Closing the Loop:
Reverse supply chain management and product return processes in electronics retailing

Master Thesis in International Logistics and Supply Chain Management

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Julija Gorskova

Edrion Ortega
Abstract

Problem
There is a gap in the knowledge concerning reverse product flows due to a lack of research and empirical data in the field of reverse supply chain management in general. Furthermore, more research is needed to investigate the factors influencing the decision making process regarding the right reverse supply chain recovery option choice for companies in order to close the supply chain loop. Processing product returns has become a critical activity for organisations as the volume of goods flowing back through the supply chain rapidly increases, and the electronics retail industry is not an exception and it could even be considered as the starting point of the reverse supply chain which eventually through recovery options closes the loop for the industry.

Purpose
The purpose of this thesis is to investigate how product returns are handled in electronics retailing in Sweden, what role retailers of electronics play in closing the loop, and which product recovery options are used. This thesis is developed in order to gain more empirical data about how returned products can be managed in the reverse supply chain. Furthermore, returned product recovery options and factors influencing their choice will be examined as well.

Methodology
To achieve the purpose of this thesis the qualitative research approach has been chosen and the multiple-case study research strategy applied to collect data through in-depth semi-structured interviews with some of the electronics retailers operating in Sweden. For further in-depth information regarding the recovery options and processes, interviews with recycling centre and workshop have been also conducted.

Conclusions
The five reverse supply chain processes are applied in practice in the researched electronics retailing in Sweden. From the retailers’ perspective, the main factors
influencing the handling of the returned product flows are legislation and corporate citizenship. The retailers have a limited role and significance in the decision-making processes in the reverse supply chain and ultimately in efficiently closing the loop and recovering as much value as possible from the returned products. The retailers outsource their recovery activities and the main criteria for selecting the appropriate recovery option is price.

**Discussion and future research**

*Managerial implications* - The other reverse supply chain managers working in other industries with time-sensitive products could implement the utilisation of the decentralised reverse supply chain design, outsourcing of transportation and recovery activities, and the use of information technology.

*Research evaluation* - The authors encountered the limitations that there is little or no research done in the reverse supply chain from the retailers’ perspective but mainly from the OEMs’. Another limitation of this research could be the limited number of investigated electronics retailers (participants). Furthermore, the research lacks measurements as in this thesis the qualitative data has been used for undertaking the empirical study.

*Future research* – The development of a measurement system for returned product value, the involvement of other members of the reverse supply chain in order to get a full picture of how to close the loop, and the development of a standardised criteria to determine the best recovery option, would be interesting research areas.
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<thead>
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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>3PL</td>
<td>Third-Party Logistics provider</td>
</tr>
<tr>
<td>B2B</td>
<td>Business-to-Business</td>
</tr>
<tr>
<td>B2C</td>
<td>Business-to-Customer</td>
</tr>
<tr>
<td>CRC</td>
<td>Centralised Return Centre</td>
</tr>
<tr>
<td>EEE</td>
<td>Electrical and Electronic Equipment</td>
</tr>
<tr>
<td>EPR</td>
<td>Extended Producer Responsibility</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>RMA</td>
<td>Return Material Authorisation</td>
</tr>
<tr>
<td>RSCM</td>
<td>Reverse Supply Chain Management</td>
</tr>
<tr>
<td>RoHS</td>
<td>Restriction of Use of certain Hazardous Substances</td>
</tr>
<tr>
<td>TAT</td>
<td>Turnaround Time</td>
</tr>
<tr>
<td>WEEE</td>
<td>Waste Electrical and Electronic Equipment</td>
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</table>
1 Introduction

The first chapter gives the reader a brief introduction into the topic background and problem discussion of this thesis. The purpose and research questions are also presented in this chapter, followed by stated delimitations and outline of the thesis.

1.1 Background to the topic

In recent years, businesses are facing a lot of challenges, due to the economic downturn and globalisation, that have led to increased competition in the market (Mann, Kumar, Kumar & Mann, 2010). Furthermore, there is economic and social pressure from the customers, who are becoming more and more demanding (Soriano & Dobon, 2008). Also, companies have to take into consideration environmental issues and follow governmental regulations. For instance, since 2002 the European Union has approved such regulations as: Waste Electrical and Electronic Equipment Directive (WEEE), Restriction of Use of certain Hazardous Substances Directive (RoHS) (Kumar & Putman, 2008; Hong & Yeh, 2012). These various challenges and pressures are forcing organisations to consider Reverse Supply Chain Management (RSCM) and their various logistics activities more carefully.

RSCM or reverse logistics are terms used interchangeably in some literature (Stock, 2001; Visich, Li & Khumawala, 2007). However, in this thesis reverse logistics is referred to as a separate process within the reverse supply chain (Blackburn, Guide, Souza, & van Wassenhove, 2004; Krikke, le Blanc & van de Velde, 2004). In recent decades RSCM has become of great interest in research as it provides a way to maintain profitable and sustainable business (Dowlatshahi, 2000). Moreover, companies have started to recognise that reverse flows can be as important as the forward ones (Blackburn et al., 2004).

Dawe (1995); Dowlatshahi (2000); Horvath, Autry and Wilcox (2005); Mollenkopf and Closs (2005) and Stock and Mulki (2009) all state that organisations have realised that efficient management of the reverse supply chain can provide them with a competitive advantage. As for the long run, sustainability is becoming a significant component of operational and competitive strategies in an increasing number of companies (Hart, 1995 & 1997; Porter & van der Linde, 1995; Shrivastava, 1995; Sharma & Vredenburg, 1998; Angell & Klassen, 1999; Hart & Milstein, 1999; Bansal & Roth, 2000; Matos & Hall, 2007). In a highly evolving and complex market, where customer demands are constantly changing and fierce competition takes place, companies are looking into incorporating the reverse flow of the supply chain to differentiate themselves and exploit the potential of the returned product, in other words to recover as much of its value as possible.

RSCM can also lead to cost savings and environmental improvements, since reverse supply chain systems make it possible to recover resources that in other circumstances would not be used at all (Dowlatshahi, 2000). In this way companies can show their corporate responsibility as well (Carter, Craig & Ellram, 1998).
Reverse supply chain is also part of a closed-loop supply chain. Closed-loop supply chain is the combination of forward and reverse flows of products and information in the supply chain that circulates an on-going flow of products. Loops can be closed by several options, for example, by reusing the whole product, reusing the components, or reusing the materials. 'Most closed-loop supply chains involve a mix of reuse options, where the various returns are processed through the most profitable alternative.' (Krikke et al., 2004, p.24) Companies influence these decisions with the mind-set of choosing the most profitable re-use option in order to recover as much value from returned products as possible, with the utilisation of the closed-loop supply chain.

1.2 Problem discussion

There is a gap in the knowledge concerning reverse product flows due to a lack of research and empirical data in the field of RSCM in general (Blackburn et al., 2004; Stock & Mulki, 2009). Blackburn et al. (2004) state that the reverse flow is rather unknown and has not been examined properly. Stock and Mulki (2009) agree and emphasise the lack of empirical data in that area and point to the importance of future research. Furthermore, more research is essential to investigate the factors influencing the decision making process regarding the right recovery option choice for companies in order to close the loop.

Organisations recognise the opportunities that exist to recover returned product value, yet there is little attention paid to developing a systematic way to do this due to the lack of knowledge about the reverse supply chain and its processes (Stock & Mulki, 2009). Some companies therefore do not utilise their returned products and processes efficiently thus losing the value and the potential to reduce costs and increase profits. Andel (1997, p. 61) states: '[... by ignoring the efficient return and refurbishment or disposal of products, many companies miss out a significant return on investment.]

Processing product returns has become a critical activity for organisations as the volume of goods flowing back through the supply chain rapidly increases (Guide, Souza, van Wassenhove & Blackburn, 2006). Padmanabhan (1997) claims, that the retail industry has the biggest amount of product returns and is considered to be one of the most competitive industries.

Electronics in the retail industry is not an exception and the retailers could be considered as the starting point of the reverse supply chain which eventually through recovery options closes the loop. The need for the re-use of returned electronic products such as brown (TV, video and audio equipment, games) and white (large and small household appliances) goods has also arisen in the industry due to the negative impact on the environment. The production and use of electronic and electrical equipment are responsible for approximately 8% of the overall global warming potential generated by a household (Neto, Waltherb, Bloemhof, van Nunen & Spengler, 2010). Moreover, Labouze, Monier and Puyou (2003) state that electrical equipment is responsible for 10–20% of the overall
environmental impact with respect to the depletion of non-renewable sources, greenhouse effect, air acidification, years of lost life, and dust (cited in Neto et al., 2010). Therefore, the efficient management of the reverse supply chain is of great importance not only to: 1) recover as much as possible of the returned product value for companies, but also to 2) reduce the ‘environmental footprint’ created by electronics and electrical products (Neto et al., 2010).

When effectively handled, product return processes can help companies recover value. Furthermore, they can aid in the development of customer return policies that can increase customer loyalty (Rogers, Lambert, Croxton & Garcia-Dastugue, 2002) and improve product sales (Mukhopadhyay & Setoputro, 2005).

1.3 Purpose

The purpose of this thesis is to investigate how product returns are handled in electronics retailing in Sweden, what role retailers of electronics play in closing the loop, and which product recovery options are used. This thesis is developed in order to gain more empirical data about how returned products can be handled in the reverse supply chain. Furthermore, returned product recovery options and factors influencing their choice will be examined as well.

1.4 Research question

In achieving its purpose this thesis will address the following research questions:

RQ1: How are product returns handled in electronics retailing in Sweden?
RQ2: Who are the actors involved and their responsibilities in handling returned products?
RQ3: What role do retailers of electronics play in closing the loop?
RQ4: Which recovery options are being used and what influences the choice?

1.5 Delimitations

Due to the time and research scope restrictions, there will be the following delimitations in this thesis:

- This thesis will be focused on the product return process of selected electronics retailers in Sweden as described from their standpoint.
- Only electronics retailers offering brown and white goods in Sweden will be interviewed.
- In this research only commercial returns will be examined since there is a high return rate and little focused research in the retailing industry. End-of-life, end-of-use returns and reusable items will not be investigated in this thesis.
- The returned product recovery options (repair, refurbishing, remanufacturing, cannibalization, recycling) will not be analysed from a technical or engineering perspective.
1.6 Outline

This thesis is presented in seven following chapters:

Chapter 1 (Introduction) gives the reader a brief introduction into the topic background and problem discussion of this thesis. The purpose and research questions are also presented in this chapter, followed by stated delimitations and outline of the thesis.

In Chapter 2 (Literature review) a literature review is presented covering the relevant topics and concepts considered relevant and related to answering the research questions. The concept of reverse supply chain and its processes are presented and the terms are defined in relation to the parameters of the thesis. The concept of the closed-loop supply chain, the outsourcing and the use of information technology in the reverse supply chain to facilitate the processes are discussed as well. The structure of the literature review is based on answering the questions identified by De Brito (2003) in order to get a better insight into the reverse supply chain and its processes.

Chapter 3 (Methodology) gives an insight into the chosen research philosophy and research approaches applied in this thesis. Furthermore, the research strategies, data collection methods, and time horizons are described. The layout of this thesis methodology is based on the ‘research onion’ concept of Saunders, Lewis, and Thornhill (2007). The concept has been applied as it explains the choice of data collection techniques and analysis procedures before coming to the central point – method evaluation, thus important layers of the onion need to be peeled away.

In Chapter 4 (Empirical study) the results of the empirical study of the selected electronics retailers that operate in Sweden are presented. Semi-structured interviews have been conducted for the purpose of gaining a better insight information and understanding of how retailers respond to returns, the reverse supply chain network and actors’ involvement, and processes for how they handle the recovery requirements. For further in-depth information regarding the recovery options and its processes, interviews with the recycling centre and workshop have been conducted as well. The identities of the companies that have been interviewed are kept anonymous upon request.

Chapter 5 (Analysis) presents the analysis of the whole research, structured in four sections that answer separately each of the research questions. The empirical findings are summarised, discussed and analysed according to the literature review of the study.

Chapter 6 (Conclusions) is summarising the analysis results, answering the research questions raised in this study.

Chapter 7 (Discussion and future research) presents the research evaluation, managerial implications, and ideas for future research are also discussed.
2 Literature review

In the following sections of this thesis a literature review is presented covering the relevant topics and concepts considered relevant and related to answering the research questions. The concept of reverse supply chain and its processes are presented and the terms are defined in relation to the parameters of the thesis. Authors seem to use the terms reverse supply chain management and reverse logistics interchangeably, however in this thesis the former is used to make a true distinction between reverse supply chain management (RSCM) and reverse logistics, as reverse logistics is rather part of the reverse supply chain processes (product acquisition, reverse logistics, sorting and disposition, recovery, and re-distribution and sales).

The structure of the literature review is based on answering the questions identified by De Brito (2003) in order to get a better insight into the reverse supply chain and its processes: drivers of RSCM (why), types of returns (what and why), processes and recovery options (how), and responsibilities and roles of actors (who). The concept of the closed-loop supply chain is also presented within this section as the use of combined forward and reverse flows helps to recover as much value from the returned products as possible through choosing the most appropriate recovery option. Lastly, the outsourcing and the use of information technology in the reverse supply chain to facilitate the processes will be discussed as well.

