Master's degree thesis

LOG950 Logistics

Reverse logistics in e-commerce: A multiple-case study of four e-commerce companies

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Preface

This master thesis represents the end of five years at Molde University College.

We would like to express our appreciation to Steffen Larvoll for presenting this problem, and we are grateful that he has used his broad network to find the participating companies in this master thesis.

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Abstract

E-commerce is rapidly growing, and the focus on forward and reverse logistics is trending. A trend in Norwegian merchandise is that traditional retailers are moving into several channels. However, there is a lack of awareness about the actual cost of returns in e-commerce, and the industry has initiated a project to gain more knowledge on the economic impact of reverse logistics. This paper investigated the economic impact of reverse logistics in e-commerce and how the return policy affects the number of returns. The research is conducted as a multiple-case study of four Norwegian companies involved in e-commerce. The calculation of cost data was based on return- and sales reports collected from the four companies.

The results show that the companies percentage returns vary from 0,71 and 3,22 percent, and there is a significant difference between them for which type of returns they receive. The total loss of profit for standard returns shows substantial differences, varying from a positive profit of 3 880 NOK to a negative loss of profit 866 902 NOK per year. The findings discovered that returned products have an economic impact on companies involved in e-commerce. The return policy and legislation affect the number of returns back to the companies. To recover value and reduce cost from standard returns, complaints, and uncollected products, well-established management for returns is necessary to keep the cost down.

Keywords: Reverse logistics, E-commerce, Return logistics management, Return policy, Cost in reverse logistics, Economic impact

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List of Abbreviation

CLSC	Closed loop supply chain
B2B	Business to business
B2C	Business to consumer
NOK	Norwegian kroner
CRM	Customer relationship management
EOL	End-of-lifecycle
ERP	Enterprise resource planning
EOU	End-of-us

1.0 Introduction

1.1 Research background

The focus on e-commerce is arising, and online sales are rapidly growing. The consumers' are aware of the many advantages of e-commerce like lower prices, higher availability, and a broader specter of products (DIBS 2018). The trend of today's society is that people want to use less time on shopping and prioritize to do other activities. From a retailer perspective, the trend in Norwegian merchandise is that traditional retailers are moving into several channels. The proportion of businesses with physical stores that also have online store has increased since 2015. In 2017 65% of traditional retailers had online stores (Virke 2018). In Norway, e-commerce use has increased by 17% in only one year from 2017 to 2018. In 2018, Norwegian e-commerce market were expected to generate a turnover of 144 billion NOK (Norwegian kroner) (DIBS 2018). The report by DIBS (2018) explain that the reason is the variety in age segments using online shopping as an alternative to regular shopping. The report from Bring (2017) states that in the timeframe from 2012 to 2017, the number of consumers' that uses e-commerce multiple times each month has doubled. The increase is massive all over Scandinavia and in all age segments.

E-commerce not only entails the flow of goods from the store to consumers. A lot of the products get returned, especially cloth, shoes or products that have a high "squeeze and feel factor." Return policy among e-commerce businesses is vital, regarding live up to consumer expectations. According to a survey done by Postnord (2018), 11% of the Nordic consumers' answer that they have returned a product within a period of two months. The study consisted of an age segment between 18 to 79 years old and a total of 90 thousand participants in the Nordic countries. Another aspect of returns among e-commerce consumers' is the expectation of free returns. Eight out of ten claims that free return is significant regarding the choice of online stores (Postnord 2018).

In this paper, the focus is on the economic impact the reverse logistics process has on companies involved in e-commerce. In today's market, it requires more and more of e-commerce business to capture the consumers, with several actors involved in e-commerce. The competition in the Nordic market is hard and drives the companies to make it easier for the consumer to buy online. That includes offering a free return policy. If the cost of returning goods is too high for the customer, the result can be loss of sales (Bring 2017). It is a typical question that arises regarding the return of products bought online because a return policy creates security among the customers and can contribute to an increase in sale. The cost aspect of reverse logistics has not been focused on in the literature among researchers. However, in the literature authors have discussed reverse logistics and its attributes (Rogers and Tibben-Lembke 2001, de Brito and Dekker 2002, 2003, de Brito, Dekker, and Flapper 2005, Rogers, Lembke, and Benardino 2013, Ravi and Shankar 2005, Thierry et al. 1995). The researchers are touching the management, barriers, drivers, and activities of reverse logistics. It has been a need for more specific data on the topics of reverse logistics (Stock and Mulki 2009). One reason for little previous research in reverse logistics is due to resistance from companies to share valuable data concerning their reverse logistics processes (Tonanont 2009).

On a request from people involved in the e-commerce market about the overall concern of the real economic impact of reverse logistics, we have found this challenge interesting to investigate. By help, we have found four companies involved in the Norwegian e-commerce market. These companies have been willing to share valuable data with us, enabling us to disclose the economic impact of reverse logistics.

