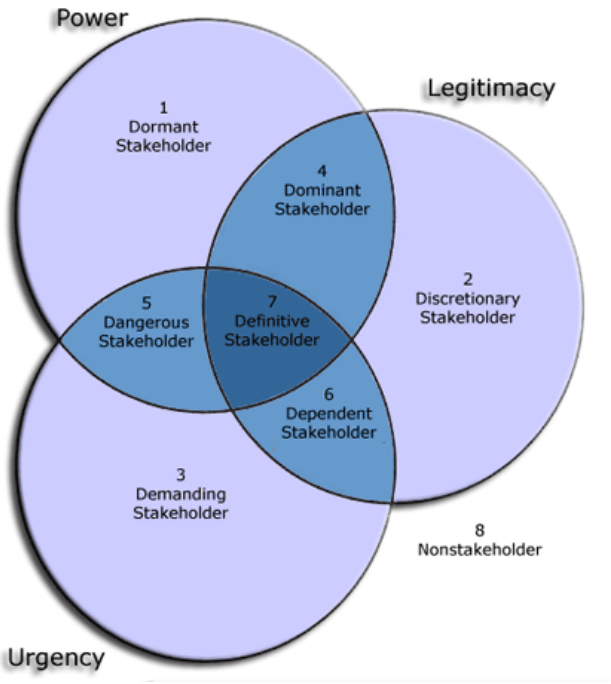

Figure 5.4: Stakeholder analysis (Mitchell, Agle, & Wood, 1997)

In Figure 5.4 we show a graphical overview of the possible states of the relation between a stakeholder and the organization.

We call stakeholders in the areas 1, 2 and 3 latent stakeholders, they only have one of the three attributes. We call stakeholders in the areas 4, 5 and 6 expectant stakeholders, they have two of the three attributes. We call stakeholders in area 7 definitive stakeholders, because they have all three attributes.

The attributes of a stakeholder can change; therefore a stakeholder analysis must be carried out periodically.

5.5.2 Stakeholders return process

Many stakeholders are involved with the return process. In total there are eight internal departments and five external customers involved with the return process. We describe all of them and determine their position.

Logistics department

Logistics unload the returns and store them in case of multiple pallets. They cannot decide what comes back to Remeha, so they have no power. They have the attribute legitimacy, because the actions to unload are desirable. It is also time sensitive, because the truck cannot wait too long, but this is not an important relationship. We can conclude that this department is a discretionary stakeholder.

They have no preference to unload pallets or single packages, both have a low workload.

RTG department

The RTG department is a definitive stakeholder. They decide for some export partners which parts they want back and they decide what will be done with defect parts. The actions that they do are desirable, proper and time sensitive for the internal and external customers.

This department wants as less as possible useless parts. This means that they want no parts that cannot be claimed by the vendor and/or parts that have no learning aspect anymore. They also have interest in batches (pallets) from wholesalers instead of single packages from service providers. This has less administration work for the RTG department.

Service department

Service has the attributes legitimacy and urgency, because their actions are necessary and time sensitive for the customer. Their power is limited, because many cases are standard (VB12 list). They only deal with exceptions. We can conclude that the service department is a dependent stakeholder.

This department will serve the customer as good as possible. They want good information from the RTG department to make the best possible decisions.

Administration department

Just like the service department, the administration activities are necessary and time sensitive for the customer, because customers want their credit note as soon as possible. They have no power regarded to the defect returns.

The interest of this department is that they want as less as possible credit documents and control activities to credit the right price. This can be achieved when the service providers send the defect parts to the wholesalers and administration can send one credit to the wholesaler.

Financially it is more attractive to credit a wholesaler than a service provider (with a purchase receipt), because Remeha refund the price that is paid by the customer (with evidence).

Quality department

This department has power when a certain part fails more than expected in a certain time. They have the power to ask these parts back for investigation. The other actions are not legislate or urgent. So this is a dormant stakeholder.

This department is only interested in defect parts where a certain problem occurs. From the other parts, they want to know how often a part fails.

Sales department

The sales department gets many calls from wholesalers and service providers about the return process of defect parts. These calls are not desirable for this department, because these kinds of questions should be answered at the service department. The attribute legitimacy is not present. The relationship of this department with the external customers and return process is time sensitive and important for Remeha. Therefore the urgency attribute is present. Overall the department is a demanding stakeholder.

Just like the service department, this department wants to serve the customers as good as possible.

R&D management department

The R&D management department has an indirect link with returning goods, because they take actions when the quality department gives them input about bad quality of parts. They have no attributes, so it is in this case a non-stakeholder.

The interest of this department is to get good and relevant information from the quality department to improve certain parts with the vendor or change assembly activities.

Spare parts department

The spare parts department manages the spare parts for the wholesalers and updates the VB12 list. Every week this list is updated with the links between the material reference and the set part reference (this part will be credited). These activities are desired for the whole process and this department has therefore the attribute legitimacy. It is a time sensitive and important relationship, because they need to take care for fast delivery to the customers. They cannot take decisions about the return process, only for the delivery of spare parts. Therefore this department is a dependent stakeholder.

The different customers of Remeha

A distinction is made between the different external customers in the Netherlands and export countries (see Section 5.3). But in this stakeholder analysis they have the same attributes, namely power, legitimacy, and urgency. Power, because if the customer has a request, Remeha tries to comply with that request. The customers also send the defect parts back to Remeha, this is a desired action and therefore they have the attribute legitimacy. The attribute urgency is present, because the customers want as soon as possible the credit. So it is an important relationship, because the parts are owned by the customer. The customers can be formulated as definitive stakeholders.

The general interest for the customers is that they receive a credit note for the defect parts in the warranty period as soon as possible. The specific wishes and interest per customer group is described in Chapter 6.

5.5.3 Overview stakeholders

To summarize the stakeholder analysis, in Table 5.1 all stakeholders are mentioned, their attributes and the type of stakeholder.

Stakeholder	Attributes			Type
	Power	Legitimacy	Urgency	
Logistics department		x		Discretionary stakeholder
RTG department	x	x	x	Definitive stakeholder
Service department		x	x	Dependent stakeholder
Administration department		x	x	Dependent stakeholder
Quality department	x			Dormant stakeholder
Sales department			x	Demanding stakeholder
R&D management department				Non-stakeholder
Spare parts department		x	x	Dependent stakeholder
Wholesalers in the Netherlands	x	x	x	Definitive stakeholder
Large service providers in the Netherlands	x	x	x	Definitive stakeholder
Small service providers in the Netherlands	x	x	x	Definitive stakeholder
Intercompany/Remeha/OEM	x	x	x	Definitive stakeholder

Table 5.1: Type stakeholders

6 Customer interviews

In literature we found that proper management of warranty logistics is needed not only to reduce the warranty servicing cost but also to ensure customer satisfaction as customer dissatisfaction has a negative impact on sales and revenue. Customer interviews are used to investigate the elements that are important for customer satisfaction.

Giuntini (2007) states that a reduction in cycle time of providing refunds and exchanges to customers is a way of enhancing customer service quality. The company needs to make it easier to return goods by providing adequate return packaging and simplifying administrative activities, pictorial documentation, and return transportation. These elements are included in the questionnaire. The interviews provide the elements that are experienced as important for the different customers.

Section 6.1 provides the structure of the questionnaire and the customer selection to gather relevant field information. Section 6.2 provides the conclusions and findings of the customer interviews. If more information is desired, Section 6.3 to 6.5 provides more detailed information. Section 6.6 provides a discussion part.

6.1 Data gathering method and customer selection

This section provides the structure of the questionnaire used for the interviews and the customer selection to gather representative field information.

6.1.1 Structure questionnaire

Interviews are conducted with external customers to gather relevant data from the field. A questionnaire is used as guidance for these interviews. The questionnaire is completed by the customer at a later moment to get the details about their experience and expectations. The questionnaire is build up in several parts. The first part is to gather general information about the company, employee interviewed and their function. The second part is about the strategy of the company and specific for the return process. The parts after that are based on the Customer Relationship Management (CRM) framework of Chen and Popovich (2003). They state that CRM is a combination of people, processes, and technology that seeks to understand the customers of the company. These three elements are part in the questionnaire. The last part is about future expectations. The questionnaires for the wholesalers and service providers are provided in Appendix B and C.

6.1.2 Customer selection

Several interviews are done with representative customers to gather relevant field information. The interviews are done with:

- The two largest wholesalers (X. and Y, see Table 5.5).
- Large service providers. From these service providers information is gathered about the reasons why service providers return their parts directly to Remeha or via a wholesaler. Differences between these providers are investigated to know their experiences and expectations.
- Small service providers. In this group is no categorization. Some service providers can be random selected to gather information about the experiences and expectations in this group.
- An export partner. The opinion of Customer X is assessed.

With these interviews representative information is expected to know what the market want to improve the return process. Nine customers are in total interviewed. Five of the ten customers (see Table 5.5) with the most returns are interviewed to know the experiences and expectations from customers that are highly involved with the return process.

Customer	Number interviewed
Wholesaler	2
Large service provider	3
Small service provider	3
Export partner	1

Table 6.1: Customers interviewed

6.2 Summary findings customer interviews

To summarize the customer interviews, in Table 6.2 the interest, experience, and expectations are given per customer group. If more information is desired, Section 6.3 provides detailed information about the opinion of the wholesalers, Section 6.4 provides the opinion of service providers, and Section 6.5 provides the opinion of an export partner.

Customer	Interest	Experience	Expectations
Wholesaler	• Serve the service providers as good as possible. • Minimize cost for this service. • Want to sell a new spare part to the service provider.	• Credit in time. • Good information back.	• Fast handling of the warranty parts. • Process as efficient as possible.
Large service provider	• Fast handling of return process. • Minimize cost for this process.	• Credit in time. • Pay period long. • Redelivery late. • Good contact point.	• Process as efficient as possible. • Link standard fees with corresponding part.
Small service provider	• As simple as possible process.	• Credit in time. • Dislike invoice after credit. • Rejections of same part not linked with reference.	• Simple procedure with less administration activities.
Export partner	• Short cycle time. • Good analyses from defect parts.	• Devious (with unnecessary returns). • Long period to present analysis to customer.	• Faster and more efficient handling of returns.

Table 6.2: Conclusions and findings from the customer interviews

6.3 Wholesalers opinion

This information is not available in the public version of this report.

6.4 Service providers opinion

This information is not available in the public version of this report.

6.4.1 Large service providers

This information is not available in the public version of this report.

6.4.2 Small service providers

This information is not available in the public version of this report.

6.5 Export partners opinion

This information is not available in the public version of this report.

6.6 Discussion

Valuable field information is gathered with the customer interviews. The interviews are useful to involve the customers with the improvement of the return process, because the Voice of the Customer (VOC) is heard. With this information a Unique Selling Point (USP) can be created. The information is input for the new policy plan to improve the customer intimacy. This is the basis to improve the customer relationships and to grow as organization. Chapter 7 provides elaborations for the policy plan to fulfill as much as possible the VOC.

We found in the interviews that CSR has low priority for the customers. Only Customer X mentioned this aspect as important.

7 Possible policy elaborations

With the customer interviews, we found barriers and preferences of the external customers. Now all the information is available to compose possible policy elaborations. These elaborations are provided in this chapter. Section 7.1 provides the positioning of the policy plan in the Remeha strategy house, Section 7.2 provides the desired situation, and Section 7.3 to Section 7.5 provides elaborations for the policy plan. The last section, Section 7.6 provides some conclusions.