2.1 Reverse supply chain

A forward supply chain manages the downstream flow of material, information, and financials from the manufacturer to its end consumer which signifies the end of this process. In contrast to this, reverse supply chain starts the process of managing the reverse flow of recovered products upstream. Reverse flows differ from forward flows in many aspects in terms of goals, priority to the company, complexity in time (lifecycles), processes, and actors within a supply chain. Jayaraman, Ross and Agarwal (2008) specify the differences between forward and reverse value chains shown in table 2-1 below:

Table 2-1 Key differences between reverse and forward value chains (Jayaraman, Ross & Agarwal, 2008, p. 410)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Reverse supply chain recoverable value chains</th>
<th>Traditional (forward) value chains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental focus</td>
<td>Focus is to prevent post-production waste from occurring</td>
<td>Focus in on pre-production and pollution prevention/remediation</td>
</tr>
<tr>
<td>Design</td>
<td>Remanufactured products have to be designed for easy disassembly. While</td>
<td>Focus in on environmentally conscious design,</td>
</tr>
</tbody>
</table>

...
this may add some cost up-front, the pay-off will occur during the product’s second, third, fourth life cycles

| Low fashion | Remanufacturing is mostly used in heavy industrial applications where customers care more about performance rather than looks | Novelty is a key marketing issue. While performance is most definitely an order winner, it pays to be more fashionable in most industries |
| Logistics | Forward and reverse flows. Uncertainty in timing and quantity of returns. Supply driven flows | Focus on open forward flow. No need to handle returns. Demand driven flows |
| Forecasting | Need to forecast both the availability of core and demand for end products | No need for parts forecasting. Focus on forecasting end products only |

Due to the characteristics and differences between forward and reverse flows the design of reverse supply chain varies from the forward supply chain.

Reverse supply chains deserve as much attention at the corporate level as forward supply chains and should be managed as a business processes that can create value for the company (Blackburn et al., 2004). Stock and Mulki (2009) state that an important activity of the reverse supply chain process is to accurately evaluate each product returned in order to determine the most optimal disposition option. Furthermore, Rogers and Tibben-Lembke (2002) agree that the purpose of the reverse supply chains is creating or recapturing value, or proper disposal.

In recent years, RSCM has become of great interest in research with the aim to maximise the returned product value. Companies have realised that there is some potential in generating added-value in reverse supply chains and that a better understanding of product returns and efficient management of reverse supply chains can provide them with a competitive advantage (Blackburn et al., 2004; Stock and Mulki, 2009), by means of customer service and cost management.

Blackburn et al. (2004) state that in comparison between forward and reverse supply chains, design strategies for reverse supply chains are relatively unexplored and underdeveloped which can be partly because of management struggles to design, plan, and control these processes involved with the reverse supply chain. Key concepts of forward supply chains such as coordination, postponement, and
the bullwhip effect could be mimicked and useful for the development of reverse supply chain design strategies to exploit opportunities to achieve economic value; however these concepts have not been examined for their relevance in this context (Blackburn et al., 2004). From the above-mentioned text it can be concluded that RSCM is a relatively new term and although there are opportunities and benefits attributed to integrating it in achieving competitive advantage more research needs to be done.

Finally it is necessary to define the ‘reverse’ terminology. ‘The terms reverse logistics, green logistics, reverse supply chain, and closed-loop supply chains are often used interchangeably to deal with the reverse flows and products.’ (Skjott-Larson et al, 2007, p. 292) Prahinski and Kocabasoglu (2006) define RSCM as ‘the effective and efficient management of the series of activities required to retrieve a product from a customer and either dispose it or recover value’. (Prahinski & Kocabasoglu, 2006, p. 519) The European Working Group on Reverse Logistics (REVLOG) defines RSCM as ‘the process of planning, implementing and controlling the backwards flows of raw materials, in process inventory, packages and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal.’ (cited in De Brito & Dekker, 2004, p. 5)

2.2 Reverse supply chain processes

When managing, coordinating and controlling reverse supply chain processes certain issues have to be taken into consideration by companies in order to achieve economically viable performance (Blumberg, 2005). These issues are:

- **Uncertain flow of materials** – usually the time of product return or returned product condition are unknown for the companies;
- **Customer specific** – since return flows depend on end users or customers, comprehensive knowledge and understanding of the specific customers is required;
- **Time critically** – of critical importance in reverse supply chain management and repair is the need to process returned items as fast as possible in order to make them available for reuse or disposal;
- **Value maximisation** – the choice of the most appropriate returned product value recovery option;
- **Flexibility** – processes connected with product returns have to support flexible capacity (facility, transportation etc.);
- **Multiparty coordination** – in order to avoid slowdowns and inefficiencies in reverse supply chain processes a proper timely communication has to be established among the parties involved (Blumberg, 2005).

Krikke et al. (2004) distinguish five business processes in the reverse supply chain – product acquisition, reverse logistics, sorting and disposition, recovery, redistribution and sales (see Figure 2-1). However, there may be differences in chains in terms of processes’ importance and sequence (Krikke et al., 2004).
Figure 2-1 Reverse supply chain processes (Prahinski & Kocabasoglu, 2006, p. 523)

**Product acquisition** - this concerns retrieving the product from the market (sometimes by active buy-back) as well as physically collecting it. The timing of quality, quantity, and composition needs to be managed in close cooperation with the supply chain parties close to the final customer.

**Reverse logistics** - this involves the transportation to the location of recovery. An intermediate step for testing and inspection may be needed.

**Sorting and disposition** - returns need to be sorted on quality and composition in order to determine the remaining route in the reverse chain. The sorting may depend on the outcome of the testing and inspection process.

**Recovery** - this is the process of retrieving, reconditioning, and regaining products, components, and materials. In principle, all recovery options may be applied either in the original supply chain or in some alternative supply chain. As a rule of thumb, the high-level options are mostly applied in the original supply chain and the lower-level options in alternative supply chains. In some areas, the reuse in alternative supply chains is referred to as ‘open-loop’ applications.

**Re-distribution and sales** - this process largely coincides with the distribution and sales processed in the forward chain. Additional marketing efforts may be needed to convince the customer of the quality of the product. In alternative chains, separate channels need to be set-up and new markets may need to be developed (Krikke et al., 2004).

According to De Brito (2003), the concept of RSCM can be examined by viewing five fundamental questions:

- **Why-receiving**: the forces driving companies and institutions to use RSCM
- **Why-returning**: the reasons why products are returned
- **What is being returned**: product characteristics and product types
- **How are products recovered**: processes and recovery options
- **Who is doing the recovery**: the actors and their roles (De Brito, 2003).

### 2.3 Drivers of reverse supply chain management (why)

In recent years the focus and importance of research in reverse supply chains has been spurred on for various reasons: high volume of product returns, revenue potential in secondary and global markets, stricter laws and legislations from governmental institutions, consumer pressures for more corporate responsibility.
in the disposal of hazardous waste, and landfills becoming limited and expensive; all making repackaging, remanufacturing and recycling more prevalent and viable alternatives (Prahinski & Kocabasoglu, 2006).

Therefore, nowadays various challenges and pressures are forcing businesses to consider RSCM more carefully. Many authors state that these main driving factors are economics, legislation or environmental drivers (Fleischmann, Bloemhof-Ruwaard, Dekker, van der Laan, van Nunen & van Wassenhove, 1997; Guide, Harrison & van Wassenhove, 2003; Flapper, van Nunen & van Wassenhove, 2005; Mann, Kumar, Kumar & Mann, 2010). Furthermore, Elkington (1997) refers to the triple-bottom-line as the integration of such factors as economy/profit, ecology/planet and equity/people, which would allow supply chain managers not only to increase profit, but also reduce social and environmental losses. De Brito (2003) supports the concept of Elkington (1997), classifying the drivers into three categories:

- **Economics** (direct and indirect)
- **Legislation**
- **Corporate citizenship** (De Brito, 2003).

### 2.3.1 Economics

The direct economic benefits include use of input materials, adding value with recovery and reduction of costs (De Brito, 2003). For instance, economic value can be gained from collecting metal scrap and offering it to steel companies as scrap metal which can be merged with virgin materials for further use. This could lead to production cost reduction for steel companies (De Brito, 2003). Furthermore, Flapper et al. (2005) emphasise that closing the loop in supply chains can result in cost reduction of numerous activities such as production, distribution, material purchasing and after-sales service.

Marketing, competition in the market and strategic issues can lead companies to gaining indirect economic benefits as well. For example, companies may get involved with recovery for strategic reasons in order to anticipate future legislation or even to impede it. Moreover, a company may participate in recovery to avert rival companies from getting their technology or to stop them from entering the market (De Brito, 2003). Furthermore, recovery can also help in a ‘green-image’ building for companies in order to differentiate them from their competitors (Flapper et al., 2005). ‘Green products’ offer new market opportunities for companies as customers become more aware of the environmental concerns (Fleischmann et al., 1997; Thierry et al., 1995).

Overall companies seem to increasingly perceive that reverse supply chains do not automatically signify financial loss (Blackburn et al., 2004) but can hold economic benefits in fact.
2.3.2 Legislation

According to De Brito (2003), legislation in this instance refers to any jurisdiction signifying that a company should recover its products or take them back. Companies have to take into consideration environmental issues and follow governmental regulations. For instance, Extended Producer Responsibility (EPR) also known as ‘producer take-back’ makes manufacturers take responsibility for the environmentally safe management of their product when it’s no longer useful or discarded (Burnson, 2010). Such regulations exist in Europe, the United States, Canada, Japan, South Korea, Taiwan and China, aiming to prevent waste and to promote the recovery of waste for reuse, remanufacturing or recycling of materials (i.e. electronic equipment, chemical products, batteries etc.) (Kumar & Putman, 2008; Swedish Environmental Protection Agency (Naturvårdsverket) report 6417, 2011).

Especially in Europe there has been an increase in environmentally-related legislation, like recycling quotas, packaging regulations and take-back responsibility for manufacturers (De Brito, 2003). In fact, some industries are under special legal pressure, for example the electronics industry (Fleischmann et al., 1997). Since 2002 the European Union has approved such regulations as: Waste Electrical and Electronic Equipment Directive (WEEE, EU Directive 2002/96/EC), Restriction of Hazardous Substances in Electrical and Electronic Equipment Regulations (RoHS, EU Directive 2002/95/EC) (Swedish Environmental Protection Agency (Naturvårdsverket) report 6417, 2011; Hong & Yeh, 2012).

The WEEE directive is based on the producer-pays-principle, as producers are requested to finance the collection, treatment, recovery, and environmentally sound disposal of WEEE. The directive aims to reduce the amount of e-waste going to landfill and it seeks to improve the environmental performance of all parties involved in the Electrical and Electronic Equipment (EEE) product lifecycle: producers, distributors (retailers), consumers and especially the operators directly involved in the treatment of waste EEE (Kumar & Putman, 2008; Swedish Environmental Protection Agency (Naturvårdsverket) report 6417, 2011). Accompanying the WEEE directive, the RoHS bans the use and placing on the EU market of new electrical and electronic equipment containing more than agreed levels of certain hazardous heavy metals (i.e. lead, mercury, cadmium, hexavalent chromium and brominated flame-retardants) (Burnson, 2010).

Besides the WEEE, RoHS directives electronics retailers operating in Sweden also need to follow the Environmental Code (Miljöbalken, 1998:811), environmental regulations for sustainable development which state that EEE containing hazardous substances have to be appropriately recycled and disposed (Svensk Handel lawyer, personal communication, 2012-04-11). Moreover, according to Swedish Customer Law (Konsument Köplagen), customers can return the bought product (including EEE) within 3 years, thus retailers must be able to handle the returned item, organizing their reverse supply chains. Furthermore, retailers must also follow their own return policies and licensed agreements with Original Equipment Manufacturers (OEMs) (Svensk Handel lawyer, personal communication, 2012-04-11).
2.3.3 Corporate citizenship

The term ‘corporate citizenship’ is used in regard to companies to express their respect towards society in the context of following good principles. There are also other terms that can be used instead such as social responsibility or ethics (De Brito, 2003). In the context of reverse supply chain management, corporate citizenship resembles a set of values or principles that motivates a company to become more environmentally and socially responsible, for example by returning and recycling products, thus reducing their negative social and environmental impact. Moreover, such activities as electronics scrap and other product recycling can improve a company’s image and increase sales by attracting environmentally conscious consumers (Hong & Yeh, 2012).

Corporate citizenship or rather being responsible should not only lie on a corporation but also the entire supply chain, since most multinational corporations operate globally it is becoming more viable to have these practices embedded throughout the entire supply chain. Andersen and Skjott-Larsen (2009) conclude ‘the rationale behind this approach is that multinational corporations are not only responsible for sound environmental and social practices within their own premises, but increasingly also for the environmental and social performance at their suppliers, and ultimately for the entire supply chain.’ (Andersen and Skjott-Larsen, 2009, p.82)

Corporate citizenship in supply chains is receiving growing attention in the media, academia and the corporate world (Pedersen & Andersen, 2006; Maloni & Brown, 2006). Furthermore, various stakeholders, including consumers, shareholders, Non-Governmental Organisations (NGOs), public authorities, trade unions, and international organisations, are showing an increasing interest in environmental and social issues related to international business (Andersen & Skjott-Larsen, 2009). However, Bowen, Cousins, Lamming and Faruk (2001) state ‘despite many multinational corporations’ efforts to implement social and environmental issues in their supply chains, a gap exists between the desirability of supply chain sustainability in theory and the implementation of sustainability in supply chains in practice’ (cited in Andersen and Skjott-Larsen, 2009, p.75) - in other words ‘walk the talk’. The handling of reverse flows can contribute to the corporate image because the efficiency and effectiveness of the reverse supply chain operations can stimulate longer-term inter-firm relationships, higher customer satisfaction ratings, and higher corporate profitability (Daugherty, Myers & Richey, 2002).