1.2 Research question

Little previous research has investigated the actual costs of returns in reverse logistics. Our research question is developed as an attempt to investigate the economic impact of reverse logistics in e-commerce. Based on the increasing growth in e-commerce, it is essential to gain more insight into the economic impact of returns in reverse logistics. The output of this research can increase the company's knowledge of the economic impact of returns, and what they actively need to work with to manage their costs related to reverse logistics. Further, this research can be beneficial for other companies in e-commerce. The research question is:

"Investigation of the economic impact for reverse logistics in e-commerce and how return policy affects the number of returns for four companies in the Norwegian e-commerce market"

1.3 Structure of the thesis

This thesis is divided into two parts. Part 1 is an introduction for the research paper. Part 2 contain the research paper

Part 1:

Chapter 1 Introduction, background of the thesis, and the research question

Chapter 2 Presents the theoretical framework for the research

Chapter 3 Introduction to case description, industry and companies

Chapter 4 Quantitative research

Chapter 5 Research design, data collection, and calculations and variables

Chapter 6 Summary, managerial implications, limitations of the study, and further research

Part 2: Research paper

Chapter 7.0 Research paper

Section 7.1 Abstract

Section 7.2 Introduction

Section 7.3 Literature review

Section 7.4 Case presentation

Section 7.5 Data

Section 7.6 Methods

Section 7.7 Results

Section 7.8 Discussion

Section 7.9 Conclusion

Section 7.10 Limitations

2.0 Theoretical framework

This chapter provides a relevant theoretical framework that is the basis of this paper. First, it describes the concept of e-commerce and its relevance to reverse logistics. Further, it presents the return management and its elements. Then the definitions of reverse logistics, its drivers, barriers, and the process and activities. In the end, closed-loop supply chain, different types of returns, and cost in logistical management are described.

2.1 E-commerce

The focus in this section is to present the concept of e-commerce. Further, it shows the relationship and importance of reverse logistics in e-commerce.

E-commerce is a growing business model and will increase in further decades. E-commerce is defined as *"the exchange transactions which take place over the Internet primary using digital technology"* (Schniederjans, Cao, and Triche 2013). It involves transactions such as buying, selling, movement of goods, services and information. The characteristics of e-commerce are high interactivity, 24/7 availability and the dependence of logistical practices (Schöder, Ding, and Campos 2016). E-commerce can be divided into two categories; Business-to-Customer (B2C) and Business-to-Business (B2B). In the last few decades, it has been in a shift from traditional retailing to e-commerce retailing. Internet retailing have contributed to discount stores, warehouse stores, direct sales, and home shopping to provide a new sale channel. The main difference between traditional retail and e-commerce is technology (Grewal, Iyer, and Levy 2004).

E-commerce and reverse logistics

Because of the rapid growth of e-commerce, logistics have become a more critical factor. Logistics is the fundamental factor of e-commerce. The integration of e-commerce and reverse logistics are because of an increase in information technology (Xu and Jiang 2009). Due to technology development, it has made the world smaller and contributed to changes in business and increasing effectiveness in the supply chain (Nisar and Prabhakar 2017). The characteristics of reverse logistics in e-commerce are intensive logistics systems, collaborative logistics network, and flexible customer relationship management (CRM). An intensive logistics system involves warehouse, distribution centers, and transportation routes to handle the forward and reverse logistics activities to process information and products through a supply chain. A collaborative logistics network coordinate information, economy, consumers, and marketing through network technology, to meet the requirements of logistics. Because of the short information distance between customers and e-businesses, CRM is essential. It is essential to understand the customer needs, to increase the quality of service, and improve image through CRM (Yanyan 2010).

The challenge of return of e-commerce products is due to the cost of processing returns. Although because of rapid growth in e-commerce, it is challenging for established retailers to supplement their physical retail with web-shop. This is because the processing of e-commerce returns is costly and return management diverse from the traditional process returns within a company. However, at the same time, it is an opportunity to create excellent customer relationships and loyalty (Mollenkopf et al. 2007).

Drivers of reverse logistics in e-commerce

E-commerce is continuously affected by global competition and sudden changes in the business environment. A reason for the competitive environment is economical, legal, societal, technological factors, and increasing globalization (Turban et al. 2015). Due to the factors above, the main reasons for reverse logistics in e-commerce as follows: Laws and regulations, competition, and asymmetric information (Xu and Jiang 2009).

Laws and regulations are important factors that drive reverse logistics in companies involved in e-commerce. Due to laws and regulations, companies may be obliged to concern about the protection of the environment through handling and recycling of product returns. Laws and regulations also describe customers rights. Because of laws and regulations, companies need return policies that ensure the consumer right and at the same time, concerns the environmental aspect of product returns (Xu and Jiang 2009).

Competition is a driver of reverse logistics in e-commerce due to the importance of maintaining customers value. Maintaining good customer value is seen as the key to survive in e-commerce. To maintain or increase customer value, companies often have lenient return policies, which further increases the number of returns from customers to companies. This show that reverse logistics and e-commerce go hand in hand because proper return management can improve customer satisfaction and increase competitive advantage (Xu and Jiang 2009).

The last driver of reverse logistics in e-commerce is asymmetric information, according to Xu and Jiang (2009). Through e-commerce, customers do not have the opportunity to see, feel, and try the products before buying it, and product descriptions may also be insufficient for the customers. This leads to asymmetric information between companies and customers, and this increases the possibilities of returns.