7.1 Positioning in the Remeha strategy house

First the policy plan is positioned in the Remeha strategy house (Figure 7.1). The policy plan should contribute to excel in the base Customer Value Proposition. The policy plan should also improve the pillar Efficiency strategy and the base motivated employees. A strategy roadmap is developed to achieve the goals for the coming years. This roadmap is shown in Appendix D. The policy plan should contribute in the following goals (in order of importance):

- Customer intimacy, CSR, Voice of the Customer, Branding (base Customer Value Proposition).
- Optimize the processes and efficiencies. Leader in Lean Management and leader in Excellence. Increase productivity and optimize group synergies (pillar Efficiency Strategy).
- Efficient ICT support (base Motivated Employees).

Figure 7.1: Remeha strategy house

The objectives for the return policy plan are described in Figure 7.2. The objectives in the figure are derived from the desired situation described in Section 3.1. The objectives are ranked in order of importance.

Objectives:	Higher customer satisfaction
	More efficient process
	Higher product quality
	Higher Corporate Social Responsibility

Figure 7.2: Objectives policy plan

Section 7.2 provides the desired situation to achieve the objectives. The elements that should be included in the policy plan are discussed after the desired situation.

7.2 Desired situation

The objectives in Figure 7.2 are the starting point to compose a policy plan. Figure 7.3 shows the requirements to achieve the objectives (marked boxes A-E in Figure 7.3). The requirements are derived from the customer interviews (Table 6.2) and observations gathered in this research.

The figure also shows the relationships between the objectives and the required elements in the policy plan. How the objectives can be achieved is discussed below:

Higher customer satisfaction

More efficiency in the supply chain, fast refund decision, link between the standard fees with the corresponding part, and a simple process ensure that the customer satisfaction increases (Figure 7.3). These goals are findings using the customer interviews (Table 6.2). A reduction of returning goods is the most important requirement for more efficiency in the supply chain. This is possible with a gatekeeping model. The model ensures a reduction of unnecessary returns. The gatekeeping model needs input, therefore data sharing in the supply chain is required.

Pro-active management of returns is needed to reduce the cycle time for returns from export partners. The model should give points in time that the export partners can send the defect parts to Remeha.

More efficient process at Remeha

A more efficient process at Remeha can be achieved with less administration activities, less storage, and less handling activities at Remeha. A gatekeeping model and data sharing in the supply chain are required to achieve these goals.

Higher product quality

Higher product quality is possible with better quality information. Unnecessary returns must be avoided to achieve this goal. Gatekeeping can be applied to avoid unnecessary returns. The RTG employees have more time to analyze critical parts in that situation. The information quality increases with more analyzing time. If such a climate can be created, a continuous improvement cycle can be determined.

Higher Corporate Social Responsibility

Less transport and less packaging are required to enhance CSR. Again, the gatekeeping model can be applied to reduce the number of returns.

Requirements

Five requirements to achieve the objectives are marked (boxes A-D) in Figure 7.3:

a) Pro-active management of returns.
b) Gatekeeping model.
c) Data sharing in the supply chain.
d) Link standard fees with corresponding part (especially for large service providers).
e) Simple procedure.

The boxes A to C should be elaborate in the best possible way to achieve the objectives. The boxes D and E are criteria that should be met. The requirements A to C are discussed in Section 7.3 to Section 7.5.

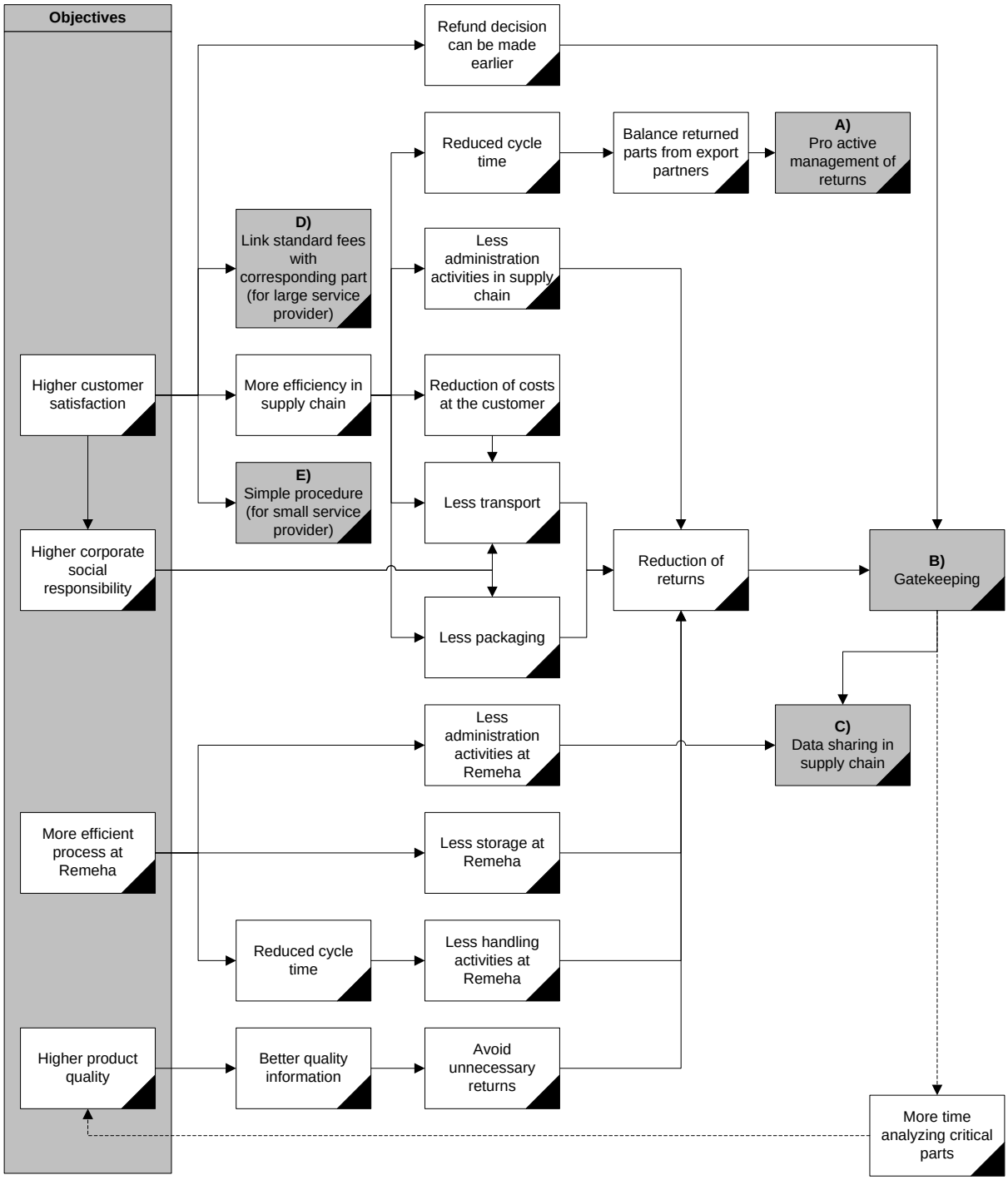

Figure 7.3: Desired situation. The arrows show how a goal can be achieved.

7.3 Proactive management of returns

In warehousing theory exist a model to find the minimum storage capacity needed in a warehouse. The goal is to decrease the peaks in total inventory by receiving orders at different moments in time (Hall, 1988). This results in a smaller storage capacity required (see Figure 7.4).

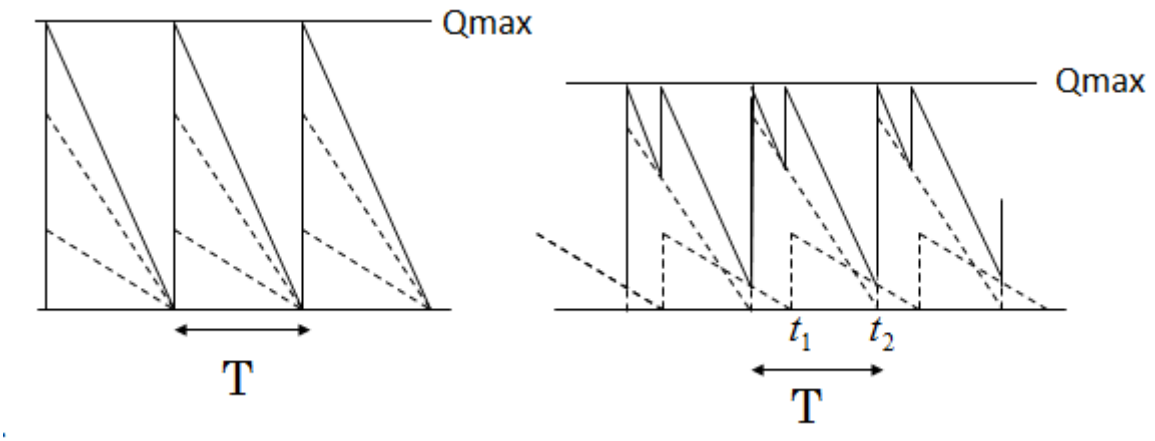

Figure 7.4: Decrease peaks due to spread deliveries

This model is useful to manage the export returns proactive, because receiving orders at different moments in time results in decreased peaks. The model assumptions are:

- Order frequencies of all *m* items are equal (once every T days).
- Demand for item *i* is constant and amounts to D_i items a day.

When the restrictions are fulfilled, the optimal delivery dates are: $t_i = T \cdot \frac{D_1 + \ldots + D_i}{D_1 + \ldots + D_m} \quad i = 1, \ldots, m$.

The intuitive logic for this formula is that the inventory levels after each delivery must be equal. The trade-off in this model is between high inventory costs due to peaks and high ordering costs in case of more frequent deliveries. The corresponding maximum inventory level for the optimal strategy is:

$$Q_{\max} = \sum_{i=1}^{m} D_i \cdot t_i = \frac{\sum_{i=1}^{m} \sum_{j=1}^{i} D_i \cdot D_j}{\sum_{i=1}^{m} D_i} \cdot T .$$

The model is used for the export partners with the most returns, because these shipments cause the unbalance. This means that the seven export partners with the most returns are included in the model.

Determining T

The interval T (see Figure 7.4) is determined with the mean number of shipments of these seven export partners, because we want no increase in the number of shipments. The mean number of shipments for these seven export partners is 12.57 shipments per year. With the assumption of 230 workings days per year, we get a T of 18.29 days. For simplicity, this T is round up to 20 days, such that there is one shipment per month.

Determining D_i

The demands (D_i) can be determined using a data sharing method. The number of returns are in that case known per export partner per month. This can be transformed to the mean number of returns per day (D_i). The export partners get the message when the parts are retrieved at the beginning of the month.

It takes time to develop a data sharing method, so in the beginning data should be gathered in another way. Historical data can be used until the data sharing method operates. The D_i is based on

the number of returns per export partner per year. This can be transformed to the mean number of returns per day (D_i). A numerical example is given below:

Numerical example
T : 20 days
Q_{max} : 404

Table is not available in the public version of this report.

The model gives that the returns from Customer X should be retrieved at the fourth working day of the month, that the returns from Customer Y should be retrieved at the eighth working day of the month etcetera. With this approach the receiving goods from these export partners are balanced.

Cycle time

The cycle time (CT) can be calculated with Little's law: $CycleTime = \frac{WorkIn\,\mathrm{Pr}\,ocess}{Throughput}$. The work in process (WIP) and throughput (TH) should be determined. The Q_{max} is taken as the work in process. This is a worst case scenario, because the Q_{max} is the highest possible WIP (see Figure 7.4). The throughput is determined as the total number of returns per year divided by the total number of working days per year (39.9 parts per day).

All the export partners are included in the model for a fair comparison between the current and new situation. The Q_{max} is 448.4 parts in that case. Based on Little's law, the cycle time is: $CT = \frac{448.4}{39.9} = 11.2 \text{ days}$ (based on all the returns from export partners in 2013). The cycle time was factually 20.92 (see Section 2.4). The model reduces the cycle time with 46.5%. The retrieval model for returns ensures that the cycle time is within the stated norm (14 days).