2.4 Types of returns (what and why)

There are different ways to classify product returns, for this thesis the authors utilize a product life-cycle based classification suggested by Krikke et al. (2004) which allows assessing opportunities for the company as well as requirements for processing a particular type of product returns. Krikke et al. (2004) describes four types of returns:

- **End-of-life returns** - these are product returns that can no longer be economically or physically used once they reach their end of life. Product
take-back at the end-of-life is often obligatory and regulated by EU directives or national legislation (i.e. packaging materials, white and brown goods, and electronic equipment). Often return systems are organized and financed by municipality authorities or government agencies (De Koster & Delfmann, 2007).

- **End-of-use returns** - these returned products or components (i.e. photocopiers, cars, TVs) are returned by customers after being in their possession for some period of time due to end of the lease, trade-in, or product replacement. When returned back to the leasing company items can be refurbished and returned to a secondary market. Normally, this category of returns are organized and managed by the leasing companies themselves (De Koster & Delfmann, 2007).

- **Commercial returns** - a broad category including defective products, products that do not fit the customer, product returned because of customer regret (De Koster & Delfmann, 2007). These returned products are tied mainly to the sales process, the result of customer returning an item shortly after sale.

- **Re-usable items** - these are often not the main product itself but related to the consumption or delivery of the main item (Krikke et al., 2004).

Commercial returns are referred to as Business-to-Business (B2B) products (unsold products, wrong deliveries) or Business-to-Customer (B2C) products (reimbursement/ other guarantees) and are initiated when the final customer returns an item for various reasons (De Brito, 2003). Krikke et al. (2004) state that commercial returns are a result of trends such as: product leasing, catalogue/internet sales, shorter product replacement cycles, and increased warranty claims. Although this type of return has no affiliation with environmental legislation to the sales or service process, it presents companies that are willing to buy back returns with potential for economic gain. Blackburn et al. (2004) state that ‘returns and their reverse supply chains represent an opportunity to create a value stream, not an automatic financial loss’ (Blackburn et al., 2004, p. 7), which was the perception of companies in the past. However, ‘the longer it takes to retrieve a returned product the lower the likelihood of economically viable re-use options.’ (Blackburn et al., 2004, p. 6)

### 2.5 Processes and recovery options (how)

#### 2.5.1 Marginal value of time

An important concept in reverse supply chain is the ‘marginal time value of the products returns’: the loss (depreciation) in value per unit of time spent before processed in the return system (De Koster & Delfmann, 2007). The current situation with the returned product flow that companies are facing is not in their favour, since much of the product value is lost while they are moving along the reverse supply chain. In fact more than 45% of the returned product value is lost (Blackburn et al., 2004) (see Appendix 1 Time value of product returns).
There are many reasons for value depreciation. Blackburn et al. (2004) point out that the product value decreases as the product gets downgraded due to being remanufactured, salvaged for parts, or simply scrapped; or, the value of the product declines during the time while it proceeds through the pipeline to its final disposition point. Moreover, Skjott-Larson et al. (2007) and De Koster and Delfmann (2007) state that often value is lost due to the lack of efficient return systems, negative effects of time delays, new product introductions, technological innovations, the product becoming a commodity, and price cuts from competitive actions.

However, the marginal value of time differs by product type and different stages of the product life cycle (Skjott-Larson et al., 2007). Some products (i.e. containers, bottles) have a relatively low marginal value of time, thus time is not a crucial factor when designing the reverse supply chain. Other products (i.e. mobile phones, personal computers) have a high marginal value and require fast-processing reverse supply chains. For instance, ‘consumer electronics products such as personal computers can lose value at rates in excess of 1% per week, and the rate increases as the product nears the end of its life cycle.’ (Blackburn et al., 2004, p. 10)

Fisher’s (1997) taxonomy of two fundamental supply chain structures for innovative respectively functional products is similar to the distinction between time sensitive and time non-sensitive reverse supply chains. The innovative products require a responsive and fast supply chain, while the functional products require a cost-efficient supply chain. The major difference between efficient and responsive reverse supply chains is the positioning of the evaluation, testing, and sorting activity in the supply chain; in cost-efficient reverse supply chains these activities are centralised whereas in a responsive reverse supply chains they are decentralised (Skjott-Larson et al., 2007; De Koster & Delfmann, 2007).

### 2.5.2 Centralised versus decentralised reverse supply chain

According to Blackburn et al. (2004), there are two ways how to structure the product return process within the reverse supply chain, a centralised and a decentralised method. The first one is designed for economies of scale; all the returned products are sent to one central location. While the latter structure is designed to make the reverse supply chain responsive, thus, for instance, each retailer could take care of returns themselves (Blackburn et al., 2004). Moreover, some companies have developed hybrid structures by combining the two methods.

*Centralised reverse supply chain*

Centralised reverse supply chain activities are delegated to one organization to handle the responsibilities of the collection, sorting and redistribution of returned products, which are processed in Centralised Return Centres (CRCs). At these facilities returned products are brought in bulk where they are evaluated and tested, and based on the result of testing the appropriate disposition alternative is selected (Rogers & Tibben-Lembke, 1999).
In a centralised reverse supply chain companies achieve processing economies of scale both in the actual processing and the transport by minimizing the cost through delaying product returns, which is also known as the postponement concept (Blackburn et al., 2004). This trade-off (postponement) for minimizing the total cost of processing the returns over time applies to returns with low time marginal value (Skjott-Larson et al., 2007) (see Appendix 2 Centralised efficient reverse supply chain).

**Decentralised reverse supply chain**

In contrast to centralised reverse supply chain where returned products are collected, sorted, and re-distributed centrally by one organization, decentralised reverse supply chains consist of multiple organisations. For instance, retailers serve the function of a ‘gate-keeper’ and are involved in collection, early initial inspection to determine the condition of the returns to send the item further to the other actors within the reverse supply chain to select the appropriate alternative disposition and redistribution of returned items (Skjott-Larson et al., 2007). This requires the presence of specific guidelines for the condition of the product, local skills to perform the initial inspection, and a logistics infrastructure to process the items further into the activities represented in Appendix 3(De Koster & Delfmann, 2007) (see Appendix 3 Decentralised responsive reverse supply chain).

A decentralised reverse supply chain is responsive for maximising asset recovery by fast tracking returns to their ultimate disposition and minimising the delay cost (Blackburn et al., 2004). This configuration favours time-based strategies. The term ‘preponement’ is used as a strategy to make the reverse supply chain responsive by reducing time delays and promoting early collection, sorting, disposition, and disassembly (Skjott-Larson et al., 2007). This trade-off of responsiveness minimises time delays over saving cost of processing returns and applies to returns with higher time/value depreciation (i.e. consumer electronics) (De Koster & Delfmann, 2007).

**Comparison**

In comparison, the main difference between centralised and decentralised reverse supply chains are the configurations and the positioning of the evaluation facilities determining the amount of actors involved with the collection, sorting, and disposal process of returns. Centralised reverse supply chains are designed for cost efficiency and are more appropriate for returns with lower time/ value depreciation, whereas decentralised reverse supply chains are designed to be responsive minimising time delays and are more appropriate for returns with higher time/value depreciation (Skjott-Larson et al., 2007).

**2.5.3 Closed-loop supply chain**

Guide, Harrison and van Wassenhove (2003) state that closed-loop supply chains were rarely viewed as systems to create value and much of the focus was on operational aspects rather than the larger strategic issues. Similarly, Wikner and Tang (2008) agree that closed-loop supply chains received increasing attention in
supply chain and operations management. However, Visich et al. (2007) acknowledge the importance of closed-loop supply chains as a key component of sustainable business operations. They all commonly state the main drivers for an increased interest in closed-loop supply chains were profitability (United States) and stricter legislative environmental regulations (European Union) (Guide et al., 2003; Wikner & Tang, 2008; Visich et al., 2007).

Closed-loop supply chain integrates activities of forward supply chain with those of reverse supply chain which includes managing product recovery processes and capturing the value of products being used or consumed by end-customers (Guide et al., 2003; Wikner & Tang, 2008) (see Appendix 4 A closed-loop supply chain). Closed-loop supply chains can be characterized according to the nature of the product, the structure of the industry, and consumption norms within the industry (Nieuwenhuis & Wells, 2003).

Closed-loop supply chain has three main areas (Blumberg, 2005):

- **Forward and direct supply chain management** consists of the overall management and coordination and control of the forward flow within the supply chain as well as the initial physical flow from manufacturer through to end-consumer.
- **RSCM** can be processed as either a subset of the closed-loop systems or standing alone, the activities would include full coordination and control, logistics of material, parts, and products from the field to processing and recycling or disposition, and finally returns back to the field where appropriate.
- **Depot repair, processing, diagnostics, and disposal** include the services related to receiving the returns from the field, where materials, parts, and products go through several processes such as diagnoses, evaluation, repair or disposition, after this process they will be either returned to the direct/forward supply chain or into secondary markets or for full disposal.

### 2.5.4 Recovery options

Thierry et al. (1995); Krikke et al. (2004) state that returned products and components can be re-sold directly, recovered, or disposed (incinerated or landfilled). From these three categories five product recovery options used for both products and components are distinguished. Each recovery option includes collection, re-processing, and redistribution of used products and components. The recovery options are also described below (see Appendix 4 A closed-loop supply chain).

*Repair* - repair aims to return a product or component to its working condition, broken parts are fixed or replaced and other parts are unaffected. Repaired products or components quality is less in comparison to new ones, but restoring a product or component to working condition is less expensive than buying a new one and will present a mutual benefit for both customers and manufacturers. ‘Repair operations can be performed at the customer’s location or at manufacturer-controlled repair centres.’ (Thierry et al., 1995, p. 118)
Refurbishing – the returned product may have scratches, dents and other forms of cosmetic damage, which do not affect the performance of the product. Within the refurbishing process, after disassembly returned products modules are inspected and fixed/ or replaced to reach specified quality (i.e. cover or panel change). Quality standards for refurbished products are less strict compared to new ones. Sometimes by refurbishing outdated modules and parts of returned products with the use of technological upgrading, the quality improves and extends the service life (i.e. computer, aircraft, and ships).

Remanufacturing - remanufacturing of returned products aims to achieve as strict quality standards as for new ones. The remanufacturing process involves an extensive disassembly and inspection of entire products. Worn-out or outdated items are all replaced with new ones and repaired items are fixed and go through extensive testing to make sure it meets company standards.

Cannibalization - in comparison with the previous recovery options cannibalization is where a limited portion of re-usable parts or components are recovered. These parts are re-used in repair, refurbishing, or remanufacturing of other products and components. Cannibalization involves selective disassembly of used products and assessments of potentially re-usable items, while the remaining parts are discarded.

Recycling - unlike the other recovery options which aim to retain the identity and functionality of used products and their components, in recycling the identity and functionality are lost. The materials of used products and components are reused again due to recycling. If the quality is appropriate these materials can later be used in the production of original items. Disassembly of the used products and components into items is followed by separation into distinct material categories. Afterwards the separated materials are reused in the production of new items (i.e. recycling of the materials in discarded cars) (Thierry et al., 1995).

2.6 Responsibilities and roles of actors (who)

In contrast to the forward chain, a reverse chain has more complex activities and processes that need to be monitored by actors within the supply chain. Burnson (2010) state that there has to be multi-party coordination in any part of reverse supply chain, whether it is source reduction, recycling, substitution, or disposal. That means that several parties are typically involved. Skjott-Larson et al. (2007) state that often there is undefined responsibility delegated in the reverse supply chain, it seems in most cases that there is no direct person placed in charge but rather the tasks are delegated among personnel where no one is obligated to perform these duties. Similarly, De Koster and Delfmann (2007) agree that often the responsibility of the reverse supply chains is fragmented between different actors, and as a result, no one takes overall responsibility.

To further add to this point Stock and Mulki (2009) argue the need for direct responsibility or obligated delegation to personnel or a department for the product return process. Stock and Mulki (2009) conclude that although senior executives are often given the responsibility of overseeing the process, it is not their main
function. Stock, Spen, and Shear (2002) point out that giving returns processing its own turf means assigning it separate leadership. Having a senior executive to oversee its activities can increase the potential of making the return process profitable. Stock et al. (2002) and Autry (2005) suggest treating the return process separately which would reduce the overlapping of tasks, maximise efficiency in handling, and increase the role of RSCM. By adopting a supply chain management concept on the reverse supply chain, De Koster and Delfmann (2007) claim that it is possible to identify, who should take the initiative, and who should be responsible for managing the reverse flows.

De Brito and Dekker (2004) describe several actors involved in handling the product return process and their roles.

The actors include:

- *Forward supply chain actors* (supplier, manufacturer, wholesaler, retailer, and sector organisations)
- *Specialised reverse chain players* (such as jobbers, recycling specialists, dedicated sector organizations or foundations, pool operators, etc.)
- *Governmental institutions* (EU, national governments, etc.)
- *Opportunistic players* (such as a charity organisation)

Their roles include:

- Managing/organising
- Executing
- Accommodating

The group of actors involved in reverse supply chain activities, such as collection and processing, are commonly independent intermediaries, specific recovery companies, reverse providers, municipalities taking care of waste collection, and public-private foundations created to take care of recovery (De Brito & Dekker, 2004).