E-commerce is a complex sales channel, and it is characterized by high availability and dependence on logistical practices. The drivers in reverse logistics in e-commerce, legislation, competition, and asymmetric information has become one of the most important reasons for e-commerce businesses to involve themselves more in reverse logistics. The drivers in reverse logistics will be further described in section 2.4.

2.2 Return logistics management

In this section the concept of return logistics management and its attributes such as return policy, return avoidance, gatekeeping, and disposition are described.

Rogers et al. (2002) have defined return management as *"that part of supply chain management that includes returns, reverse logistics, gatekeeping and avoidance."* Activities like avoidance and gatekeeping are vital in supply chain management. Return management is divided into two elements, strategic and operational elements. The purpose of strategic elements in return management is to create a fundament and structure for implementation in a company or across members of the supply chain. The objective of operational is to realize what has been created from the strategic level. The strategic and operational processes are managed by an interdisciplinary team that includes marketing, finance, production, purchasing, and logistics. The involved actors could be customers, suppliers or a third-party services (Rogers et al. 2002).

In return logistics management, it is necessary to define and make it clear what returns is. It is also important to create a clear picture of how returns are connected to reverse logistics. This is described in section 2.3. We will use the definition by the Supply Chain Council, which states that returns are the *"Process associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support"* (Council 2005). Rogers et al. (2002) describes that the definition of return mainly focuses on the physical flow of goods. It is not involving the management activities.

Return policy

The goal and strategy of a company return management often lay the foundation for the return policy. Return policies would further help the company to achieve its return management goals, or at least help them on the path. Return policies is applied in several ways, and Rogers et al. (2002) state that the return policies can be used to improve the firm/brands image, improve profits, and the customer loyalty. Return policies could enhance the company's commitment to its customers by giving them several return options, like free return, possibilities to return a product to a physical store, or a long period of open return. By giving private customers a return option, will reduce customers risk of the purchase since they can return products if it does not fit (Rogers et al. 2002).

The return policy determines how businesses approach returns. In e-commerce, the return policy is categorized into two parts, lenient or restrictive return policy. A lenient return policy is where the e-tailer take the cost of returns (Bonifield, Cole, and Schultz 2010). A lenient return policy would contribute to increased sales and a larger volume of returns (Lantz and Hjort 2013). The restrictive return policy has restrictions regarding the time aspect of product return, and that the customers must carry the cost of returning products. This decrees customers flexibility (Mukhopadhyay and Setoputro 2004, Wood 2001).

Return avoidance

"Return avoidance means developing and selling product in a manner such that requests are minimized" Rogers et al. (2002). It is a critical step in return management process and contributing to separate between reverse logistics and traditional way of return. Rogers et al. (2002) have listed some central methods to return avoidance. The first step is by improving the product quality, and the second step is better guidelines regarding how to handle the returned product. The aim is to learn from the return process to enhance products, increase the "ease-to-use" and decrease the number of future returns. Especially in an e-commerce perspective, it contributes to minimizing customers risk of purchasing a product. An example is the business of cloth, where it is numerous different sizes. If the suppliers are not

consistent in their sizes, the result would be that the consumer buys wrong the size and sends it back in return. Return management aims to integrate the suppliers through guidelines, to ensure that they know about their role in the avoidance of returns (Rogers et al. 2002).

Gatekeeping

"Gatekeeping is the screening of both return request and the returned merchandise" (Rogers et al. 2002). The purpose of gatekeeping is screening of the products, where it is determined if a product is acceptable as a return, or not. It also involves the improvement of return policies, which define which returns that are accepted. The primary purpose of gatekeeping is to ensure that only accepted products are returned, in a specific point in the return process. The implementation of gatekeeping usually involves an integration of activities with the other actors in the supply chain. By having gatekeeping implemented in the point of entry, it could minimize unnecessary costs. By not allowing unwarranted products to enter the return process (Rogers et al. 2002).

Disposition

"Disposition refers to the decision about what to do with the returned product" (Rogers et al. 2002). Disposition involves activities such as resale through secondary markets, recycle, remanufacture or transfer to disposal. It creates a fundament of guidelines for the returned product final destination. It is necessary to develop procedures for disposition options across the supply chain and from other aspects of the supply chain. The aspects could be CRM, product development, commercialization and supplier relationship management (Rogers et al. 2002).

Return logistics management is a critical factor to manage product returns. A clear return policy is necessary to decrease the number of returns. Preventive measures such as return avoidance and gatekeeping contribute to an effective return process, minimize costs and future returns.

2.3 Reverse logistics

Lambert and James (1982) developed one of the first definitions of reverse logistic. They defined reverse logistics as something *"going the wrong way on a-way street because the great majority of production shipments flow in one direction"* (Lambert and James 1982).

Further the definition was developed by Murphy and Poist (1989). They defined reverse logistics as *"movement of goods from a consumer towards a producer in a channel of distribution"* (Murphy and Poist 1989).