7.4 Gatekeeping model and control

We introduce in the first part a gatekeeping model that avoids unnecessary returns from customers. The second part is about the control of the process. This means that the gatekeeping process is proofed for (large) cases of fraud (multi warranty requests for one part).

7.4.1 Gatekeeping model

As mentioned in the literature chapter (Chapter 4), improved gatekeeping is a critical factor in making the entire reverse flow manageable and efficient. The gatekeeping requirement also has a central position in the desired situation shown in Figure 7.3. Gatekeeping assures that only products that should be returned to a specific point in the returns network are indeed returned to that point.

The gatekeeping model developed for Remaha is a decision tree that needs input from the service provider, wholesaler, or export partner (see Figure 7.5). With this information, the model gives answer if the part qualifies for warranty (Yes/No/Investigation decision) and the model can give answer if the part needs back to Remeha (Yes/No decision). The decision is dependent on:

1. Installation date/production date.
2. Spare part number.
3. Defect reason.
4. Failure rates.
5. Vendor guarantee periods.
6. Agreements about return to vendor.

7. Manual request related to quality information.
8. Parts lenient list.
9. Price list.

The gatekeeping model can be used by wholesalers, service providers, and export partners to avoid unnecessary returns. The model needs to be programmed in an environment such that it can be used by the customers and such that Remeha can receive quality information.

7.4.2 Gatekeeping control methods

The gatekeeping model needs a control element to avoid (large) cases of fraud. An illustration for possible fraud is: a service provider claims warranty for a part that Remeha does not need back. Certain time later, the same service provider can claim warranty for the same part where this service provider already received a credit. A control element is necessary to avoid this. The control can be done with several methods. The options are discussed in the next sections.

Check on location

A control option is to check the parts on location. If a service provider or wholesaler has warranty parts, a technical engineer of Remeha checks and marks the parts. If everything is correct, the parts can be scrapped.

Random check on location

Another option is the random check on location. This should be done by a technical engineer of Remeha. A penalty can be given and/or more checks can be done if a random check is not correct.

Random reclaim batches

Random reclaim of batches is another option for control. If a service provider or wholesaler has warranty parts, a batch is random recalled. Just like the random check on location, a penalty can be given and/or more checks can be done if a random check is not correct.

Visualization control

The last option as control method is visualization. A service provider or wholesaler can make a photo of the warranty parts that are marked. If this photo is sent, Remeha controls the process.

Evaluation

The evaluation is done from the customer, Remeha, and CSR perspective.

Customer perspective

From the customer perspective, the check on location and random check on location are most desired. Unnecessary returns are scrapped early in the supply chain with these methods. The customer has the advantage that transport for these parts are avoided and that the customer has fast a credit note for these parts.

The reclaim of batches reduces the advantage of avoiding unnecessary returns and a penalty element is needed in cases of fraud. The customer does not like a penalty and a discussion can start (this also applies for the random check on location). The visualization method has the disadvantage that the customers are required to make good photos.

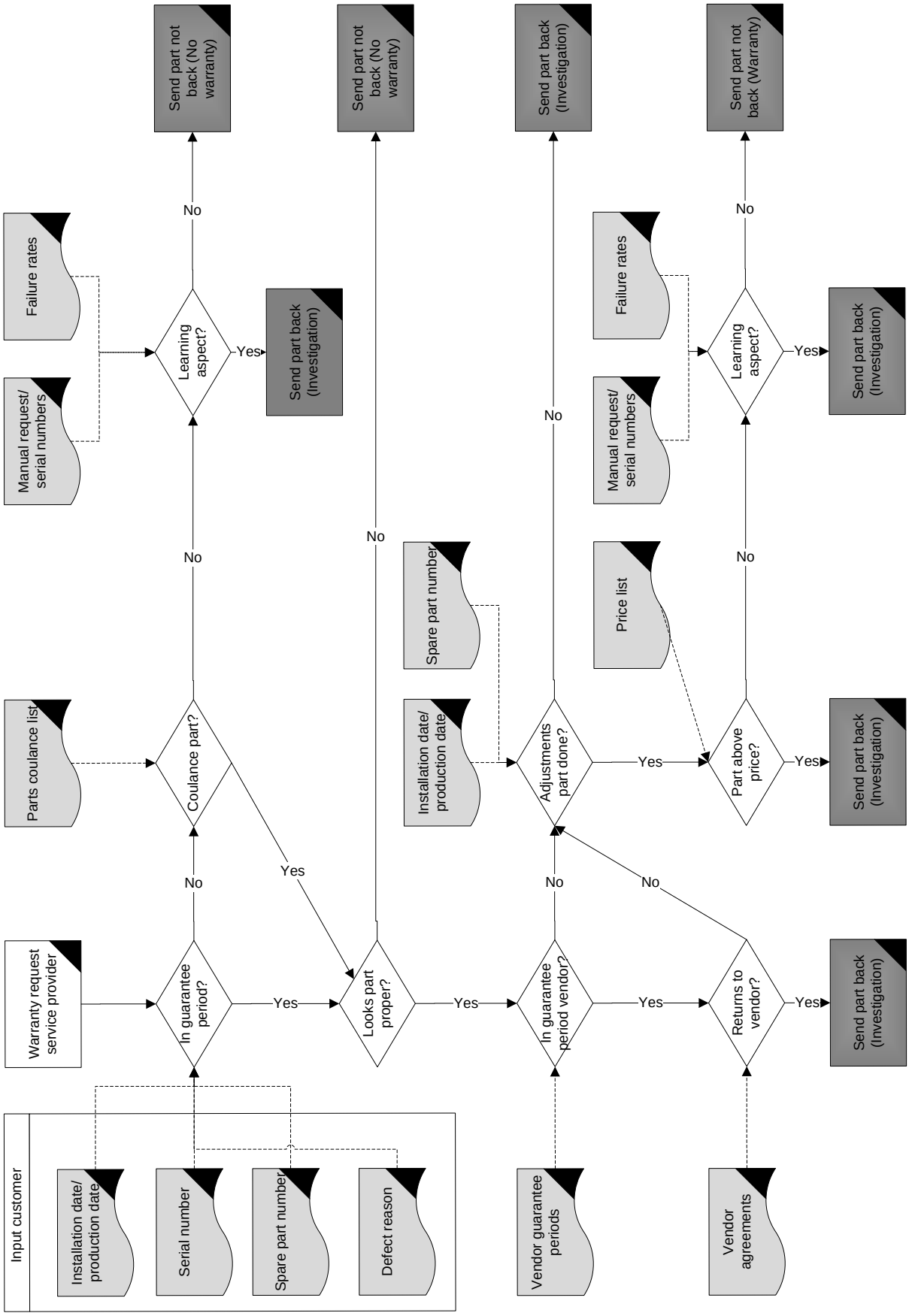

Figure 7.5: Gatekeeping model

Remeha perspective
The check on location means that a technical engineer travels to the customer. When the gatekeeping model is available for more customers, the technical engineer needs to travel more, but in that case several customers can be visit in one route. Another advantage is that customer visits are good for customer relationships. The customers can be updated with the latest information.

The random check on location reduces the travel time, but also reduces the control element. Remeha does not see all the parts physically anymore. The random reclaim of batches has the disadvantage that Remeha gets batches with unnecessary returns back and this results in more handling activities. The visualization method has the disadvantage that the photos can be vague and that it is difficult to judge the photos.

CSR perspective
From the CSR perspective, the check on location results in more CO_2 emission on one hand, because of the travel visits of the technical engineer. On the other hand it reduces the CO_2 emission, because there is no transport of unnecessary returns. The random check on location is in this perspective a better option. The random reclaim of batches results in CO_2 emission for the transport of batches with unnecessary returns to Remeha. The visualization control is in this perspective the best option, because this option has no CO_2 emission from travelling and no CO_2 emission from the transport of unnecessary returns.

Evaluation
The method check on location is in the beginning the best method, because the customer perspective is the most important perspective. The RTG employees also prefer the check on location method in the beginning. The companies know what Remeha wants and what the RTG department feels as important. It is also good for the customer relationships. If the companies do a good job with the warranty parts, this can be replaced for random check on location. This is a better option in the CSR perspective.

7.5 Data sharing methods

This section provides alternatives for data sharing. First the concept of Product Data Management (PDM) is discussed. After that, the data sharing methods Electronic Data Interchange (EDI), Radio Frequency Identification (RFID), Near Field Communication (NFC), and Data Matrix codes are discussed.

Product Data Management (PDM)
Product Data Management (PDM) systems aim to capture, process, and disseminate product data during the product's entire lifecycle, in which it goes through different configuration and condition stages (Krikke, Kokkinaki, & Van Nunen, 2003). Usually such information is generated by various supply chain players. More specifically, PDM systems:

- Maintain accurate data on complex products (many parts, variants, alternatives).
- Record maintenance changes on a product during its lifecycle.
- Disseminate product at an intra-organizational level.

PDM systems include data on:

- Product or process definition (Bill of Material, Engineering Change Order, and Order Processing).
- Control information (location, access, maintenance records).
- Configuration management data (version number, release level, upgrades).

The system can be arranged in different ways dependent on the process and the required information. In Section 7.5.1 to 7.5.4 different data sharing methods are discussed. The pros and cons are given per method.

7.5.1 Electronic Data Interchange (EDI)

Inter-organizational computer networks support the exchange of computer stored information across organizational boundaries. These linkages have been referred to as Inter-Organizational Systems (IOSs) (Cash & Konsynski, 1985). Electronic Data Interchange (EDI) is a subset of IOSs and refers to the exchange of business documents between organizations in a computer readable, structured, and standard format (Wright, 1991). EDI refers to exchanges where the content and format of data transferred conforms to established standards and enables and electronic means of conducting business transactions (Hart & Saunders, 1997).

Researchers have claimed that inter-organizational systems using EDI, e-mail, etc., lead to vertical information integration between trading partners along the value chain. By improving the accuracy and timeliness of information exchanged over manual methods. EDI is believed to significantly change how organizations conduct business with their suppliers and customers.

Mukhupadhyay, Kekre & Kalathur (1995) study the estimated benefits of improved information exchanges between Chrysler and its suppliers that result from using EDI. The major benefits of the EDI system at Chrysler can be divided into two categories. First, improved information exchanges between Chrysler and its suppliers because of EDI may lead to cost savings. Second, preparing and processing documents electronically should also lead to savings over the manual mode. These savings accrue primarily from reduced personnel cost and lower transmission charges.

Benjamin, De Long & Scott Morton (1990) did research about the competitive advantage of using EDI. They conclude that the existence of standards will continue to be the fundamental factor. Another important factor is the organization's ability to manage the changes in structure and work processes that must attend the implementation of this technology. Hart and Saunders (1997) found that power and trust are critical factors in the adoption and use of EDI.

Remeha has some experience with EDI. They use this system for sales orders to the wholesaler X. Also an EDI system is started with the wholesalers Y and Z for order confirmations. However, this process proceeds poorly.

It should be possible to add return orders instead of sales orders to this system. Disadvantage of this system is that every customer needs to buy the EDI system. For the wholesalers that use the technology, the standards for the system should be determined, because every customer uses this system in a different way. This can cause organizational changes. But if the standards are determined, the customer can share the data with Remeha without a duplication of administration activities.