### 2.6.1 Outsourcing in the reverse supply chain

Many businesses chose to outsource their non-core activities to third-parties, as a result it has created an emerging business opportunity attracting several new actors to enter the market and fill the demand for new services (Hertz & Alfredsson, 2003), especially in the logistics area. A study by Persson and Virum (2001), discusses the potential economic advantages of logistics outsourcing such as: the elimination of infrastructure investments; access to world-class processes, products, services or technology; improved ability to react quickly to changes in business environments; risk sharing; better cash-flow; reducing operating costs; exchanging fixed costs with variable costs; access to resources not available in own organization.

Guide and van Wassenhove (2002) point out that from the perspective of RSCM, the outsourcing decision is one of the greatest challenges in creating the reverse
supply chain. De Koster and Delfmann (2007) state that in the reverse supply chain the returned products can flow either from retailers, through distributors to the manufacturer, or it can be outsourced to a third-party logistics provider (3PL), who collects the items at customers' location and return them to the client's location or a dedicated return centre. In recent literature and practice two types of third-parties appear as an intermediary in the reverse supply chain (De Koster & Delfmann, 2007):

- **Dedicated processors** - return centres specialized in one particular industry or type of item, often contingent to government regulation
- **3PLs** - offering ‘reverse logistics’ as a part of their total service portfolio.

Commonly, 3PL services of logistics are connected with value-creation: time, place and form utility. This provides an opportunity for the reverse supply chain not only to retrieve the products, store it and/or move it backwards towards disposition (time and place utility), but the logistics provider can also be involved in the process of remanufacturing, refurbishing, repair, recycle and/or re-use. (De Koster & Delfmann, 2007) For instance, a number of OEMs, such as Hewlett-Packard, Dell, Ford, General Motors, Pitney Bowes, Bosch, and many others, offer remanufactured products, in many cases, outsourcing the remanufacturing to other companies (Souza, 2009).

### 2.6.2 Information technology in the reverse supply chain

As many organisations focus on IT investments in the forward flow of the supply chain, they are often facing inefficient and undisciplined returns management process (Jayaraman, Ross & Agarwal, 2008). Thus, the information exchange enhances operational efficiency in reverse supply chain (i.e. speedy Return Material Authorisation (RMA) and product tracking) and provides greater supply chain visibility, which can in turn lead to cost reductions, improved in-stock performance, increased sales, and improved customer satisfaction of the returns turnaround process (Olorunniwo & Li, 2010).

Yu, Yan and Cheng (2001); Sandberg (2007) and Skjott-Larsen (2007) state that electronic communication infrastructure is significant and also is a prerequisite for timely and efficient information exchange among actors. The need for a unified data software to connect all parties and simplify the coordination process within the reverse supply chain, this can create an infrastructure that also facilitates and reduces the cost and time for financial transactions (Skjott-Larsen et al., 2007). According to Skjott-Larsen et al. (2007), inter-organisational integration enables trust, which is the essential element of a partnership in an integrated supply chain and in turn promotes collaboration and decision delegation, and reduces independent organisational behaviour among supply chain members.

The utilisation of new software and systems to support the integration and coordination of all actors and participants in the closed-loop supply chain process allows them to communicate and interact online and in real time. As a result, this can lead to significant improvement in the productivity of the reverse supply chain.
parts provisioning and allocation process, as well as the creation of a ‘just in time’
approach to repair and refurbishment (Blumberg, 2005).

Furthermore, the return flows are rarely measured in a systematic way. Hence the
information technologies can aid to setting up the measures and evaluating the
performance for the reverse supply chain, i.e. in terms of time from consumer
complaints to refunding the money, quality and quantity of returns, causes of
returns, costs involved in returns, etc. (De Koster & Delfmann, 2007).
3 Methodology

This chapter gives an insight into the chosen research philosophy and research approaches applied in this thesis. Furthermore, the research strategies, data collection methods, and time horizons are described. The layout of this thesis methodology is based on the ‘research onion’ concept of Saunders, Lewis, and Thornhill (2007) (see Appendix 5 Research onion). The concept has been applied as it explains the choice of data collection techniques and analysis procedures before coming to the central point – method evaluation, thus important layers of the onion need to be peeled away (Saunders et al., 2007).

3.1 Research philosophy

Saunders et al. (2007) distinguish between three major ways of thinking about research philosophy: epistemology, ontology, and axiology. In this thesis the epistemology view is the most appropriate philosophy. It constitutes acceptable knowledge in the field of study (Saunders et al., 2007). There are three streams within epistemology: positivism, realism, and interpretivism (Saunders et al., 2007). In this thesis interpretivism is applied, Livesey (2006) states in support of interpretivism that society doesn’t exist in an objective, observable, form; but instead, it is experienced by subjective behaviour. Therefore to understand and explore reality it is essential to investigate subjective reasons on which people’s actions are based (Saunders et al., 2007).

Due to the complexity of the business environment and the dynamics of each company’s development, the internal and external processes carried out vary and are unique. Therefore, from the interpretivism perspective the generalisation approach is less likely to be used, instead qualitative and less-structured research approaches are favoured (Saunders et al., 2007). In this thesis research the aim is to investigate the reverse supply chain processes performed by four electronics retailers in Sweden of different sizes. Thus, it is necessary to understand the objectives and the actions of each company, to point out, why a certain product recovery option is being used. As a result, the interpretivism view is the most appropriate for this research.

3.2 Research approaches

Deductive and inductive approach

Ghauri and Gronhaug (2005) state that there are two ways of establishing what is true or false and to draw conclusions: induction and deduction. In the deductive approach researchers develop a theory or a hypothesis and design a research strategy to test the hypothesis. On the other hand, the inductive approach allows researchers to draw general conclusions from empirical observations by collecting data; this type of research is often associated with a qualitative type of research (Ghauri & Gronhaug, 2005). This thesis is based on the inductive approach as there is a lack of research and empirical data in the field of reverse supply chain
management. Furthermore, in-depth analysis surrounding the issue of choosing the appropriate recovery options for returned products is essential.

*Exploratory, explanatory and descriptive approach*

Depending on the purpose of study, research can be classified as: exploratory, explanatory, and descriptive. Exploratory studies help researchers to gain more knowledge in new, unknown, or unexplored areas- to find out *‘what is happening; to seek new insights; to ask questions and to assess phenomena in a new light’* (Robson, 2002, p. 59). Explanatory studies aim to study a situation or a problem in order to explain the relationship between variables (Saunders et al., 2007). The purpose of descriptive studies is to *‘portray an accurate profile of persons, events, or situations.’* (Robson, 2002, p. 59) Key characteristics of descriptive studies are structure, precise rules and procedure (Ghauri & Gronhaug, 2005).

In this research the combination of both exploratory and descriptive approaches are used. Based on the purpose of this thesis the exploratory approach is suitable in order to gain more knowledge in the field of reverse supply chain management. The descriptive approach is used to *‘portray’* product return process in electronics retailing.

### 3.3 Research strategy

Saunders et al. (2007) point out that the choice of research strategies (experiment, survey, case study, action research, grounded theory, ethnography, archival research) is based upon answering the research questions and meeting objectives. For the basis of conducting empirical research, a case study as a strategy is chosen. The case study strategy allows the generating of answers for the research questions for this thesis.

A number of electronics retailers (seven) that offer white and brown goods and operate in Sweden have been contacted (phone communication and e-mails) and four out of them agreed to participate in the empirical study. The criterion for selection has been to investigate electronics retailers of different sizes to examine whether they have similar approaches in handling product returns and choosing recovery options. The information regarding the electronics retailing companies has been found through the Swedish website (*www.allabolag.se*).

### 3.4 Research method

Saunders et al. (2007) distinguish two methods *quantitative* and *qualitative*, to obtain data in order to solve/ answer a particular research problem or questions. The quantitative method is mainly used when collecting statistical data; in contrast the qualitative method involves non-numerical data collection (Saunders et al., 2007).

The qualitative method is used for this thesis in order to gain more knowledge about the phenomena of product returns, by collecting the reflections on this issue from interviewed participants (representatives of the selected electronics retailing
companies). ‘For inductive and exploratory research, qualitative methods are most useful, as they can lead to hypothesis building and explanations.’ (Ghauri & Gronhaug, 2005, p. 111) Furthermore, the mono method is chosen as a single qualitative data collection technique in the form of in-depth interviews (Saunders et al., 2007).

3.5 Time horizons

Saunders et al. (2007) refer to a cross-sectional study as the ‘snapshot’ time horizon and a longitudinal study as the ‘diary’ time perspective. Longitudinal research allows studying the change or development of a phenomena or situation over time, however this type of research is very time consuming (Saunders et al, 2007). This thesis is conducted as a cross-sectional study, due to time constraints given to answer the research questions and fulfil the objectives. A cross-sectional study examines a particular phenomenon at a particular time, in this thesis it is not necessary to investigate returned product handling at more than one point in time.

3.6 Data collection

Data collection is an essential part of research; however sources differ with the collecting process. There are several ways and manners of obtaining, structuring, and analysing data to facilitate the research process. Depending on the origin of the source, collected data is classified as secondary or primary data. Ghauri and Gronhaug (2005) and Saunders et al. (2007) identify that secondary data are information previously collected by others for some other purpose, and primary data are original or new information collected specifically for the research at hand.

3.6.1 Secondary data

In this thesis the following sources of secondary data have been used in the form of:

- **Documentary sources**: articles from academic journals, publications, other thesis and dissertations, the Internet;
- **Multiple sources**: books, industry specific reports, Swedish Environmental Protection Agency (Naturvårdsverket) reports, EU directives.

3.6.2 Primary data

In this thesis interviews are applicable as a source of collecting primary data. Saunders et al. (2007) categorize three types of interviews: structured, semi-structured, and unstructured or in-depth interviews. For this thesis, due to the uniqueness of each company, semi-structured interviews are used. The questions are related to particular interviews, given a specific organizational context that is encountered in relation to the research topic (Saunders et al., 2007). The order of the questions may vary depending on the flow of the conversation, and additional
questions have been asked to explore the research topic or objectives given the nature of the company (Saunders et al., 2007). Additionally to electronics retailers for further in-depth information regarding the recovery options and its processes, interviews with the recycling centre and workshop have been conducted. Furthermore, to get an insight into Swedish legislation concerning product returns in electronics retailing an interview with Svensk Handel representative was also conducted. Most interviews have been held face-to-face and telephone interviews have been used as well (see Appendix 7 Interview participants).

3.7 Reliability

The research approaches and design chosen for this thesis to which the collection primary and secondary data is gathered can have an effect on the reliability of the findings. According to Saunders et al. (2007) ‘reliability refers to the extent which your data collection techniques or analysis procedures will yield consistent findings’. Providing reliable sources of information to conduct and carry out research is critical to reduce the possibility producing inconsistent and non-credible findings.

The quality of information obtained during the collection of primary and secondary data will determine the success of how the analysis and interpretations of the findings can prove useful for academia and practitioners alike as well as provide a base for further research in this topic.

3.8 Validity

The validity of a research is concerned with whether the findings validate what was being said throughout this thesis; it is to see whether the relationship between two variables is a causal relationship (Saunders et al., 2007). For instance, the research conducted for this thesis concerns how product returns are handled and the role retailers play in the electronics industry specifically in Sweden. The research conducted will validate whether or not the retailers role has a contributory factor in how products are being processed in order to close the loop.

The timing of the research can have an influence on the results which may minimise the validity of the findings, also to see whether the findings can be adaptable or equally applicable to other research settings or similar organisations within a particular industry or of comparison (Saunders et al., 2007). The authors conducted semi-structured interviews so it can be flexible and interactive to validate the interviewees of their understandings and opinions and see if it mirrored each other which also increase the reliability of the findings since they are credible sources.
3.9 Method evaluation

To achieve the purpose of this thesis the authors have chosen the qualitative research approach and apply the multiple-case study research strategy to collect data through semi-structured interviews.

However, there are weaknesses attributed to the chosen methods conducting the empirical research.

Furthermore, a limited number of electronics retailers (participants) operating in Sweden has been examined in this thesis due to the fact that some companies when contacted didn’t agree to take part in this research. This hinders the purpose of reaching an in-depth understanding of the phenomenon, hence making the findings less valuable for the academia and the practitioners but making a case for future research. The data collected through the semi-structured interviews is based on the information from the retailers’ perspective, which is due to the time constraints of the research and does not give a whole picture of the phenomenon. The participating companies’ and their interviewed employees’ identities are kept anonymous upon request.
4 Empirical study

In the following sections, the results of the empirical study of the selected electronics retailers that operate in Sweden are presented. Semi-structured interviews have been conducted for the purpose of gaining a better insight information and understanding of how retailers respond to returns, the reverse supply chain network and actors’ involvement, and processes for how they handle the recovery requirements. The identities of the companies that have been interviewed are kept anonymous upon request, and throughout this thesis they are referred to as company A, B, C, and D respectively. For further in-depth information regarding the recovery options and its processes, interviews with the recycling centre and workshop have been conducted. For the purpose of consistency throughout this thesis these companies interviewed are also kept anonymous and are referred to as the workshop (repair centre) and the recycling centre. This chapter is finalised with presenting the summary table of the empirical study.