Rogers et al. (1999) in cooperation with the Council of Logistics Management, have developed a new and more complex definition. They defined reverse logistics as:

> *"The process of planning, implementing and controlling the efficient, cost effective flow of raw materials, in process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal" (Rogers et al. 1999).*

The definition provided by Rogers et al. (1999) was later criticized by de Brito and Dekker (2003). The critic was regarding the point of consumption and that the product must be returned to origin. They state that the product can be returned at any point of the reverse process. They adopted their definition from The European Working Group on Reverse logistic Revlog (1998). The researchers defined it as *"The process of planning, implementing and controlling flows of raw materials, in process inventory, and finished goods, from a manufacturing, distribution or use point to a point of recovery or point of proper disposal"(Revlog 1998).*

It is necessary to distinguish between returns and reverse logistics since it can be confusing to see what the differences are. Our interpretation of return and reverse logistics is that a return is a physical product going backward in the supply chain, and reverse logistics is the necessary activities for handling the return. Based on the definitions of reverse logistics, and return, we have defined return as a part of the reverse logistical process. Further, it will be described how the return moves through the reverse logistics process, in terms of transportation, and handling.

The researchers agree that the primary function of reverse logistics is about the movement of goods back to the point of recovery or disposal. Rogers et al. (1999) and Revlog (1998) have a more detailed definition of reverse logistics than Lambert and James (1982) and Murphy and Poist (1989). The similarities between Rogers et al. (1999) and Revlog (1998) are the reverse logistics that involves planning, implementing, and controlling the reverse flow of material. The difference between those definitions are the point of return. Rogers et al. (1999) state that the point of recovery or disposal is the point of origin. Revlog (1998) states that the point of recovery or disposal could be at any point of the reverse process. The definition from Revlog (1998) provides the reverse logistics process more flexibility because the reverse process could begin at any point. Based on the definitions presented above we have decided to use the approach from Revlog (1998) further in the research.

It is also important to distinguish between reverse logistics and green logistics. Rogers and Tibben-Lembke (2001) have separate the activities and those activities that are involved in both.

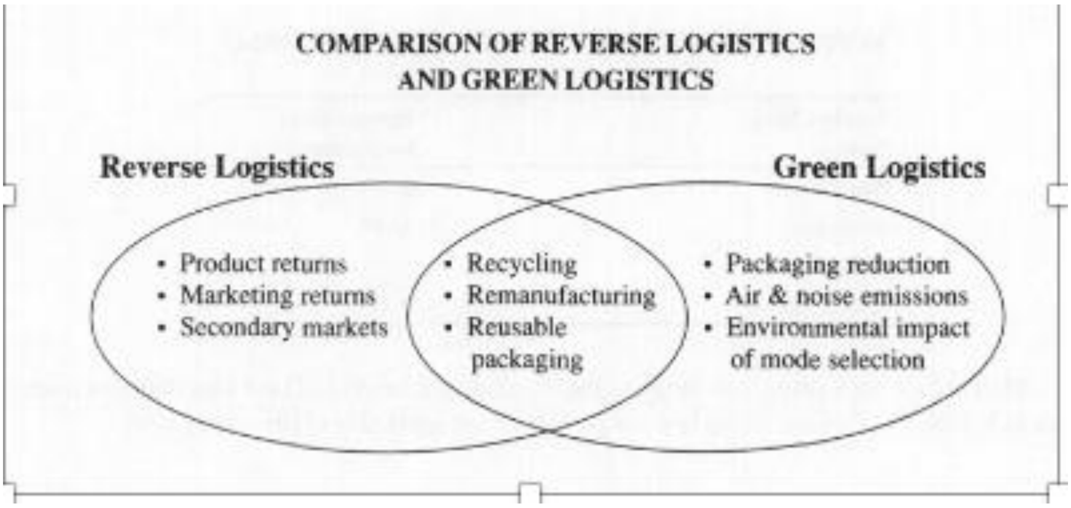

Figure 1 Comparison of reverse logistics and green logistics (Rogers and Tibben-Lembke 2001)

Several activities are involving reverse and green logistics, such as recycling, remanufacturing and reusable packaging. Reverse logistics aims to recover economic value from product returns and focus on the movement about the product. Green logistics concerns the environmental impact of logistical activities, and it would be defined as *"effort to measure and minimize the environmental impact of logistical activities"* (Rogers and Tibben-Lembke 2001).

2.4 Drivers of reverse logistics

In a traditional forward supply chain, the main driver is the customers at the end. The customers, in the end, are the principal objects which create demand. According to de Brito and Dekker (2003), there are three reasons for companies to get involved in reverse logistics. The three reasons are *"because they can profit from it, and because they have to, and because they "feel" socially motivated to do it."* Therefore, the most important driving forces in reverse logistics are economics, legislation, and corporate citizenship. These drivers are shown in the figure "driving triangle" below by (de Brito and Dekker 2003).