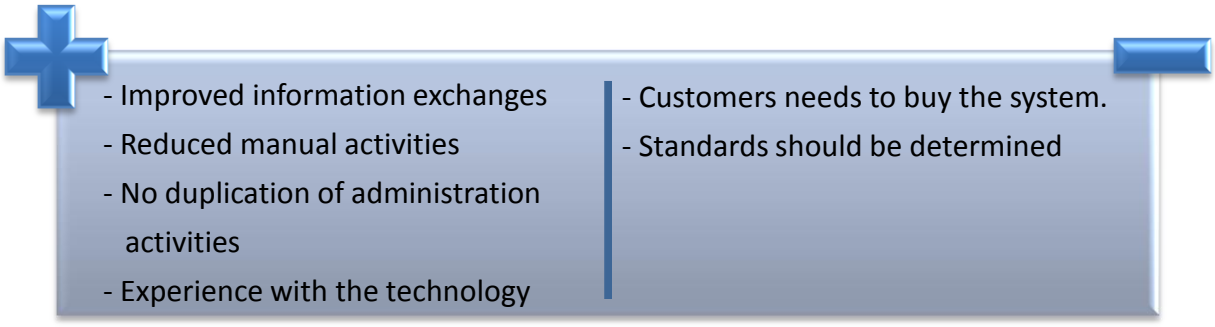

Figure 7.6: Pros and cons Electronic Data Interchange (EDI)

7.5.2 Radio frequency identification (RFID)

RFID is a generic technology concept that refers to the use of radio waves to identify objects. RFID tags have both a microchip and an antenna. The microchip is used to store object information such as a unique serial number. The antenna enables the microchip to transmit object information to a reader, which transforms the information on the RFID tag to a format understandable by computers (Angeles, 2005).

RFID is part of a range of technologies (such as barcodes, biometrics, machine vision, magnetic stripe, optical card readers, voice recognition, smart cards, etc.) used for automated data collection to augment enterprise resource planning (ERP) (Gupta, 2000). The RFID is considered a significant improvement over the conventional barcode, which needs to be read by scanners in line of sight fashion and can be stripped away if the paper product labels get ripped or damaged. RFID can also facilitate inter-organizational E-commerce initiatives such as continuous replenishment or vendor-managed inventories (Smaros & Holmstrom, 2000).

An advantage of RFID is that no administration activities are needed, because all the data is in the chip. The service engineer does not need to collect data about the part and neither does the wholesaler. A big disadvantage is that every part needs a RFID chip, but only a small fraction of the parts come back. This means that a high fraction of the RFID chips in the parts has no function in the return process and are scrapped after their life time. Other issues are privacy issues and chemical waste. Remeha does not have any experience with RFID at the moment.

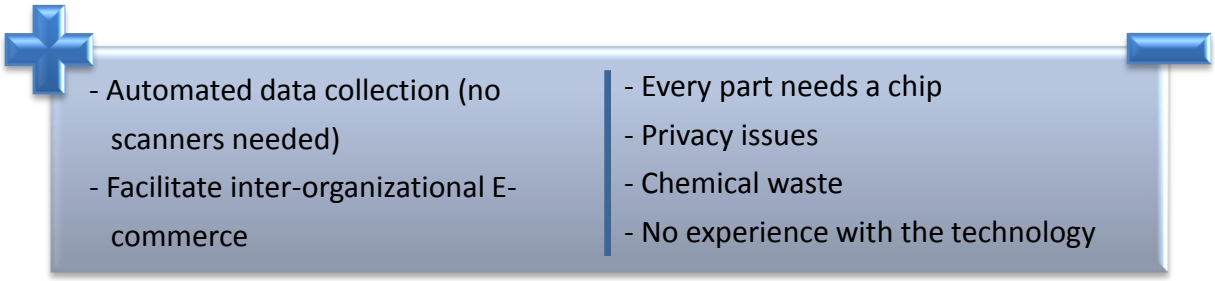

Figure 7.7: Pros and cons Radio Frequency Identification (RFID)

7.5.3 Near field Communication (NFC)

Near Field Communication (NFC) is a technology for contactless short-range communication. Based on the Radio Frequency Identification (RFID), it uses magnetic field induction to enable communication between electronic devices. The number of short-range applications for NFC technology is growing continuously, appearing in all areas of life. Especially the use in conjunction with mobile phones offers great opportunities (Field, 2012).

One of the main goals of NFC has been to make the benefits of short-range contactless communications available to consumers globally. The existing radio frequency (RF) technology base has so far been driven by various business needs, such as logistics and item tracking.

NFC devices can send and receive data simultaneously. So this technology has a very bright future scope. Since it is a new technology, NFC enabled mobile users need to be educated on how it will work for them to make payment or exchange any information. But there is a requirement of a protected infrastructure for NFC technology so that it could be widely adopted all over the world. This technology has several advantages over other wireless technology because it provides bidirectional communication for exchanging information (Sharma, Gusain, & Kumar, 2013).

Just as the RFID technology, NFC has the advantage that no administration activities are needed, because all the data is in the chip. The bidirectional communication is an advantage compared with

RFID. Disadvantage is that every part requires a chip. Another disadvantage is that the technology is relative new and especially used by mobile devices, but NFC technology is being grown up at enormous speed (Sharma, Gusain, & Kumar, 2013).

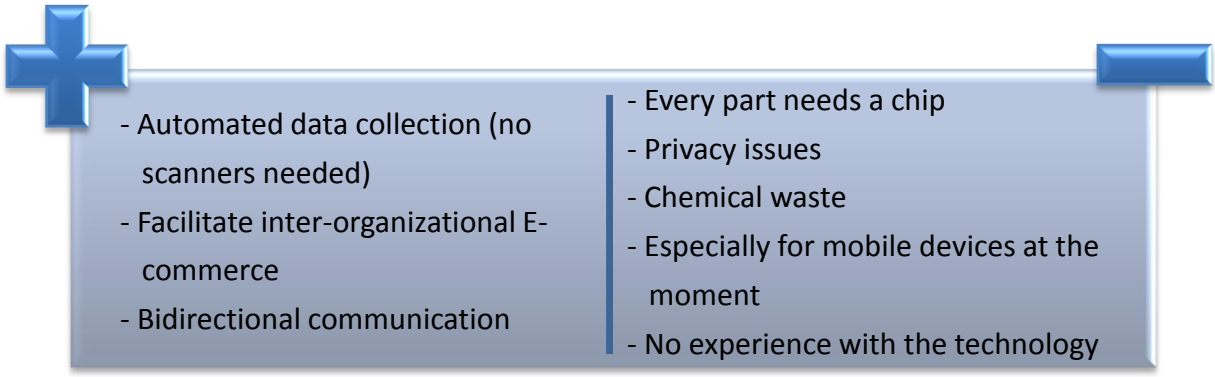

Figure 7.8: Pros and cons Near Field Communication (NFC)

7.5.4 Data Matrix codes

The barcode is a sort of remark composed by a series of bar and space arranged regularly and corresponding character who can be recognized by person's eye. It indicates certain information. In the barcode, if the number combination is different, the width of bar and space will change, thus indicate certain information. We link artificially a bar code with a sort of goods, the one-to-one relationship come into being between the bar code and the goods, so we can obtain goods information through quick scanning bar code, thus the efficiency of managing goods can be improved (Hong-Ying, 2009).

There are several types of barcodes. Traditional barcoding is coupled with the Universal Product Code (UPC) and every day accounts for billions of scans all over the world. Within the Auto-ID family, a new Data Matrix system of coding has evolved which allows barcodes to hold more data than the traditional method. Product data is encoded in both horizontal and vertical dimensions and, as more data is encoded, the size of the barcode can be increased in both the horizontal and vertical directions thus maintaining a manageable shape for easy scanning and product packaging specifications (Shaked, Levy, Baharavl, & Yen, 2007).

Remeha has experience with the Data Matrix system. This technology is at the moment used in the assembly process of the boilers. This two-dimensional barcode covers four different parts of data. Advantage of this system is that the administration activities at Remeha are strongly reduced. Disadvantage is that the service provider should administrate it and this is a duplication of work if this service provider also needs to administrate it in their own system.

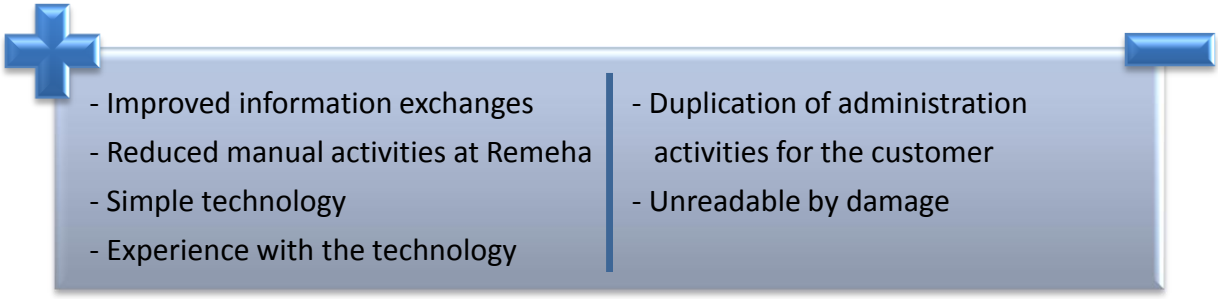

Figure 7.9: Pros and cons Data Matrix codes

7.6 Summary

This chapter provides possible policy elaborations to achieve the stated objectives. The requirements to achieve the objectives for the policy plan are shown in Figure 7.10. Customer satisfaction is the most important objective.

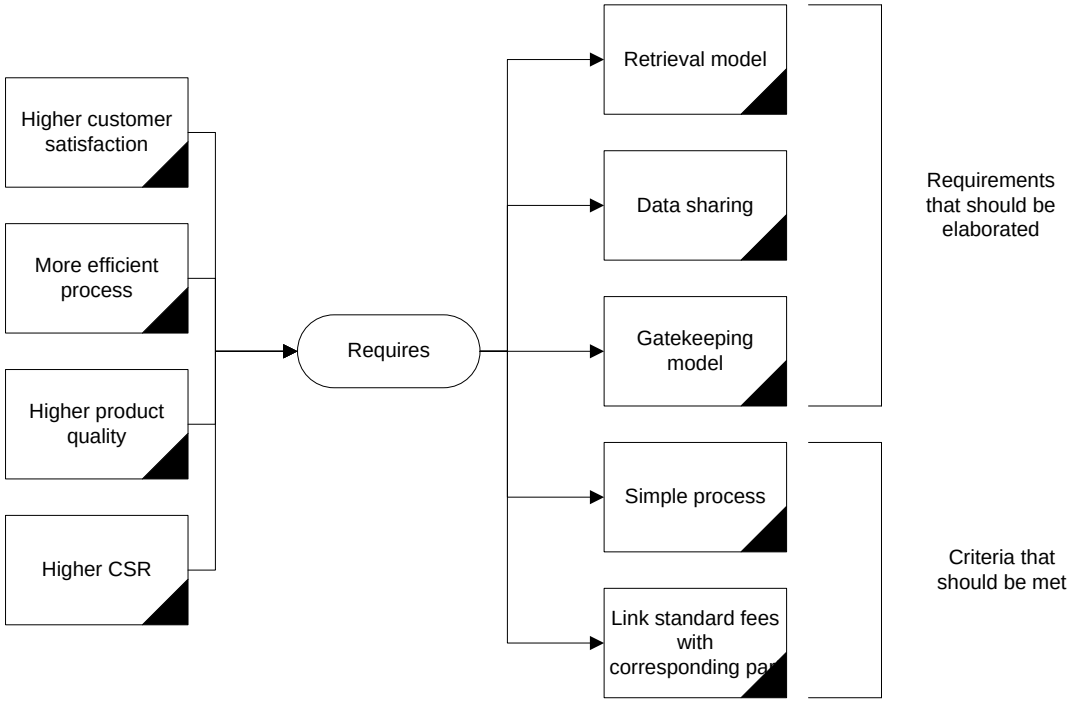

Figure 7.10: Requirements for the policy plan

We found an inventory model from the warehouse theory to decrease the peaks of returns from export partners. This decreases the cycle time for export partners. A gatekeeping model is developed to avoid unnecessary returns. This model ensures a higher customer satisfaction and a more efficient process. These methods can be used for the coming years.