4.1 Company A

The following empirical data has been received through the conducted face-to-face interview with the company A store part-owner (2012-03-27).

4.1.1 Company A description and product returns

Company A is a small private electronics retailer that operates in Sweden with one store in Jönköping owned by company A. Four workers are employed by company A to perform all the necessary activities to maintain both forward and reverse supply chain processes in order to deliver the products to the final customers and satisfy their needs and desires, providing high levels of service.

Company A offers a variety of big home appliances (white goods), for example refrigerators, washing machines, dryers, microwaves, and small home appliances, for example toasters, coffee machines, blenders, irons. Most of the products are Electrolux and Husqvarna brands; however such brands as Brown and Philips are also presented. Mostly small kitchen appliances are returned to the store by customers, annually 5-10% of electronics products are returned to company A.

Depending on the brand or type of product, especially in the case of smaller low-cost items, returned products are simply exchanged for new ones within one day. More expensive items going through the recovery process are usually returned to company A within 1-12 days. Returned low-cost items are held by company A for three months and if not re-sold are sent to the contracted recycling centre for disposal.

4.1.2 Reverse supply chain network and actor responsibilities

There are several actors involved in company A reverse supply chain network: company’s store, workshops of suppliers, recycling centre and 3PL transportation
companies. Since company A is a smaller company in comparison to others, they do not have a separate department that is responsible for handling returns. Customers bring returned products to the stores sales counter and explain their reasoning for returning the item for the employee to register the issue and decide the best possible solution to handle the returns. However, company A has in-house technicians, who can inspect and do some minor repairs. The initial testing and inspecting is done in-house to determine the degree of repair needed on the items, minor repairs can be also done in-house.

Further testing, inspecting, and recovery are outsourced to authorised decentralised workshops of suppliers (depending on the product brand) and are processed at their facilities. Company A also outsources its transportation activities that take place outside the store location city radius to 3PL transportation companies that are contracted by their suppliers. There is no special warehouse for storing returns, but rather they have a small section within the warehouse to store returns for a particular time-frame (three months). When it is determined that an item is to be disposed, it is sent to the recycling centre facilities, as company A outsources its recycling activities.

In order to control the reverse supply chain network the program Xpos is used by company A for communication and information sharing with suppliers regarding returned items. The program’s purpose is also to keep records on returned items that are damaged. Besides this company A also uses phone and e-mails to communicate with suppliers for more detailed information collection and exchange about the status and reparation process of an item. These technologies help facilitate the company A business activities by organizing and managing information as well as acting as a time and cost saving solution.

4.1.3 Reverse supply chain processes

When the product is returned to company A it goes through the following processes in the reverse supply chain:

Product acquisition - When products are returned, they are brought by customers to the sales desk which also serves as a return station for customers. A copy of the original receipt and customer contact information are taken for administrative purposes to later on notify and update the customers of the product status, when it is being repaired and ready to collect.

Sorting and disposition - After acquisition, returned products go through initial testing and inspection by in-house technicians to determine the problem with the item. If there is a minor issue or reparation needed it is handled in-house. If the products require bigger repairs the items are sent to suppliers’ service stations that provide further testing, sorting, and inspecting activities to identify the issue with the product. In some cases after initial testing or inspecting it is revealed that there is nothing wrong with the returned item.
Reverse logistics - Company A outsources its transportation activities that take place outside the store location city radius to 3PL transportation companies that are contracted by their suppliers.

Recovery - Company A outsources product recovery activities to the authorised suppliers’ service stations. The recycling activities are also outsourced to a recycling centre to handle the disposal of discarded items.

Redistribution and sales – Company A does not re-sell or re-distribute repaired items, they sell only new products. The product brands have their own separate redistribution channels.

The evaluation of the performed activities involved in the product return process is not done by company A itself, but issues are rather reported to suppliers’ headquarters.

4.1.4 Product recovery and factors influencing the choice

Company A is not authorised and does not perform the recovery process itself, thus the recovery activities are outsourced to authorised suppliers’ workshops and the recycling centre. Only minor repairs are done in-house to smaller low-cost items, except in the case when the items are no longer under warranty. From the retailer’s perspective, product price is the factor influencing the choice of the recovery option. Small low-cost appliances are exchanged or recycled, as for bigger expensive appliances, they are sent to workshops for further examination and repairs.

4.1.5 Driving forces for handling returns

The main driving forces for handling returns for company A are legislation and corporate citizenship. As company A is a small private company, it is especially important for its business activities to show its corporate responsibility and that they follow environmental legislation. Aside from that the retailer also has a personal interest in making an input in helping the environment and aiding sustainability.

4.2 Company B

The following empirical data has been received through the conducted face-to-face interview with the company B after-sales store manager (2012-03-27) and telephone interview with the company B regional after-sales store manager (2012-04-02).

4.2.1 Company description and product returns

Company B is an electronic retail chain operating in most of the Nordic region; it has stores located in various parts of Sweden. Its business activities include the
selling of electronic brands, customer service, and product information. The service department of each location store handles the product returns of customers with staff numbering up to 10-15 employees (Regional after-sales manager, personal communication, 2012-04-02).

Company B has a wide assortment of electronic products (Samsung, Apple, Acer, Philips) ranging from computers and accessories, laptops, home and mobile telephones, audio and video devices, home appliances, to movies and gaming. The products that are returned to the service desk are mainly mobile phones, laptops, televisions, and campaign products (on sale items), and small home appliances. Company B has an annual percentage of returned products of 1.8% (Regional after-sales manager, personal communication, 2012-04-02).

On average the store has a policy to have products ready within 21 days. Each store varies depending on how important the after-sales service department at various stores considers response to returns. The particular store investigated averaged ten working days from initial product acquisition to returning the recovered item. Within five working days customers have an answer regarding the status of the item and problem or malfunction associated with it (After-sales store manager, personal communication, 2012-03-27).

4.2.2 Reverse supply chain network and actor responsibilities

The various actors involved in company B reverse supply chain network are: company store, recycling centres, OEMs, authorised workshops, and 3PL transportation companies. Stores do initial testing and depending on the criteria of item price (under 1000 SEK) and OEMs agreement of disposal, the item will not be repaired and will be sent to a recycling facility in order to go through a disposal process. If the item is over 1000 SEK it will be sent to the various authorised workshop centres for further testing and inspection, based on the result a recovery option is chosen (After-sales store manager, personal communication, 2012-03-27).

Minor initial testing and inspecting on the returned items are done in-house but can also be performed by various authorised workshops. This is done in a decentralised manner. Depending on the brand and product type, it will be sent to the appropriate authorised workshop for further processing. After the product is repaired or refurbished it will be sent back to the store and eventually to the customer. If recovery is not possible the item will be sent to a recycling facility or in rare cases back to the OEMs (After-sales store manager, personal communication, 2012-03-27).

Logic RMA is software used by company B and OEMs to connect their IT systems. When the product is returned it will be registered in both systems to further track its process through the reverse supply chain. Besides this software company B has its own internal software to track its inventory and sales which also is interconnected with the Logic RMA system (Regional after-sales manager, personal communication, 2012-04-02).
4.2.3 Reverse supply chain processes

*Product acquisition* - Customers bring returned items to the service desk (after-sales department) which is located in the various stores, returned items get registered and a copy of the receipt for the item is taken to record keeping and is proof of retrieval and reimbursement of funds. Customers are or can be informed of item status by SMS (After-sales store manager, personal communication, 2012-03-27).

*Sorting and disposition* - The initial testing is done in-house and items below 1000 SEK will be disposed of based on the OEM's request and agreement. If items cost more than 1000 SEK they will be sent to the appropriate authorised workshops for further testing, sorting and disposition. This part of the process is mainly outsourced (After-sales store manager, personal communication, 2012-03-27).

*Reverse logistics* - Company B outsources all its transportation activities to 3PL transport companies, both in the forward and reverse supply chain that are contracted by the OEMs (After-sales store manager, personal communication, 2012-03-27).

*Recovery* - Company B outsources this activity to the various authorised workshops contracted by brand manufacturers to handle the recovery processes. The recycling activities are also outsourced to various recycling centres to further sort and dispose of the products (After-sales store manager, personal communication, 2012-03-27).

*Redistribution and sales* - When an item is returned it is sent to the inventory department to see if the package or item was opened or used. If it is still brand new then it will be returned to the shelf and sold at store price. If an item from the package is missing (i.e. manual, batteries, accessories) then the items will be labelled to inform customers of missing items and resold at a discounted price (After-sales store manager, personal communication, 2012-03-27).

Each store location evaluates how fast on average the product return process is handled by returning the products back to the customers. This is done by a turnaround time (TAT) evaluation system, which measures how quickly on average they handle each return (Regional after-sales manager, personal communication, 2012-04-02).

4.2.4 Product recovery and factors influencing the choice

Company B outsources its recovery activities to authorised workshops because OEMs do not authorise retailers to perform the recovery process itself. Even products that are returned that are no longer under warranty is still sent to various workshops, because company B does not have any facilities to handle these activities (Regional after-sales manager, personal communication, 2012-04-02).

One of the factors influencing the choice of recovery options is price, if the product is under 1000 SEK company B does not repair it and the item is sent to the
recycling facility. If the product is above 1000 SEK the initial testing and inspection is done by company B or it is at once sent to the authorised workshops to perform this process along with the recovery according to the warranty and guidance set by the OEM (Regional after-sales manager, personal communication, 2012-04-02).

4.2.5 Driving forces for handling returns

From company's B perspective there is no direct economic value for handling returns, because they do not have direct ownership of the products they sell and OEMs do not authorise them to do so. The main driving force for handling returns is governmental pressures through legislation which obligate companies to take care of returned products. Another is corporate responsibility towards the customers and society, since business entities are regarded as persons, company image is the key to retaining customers by keeping them happy (Regional after-sales manager, personal communication, 2012-04-02).

4.3 Company C

The following empirical data has been received through the conducted face-to-face interview with the company C deputy store manager (2012-03-29) and face-to-face interview with the company C head of after-sales department (2012-04-04).

4.3.1 Company C description and product returns

Company C is a big player on the consumer electronics European market, operating internationally in such countries as Germany, Austria, Hungary, Portugal, Spain, Netherlands, Greece, Italy, Belgium, France, Poland, Russia, Turkey, and China and in Sweden (Deputy store manager, personal communication, 2012-03-29).

In Swedish stores company C offers a variety of consumer electronics products from different brands (Electrolux, Samsung, Brown, Philips and other): white goods (refrigerators, washing machines, dryers, microwaves), small home appliances (toasters, coffee machines, blenders), brown goods (TV, DVD, audio equipment), mobile phones, computers and other. Mostly mobile phones, laptops and small low-cost home appliances are returned to the store by customers. Annually 3-4% of electronics products are returned to Company C and turn-around time usually takes 10-14 days (Head of after-sales department, personal communication, 2012-04-04).

4.3.2 Reverse supply chain network and actor responsibilities

In the example of one of company C's stores in Sweden, the following actors were identified to be involved in the reverse supply chain network: company's store, workshops, recycling centre and 3PL transportation companies (Deputy store manager, personal communication, 2012-03-29).
Company C has a special service department that handles product returns in each store. The returned products are brought by customers to the service desk, where products are retrieved and registered. Company C has a special ‘lager system’. Depending on the type of return and the status of the product it is determined to which ‘lager’ to allocate the returned item for further processing. When the returned item is moving from one ‘lager’ to another, its status change is registered in company C’s IT system (Head of after-sales department, personal communication, 2012-04-04).

Simple returned product diagnostics is done in-house in the store’s warehouse facility, but mainly testing, inspecting, and sorting and also its recovery processes are outsourced to authorised workshops contracted by OEMs. The returns are then sent to authorised workshop facilities on a daily bases. The recycling activities are also outsourced and processed in the recycling centres facility. Lastly, Company C outsources all of its transportation activities to 3PL transport companies both in the forward and reverse supply chain that are contracted by OEMs (Head of after-sales department, personal communication, 2012-04-04).

The service connection database is used to connect internally all service departments that operate in Sweden. The program is used to register returns, providing other detailed information on the returned items. Furthermore, it also contains guidance from all the company brands on how to process the returned item and which recovery activities should be performed (Head of after-sales department, personal communication, 2012-04-04).

4.3.3 Reverse supply chain processes

When the product is returned to company C it goes through the following processes in the reverse supply chain (Head of after-sales department, personal communication, 2012-04-04):

Product acquisition - Customers bring their returned items to the service desk located in the store, along with a receipt for proof of warranty in order to register the item into the system for administrative purposes. Depending on the returned product type and guidelines to handle them they are placed and labelled under the ‘lager system’ for further processing.

Sorting and disposition - Each OEM has its own guidance on the sorting and disposition of returns and company C has to follow them. Minimal initial testing and inspection can be done in-house. Further, depending on the criteria and guidelines of each OEM and the type of recovery options needed, the item will be sent to the appropriate authorised workshop. The process is done in a decentralised manner. Mainly during the initial testing and inspection the following issues are revealed: software problems, power supply problems for white goods, dust in mobile phones and laptops, defective speakers of mobile phones, broken or defective TV panels.

Reverse logistics – Company C outsources all of its transportation activities to 3PL transport companies both in the forward and reverse supply chain that are
contracted by OEMs (Deputy store manager, personal communication, 2012-03-29).