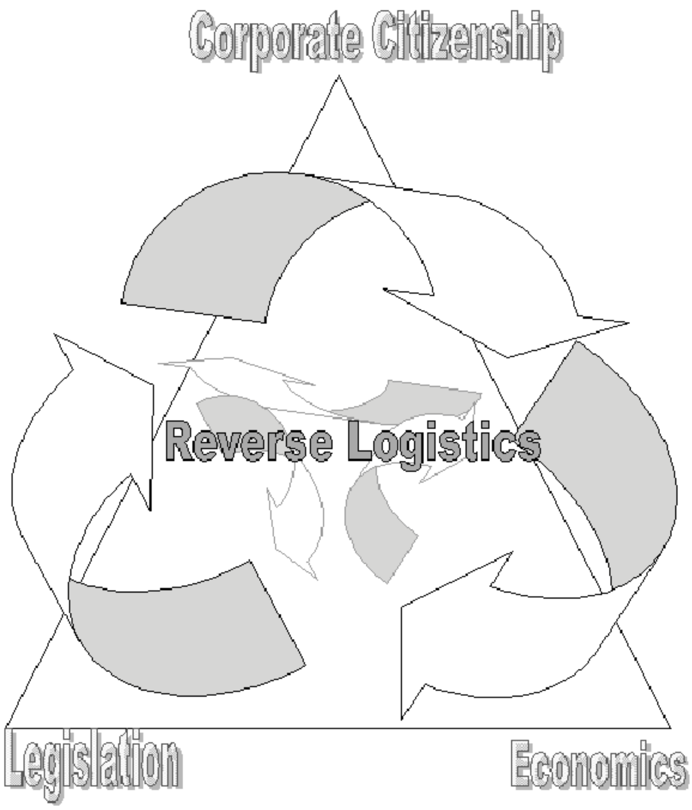

Figure 2 Driving triangle for reverse logistics (de Brito and Dekker 2003)

This figure describes how economics, legislation, and corporate citizenship drives the reverse logistics. For example, if there is new legislation in e-commerce, this could affect corporate citizenship and further the economic situation for companies. We will further describe the economical, legislation and corporate citizenship aspects.

Economics

The main reason why companies have started to focus on reverse logistics is the financial opportunities. By focusing on reverse logistics, companies might be able to gain profit from reducing the usage of raw materials, reducing the cost of disposing materials and increasing value from the recovery process. Due to the economic opportunities in reverse logistics, several companies have involved themselves in the recycling process (de Brito and Dekker 2003).

Other factors for companies to involve themselves in reverse logistics, are marketing opportunities, competition, and strategic issues. These factors might not give immediate expected profit, but it is expected that companies will get indirect gains from this (de Brito and Dekker 2003). Louwers et al. (1999) mentions that *"companies may get involved with recovery as a strategic step to get prepared for future legislation."* Another reason to get involved in the recovery process is to prevent legislation. To avoid competition, companies could focus on the recovery process to prevent other companies from entering the market or from getting the hand on the technology in their products. Offering both a product and a recovery solution might also improve the relations between customers and suppliers.

According to de Brito and Dekker (2003), the economic drivers in reverse logistics can be summarized as direct gains and indirect gains. The direct gains are a reduction in input materials, reduction in cost, reduction in materials and value-added recovery. The indirect gains are market protection through preventing competitors from getting the hand on their technology, improving the green image, improved customer/supplier relations, and being able to anticipate or prevent legislation.

Legislation

According to de Brito and Dekker (2003), the driver "legislation" refers to the jurisdiction a company needs to follow in terms of taking used products back, or how they should recover them. Due to an increased environmental focus, especially in Europe, there has been an increase in environmental-related legislation. There has been a focus on packaging regulations, recycling quotas and manufacturing take-back responsibility. According to Bonev (2012), the regulations have been developed to protect the environment and to push companies to concern about the environment. Due to the regulations, companies can be held responsible for the recycling and final disposal of products. If customers fail to dispose products properly, the manufacturers can be held responsible. A result of this is an increase of manufacturers involvement in the return process for their products.

Legislation as a driver of reverse logistics affects the return policy for e-commerce businesses. Norwegian e-commerce businesses are required to follow the Cancellation Act. This law states that companies offering products through an online store are obliged by law to provide its customers a right of cancellation within 14 days. The law also states that the customer has to carry the cost of returning the products to the company (Lovdata 2014). This law creates uncertainty to if, and when a product returns to the company. This uncertainty makes it challenging for companies to plan their employment in their warehouse.

Consumer Purchase Act is another law affecting e-commerce businesses. This law concerns consumers' rights concerning the purchase of products, when it comes to delivery, delays, defective goods, consumers' obligation, cancellation and return and sellers' rights if a consumer breach the contract (Lovdata 2017). If a company delivers a defective or a product with minor faults, the consumer has several options. The consumer can choose among withholding the purchase price, rectification or redelivery, price reduction, cancellation of the purchase, or claim compensation (Lovdata 2017). Companies face uncertainty concerning the number of returns they will receive after a product is sold due to this law. These possible returns negatively affect the company's due to possible loss of profits. This law is essential for securing rights.

Corporate citizenship

The last driver in reverse logistics is corporate citizenship. Corporate citizenship is the principles or values developed by a company. Developing a set of values and principles helps companies to take more responsibility and could lead to a higher focus on reverse logistics, often having a positive effect, socially and environmental. Companies increased emphasis on corporate citizenship is usually caused by customers' expectations about greener companies, taking the environmental challenges seriously. Since customers have a focus on "green" companies, companies can gain a competitive advantage by developing a "green image" (Bonev 2012).