A number of data sharing methods are discussed to give input for the gatekeeping model and to achieve a more efficient return process. An adequate method for this is dependent on the development of the technologies and other goals Remeha has. As for example NFC is growing fast and Remeha can use it for several objectives, this is also interesting to use it for the return process.

As mentioned earlier, this chapter provides possible policy elaborations. In the next chapter the future developments and the internal process at Remeha are taken into account.

8 Policy plan and implementation

In Chapter 7 we discussed possible policy elaborations to achieve the desired situation. However, the main research question is to compose a policy plan taken into account the internal process at Remeha. This chapter provides an adequate policy to improve the return process for the different external customers regarding customer satisfaction, quality information, transportation cost, packaging cost, administration activities, and in relation with corporate social responsibility (CSR).

Section 8.1 provides the future developments, Section 8.2 provides possibilities with the future developments, and Section 8.3 is about customer segmentation to fulfill the expectations from the customers as much as possible. Section 8.4 provides the business case for the policy plan. In the last section, Section 8.5, provides the implementation plan.

8.1 Future developments

Remeha develops a new website with a login application. The Return Material Authorization (RMA) module is a part of this website. The RMA module is part of the process of returning a product in order to receive a refund, replacement, or repair during the product's warranty period. The owner of the product must contact the manufacturer (or distributor or retailer) to obtain authorization to return the product or part. The resulting RMA number must be displayed on or included in the returned product's packaging, no returns are accepted without this number.

8.2 Possibilities with future developments

The new RMA module proposes possibilities for the return process. In the RMA module a process can be designed. With the login application for customers (wholesalers/service providers/export partners) segmentation is possible. The RMA module proposes possibilities for the gatekeeping model and Data Matrix technology. The module with these features can be described as an intelligent web application.

Gatekeeping model

After the log in, the customer fills in a form with the required information or import an Excel file (see Table 8.1). This is a method for data sharing, because Remeha uses the information from the customer. The RMA module with these features is a universal solution. Every customer can use the module.

The input for the web application is based on the required information for the gatekeeping model. The model answers if the part qualifies for warranty (Yes/No/Investigation decision) and the model can answers if the part needs back to Remeha (Yes/No decision). The gatekeeping decision is based on the gatekeeping model in Section 7.4.1.

Input customer					*Output*	*Output (option)*
Spare part number	**Serial number**	**Installation date**	**Reference**	**Reason defect**	**Warranty**	**Back to Remeha**
S100006	2005511187222	08.09.2005	000001	Leakage (01)	**YES**	**NO**
S100812	2013090012767	03.04.2013	732458	Mechanical noise (05)	**Investigation**	**YES**

Import Excel file Send

Table 8.1: Input and output RMA module based on the gatekeeping model

Running example: Part X
Part X with problem X is one of the parts that does not need to go back to Remeha. This part is registered by the service provider and can be scrapped after the company visit. A day after the registration the company gets the credit note of the parts that do not need back to Remeha.

This reduces the transport cost to Remeha (and the wholesaler when present), the administration activities at the wholesaler when present, and the administration and handling activities at Remeha. A day after registration the customer gets the credit note instead of after warranty procedure.

Data matrix codes

When the service provider registered the parts, the service provider can print the form with customer information and part information in data matrices. The data matrix scanners take over the administrate activities at Remeha. Instead of manual import of information, the data matrices enter the information in Z-Return (module in SAP) using Data Matrix scanners.

This means that Z-Return is leading for the data matrix technology. The matrices should include the information that is required in Z-Return. Z-Return has a part about customer information in the header and a part about part information below. This means that the data matrix technology should also include two different parts (matrices): one with the customer information and one with the part information.

Returning goods to Remeha

Name	: Dekker Warmtetechniek
Customer number	: 120852
Group	: YFIELD
Code	: CRNL
Reference	: BEVERLAND

Spare part number	Material	Serial number	Reference	Installation date	Reason defect	Request	Code
s100812	PUMP	1005308461330	114789	10/12/2013	Does not turn	Credit	
s100812	PUMP	1005308461330		08/07/2013	Does not turn	Credit	

Figure 8.1: Visualization RMA form with data matrices

In Figure 8.1 a visualization form is shown. The top right data matrix includes the customer information. In the table below the data matrices include the part information.

The process is summarized in Figure 8.2.

Figure 8.2: Proposed process for returning goods

Formulated criteria

Two criteria are formulated in chapter 7: Link between standard fees with the corresponding part and a simple process. With the login application in the new website, it is possible to link the standard

fees with the corresponding part for the customers that have a special arrangement with Remeha. When the customer registers a part, the credit is based on the standard fee and the price of the part.

The procedure is also simple for the customers. The feature to import an Excel file avoids multiple administration activities. It is especially for the customers with many returns an effective tool. The Excel file comes often from the ERP system of the customer. A condition is that the Excel file should have a fixed format.

The number of input fields is minimized and the customers do not need to give customer information every time. This reduces complexity and therefore fulfills a desire from small service providers.

8.3 Customer segmentation

The main research question is to create the best policy to improve the return process for the different external customers. Customer segmentation is needed to achieve the goal of creating the best return process for the different customers. There are two reasons for customer segmentation:

- The situation and desires of the customers are different (see Table 6.2).
- It is not desired for Remeha that all the customers use the gatekeeping model. Reasons are the customer visits needed for the check on location to avoid cases of fraud with the gatekeeping model and disposal arrangements should be made. This arrangement is needed to know where the defect parts are scrapped (CSR perspective). The arrangement can be used as condition for the gatekeeping model.

The best return policy taken into account the internal process at Remeha is described per customer group.

Wholesaler

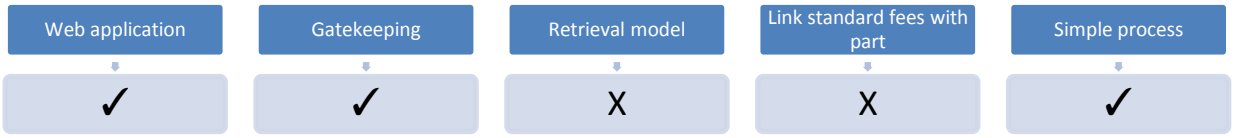

Figure 8.3: Return policy for wholesalers

The largest wholesalers use the EDI technology. The wholesaler X indicated in the customer interview that EDI is the most ideal system. Practically the process for order confirmations proceeds very poorly. If this applies for sales orders (that have more activities and higher volumes), it is likely that this also applies for return orders (that has less priority and lower volumes). For Remeha it is also undesirable to develop a system for only a few customer. Therefore the intelligent web application is a more suitable system (see Figure 8.3). They can import an Excel file to avoid multiple administration activities.

The gatekeeping model should be included in the web application. This ensures that the largest wholesalers do not send unnecessary returns. It makes the process fast and efficient. When this situation is reached, the customer satisfaction increases. This is especially good for the customer relationships with the specialists (X, Y, and Z), because they have the most returns to Remeha (see Table 5.5).

The wholesalers provide the warranty handling service. They have this service for customer loyalty. The service providers experience this service as positive. One of the reasons is that the parts are picked up by the wholesaler. It is for Remeha desired that the wholesalers provide this service, because Remeha is not equipped to provide the same service. If Remeha will provide this service, it generates a lot of costs.

Advantages for wholesalers:

- Reduction of transport costs (on average 0.98 Euro per part, see Appendix E).
- Shorter cycle time, because returns are handled faster.
- Fast credit for returns that do not come back to Remeha.
- Simple process to start the warranty procedure (by using the import Excel file feature).
- The wholesalers keep the possibility for customer loyalty.

It is attractive for the wholesalers to import part information, if the wholesalers have a reduction of transport costs and fast a credit note for the parts that do not come back to Remeha.

Large service provider

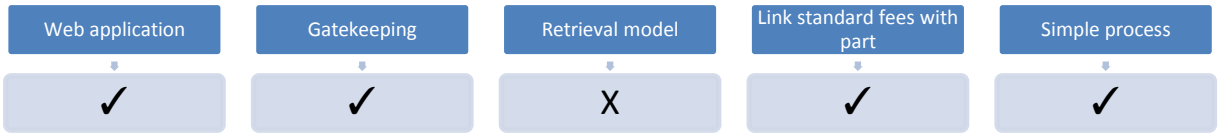

Figure 8.4: Return policy for large service providers

A process as efficient as possible is the most important desire from large service providers. The gatekeeping model should be available for these customers (see Figure 8.4). The gatekeeping model ensures that unnecessary returns are avoided. However, the gatekeeping model needs input. This is possible with the intelligent web application in the RMA module. They can import an Excel file and the application answers if the part qualifies for warranty and if the part needs back to Remeha.

It is hard to implement a system like EDI, because the large service providers have different ERP systems. EDI requires a computer readable, structured, and standard format, so EDI is difficult to implement in this situation.

With the login application in the new website, it is possible to link the standard fees with the corresponding part for the customers that have a special arrangement with Remeha. When the customer registers a part, the credit is based on the standard fee and the price of the part.

Advantages for large service providers:

- Reduction of transport costs (on average 0.98 Euro per part, see Appendix E).
- Shorter cycle time, because returns are handled faster.
- Fast credit for returns that do not come back to Remeha.
- Link between standard fees with the corresponding part.
- Simple process to start the warranty procedure (by using the import Excel file function).

It is attractive for the large service provider to import part information, if the service providers have a reduction of transport costs and have fast a credit note for the parts that do not come back to Remeha. The standard fees are also linked with the corresponding part.

Small service provider

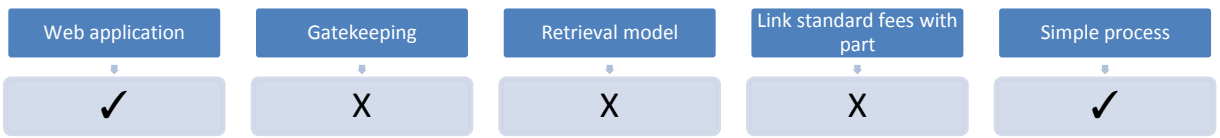

Figure 8.5: Return policy for small service providers

The most important desire from the small service providers is that the warranty procedure is simple. The RMA module with customer login is a simple method to start the warranty procedure. The service provider knows the required information for Remeha. The required information is also

minimized such that the administration activities take as less as possible time for the service provider.

The gatekeeping model is not available for the small service providers (see Figure 8.5). These customers are in general not interested in avoiding unnecessary returns. The small service providers have small benefits from this model. A link between the standard fees with the corresponding part is not necessary, because the small service providers do not have special arrangements for standard fees with Remeha.

Advantages for small service providers:

- Shorter cycle time, because returns are handled faster.
- Simple process to start the warranty procedure.

Export partner

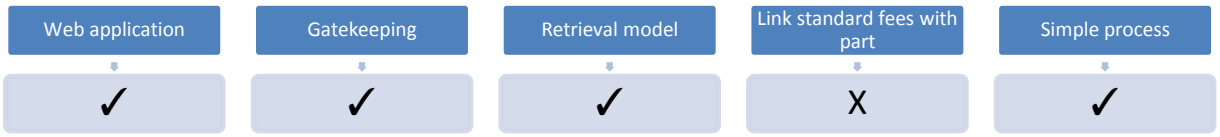

Figure 8.6: Return policy for export partners

The gatekeeping model should be available for the export partners (see Figure 8.6). Just like the wholesalers and large service providers, this ensures that the customers do not send unnecessary returns. It makes the process fast and efficient. This increases the customer satisfaction.

The control method check on location to avoid (large) cases of fraud (multi warranty requests for one part) is not useful for these customers, because the distances are too large. Training for the export partners should be given to avoid irregular warranty cases. The random reclaim of batches can be done afterwards to control the gatekeeping process.