**Recovery** – Company C outsources product recovery activities to the authorised suppliers’ workshops based on the brand guidance. The recycling activities are also outsourced to the recycling centre to handle the disposal of discarded items (Head of after-sales department, personal communication, 2012-04-04).

**Redistribution and sales** – Company C has a ‘try and buy’ system when customers can try a product for 30 days and return it to the store if not satisfied. If an item is returned without being used it will be sent to the inventory department to be re-registered and afterwards will be sent back to the store for sale at a new-product price. In case a returned product lacks an accessory it will be repackaged and labelled to notify the customer that a component is missing and offered at a discounted price. Only when the store takes ownership of products can they be resold (Head of after-sales department, personal communication, 2012-04-04).

The workshop performance is being mainly evaluated by company C’s headquarters. Discussions among location store managers about all workshops’ service quality are rendered on a weekly base. If not satisfied, a report is sent to company’s C headquarters for further discussions with workshops on how they would like to improve their services. The workshops are mainly evaluated by their TAT, how quickly they can repair and fix returns and the quality of the service (Deputy store manager, personal communication, 2012-03-29).

### 4.3.4 Product recovery and factors influencing the choice

Company C is not authorised to perform the recovery process itself, thus the recovery activities are outsourced to authorised OEM workshops and the recycling centre. The OEM themselves are outsourcing less and focus on building their own facilities to repair returns in order to boost quality control of repairs and quicker TAT (Head of after-sales department, personal communication, 2012-04-04).

The minor repairs are done in-house in the case the items are owned by company C or are no longer under warranty. From company C’s perspective, product price, day of purchase, brand and type of product are the factors influencing the choice of the recovery option (Head of after-sales department, personal communication, 2012-04-04).

### 4.3.5 Driving forces for handling returns

The main driving forces for handling returns for company C are legislation and corporate citizenship. According to the Swedish law (Reklamationsrätt), customers can return the products to the company within a three-year period aside from the period stated in the warranty; therefore, companies should be able to organise their processes to handle the returns and provide high quality of service (Head of after-sales department, personal communication, 2012-04-04). Company C collaborates only with experienced actors to handle their product return process.
by outsourcing those activities (Deputy store manager, personal communication, 2012-03-29). For instance, by recycling returned items company C shows their corporate responsibility. However, there is no direct economic gain for retailers from handling returns, indirectly service value added can increase the customer retention rate by keeping them satisfied with the service (Head of after-sales department, personal communication, 2012-04-04).

4.4 Company D

The following empirical data has been received through the conducted face-to-face interview with the company D store manager (2012-04-02).

4.4.1 Company D description and product returns

Company D is a medium-sized electronics retailer operating in most of the Nordic region as well as affiliates in the Netherlands; they have a selected number of stores located within each country. Its business activities include selling home entertainment systems from mid to high-end brands (Apple, Toshiba, Denon, and NAD). The stores are smaller in comparison to other retailers with a staff of usually four employees handling the daily activities from selling, basic installation of products, to other customer service activities.

Company D specialises in selling brown goods ranging from stereos, home theatre systems, flat-screen televisions, audio devices, and accessories. Company D has a 'try and buy' system in place to minimize product returns by leasing customers that are hesitant in purchasing a product. The annual rate on returns is less than 1% as a result of this type of strategy. Most of the products that are returned by customers are CD/DVD/Blu-ray players and televisions.

Customers have 30 days to try a product and if not satisfied return it, in this case the product is checked for any physical damages and then placed in the store to be re-sold at a discounted price. If a customer purchases a product they have 8 days to exchange it for another one. Based on price (less than 3000 SEK) it is determined whether the return will be exchanged for a new one or it will be sent out for further processing through the recovery options. Products that are more expensive (more than 3000 SEK) are sent through the recovery process, and within 7-21 days products are returned to customers depending on the extent of repairs. When the product is not under warranty or due to faulty damages from a customer, the costs for repairs are covered by customers themselves.

4.4.2 Reverse supply chain network and actor responsibilities

There are several actors involved in Company D reverse supply chain: company store, service warehouses (workshops), recycle centres, and 3PL transportation companies. Since company D is smaller in comparison to other retailers, they do not have a separate department that is responsible for handling returns.
Customers bring their returns to the sales counter and explain the reason for the return and then the employee will decide the best option for handling returns.

Minor repairs are done in-house by technicians, for more extensive repairs products are sent to one of the service warehouses for further testing, inspecting, and sorting and also recovery. Company D outsources its transportation activities to 3PL transportation companies. When it is determined that a product needs to be disposed of, useful components are cannibalised and the rest will be disposed of and further processed by a recycling centre.

Company D has an intranet connecting all stores together and it is also incorporated with the service system, everything is done online. The purpose of this system is to record detailed information of the company's products and their returns flowing through the network.

4.4.3 Reverse supply chain processes

Product acquisition - When products are returned they are brought to the sales desk which also is used for accepting returns. The employee then checks if the product is under warranty, this determines whether the customer will pay for the repair service or not.

Sorting and disposition - Usually the returns are exchanged, initial testing and inspection is done to determine the extent of repairs and then sent to one of the service warehouses for repairs. Minor repairs and services are handled by in-house technicians, for mid-to-extensive repairs the product is sent to either the service warehouse facility or to a recycling centre. Further testing, sorting, inspecting is done at one of the service warehouses facility. Through this process it will be determined whether it will be worth repairing or scrapping. Re-usable components are taken for future use to repair other products that require minor repairs.

Reverse logistics - Company D outsources its transportation activities to 3PL transportation companies.

Recovery - Company D outsources their recovery activities to service warehouses that handle its product recovery. At the service warehouse further testing, inspecting, and sorting is done to determine its recovery option.

Redistribution and sales - Company D has a 'try and buy' system for customers that are hesitant to buy a product. If a customer returns a product for any reason the product is checked for damages and if its package is complete, if there is no physical damages it will be re-packaged and re-sold at a discounted price. If there are minor damages it will be sent to the service warehouse to be re-worked and sent back to be re-sold at a discounted price.
4.4.4 Product recovery and factors influencing the choice

Company D outsources its recovery processes to service warehouses, although they are non-partners they have extensive training of the products. There are two facilities in Sweden and every store uses them. Minor repairs are done by in-house technicians at store location. They also outsource their recycling activities to recycling centres. From company’s D perspective, warranty and product price is one of the initial factors that influence choice of recovery. For returns that are no longer under warranty, repairs and services rendered will be paid from customers themselves. Inexpensive returns (less than 3000 SEK) are exchanged, old products will be sent to the service warehouse for further processing. Expensive returns (more than 3000 SEK) are fixed in-house for minor repairs or sent to service warehouse for more extensive repairs.

The lifecycle of the returned product is important; an old product might need out-of-date components that are no longer available. Company D has spare parts for many products and some can be 20 years old but they are not always possible to get repaired (Store manager, personal communication, 2012-04-02).

4.4.5 Driving forces for handling returns

Company D focuses on corporate citizenship by taking responsibility for their customers and that their products are handled with care so that they can use them longer if they get serviced properly and on time. Company D also focuses on minimising returns and keeping their customer satisfied by providing added-value services. Aside from having a responsibility to the customers, company D also has a responsibility to the environment so they avoid returns and use the appropriate recovery option. Due to legislation in Sweden company D has the obligation to handle returns properly (Store manager, personal communication, 2012-04-02).

4.5 Workshop (repair centre)

For more in-depth information about the recovery options and factors that influence the appropriate recovery option choice; a face-to-face interview (2012-04-12) has been conducted with one of the main workshops’ head production engineer providing service to companies A, B, C and D respectively. Since most of the electronics retailers have the same brands they are all sent to the same workshops for further testing, inspection, sorting and recovery.

4.5.1 Testing, inspection, and sorting processes

The sorting of the goods is done by the retailer and courier. The workshop has two workshops that are located in Sweden one in Växjö and one in Linköping. The one in Växjö is specialized in PC-repairs, and the one in Linköping is specialized in brown goods (TV, monitors, audio video etc.). They do not repair mobile phones or white goods, except for a few exceptions. The retailer has a matrix where they can see what products shall be sent to Växjö and what shall be sent to Linköping.
When the goods arrive at the workshops they are inspected for any visible damages that might have happened during transportation. The retailers also notify if there were any visible damages on the product when it was sent for recovery, and these notes are matched with what can be found on the product. If any doubt, the product is put on hold and the retailer is contacted.

All products sent for recovery have a failure description that tells what the problem is with the product. The testing is done based on the failure description. When testing different stress test programs are used, they have reference parts (also known as golden parts), that are swapped with parts that might be broken to see if the failure will disappear - trial and error.

There are also service bulletins sent from the OEM that state of common and known errors, this also helps them to recognize the appropriate solution based on the failure. The main problems that occur during testing, inspection, and sorting are:

- **Testing** – intermittent failures that needs longer troubleshooting and contact with customer for more information of the failure
- **Inspection** – transportation damage
- **Sorting** – product sent to wrong workshop.

### 4.5.2 Recovery options and factors influencing the choice

Most of the returned products that are sent are repaired, but there is also a smaller amount of units that is either refurbished/remanufactured or recycled. The choice of the repair option is based on the fact that it is more expensive to recycle the unit and give the customer a new one, instead of repairing it. However, if the failure is very complicated, like a water damage or drop damage, it happens that the unit is recycled instead of being repaired since the amount of parts that needs to be exchanged is more expensive, instead the customer is given a new unit.

The TAT is very different and varies due to brand and service type (in warranty or out of warranty). For some brands there is a local stock at the workshop with spare parts, and for some the spare parts are sent directly from the OEM. If it is a warranty case and the workshop has the spare parts in stock, they can often repair and send the unit back within one to two working days. If it is an out of warranty repair they need to send a quotation to the customer or insurance company. It can often take up to one week or more to get an answer. And if the answer is to repair the unit they need to wait for spare parts to arrive at the workshop. So the time can vary a lot, but as an average the unit is returned within three to four working days.

### 4.6 Recycling centre

The Swedish collection system is originally based on an agreement between a producer organization, El-Kretsen, representing producers of electronic products,
and the Swedish municipalities. The agreement was concluded in 2001, in connection with the implementation of the Swedish producer responsibility, establishing that the local authorities of the municipalities of Sweden will bear the costs of the collection of electric waste and El-Kretsen will bear all other costs (Swedish Environmental Protection Agency (Naturvårdsverket) report, 2009). For more in-depth information about the recycling process a face-to-face interview has been conducted with foreman of one of the recycling centres located in Jönköping (2012-04-04).

Retailers deliver the returned items directly to the recycling facility for further processing, which is done on a semi-weekly bases. The recycling centre acts as a ‘middle man’ in the recycling process, they receive products for sorting and then forward all the sorted materials to various specialized recycling companies to further break down and process the components. They are sorted based on the type of product, when being dismantled into separate components and later on sent to other recycling companies for further processing. Hazardous waste and components are separated and placed into different containers to be taken to specialised recycling companies. The facility is centralized, there is one centralised location for each city or region for all the retailers to bring their electronic products to be further processed and recycled. Sorting and inspecting is time consuming and usually takes three to four days.

The recycling centre does not re-sell any of the recycled materials, as they do not have ownership of them but rather a private company (El-Kretsen) has commissioned them to handle the sorting and inspecting. After the materials are further broken-down they will be sold back to OEMs.

The company provides initial inspection and sorting of the products, but further processes are done by other companies involved in the recycling process. So indirectly these activities are outsourced to specialized recycling companies. Furthermore, transportation is outsourced to 3PL transportation companies that are contracted by the privately owned recycling company. Lastly, the opportunities for recycling are saving energy, costs, and resources. The driving forces associated with recycling are limited resources, environmental issues, as the saving and re-using of materials.
### 4.7 Summary of the empirical study

The summary of the empirical study is presented in table 4-1.