The drivers of reverse logistics, economics, legislation, and corporate citizenship, described by de Brito and Dekker (2003) and Bonev (2012) slightly differs from the drivers of reverse logistics in e-commerce described by Xu and Jiang (2009). Xu and Jiang (2009) only differ in the description of asymmetric information as a driver. This shows that de Brito and Dekker (2003) are relevant to e-commerce.

2.5 Barriers in reverse logistics

Rogers et al. (1999) asked 300 companies about what types of challenges they face regarding reverse logistics. The result showed the following challenges: company policies, lack of systems, competitive issues, management inattention, financial and personnel resources, legal issues, and importance of reverse logistics relative to other challenges (Rogers et al. 1999).

Table 1 Barriers to reverse logistics (Rogers et al. 1999)[i]

Barriers to Reverse Logistics

Barrier	Percentage
Importance of reverse logistics relative to other issues	39.2%
Company policies	35.0%
Lack of systems	34.3%
Competitive issues	33.7%
Management inattention	26.8%
Financial resources	19.0%
Personnel resources	19.0%
Legal issues	14.1%

This table shows the importance of the different barriers, according to the companies involved in the research by Rogers et al. (1999). The barriers will be further elaborated in the following section.

Information and technological systems

Rogers et al. (1999) describe the lack of systems as a challenge regarding the implementation of reverse logistics. Information systems are necessary for a reverse logistics process and contribute as a supporting factor in the reverse logistics process. A well-established information system is significant regarding the design of a product development program - programs that involve activities such as environment, recovery, and reuse. The primary purpose of an efficient information system is the need for tracking and tracing of returned products and connect it with the previous former transaction. de Brito, Dekker, and Flapper (2005) state that connecting recent sales with product returns makes it easier to link the two processes together.

Company policies

For companies dealing with reverse logistics, the company policies are a critical barrier. Lack of attention to reverse logistics and management can relate to company policy. Companies develop their policies regarding the forward flow of products and are not concerning the handling of returns and to recovering its value (Ravi and Shankar 2005).

Financial resources

Financial resources are crucial in reverse logistics as the support of infrastructure and labor needs for the reverse logistics process. Companies are dependent on requiring necessary financial support to implement a well-functioning reverse logistics. The education of personnel is connected with financial support because it is essential for proper management and making reverse logistic profitable. Ravi and Shankar (2005) describe information and technological systems as a critical factor in reverse logistics but are dependent on significant financial support. Without financial support, it would be challenging to implement tracking and tracing, and recovery option such as reuse or remanufacturing for product returns.

Training and education

Rogers et al. (1999) describe a lack of education as a critical barrier in reverse logistics. Education and training are essential to implement a well working reverse logistics process. New technology and processes make it is necessary to educate personnel. The education aims to cover critical business functions, that can contribute to develop and integrate reverse logistics (Ravi and Shankar 2005).

Commitment by top management

Rogers et al. (1999) describe the lack of commitment by top management as a primary barrier in reverse logistics. The commitment by the top management is necessary to create a clear vision and show the value of reverse logistics. The top management should interpret the reverse logistics activities in the strategic and action plans, to integrate reverse logistics through the supply chain (Ravi and Shankar 2005).

Awareness about reverse logistics

Janse, Schuur, and de Brito (2009) mention that the little recognition of reverse logistics is seen as a barrier to create a competitive advantage. They also state that organizations are more concentrated on the forward flow of products, then reverse logistics can contribute to economic profitability by recovering value from returned products. Implementation of reverse logistics can also benefit the environment, but lack of awareness of these benefits is a barrier (Ravi and Shankar 2005).

Strategic planning

Strategic planning in reverse logistics can be seen as a factor to present industrial environment (Rogers et al. 1999). Strategic planning can be identified with the reverse logistics goals and the long-term plans to manage them. To implement reverse logistics in an organization, the contribution of strategic planning to achieve goals is crucial (Ravi and Shankar 2005). Accurate forecasting and planning is difficult, and it is a direct barrier for both strategic and operational planning (Janse, Schuur, and de Brito 2009).

Dealers, distributors and retailers

Ravi and Shankar (2005) describe unwillingness through the supply chain as a barrier to implementation of reverse logistics process and activities. Efficient reverse logistics is dependent on support from dealers, distributors, and retailers in the reverse logistics process. The return policy is connected with the risk sharing between sellers and consumers, and are an essential barrier regarding consumer returns (Ravi and Shankar 2005).

Product quality

Product quality is a barrier that touches reverse logistics regarding end-of-use (EOU) and end-of-lifecycle (EOL). Thierry et al. (1995) stated that the quality standards of recovered products need to be corresponding to the original quality. The customers are expecting the original quality level from the returned product because it is resold. It can be challenging to set a new sales price on with returned products, because of the quality aspect (Ravi and Shankar 2005).

In general, without commitment by top management, strategic planning, and awareness of reverse logistics, the financial support of reverse logistics is absent. Further, lack of financial resources, contributes to less knowledge among employees, through lack of training and education. Information system is necessary to support the reverse logistics activities and are critical to integrate the participants in the supply chain. The barriers could contribute to increased costs and inefficient reverse logistics process (Ravi and Shankar 2005, Janse, Schuur, and de Brito 2009, Rogers et al. 1999, de Brito, Dekker, and Flapper 2005, Thierry et al. 1995).The reverse logistics process will further be described in section 2.6.