However, the gatekeeping model needs input. This is possible with the intelligent web application in the RMA module. The Excel file import option can be used to avoid multiple administration activities.

The retrieval model should be applied to balance the incoming parts from export partners. The model results in more manageable batches and a shorter cycle time. This was a requirement to enhance customer satisfaction.

Advantages for the export partners:

- Shorter cycle time, because returns are handled faster (also because of the retrieval model).
- Fast credit for returns that do not come back to Remeha.
- Simple process to start the warranty procedure (by using the import Excel file function).

It is attractive for the export partner to import part information, if the export partners have fast a credit note for the parts that do not need to go back to Remeha. The transport of parts also reduces.

Overview
An overview is given in Table 8.2.

Customer	Web application	Gatekeeping model	Retrieval model	Link standard fees with part	Simple process
Wholesaler	✓	✓			✓
Large service provider	✓	✓		✓	✓
Small service provider	✓				✓
Export partner	✓	✓	✓		✓

Table 2.2: Overview customer segmentation

The web application in the RMA module is a universal approach to start the warranty procedure. It is also a relative simple system to develop. Let customers participate with the development of the RMA module to make the module user friendly.

There are companies that outsource their activities regarded to returning goods. However, outsourcing of the process is not efficient for Remeha, because it is desired for quality information that the parts come back to Remeha. Outsourcing means in this situation more transports and therefore a less efficient process and deterioration for CSR.

8.4 Business case (fictitious numbers)

The business case is made for the development and the operation of the intelligent web application. It includes the costs and benefits for Remeha. Corporate social responsibility is also taken into account for the proposed situation. Data and assumptions are needed for the business case. These are discussed first.

Data
Data about the returns is required to calculate the reduction of returns with the gatekeeping model (see Table 8.3). An assumption is that the top 10 customers (both National and Export) with the most returns in 2013 get the gatekeeping model.

Table is not available in the public version of this report.

It is hard to determine the reduction of returns with the gatekeeping model. XX% of the returns was out of warranty in 2013. This percentage can be avoided anyway. Looking at the percentage of parts that have obtained warranty and is scrapped after the judgment is XX% (based on the returns in 2013). Different scenarios are calculated in the business case. A range from 25% to 45% less returns is taken.

The starting point is a reduction of 35%. Research conducted by a specialized company in return handling results that more than 35% of the returns are unnecessary (S&H Productfulfilment BV , 2014). We analyzed other scenarios for the sensitivity analysis. More required data is described in Appendix E.

Costs and benefits
The business case is constructed with the costs and benefits for Remeha. The payback period is determined in the end.

Costs
The total costs are the development costs for the intelligent web application, the company visits and the annual maintenance for the gatekeeping model in the web application (see Table 8.4).

Cost elements	Cost
Development	
Development costs intelligent web application	€ 75,000.00
Company visits	
Travel time to customer (per year)	€ 18,000.00
Fuel (per year)	€ 3,000.00
Maintenance	
Maintenance application (per year)	€ 9,000.00
Initial cost	**€ 75,000.00**
Annual cost	**€ 30,000.00**

Table 8.4: Cost for proposed system (fictitious numbers)

Benefits

The benefits for Remeha are a reduction in administration activities because of the data matrix technology, less handling cost because of less returns and less transport cost for the returns from export partners. The detailed costs reductions of these activities are described in Appendix E.

The total reduction for Remeha expressed in Euros is (Table 8.5):

Scenario	25%	30%	35%	40%	45%
Reduction administration cost (per year)	€ 12,600.00	€ 12,100.00	€ 11,700.00	€ 11,200.00	€ 10,800.00
Reduction handling cost (per year)	€ 23,800.00	€ 28,600.00	€ 33,300.00	€ 38,000.00	€ 42,800.00
Reduction transport cost export returns (per year)	€ 16,400.00	€ 19,700.00	€ 22,900.00	€ 26,300.00	€ 29,500.00
Annual reduction total	€ 52,800.00	€ 60,400.00	€ 67,900.00	€ 75,500.00	€ 83,100.00

Table 8.5: Total reduction Remeha (fictitious numbers)

The net present value (NPV) is needed to determine the payback period. The formula is: $\mathrm{NPV} = \frac{Future\,value}{(1+i)^t}$, with i is the discount rate and t is the period.

An opportunity cost of capital of 6% is taken for the discount rate. The cash flows for the coming five years are calculated for the scenario of 35% less returns (see Table 8.6).

Year	0	1	2	3	4	5
Costs Remeha	€ 75.000,00	€ 30.000,00	€ 30.000,00	€ 30.000,00	€ 30.000,00	€ 30.000,00
Benefits Remeha	€ -	€ 67.900,00	€ 67.900,00	€ 67.900,00	€ 67.900,00	€ 67.900,00
NPV Remeha	€ - 75.000,00	€ 35.754,72	€ 33.730,87	€ 31.821,57	€ 30.020,35	€ 28.321,08
Benefit Remeha-costs	€ - 75.000,00	€ - 39.245,28	€ - 5.514,42	€ 26.307,15	€ 56.327,50	€ 84.648,59

Table 8.6: Cash flows in the coming five years (fictitious numbers)

The payback period for this scenario is two years and two months. The net present value over five years is € 84.648,59. The payback period is three years and ten months for the scenario of 25% less returns and the payback period is one year and six months for the scenario of 45% less returns. More details are given in Appendix E.

Other advantages

Other advantages that cannot be expressed in Euros are:

- Shorter cycle, because of the data matrix scanning and less returns.
- More detailed information, because of the web application. The customers that have returns exactly know the required information.

Corporate Social Responsibility (CSR)

The gatekeeping model has from the CSR perspective the advantages that there is less transport and therefore less CO_2 emission. The estimated reduction is 157 pallets per year with the assumption of 35% less returns (see Appendix E for details).

Conclusion

The intelligent web application with gatekeeping model and the data matrix technology has the following consequences for Remeha, the customer and in the CSR perspective.

Remeha:

- Initial investment of 75,000 Euros (fictitious number).
- Annual cost of 30,000 Euros (fictitious number).
- Annual reduction of 67,900 Euros (based on 35% less returns) (fictitious number).
- Payback period of 2 year and 2 months (based on 35% less returns).

Customer:

- On average 0.98 Euro per part transport cost reduction for customers using the gatekeeping model (fictitious number).
- Shorter cycle time, because returns are handled faster (for all the customers).
- 46% cycle time reduction for returns from export partners.
- Fast credit for returns that do not come back to Remeha (applies for wholesalers, large service providers and export partners).
- Simple process to start the warranty procedure (for all customers).
- The link between standard fees and the corresponding part is possible.
- The wholesalers keep the possibility for customer loyalty.

CSR perspective:

- Less CO_2 emission, because of less transport (and therefore less weight) of pallets.

The proposed process has advantages for the customers. The policy plan contributes to excel in the base Customer Value Proposition. This results in a broader base to improve the customer relationships and to grow as organization. Customer segmentation also fits well with the ambitions to start with partner programs. The proposed situation is also good in the CSR perspective.

Looking at the business case, the policy is interesting for Remeha. The payback period for the investment is slightly more than two years and the policy has benefits after that period.

8.5 Implementation

The implementation method for the intelligent web application is discussed in this section. The implementation methodology, work breakdown structure (WBS), and Gantt chart are given. Some threats are given in the end.

8.5.1 Implementation methodology web application

Remeha needs an implementation methodology for the introduction of the intelligent web application. A committee of OASIS FWSI TC developed a robust web service implementation methodology (OASIS, 2005). Common functional elements define that practitioners can adopt to create high quality web service systems without re-inventing them for each implementation. The web service implementation methodology includes the following phases (Figure 8.8):

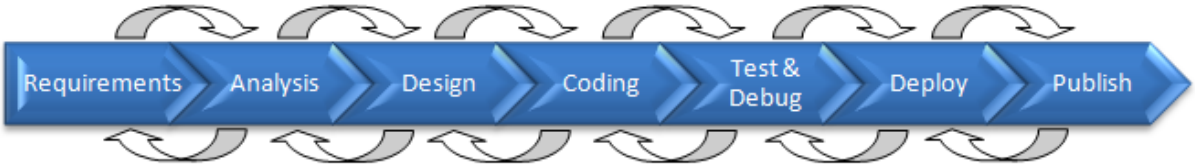

Figure 8.8: Implementation methodology phases

W.W. Royce (1970) states that an iterative relationship should exist between successive development phases. The steps are based on the following concept: that as each step progresses and the design is further detailed, there is an iteration with the preceding and succeeding steps, but rarely with the more remote steps in the sequence (Royce, 1970). At any point in the design process after the requirements analysis is completed there exists a firm and close-up, moving baseline to which to return in the event of unforeseen design difficulties. What we have is an effective fallback position that tends to maximize the extent of early work that is salvageable and preserved.

8.5.2 Work breakdown structure

To give a clear overview of the tasks that should be performed, Figure 8.9 shows a work breakdown structure (WBS). This WBS is a decomposition of the project into smaller components. In this way, the project becomes easier to organize and manage. The work packages are based on the required activities for a successful implementation according to OASIS (2005).

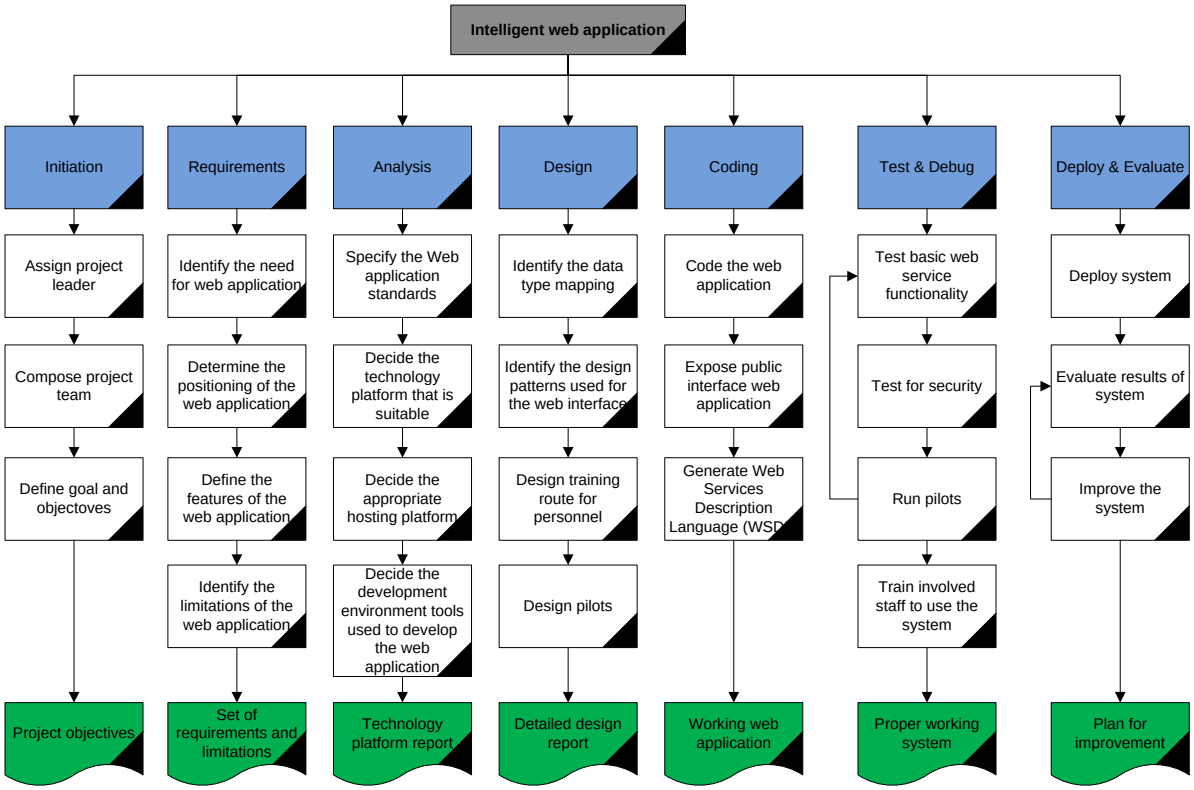

Figure 8.9: Work breakdown structure (Based on OASIS (2005))

8.5.3 Gantt chart

We have made a time planning for the combined work packages in the work break down structure which gives an indication for the completion of the intelligent web application (see the Gantt chart in Figure 8.10).