#### Table 4-1 Summary of the empirical study (compiled by authors)

<table>
<thead>
<tr>
<th></th>
<th>Company A</th>
<th>Company B</th>
<th>Company C</th>
<th>Company D</th>
<th>Workshop</th>
<th>Recycling centre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product acquisition</strong></td>
<td>Product acquisition is done at the sales desk. No after-sales department</td>
<td>Have separate department that handles product returns</td>
<td>Product acquisition is done at the sales desk. No after-sales department</td>
<td>Receive product returns from retailers</td>
<td>Perform major sorting and disposition activities</td>
<td>Receive disposable products from retailers and workshops</td>
</tr>
<tr>
<td><strong>Sorting and disposition</strong></td>
<td>Minor sorting and disposition done in-house and major sorting and inspection is outsourced workshops and recycling centres</td>
<td></td>
<td></td>
<td></td>
<td>Perform major sorting and disposition activities</td>
<td>Perform sorting and disposition activities</td>
</tr>
<tr>
<td><strong>Reverse logistics</strong></td>
<td>Outsources their transportation activities to 3PL transportation companies</td>
<td></td>
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<tr>
<td><strong>Recovery</strong></td>
<td>Outsources recovery activities to the authorised workshops and recycling activities to recycling centres</td>
<td></td>
<td></td>
<td></td>
<td>Perform recovery activities</td>
<td>Perform recycling activities</td>
</tr>
<tr>
<td><strong>Re-distribution and sales</strong></td>
<td>Does not re-sell or re-distribute repaired items, they sell only new products. OEMs have own separate re-distribution channels.</td>
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</tr>
<tr>
<td><strong>Actors involved in reverse supply chain</strong></td>
<td>Retailers, authorised workshops, OEMs, recycling centres and 3PL transportation companies</td>
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<tr>
<td><strong>Technology</strong></td>
<td>Xpos program, phone and e-mails</td>
<td>Logic RMA software, internal software, phone and emails</td>
<td>Service connection database</td>
<td>Intranet connection incorporated with the service system</td>
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<tr>
<td><strong>Performance evaluation</strong></td>
<td>Issues are reported to OEMs</td>
<td>TAT evaluation system from each local store</td>
<td>Performance is evaluated by retailer headquarters</td>
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<tr>
<td><strong>Driving forces for handling returns</strong></td>
<td>The main driving forces are legislation and corporate citizenship. There are no direct economic benefit from a retailer perspective, but indirectly through customer retention</td>
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<td><strong>Recovery options</strong></td>
<td>Most of the returned products that are sent to the workshops are repaired, but there is also a smaller amount of units that is either refurbished/remanufactured or recycled. The choice of the recovery option is based on the fact that it is more expensive to recycle the unit and give the customer a new one, instead of repairing it</td>
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<td><strong>Factors influencing recovery option choice</strong></td>
<td>From all Companies (retailers) perspective the main criteria for recovery option choice is the price, which is stated in the OEMs guidelines that they have to follow. Additional criteria such as day of purchase, brand type, type of product to determine the returned product recovery choice</td>
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5 Analysis

This chapter presents the analysis of the whole research, structured in four sections that answer separately each of the research questions. The empirical findings are summarised, discussed and analysed according to the literature review of the study.

5.1 RQ1: How are product returns handled in electronics retailing in Sweden

According to Krikke et al. (2004), there are five business processes in the reverse supply chain - product acquisition, reverse logistics, sorting and disposition, recovery, re-distribution and sales. The conducted empirical research revealed that these five reverse supply chain processes are applied in practice in electronics retailing in Sweden and add value to the companies involved. This supports the statement of Blackburn et al. (2004) that reverse supply chains deserve as much attention at the corporate level as forward supply chains and should be managed as business processes that can create value for the company.

Product acquisition – All companies have the same product acquisition process, however the size of the company and its resources will determine whether they have a special department to handle the returns. For instance, companies B and C are bigger in size and operate internationally in comparison to companies A and D that are smaller in size; therefore they have a separate department to receive and handle the returned products. During product acquisition each company registers information regarding returned items in their internal data bases that are also interconnected with the OEMs. For example, company C uses a special 'lager system' to register and appropriately allocate the returned products for further processing (Head of after-sales department, personal communication, 2012-04-04).

Sorting and disposition – As Stock and Mulki (2009) state an important activity of the reverse supply chain process is to accurately evaluate each product returned in order to determine the most optimal disposition option, therefore, each company fulfils sorting and disposition activities. All companies have in-house technicians that perform initial testing to determine the problem with the item, minor repairs are done in-house and in more complex cases items are sent to OEMs authorised workshops that provide further testing, sorting, and recovery activities. Companies do the sorting based on the guidelines from OEMs. For instance, the inexpensive items are discarded by the recycling centres, as it is not economically efficient to replace the damaged components within the items (Head production engineer, personal communication, 2012-04-12). In the case of expensive items they are outsourced to authorised workshops for further testing, sorting, disposition and recovery.

Reverse logistics – All companies outsource their transportation activities to 3PL transport companies, both in the forward and reverse supply chain that are contracted by OEMs.
**Recovery** – All companies outsource their product recovery activities to the authorised workshops. The recycling activities are also outsourced to a recycling centre to handle the disposal of discarded items.

**Redistribution and sales** – Redistribution and sales opportunities are limited, because OEMs have not given permission of ownership to companies to re-sell the repaired items. Some OEMs have their own separate re-distribution channels, which is the case for company A. On the other hand, some companies such as C and D have a ‘try and buy’ system for hesitant customers to try an item for a period of time in order to minimise or avoid product returns. In these rear instances when a product is returned, it can be repackaged and re-sold at the discounted price, notifying the customer that the item was previously used or the package is not complete.

From the empirical findings of the companies investigated it is clear that they all utilise the decentralised reverse supply chain design. As consumer electronics products belong to the time-sensitive category (Fisher, 1997), according to Skjott-Larson et al. (2007) and De Koster and Delfmann (2007) innovative products require a responsive and fast supply chain. Therefore, in responsive reverse supply chains the positioning of the evaluation, testing, and sorting activity is decentralised.

All companies use information technology (programs and software) for information sharing among actors involved in the reverse supply chain. For instance, company A uses their Xpos program for communication and information sharing with suppliers regarding returned items. Company B and OEMs uses Logic RMA software to connect their IT systems. The service connection database is used by company C to connect internally all service departments that operate in Sweden. Company D has an intranet connecting all stores together and it is also incorporated with the service system, everything is done online. The information exchange enhances operational efficiency in reverse supply chain (i.e. speedy RMA and product tracking) and provides greater supply chain visibility, which can in turn lead to cost reductions, improved in-stock performance, increased sales, and improved customer satisfaction of the returns turnaround process (Olorunniwo & Li, 2010).

Blumberg (2005) state that there are issues to take into consideration when managing, coordinating and controlling reverse supply chain processes (i.e. uncertainty flow of materials, customer specific, time critically, value maximization, flexibility and multiparty coordination). The utilisation of decentralised reverse supply chain design, outsourcing of transportation and recovery activities and use of information technology can minimise or avoid the above mentioned issues that company managers face while handling product returns.
5.2 RQ2: Who are the actors involved and their responsibilities in handling returned products

Burnson (2010) state that there has to be multi-party coordination in any part of reverse supply chain, whether it is source reduction, recycling, substitution, or disposal. That means that several parties are typically involved. The empirical findings revealed that all four companies that were examined have the same actors involved in their reverse supply chain: retailer (store), recycling centres, OEMs’ authorised workshops, and 3PL transportation companies.

Moreover, De Koster and Delfmann (2007) state that in the reverse supply chain the returned products can flow either from retailers, through distributors to the manufacturer, or it can be outsourced to a 3PL, who collects the items at customers’ location and return them to the client’s location or a dedicated return centre. As the retailers use decentralised reverse supply chains it consist of multiple organisations. For instance, retailers serve the function of a ‘gate-keeper’ and are involved in collection, early initial inspection to determine the condition of the returns to send the item further to the other actors within the reverse supply chain to select the appropriate alternative disposition and redistribution of returned items (Skjott-Larson et al., 2007). This requires the presence of specific guidelines for the condition of the product, that are used in practise by interviewed companies, local skills to perform the initial inspection, and a logistics infrastructure to process the items further into the activities represented in Appendix 3 Decentralised responsive reverse supply chain (De Koster & Delfmann, 2007).

The group of actors involved in reverse supply chain activities, such as collection and processing, are commonly independent intermediaries, specific recovery companies, reverse providers, municipalities taking care of waste collection, and public-private foundations created to take care of recovery (De Brito & Dekker, 2004), which can be seen from the empirical data. Stock and Mulki (2009) argue the need for direct responsibility or obligated delegation to personnel or a department for the product return process. Furthermore, Stock et al. (2002) and Autry (2005) suggest treating the return process separately which would reduce the overlapping of tasks, maximise efficiency in handling, and increase the role of RSCM. From the empirical findings, only companies B and C have separate after-sales department to handle the returned products.

The need for a unified data software to connect all parties and simplify the coordination process within the reverse supply chain, this can create an infrastructure that also facilitates and reduces the cost and time for financial transactions (Skjott-Larsen et al., 2007). All the examined companies use IT to facilitate information sharing processes along their respective reserve supply chains. According to Skjott-Larsen et al. (2007), inter-organisational integration enables trust, which is the essential element of a partnership in an integrated supply chain and in turn promotes collaboration and decision delegation, and reduces independent organisational behaviour among supply chain members.
Many authors state that the driving factors for the companies to handle returned products are economics, legislation or environmental drivers (Fleischmann, Bloemhof-Ruwaard, Dekker, van der Laan, van Nunen & van Wassenhove, 1997; Guide, Harrison & van Wassenhove, 2003; Flapper, van Nunen & van Wassenhove, 2005; Mann, Kumar, Kumar & Mann, 2010). Furthermore, Elkington (1997) refers to the triple-bottom-line as the integration of such factors as economy/profit, ecology/planet and equity/people, which would allow supply chain managers not only to increase profit, but also reduce social and environmental losses. De Brito (2003) supports the concept of Elkington (1997), classifying the drivers into three categories: economics (direct/indirect), legislation and corporate citizenship.

For all four interviewed companies the main driving forces to handle returns are legislation and corporate citizenship. Some industries are under special legal pressure, for example the electronics industry (Fleischmann et al., 1997). Besides the WEEE, RoHS directives electronics retailers operating in Sweden also need to follow the Environmental Code (Miljöbalken, 1998:811), environmental regulations for sustainable development which state that EEE containing hazardous substances have to be appropriately recycled and disposed (Svensk Handel lawyer, personal communication, 2012-04-11). Moreover, according to Swedish Customer Law (Konsument Köplagen), customers can return the bought product (including EEE) within three years, thus retailers must be able to handle the returned item, organising their reverse supply chains. Furthermore, retailers must also follow their own return policies and licensed agreements with OEMs (Svensk Handel lawyer, personal communication, 2012-04-11).

Corporate citizenship in supply chains is receiving growing attention in the media, academia and the corporate world (Pedersen & Andersen, 2006; Maloni & Brown, 2006). However, Bowen, Cousins, Lamming and Faruk (2001) state ‘despite many multinational corporations’ efforts to implement social and environmental issues in their supply chains, a gap exists between the desirability of supply chain sustainability in theory and the implementation of sustainability in supply chains in practice’- in other words ‘walk the talk’. The OEMs have little interest in producing sustainable products/ components because of the constantly changing demand of the customers which leads to additional production costs and ultimately affect their turnover. They are faced with the dilemma of producing quality and sustainable products which could result in a decrease in sales volume and turnover as the product lifecycle increases. On the other hand, the handling of reverse flows can contribute to the corporate image because the efficiency and effectiveness of the reverse supply chain operations can stimulate longer-term inter-firm relationships, higher customer satisfaction ratings, and higher corporate profitability (Daugherty, Myers & Richey, 2002).

From the retailers perspective there are no direct economic benefits in terms of additional profits or sales in the secondary market because OEMs have not given them the authority to have a more significant role in deciding which recovery options to choose and also there is no organised re-distribution channel to re-sell returned products in order to recover value. Indirectly, the economic gains to product recovery for retailers are through exercising corporate citizenship; being
more environmentally and socially responsible by handling product returns from customers creates a positive company image that aids to customer retention.

5.3 RQ3: What role do retailers of electronics play in closing the loop

Closed-loop supply chain has three main areas: forward and direct supply chain management; RSCM; and depot repair, processing, diagnostics, and disposal (Blumberg, 2005). This thesis is focusing on the second and the third areas of closed-loop supply chain, since there is a gap in the knowledge concerning reverse product flows due to the lack of research and empirical data in the field of RSCM (Blackburn et al., 2004; Stock & Mulki, 2009). The RSCM can be processed as either a subset of the closed-loop systems or standing alone, the activities would include full coordination and control, logistics of material, parts, and products from the field to processing and recycling or disposition, and finally returns back to the field where appropriate (Blumberg, 2005). Lastly, the latter area of closing the loop in the supply chain includes the services related to receiving the returns from the field, where materials, parts, and products go through several processes such as diagnoses, evaluation, repair or disposition, after this process they will be either returned to the direct/forward supply chain or into secondary markets or for full disposal (Blumberg, 2005).

The OEMs are the starting point for producing the products and they also play a significant role in the forward supply chain, retailers are the starting point and the closest actors within the reverse supply chain to the end-consumers of electronic products. Unlike OEMs in the forward flow retailers have a limited role and significance in the decision-making processes in the reverse supply chain and ultimately efficiently closing the loop and recovering as much value as possible from the returned products. The OEMs have given or forced the responsibility onto retailers to retrieve and register the returned products, but limit them in terms of authority, taking ownership of the products, and the decision making process of product recovery. Instead they are obliged to follow the guidelines of the OEMs in the product recovery process. Moreover, according to Swedish Customer Law (Konsument Köplagen), customers can return the bought product (including EEE) within three years, thus retailers must be able to handle the returned item, organising their reverse supply chains.

The retailers can close the loop if returned items were not opened and used, as the products are repacked and sold at the same price of a new product or if the item is missing some component then they can be sold for discounted price if the items are owned by the retailers. In other cases retailers must follow the OEMs guidance’s that narrow their decision-making opportunities. If items are decided to be discarded they are sent to recycling centres, where the items are dissembled and components are separated into recycled item groups. Some of the recycled materials are later on sold, so there is a chance that they will be used again in the new product production, closing the loop.

The retailers are in competition among one-another, but have the same product brands from the OEMs, so they share similar standards and guidelines how to handle each OEMs product when it comes to building a criteria for choosing the
best recovery option. The OEMs have authorised workshops that handle the recovery options, which act as the ‘middle man’ between retailers and OEMs in the recovery process. Outsourcing these activities to the workshops minimises the role and control of the retailer in the reverse supply chain. The need for retailers to play a more significant role in the reverse supply chain could aid to determine the best recovery option for a particular returned product. If retailers have more control they can build a more systematic criteria for recovery options as well as develop a systematic evaluation process to evaluate the performance of workshops which could result in decreased TAT and effectively produce a more viable solution in recovering as much value of returned product as possible.