2.6 Reverse logistics process

The primary purpose of product recovery management is to recapture the economic value of a product by minimizing the quantities of waste (Thierry et al. 1995). de Brito and Dekker (2002) have created four staged model of the reverse logistics process.

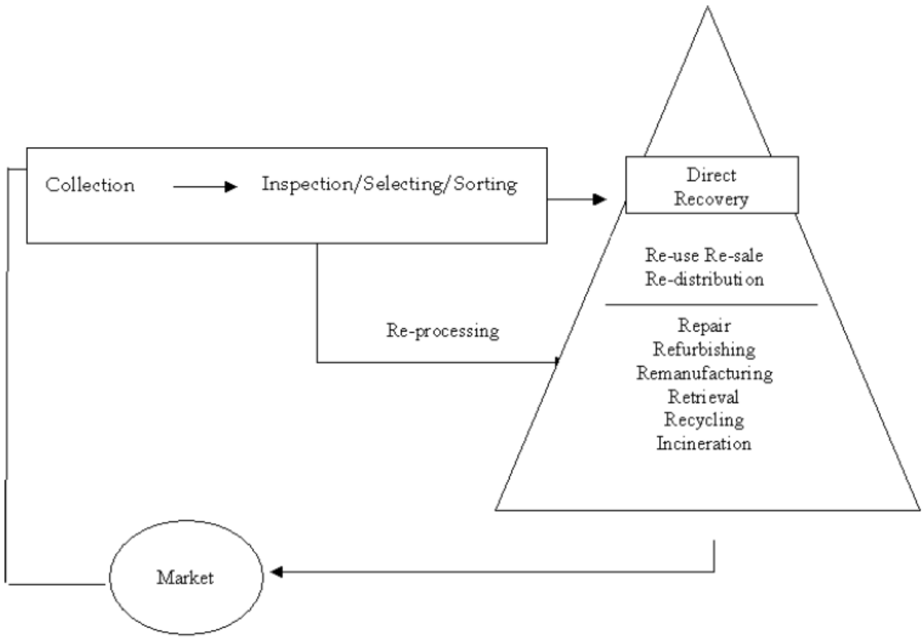

Figure 3 Reverse logistics process (de Brito and Dekker 2002)

The reverse logistics process model describes the four main steps as collection, inspection/sorting/selection, direct recovery or re-processing and re-distribution. The model also describes the stages more in detail and list the different handling solutions for returned products, and the describe the steps of reverse logistics as followed.

Collection

The collection is the first point of the reverse process of bringing the products from the consumer to the point of recovery (de Brito and Dekker 2002). The collection phase covers activities like gathering used products, or leftovers. The stage includes the transport of returned products to a location for examination and processing. The collection activities are in some degree needed because of legislation. In this stage, it is a high degree of uncertainty regarding where the products are located and needed to be collected. It is also uncertainty in the aspect of quantity and time of arrival (Bonev 2012).

Inspection/selection/sorting

At this stage, the products get inspected, selected and sorted. Based on their quality a decision is made regarding which type of recovery step it would follow. The products are sorted based on planned recovery options, and for every option, the products are sorted out based on the quality and which recovery option it belongs to (de Brito and Dekker 2002).

Direct recovery/re-processing

Direct recovery includes re-use, re-sale, and re-distribution. The reprocessing stage includes recovery options like repair, refurbishing, remanufacturing retrieval, recycling, and incineration (de Brito and Dekker 2002). The recovery options are different regarding the degree of upgrading needed, where repair is the easiest option and remanufacturing is the most costly and time-consuming option (Thierry et al. 1995).

Further, Thierry et al. (1995) listed and described the recovery options in this stage in the reverse logistics process:

Repair

The objective of repairing is to recover a used product to its original quality. The repair process involves repairing or replacement of broken parts. Repairing requires limited product disassembly and reassembly. Repair operations can be done at the customer location by a repair center (Thierry et al. 1995).

Refurbishing

Refurbishing is to recover products to a specific quality. Refurbishing can also include upgrading of the technological aspects of a product. It contributes to an improvement of the product quality and an extension of the lifecycle for a product (Thierry et al. 1995).

Remanufacturing

The objective of remanufacturing is to recover used products to a quality standard equivalent to a new product. In this process, stages such as disassembly and inspection of parts and modules are typical. The approved components and modules are assembled into remanufactured products (Thierry et al. 1995).

Cannibalization

In the other three recovery options, a product or components are recovered. In cannibalization, a smaller portion of a product is recovered and reused. The recovered components, are used as secondary components in other products (Thierry et al. 1995).

If companies want to extract value from reversed products, they need to go through the steps collection, inspection/selection/sorting and direct recovery/re-processing, as described. If a product needs re-processing, they need to find the best solution for recovering value from the product by deciding between repair, refurbishing, remanufacturing or cannibalization.