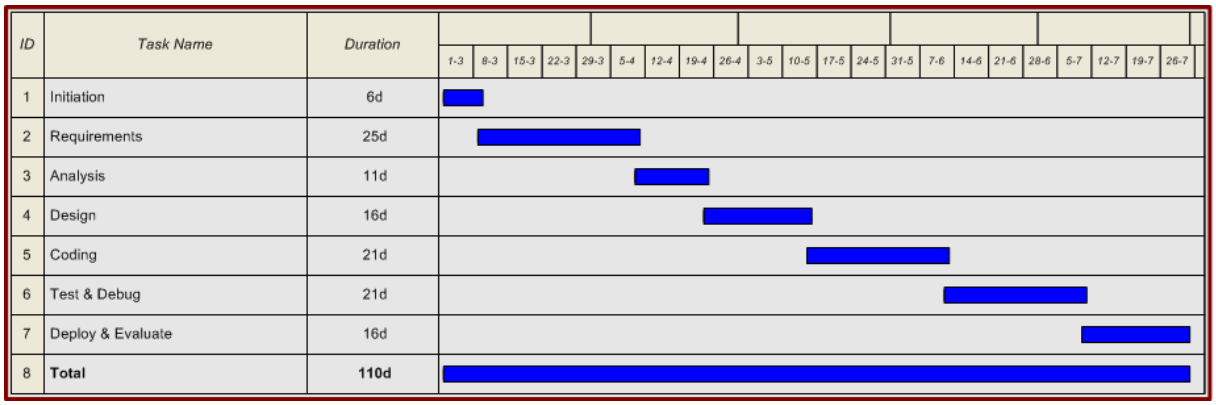

Figure 8.10: Gantt chart

The completion moment of the new website is unclear. Therefore we made a general time planning. The development period of the new module is estimated to be five months. The implementation can start after the completion of the new website. The time planning is of course dependent on the priority of the project.

A Gantt chart is not needed for the retrieval model. The ideal situation is that the model gets input from the intelligent web application. But it takes time before the web application operates. Until

then historical data can be used. The D_i is based on the number of returns per export partner per year. This can be transformed to the mean number of returns per day (D_i).

When the web application operates, the data can be determined using this application. The returns are known per export partner per month. This can be transformed to the mean number of returns per day (D_i). In the beginning of the month, the export partners get the message when the parts are retrieved.

8.5.4 Threats/Attention points

A number of threats for the proposed situation are:

- Full acceptance of the customer (service providers send parts without authorization to return the parts).
- The development costs are higher than expected.
- The project takes more time than expected.
- The gatekeeping model is less effective than expected.
- The system is implemented too fast. This can result in a system that does not work as expected. This can lead to a loss of confidence in the system.

9 Conclusions and recommendations

The conclusions and recommendation are given in this chapter to conclude this research. Section 9.1 provides the conclusions and Section 9.2 provides limitations of this research. Section 9.3 provides recommendations and Section 9.4 provides suggestions for further research.

9.1 Conclusions

The sub research questions are answered in the previous chapters. The main research question is answered after the findings and the policy for returning goods. The main research question formulated in Chapter **Fout! Verwijzingsbron niet gevonden.** is: *What is the best policy to improve the return process for the different external customers taken into account the internal process at Remeha?*

Findings

In this research we found that some parts are immediately scrapped after the warranty judgment and administration activities. No quality information is gathered from these parts. It is not by definition necessary to send these parts back to Remeha. Another aspect is the administration. The service provider should administrate the parts, if it is received at the wholesaler, they also need to administrate it in their system. The same administration activities are done when the parts are received at Remeha. This means that three companies administrate the same data about the parts.

We also found a high variety in the cycle times for returns from export partners. This is due to the reactive form of receiving goods. The export partner often decides when they send the warranty goods. If several export partners send warranty goods in the same week, the cycle time is high. Another reason is that some export partners send batches that are too large.

Using customer interviews, we found that the perception of the customers about the warranty process is generally good. Wholesalers, large service providers and export partners desire improvements in process efficiency . The small service providers desire a simple process. A special desire from the large service provider is a link between the standard fees with the corresponding part by exchanging a part in the warranty period.

Policy and answer main research question

The composition of the policy plan starts with objectives. The requirements to achieve the objectives for the policy plan are shown in Figure 9.1. Higher customer satisfaction is the most important objective. These requirements should be met taken into account the internal process at Remeha.

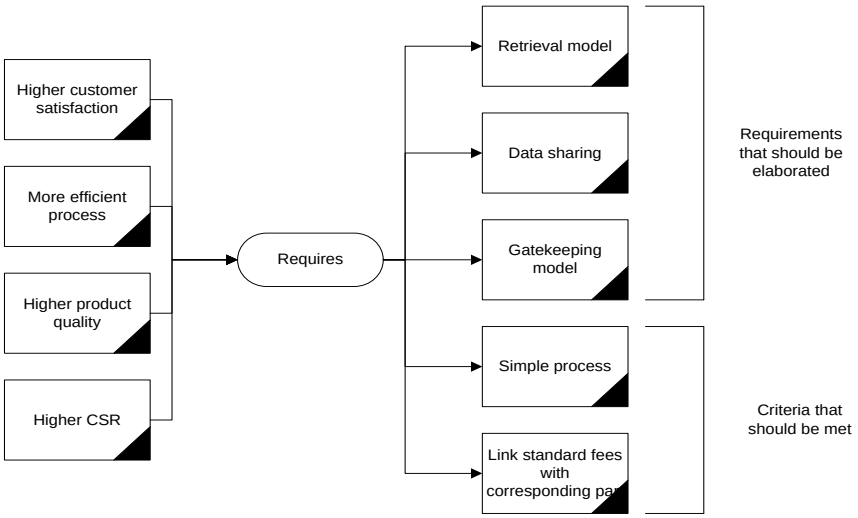

Figure 9.1: Requirements to achieve the objectives

A future development is the Return Material Authorization (RMA) module in the new professionals website. In this module an intelligent web application should be developed. This web application includes a gatekeeping model and the Data Matrix technology (2D barcode).

Requirements

- A retrieval model is developed to balance the incoming returns from export partners. The model gives the retrieval times for the seven customers with the most returns in a year. This results in more manageable batches and more balanced incoming goods. Using this model, the cycle time for export returns reduces from 20.92 days to 11.2 days (46% reduction, based on the data from 2013).
- The Data Matrix technology is an adequate method for data sharing. The information from the customer is converted in a Data Matrix. The administration activities are done using Data Matrix scanners when the parts are received at Remeha. We have also investigated other data sharing methods. These methods are not suitable for this process at the moment. These methods can be reconsidered when a method has more advantages than disadvantages.
- The gatekeeping model is developed to avoid unnecessary returns. The model needs a control method to avoid (large) cases of fraud (multi warranty requests for one part). The check on location is the best method to start with. This can be replaced for random check on location if the customer does a good job with the warranty parts. In the CSR perspective this is a better option.
- With the login application in the new website, it is possible to link the standard fees with the corresponding part for the customers that have a special arrangement with Remeha. The credit is based on the standard fee and the price of the part.
- The feature to import an Excel file avoids multiple administration activities and makes the process simple for customers with many returns. The required information is also minimized such that the administration activities take as less as possible time for the service provider.

Customer segmentation is needed to achieve the goal of creating the best return process for the different customers, because the situation and desires of the customers are different. The best policy to improve the return process for the different external customers is summarized in Table 9.1. The customers are served as good as possible taken into account the internal process at Remeha with this segmentation.

Customer	Web application	Gatekeeping model	Retrieval model	Link standard fees with part	Simple process
Wholesaler	✓	✓			✓
Large service provider	✓	✓		✓	✓
Small service provider	✓				✓
Export partner	✓	✓	✓		✓

Table 9.1: Customer segmentation

Objectives

- Higher customer satisfaction is achieved by:
  - On average 0.98 Euro per part transport cost reduction for customers using the gatekeeping model.
  - Shorter cycle time, because returns are handled faster (for all the customers).
  - Fast credit for returns that do not come back to Remeha (applies for wholesalers, large service providers and export partners).
  - Simple process to start the warranty procedure (for all customers).
  - The link between standard fees and the corresponding part is possible.
  - Wholesalers keep the possibility for customer loyalty.

- More efficient process is achieved by:
  - Reduction of administration activities because of the data matrix technology.
  - Reduction of handling activities because of the gatekeeping model.
  - Reduction of transport, because of the gatekeeping model.
- Higher product quality is achieved by:
  - Better quality information. The RTG employees have more time to analyze critical parts when unnecessary returns are avoided. The information quality increases with more analyzing time. If such a climate can be created, a continuous improvement cycle can be determined.
- Higher Corporate Social Responsibility (CSR) is achieved by:
  - Less CO_2 emission, because of less transport (and therefore less weight) of pallets.

The proposed process has advantages for the customers. The policy plan contributes to excel in the base Customer Value Proposition in the Remeha strategy house. This results in a broader base to improve the customer relationships and to grow as organization. Customer segmentation also fits well with the ambitions to start with partner programs. Looking at the business case, the policy is interesting for Remeha. The initial estimated costs are 75,000 Euros (fictitious number). The annual operational costs for this system are estimated to be 30,000 Euros (fictitious number). The annual benefits for Remeha are estimated to be 67,900 Euros (fictitious number) by a reduction of administration activities, handling activities, and transport cost for returns from export partners (assuming 35% less returns). The payback period is two years and two months in that scenario.

Outsourcing of the process is not efficient, because it is desired for quality information that the parts come back to Remeha. Outsourcing means more transports and therefore a less efficient process and deterioration of CSR.

9.2 Limitations

This research has several limitations that we discuss in this section.

- Nine customers are in total interviewed, because we were not be able to interview a lot more customers. Looking at the total number of customers, this is a small number. The solution is based on the limited information gathered from these interviews.
- We were not be able to make an exact calculation for the business case, because the process does not operate at the moment. We were only be able to make several assumptions.

9.3 Recommendations

The recommendations that follow from this research are outlined in this section.

- Develop an intelligent web application in the RMA module to regulate the returning goods from customers. Include in this module the gatekeeping model (to avoid unnecessary returns) and the data matrix technology (for data sharing in the supply chain).
- Implement the retrieval model to balance the returns from export partners.
- Apply customer segmentation. Use the gatekeeping model for the customers (wholesalers, large service provider, and export partners) with the highest number of returns.
- Link the standard fees with the corresponding part for the large service providers that have special arrangements with Remeha. The link can be developed in the web application.
- Minimize the required number of input field to give authorization to return a part. Link these input fields with the required input for the gatekeeping model.
- Let the wholesalers keep the possibility for customer loyalty. They provide a good service to the service providers.

- Focus on product quality improvement instead of warranty judgments at the RTG department. This is possible when the incoming goods are decreased by using the gatekeeping model.
- Do the activities regarded to warranty goods at the administration department every day instead of once a week. The cycle time decreases in this way.

9.4 Further research

Several suggestions for further research are given in this section.