The utilisation of new software and systems to support the integration and coordination of all actors and participants in the closed-loop supply chain process allows them to communicate and interact online and in real time. As a result, this can lead to significant improvement in the productivity of the reverse supply chain parts provisioning and allocation process, as well as the creation of a ‘just in time’ approach to repair and refurbishment (Blumberg, 2005). Furthermore, the return flows are rarely measured in a systematic way. For instance, the evaluation of the performed activities involved in the product return process is not done by company A itself, but issues are rather reported to OEMs headquarters. Hence the information technologies can aid setting up the measures and evaluating the performance for the reverse supply chain, i.e. in terms of time from consumer complaints to refunding the money, quality and quantity of returns, causes of returns, costs involved in returns, etc. (De Koster & Delfmann, 2007). Each store location evaluates how fast on average the product return process is handled by returning the products back to the customers. For example, company B uses a TAT evaluation system, which measures how quickly on average they handle each return (Regional after-sales manager, personal communication, 2012-04-02).

5.4 RQ4: Which recovery options are being used and what influences the choice

From the empirical findings of the companies that were interviewed the recovery activities, including recycling are outsourced to authorised workshops contracted by OEMs and recycling centres, that are part of the Swedish collection system, which is originally based on an agreement between a producer organization, El-Kretsen, representing producers of electronic products, and the Swedish municipalities (Swedish Environmental Protection Agency (Naturvårdsverket) report, 2009).

Most of the returned products that are sent to the workshops are repaired, but there is also a smaller amount of units that is either refurbished/remanufactured or recycled. The choice of the repair option is based on the fact that it is more expensive to recycle the unit and give the customer a new one, instead of repairing it (Head production engineer, personal communication, 2012-04-12). However, if the failure is very complicated, like a water damage or drop damage, it happens that the unit is recycled instead of being repaired since the amount of parts that
needs to be exchanged is more expensive, instead the customer is given a new unit (Head production engineer, personal communication, 2012-04-12).

The TAT varies due to brand and service type (in warranty or out of warranty). For some brands there is a local stock at the workshop with spare parts, and for some the spare parts are sent directly from the OEM. If it is a warranty case and the workshop has the spare parts in stock, they can often repair and send the unit back within one to two working days. If it is an out of warranty repair they need to send a quotation to the customer or insurance company. It can often take up to one week or more to get an answer. And if the answer is to repair the unit they need to wait for spare parts to arrive at the workshop. So the time can vary a lot, but as an average the unit is returned within three to four working days (Head production engineer, personal communication, 2012-04-12).

When it is determined to discard the returned item, the companies deliver items directly to the recycling facility for further processing, which is done on a semi-weekly bases by the retailers. The returned products are sorted based on the type of product, when being dismantled into separate components and later on sent to other recycling companies for further processing. Hazardous waste and components are separated and placed into different containers to be taken to specialized recycling companies (Foreman, personal communication, 2012-04-04).

From the perspective of all interviewed retailers and companies the main criteria for recovery option choice is the price, which is stated in the OEMs guidelines that they have to follow. Furthermore, company C also mentions additional criteria such as day of purchase, brand type, type of product to determine the returned product recovery choice (Head of aftersales department, personal communication, 2012-04-04). Company D also states that warranty and product lifecycle have to be taken into consideration as well when determining the recovery option, as an old product might need out-of-date components/spare parts that are no longer available (Store manager, personal communication, 2012-04-02).
6 Conclusions

The following chapter of the thesis is summarising the analysis results, answering the research questions raised in this study.

In ever-changing markets, particularly in electronics retailing in Sweden, where complexity is high in terms of consumer demand, competition, globalisation, increased social and environmental pressures, and inter-connected supply chains, companies are constantly seeking new opportunities to remain competitive while responding to the above-mentioned challenges and pressures. While there are opportunities in product returns and the reverse supply chain, as the volume of returned products increases, knowledge to efficiently manage these reverse flows is inadequate but becoming of a great importance. In order to fulfil the purpose of this thesis and answer the research questions the relevant literature on the reverse supply chain, its processes, recovery options and factors influencing the choice in order to close the loop, have been examined and compared with the empirical findings.

The conducted empirical research revealed that five reverse supply chain processes, namely product acquisition, reverse logistics, sorting and disposition, recovery and re-distribution and sales, are applied in practice in electronics retailing in Sweden. The findings of this thesis support the statement of De Brito and Dekker (2004) that the group of actors involved in reverse supply chain activities, such as collection and processing, are commonly independent intermediaries, specific recovery companies, reverse providers, municipalities taking care of waste collection, and public-private foundations created to take care of recovery. As the data in the reverse supply chain is more complex in comparison to the forward flows, there is a need for a more unified data and software to connect all parties and simplify the coordination process within the reverse supply chain, this can create an infrastructure that also facilitates and reduces the cost and time for financial transactions (Skjott-Larsen et al., 2007).

The empirical findings have revealed that from the retailers’ perspective the main factors influencing handling and the returned product flows are legislation and corporate citizenship. There are no direct economic benefits for retailers in terms of additional profits or sales in the secondary market because OEMs have not given them the authority to have a more significant role in deciding which recovery options to choose and also there is no organised re-distribution channel to re-sell returned products in order to recover value. Indirectly, the economic gains from product recovery for retailers are through exercising corporate citizenship which has the potential for customer retention.

The retailers can close the loop if returned items were not opened and used, as the products are repacked and sold at the same price of a new product or if the item is missing some component then they can be sold for discounted price if the items are owned by the retailers. If items are decided to be discarded they are sent to recycling centres, where the items are dissembled and components are separated into recycled item groups. Some of the recycled materials are later on sold, so there
is a chance that they will be used again in the new product production, closing the loop.

It can be concluded that the retailers have a limited role and significance in the decision-making processes in the reverse supply chain and ultimately in efficiently closing the loop and recovering as much value as possible from the returned products. The OEMs have given or forced the responsibility onto retailers to retrieve and register the returned products, but limited them in terms of authority, taking ownership of the products, and decision making processes in the product recovery. Instead they are obliged to follow the guidelines of the OEMs in the product recovery process. The need for retailers to play a more significant role in the reverse supply chain could help to determine the best recovery option for a particular returned product. If retailers have more control they can build more systematic criteria for recovery options as well as develop a systematic evaluation process to evaluate the performance of workshops which could result in decreased TAT and effectively produce a more viable solution in recovering as much value from returned product as possible.

It has also been revealed that retailers outsource their recovery activities to authorised workshops that are contracted by OEMs and recycling centres that are part of the Swedish collection system. Most of the returned products that are sent to the workshops are repaired, but there is also a smaller amount of units that is either refurbished/remanufactured or recycled. The main criterion for selecting the appropriate recovery option choice is price; if OEMs consider that it is not economically viable to repair an item it will be discarded. Additional factors include: day of purchase, brand type and type of product, warranty and product lifecycle.

In summation to this thesis it could be concluded that an increased role from retailers in the reverse supply chain activities could help researchers and academia in bridging the gap in knowledge on how to recover as much value as possible from returned products. Also through gained knowledge it can aid in utilising the other actors within the supply chain and increase efficiency which may result in competitive advantage throughout. More research could be focused on the technological advances in the forward supply chain and adapted them in the reverse where applicable in order to close the loop.
7 Discussion and future research

In this chapter the managerial implications, research evaluation and ideas for future research are also discussed.

Managerial implications

On the example of Swedish electronics retailers, the other reverse supply chain managers working in other industries with time-sensitive products could implement the utilisation of the decentralised reverse supply chain design, outsourcing of transportation and recovery activities, and the use of information technology. This could minimise or avoid the issues as stated by Blumberg (2005) that company managers face while handling product returns. The use of technology can increase transparency among actors which could in turn increase knowledge to improve processes. Albeit, the implementation of reverse supply chain management can be related with additional costs for the company.

Research evaluation

During the research for the literature review the authors encountered limitations that there is little or no research done in the reverse supply chain from retailers’ perspective but mainly from the OEMs’. Concerning the research method evaluation, it is essential to mention that during working on the literature review it has been revealed that most of the authors use the terms RSCM and reverse logistics interchangeably, that could confuse the researchers.

Another limitation of this research could be a limited number of electronics retailers (participants) operating in Sweden has been examined in this thesis due to the fact that some companies when contacted didn’t agree to take part in this research. This hinders the purpose of reaching an in-depth understanding of the phenomenon, hence making the findings less valuable for the academia and the practitioners but making a case for future research. As in this thesis the qualitative data has been used for gaining empirical study, the research lacks measurements.

Future research

A future research for measuring the value of the returned products could be valuable for academia and practitioners alike, developing a measurement system that could aid companies in evaluating the economic benefits of recovering the returned items and closing the loop. The data collected through the semi-structured interviews is based on the information from the retailers’ perspective, which is due to the time constraints of the research and does not give a whole picture of the phenomenon. Therefore, future researchers could involve the other members of the reverse supply chain in their study in order to get a full picture of how the loop in the reverse supply chain can be closed through the use of recovery options. The standardised criteria to determine the best recovery option has to be developed, which is why further research will be essential in order to decrease the TAT and recover as much value from the returned item as possible.
References


Appendices

Appendix 1 Time value of product returns

Source: Skjott-Larson et al., 2007, p.301
Appendix 2 Centralised efficient reverse supply chain

Source: Blackburn et al., 2004, p. 13
Appendix 3 Decentralised responsive reverse supply chain

Source: Blackburn et al., 2004, p. 16
Appendix 4 A closed-loop supply chain

Source: Visich et al., 2007, p.439
Note: based on Thierry et al. (1995) & Krikke et al. (2004)
Appendix 5 The research onion

Source: Saunders et al., 2007, p. 102
Appendix 6 Interview questions

An academic research on product returns and recovery options

Every year the returned product amount tends to increase, therefore there is a need to efficiently handle the returned products and find the appropriate recovery option to get as much as possible of the invested money back. The goal of this thesis is to investigate how the product returns are managed in electronics retailing in Sweden, what role retailers of electronics play in closing the loop, which product recovery options are used and the factors influencing the choice.

We appreciate that you take the time to participate in our research. Your answers will provide a big input in the credibility and validity of our findings. The data gained from responses in this interview will be kept anonymous and used for academic purposes only.

General

What is your position within the company?

What are your main responsibilities within the company?

What are the products that your company offers the customers? Which products are mainly returned by customers?

Statistics data on product returns

What is the percentage of returned products for electronics annually?

How many days does it take from the initial customer’s return issue until the problem is solved (money is refund or products are replaced)? (in days)

The following questions are related to who is responsible within the reverse supply chain of your company for handling product returns. Each product or brand has its own return process and different actors have their own role and responsibilities.

Who takes control of handling returned products in your company?

Do you have a special department in your company that is only responsible for product returns?

Who are the actors involved in your reverse supply chain management?

Could you describe the network of facilities involved in your reverse supply chain (store, warehouse, distribution centre, sorting and inspection facilities).

Do you outsource any of processes/activities in the reverse chain? If yes, what are the reasons? If no, explain why?
Could you describe which Information Technology System do you use in your reverse supply chain management and how does your IT system facilitate your reverse supply chain processes?

Do you believe that reverse supply chain gets enough attention from the senior managers?

Do you evaluate performance of handling product returns within the reverse supply chain? If yes, how?

The following questions are related to your company business processes in the reverse supply chain. This involves the various stages of how returned products are processed from acquiring, sorting & disposing, transporting, recovering to re-distribution and sales.

What are the business processes involved in your company’s reverse supply chain? (Product acquisition; sorting and disposition; reverse logistics; recovery; re-distribution and sales)

**Product acquisition:** this involves the process of acquiring returned products for various reasons from customers

How are the products retrieved from the final customer?

**Sorting & disposal:** in order to choose the appropriate recovery option returned items are tested, inspected, and sorted. Please indicate in the following questions how your company fulfils this stage

How are testing, inspection and sorting done (briefly)?

Where are (shops, centralized/ decentralized centres) testing, inspection and sorting done?

What are the main problems that occur during product testing, inspection and sorting processes?

**Re-distribution and sales:** when the products have completed the process of testing, inspecting, and sorting they are returned to your company. The following questions are related to explaining what happens when they are returned

Do you re-sell product returns? If no, why? If yes, could you describe the process of re-distribution and sales?

The following questions are related to the recovery options (repair, refurbishing, remanufacturing, cannibalization, recycling) and factors (economic, legislation, corporate citizenship) influencing their choice.

Do you see any opportunities in recovering returned products? If yes, what are they?

What are the recovery alternatives for product returns after testing? (Repair, refurbishing, re-manufacture, cannibalization, recycling)
What are the driving forces or main reasons for your company to handle returns? (Economic, legislation, corporate citizenship)

What are the main criteria that influence the choice of appropriate recovery option?
## Appendix 7 Interview participants

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<tr>
<th>Company</th>
<th>Position</th>
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<th>Interview length</th>
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<td>Store manager</td>
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<tr>
<td>Svensk Handel</td>
<td>Lawyer</td>
<td>Face-to-face</td>
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