- This research was focused on the customer. It can also be focused on the vendor. The concept of data sharing can possibly be extended to the vendors.
- Investigate the further possibilities for refurbishing of parts. This decreases the scrap percentage and the corporate social responsibility increases. When refurbishing is desired, it also has influence on the return process. When the refurbishing of parts is outsourced, it is probably better to send defect parts immediately to this company. Investigation should be done how the market reacts on refurbished parts.

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Appendices

Appendix A

Table is not available in the public version of this report.

Appendix B (in Dutch)

Enquête groothandels

Naam groothandel: …….

Naam medewerker: …… **Functie:** …….

Inleiding vragenlijst:
Er komen steeds meer vragen en verzoeken vanuit de markt (klant en intercompany) om een optimalisering garantieafhandeling en goederenstroom te realiseren. Dit vanuit klanttevredenheid, efficiëntie en MVO oogpunt.

Deze vragenlijst heeft de volgende doelen:

1. Om het proces bij de klant (fysieke stroom en informatiestroom) in kaart te brengen.
2. Om ervaringen van de klant over het huidige retour proces van Remeha te peilen.
3. Om verbeterpunten op te doen voor de toekomst

Opbouw vragenlijst:
Deze enquête bestaat uit de volgende zes delen:

1. Strategie
2. Proces
3. People
4. Technology
5. Ontvangst van klanten
6. Toekomst perspectief

Deel I: Strategie

***Vraag 1*: Wat is de onderscheidende factor in uw bedrijfsstrategie?**
○ Prijs ○ Service ○ Innovatie

***Vraag 2*: Wat is de onderscheidende factor in de retourgoederen proces?**
○ Kosten gedreven ○ Klant gedreven ○ Combinatie

***Vraag 3*: Heeft uw bedrijf een speciale strategie m.b.t. retourgoederen?**
○ Ja, strategie … ○ Nee ○ Weet ik niet

Deel II: Proces

***Vraag 4*: Kunt u de huidige retour proces van uw bedrijf beschrijven?**

……
……

***Vraag 5*: Worden de defecte onderdelen opgeslagen in uw magazijn?**

- Ja
- Nee

***Vraag 6*: Wat vindt u in het algemeen van retourgoederen?**

……
……

***Vraag 7*: Wat is uw algemene ervaring met de retour proces van Remeha?**

……
……

***Vraag 8*: Wat zijn de sterke/zwakke punten van dit proces vergeleken met retourprocessen van andere fabrikanten?**

Sterke punten: ……
……
Zwakke punten: ……
……

***Vraag 9*: Wat vindt u van de doorlooptijd van herleveren of crediteren van retour goederen van Remeha?**

……
……

***Vraag 10*: Wat zijn voor u succesfactoren voor een efficiënte retourgoederen proces in uw bedrijf?**

1 Samenwerking met levering partners	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
2 Strategie voor voorkomen retourgoederen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
3 Strategie voor voorkomen onnodige retourgoederen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
4 Inzichten in kosten en prestaties	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
5 Management bewustzijn	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
6 Geautomatiseerde proces retourgoederen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
7 Anders, namelijk…	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t

Deel III: People

***Vraag 11*: Heeft u een speciale afdeling voor retourgoederen? Zo ja, hoeveel FTE heeft deze afdeling?**

……
……

***Vraag 12*: Zijn de garantieregelingen van Remeha duidelijk voor uw medewerkers?**
…… ……

***Vraag 13*: Hoeveel procent van de onderdelen filtert u voor het retourneren?**				
○ 0% - 20%	○ 20% - 40%	○ 40% - 60%	○ 60% - 80%	○ 80% - 100%

Deel IV: Technology

***Vraag 14*: Welk software systeem gebruikt u om uw retourgoederen stroom te ondersteunen?**
…… ……

***Vraag 15*: Hoe belangrijk is dit IT systeem om de retourgoederen stroom te ondersteunen?**
Niet belangrijk **1 2 3 4 5** Heel belangrijk

***Vraag 16*: Hoe tevreden bent u over de ondersteuning van uw IT systeem?**
Niet tevreden **1 2 3 4 5** Heel tevreden

***Vraag 17*: Hoe zijn de integratie opties van uw IT systeem voor andere ketenpartners?**
Geen opties **1 2 3 4 5** Geavanceerde opties

Deel V: Ontvangst van klanten

***Vraag 18*: Wat is uw algemene ervaring over de staat waarin u defecte onderdelen ontvangt?**
…… ……

***Vraag 19*: Hoe vindt de informatiestroom van defecte onderdelen die u ontvangt van uw klanten?**
…… ……

***Vraag 20*: Hoe vaak vullen uw klanten het standaard formulier van Remeha in?**				
○ Nooit	○ Soms	○ Regelmatig	○ Vaak	○ Zeer vaak

***Vraag 21*: Hoeveel procent van de onderdelen die u verkoopt gaat retour via uw bedrijf?**				
○ 0% - 20%	○ 20% - 40%	○ 40% - 60%	○ 60% - 80%	○ 80% - 100%

Deel VI: Toekomst perspectief

***Vraag 22*: Welke service van Remeha verwacht u voor uw retourgoederen?**
…… ……

***Vraag 23*: Welke veranderingen zou u graag willen zien om deze service te realiseren?**		
1 Ondersteuning bij probleemgevallen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
2 Delen van gedetailleerde informatie over retourgoederen naar Remeha	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
3 Financiële afhandeling	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
4 Prestatie metingen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
5 Informatiestroom	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
6 Reductie van verpakkingen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
7 Verminderen transport	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
8 Anders, namelijk…	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t

***Vraag 24*: Heeft u uw retourgoederen proces veranderd in de afgelopen twee jaar?**
…… ……

***Vraag 25*: Welke verbeter projecten m.b.t. het retourgoederen proces heeft u gepland voor de komende jaren?**
…… ……

***Vraag 26*: Welke verdere informatie zou u graag terug willen ontvangen van Remeha?**
…… ……

***Vraag 27*: Hoe staat u tegenover informatie delen met Remeha m.b.t. retourgoederen?**
…… ……

***Vraag 28*: Welke rol zal u graag in de toekomst willen in het retourgoederen proces?**
…… ……

***Vraag 29*: Zou u in de toekomst meer activiteiten willen doen in het retourproces? En zo ja, welke?**
○ Ja, zoals ……
○ Nee

Appendix C (in Dutch)

Enquête installateurs

Naam installateur: ……

Naam medewerker: …… **Functie:** …….

Inleiding vragenlijst:
Er komen steeds meer vragen en verzoeken vanuit de markt (klant en intercompany) om een optimalisering garantieafhandeling en goederenstroom te realiseren. Dit vanuit klanttevredenheid, efficiëntie en MVO oogpunt.

Deze vragenlijst heeft de volgende doelen:

1. Om het proces bij de klant (fysieke stroom en informatiestroom) in kaart te brengen.
2. Om ervaringen van de klant over het huidige retour proces van Remeha te peilen.
3. Om verbeterpunten op te doen voor de toekomst.

Opbouw vragenlijst:
Deze enquête bestaat uit de volgende vijf delen:

1. Strategie
2. Proces
3. People
4. Technology
5. Toekomst perspectief

Deel I: Strategie

***Vraag 1*: Wat is de onderscheidende factor in uw bedrijfsstrategie?**
○ Prijs ○ Service ○ Innovatie

***Vraag 2*: Wat is de onderscheidende factor in de retourgoederen proces?**
○ Kosten gedreven ○ Klant gedreven ○ Combinatie

***Vraag 3*: Heeft uw bedrijf een speciale strategie m.b.t. retourgoederen?**
○ Ja, strategie … ○ Nee ○ Weet ik niet

Deel II: Proces

***Vraag 4*: Kunt u de huidige retour proces van uw bedrijf beschrijven?**
……

***Vraag 4*: Kunt u de huidige retour proces van uw bedrijf beschrijven?**

……

***Vraag 5*: Worden de defecte onderdelen opgeslagen in uw magazijn?**

- Ja
- Nee

***Vraag 6a*: Stuurt u de onderdelen rechtstreeks naar Remeha of via de groothandel?**

- Rechtstreeks naar Remeha
- Via de groothandel

***Vraag 6b*: Waarom kiest u voor deze retourstroom?**

……
……

***Vraag 7*: Wat vindt u in het algemeen van retourgoederen?**

……
……

***Vraag 8*: Wat is uw algemene ervaring met de retour proces van Remeha?**

……
……

***Vraag 9*: Wat zijn de sterke/zwakke punten van dit proces vergeleken met retourprocessen van andere fabrikanten?**

Sterke punten: ……
……
Zwakke punten: ……
……

***Vraag 10*: Wat vindt u van de doorlooptijd van herleveren of crediteren van retour goederen van Remeha?**

……
……

***Vraag 11*: Wat zijn voor u succesfactoren voor een efficiënte retourgoederen proces in uw bedrijf?**

1 Samenwerking met levering partners	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
2 Strategie voor voorkomen retourgoederen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
3 Strategie voor voorkomen onnodige retourgoederen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
4 Inzichten in kosten en prestaties	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
5 Management bewustzijn	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
6 Geautomatiseerde proces retourgoederen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
7 Anders, namelijk…	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t

***Vraag 11*: Wat zijn voor u succesfactoren voor een efficiënte retourgoederen proces in uw bedrijf?**
Niet belangrijk **1 2 3 4 5** heel belangrijk n.v.t

Deel III: People

***Vraag 12*: Zijn de garantieregelingen van Remeha duidelijk voor uw installateurs?**
…… ……

***Vraag 13*: Hoeveel procent van de onderdelen filtert u voor het retourneren?**
○ 0% - 20% ○ 20% - 40% ○ 40% - 60% ○ 60% - 80% ○ 80% - 100%

***Vraag 14*: Hoe vaak vullen uw installateurs het standaard formulier van Remeha in?**
○ Nooit ○ Soms ○ Regelmatig ○ Vaak ○ Zeer vaak

Deel IV: Technology

***Vraag 15*: Welk software systeem gebruikt u om uw retourgoederen stroom te ondersteunen?**
…… ……

***Vraag 16*: Hoe belangrijk is dit IT systeem om de retourgoederen stroom te ondersteunen?**
Niet belangrijk **1 2 3 4 5** Heel belangrijk

***Vraag 17*: Hoe tevreden bent u over de ondersteuning van uw IT systeem?**
Niet tevreden **1 2 3 4 5** Heel tevreden

***Vraag 18*: Hoe zijn de integratie opties van uw IT systeem voor andere ketenpartners?**
Geen opties **1 2 3 4 5** Geavanceerde opties

Deel V: Toekomst perspectief

***Vraag 19*: Welke service van Remeha verwacht u voor uw retourgoederen?**
…… ……

***Vraag 20*: Welke veranderingen zou u graag willen zien om deze service te realiseren?**		
1 Ondersteuning bij probleemgevallen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
2 Delen van gedetailleerde informatie over retourgoederen naar Remeha	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
3 Financiële afhandeling	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t

***Vraag 20*: Welke veranderingen zou u graag willen zien om deze service te realiseren?**

4 Prestatie metingen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
5 Informatiestroom	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
6 Reductie van verpakkingen	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
7 Verminderen transport	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
8 Anders, namelijk…	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t
	Niet belangrijk **1 2 3 4 5** heel belangrijk	n.v.t

***Vraag 21*: Heeft u uw retourgoederen proces veranderd in de afgelopen twee jaar?**

……
……

***Vraag 22*: Welke verbeter projecten m.b.t. het retourgoederen proces heeft u gepland voor de komende jaren?**

……
……

***Vraag 23*: Welke verdere informatie zou u graag terug willen ontvangen van Remeha?**

……
……

***Vraag 24*: Hoe staat u tegenover informatie delen met Remeha m.b.t. retourgoederen?**

……
……

Appendix D

This information is not available in the public version of this report.

Appendix E

This information is not available in the public version of this report.