2.7 Reverse logistics activities

The primary use of the reverse logistics process is collecting damaged, unwanted, or outdated products. The process also includes packaging and shipping products to the end-consumer or resellers. A returned product face several recovery options. Rogers et al. (1999) listed some reverse logistics activities.

Table 2 Common reverse logistics activities (Rogers et al. 1999)

Material	Reverse Logistics Activities
Products	Return to Supplier Resell Sell via Outlet Salvage Recondition Refurbish Remanufacture Reclaim Materials Recycle Landfill
Packaging	Reuse Refurbish Reclaim Materials Recycle Salvage

According to Rogers et al. (1999), reverse logistics activities consist of products and packaging. The return products in reverse logistics have different reasons to be returned. The reasons include remanufacturing, refurbishment or a general customer return. Packaging returns are mainly going back because it is reusable, or it is regulations according to disposal.

Rogers et al. (1999) refer to the activities as disposition channels. The choice of the channels is regarding the condition of the product.

Return to supplier occurs because of defects, marketing returns, oldness or overstocks. Marketing returns appear when a supplier generates incentives for retailers to order higher quantities than necessary. It contributes to returns of products that the retailer cannot sell. If the returned merchandise defects, the typical action is to compensate the retailer. The compensation is given after an evaluation of the product and its condition (Rogers et al. 1999).

Resell is when unused or unopened products get returned. Resold products might need to be repacked during the process. Restrictions and legal concerns also determine if a product is resold. Outlets offer a new sales channel to resell products in a secondary market. It contributes to a certain control over the products and can guard their reputation and position. The outlet has become a source of profit, compared to other disposition alternatives (Rogers et al. 1999).

If a product is unable to be resold, the final option is disposal. Return logistics aims recapture the highest value of a product, but also dispose of the product at the smallest cost. Reclaim of materials arises if the product contains valuable metals, such as gold, and silver. In other situations, materials can be useful for scrap dealers (Rogers et al. 1999).

2.8 Closed-loop supply chain management

Closed-loop supply chain management has been defined as *"the design, control, and operations of a system to maximize value creations over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time."(Guide Jr and Van Wassenhove 2009).*

A closed-loop supply chain diverges from a traditional supply chain. It combines both a traditional forward supply chain and additional reverse logistics activities. A closed-loop supply chain aims to integrate the reverse logistics process and forward logistics to capture the value of all supply chain activities. The additional reverse logistics activities are product acquisition, transport, testing, sorting, disposition, refurbishing, and remarketing (Guide, Harrison, and Van Wassenhove 2003). The activities are described in section 2.6 and 2.7.

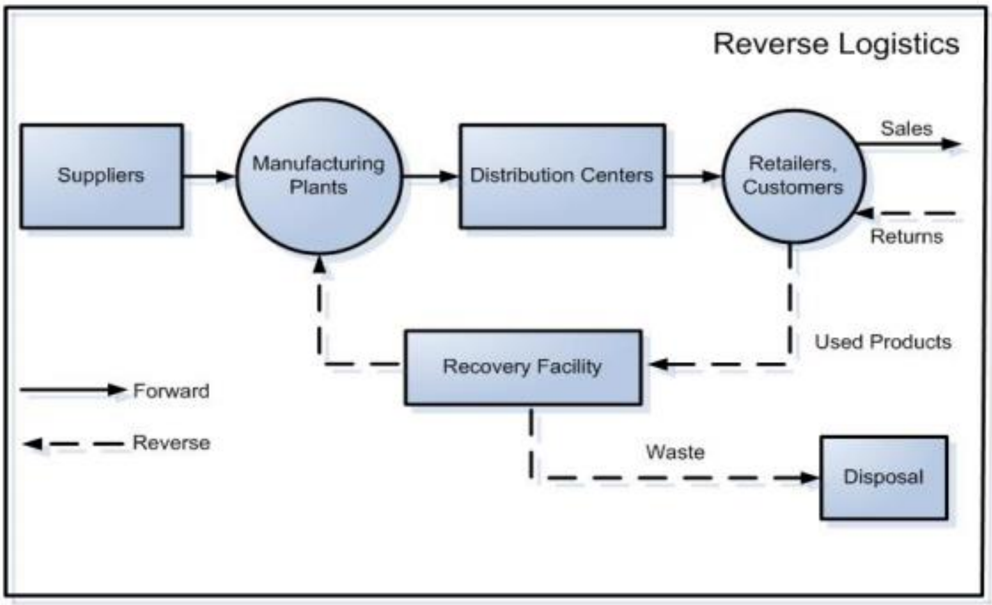

Figure 4 Closed-loop supply chain (Tonanont 2009)

The figure describes the components of a closed-loop supply chain, where suppliers, manufacturing plants, distribution centers, retailers/ customers and recovery facility are the key components (Tonanont 2009).

2.9 Types of returns

It exists several types of returns within reverse logistics. In this section, we will elaborate on the different kinds of returns relevant to this thesis. The following types is categorized as consumer returns, product recalls, environmental returns, and distribution returns. Further it also describes disposition strategies for consumer returns.

Consumer returns

Consumer and customer returns are referring to a similar definition. There are three reasons for consumer returns. Consumer returns could be a consumer returning a defect product, a consumer that is not satisfied with the product or regret the purchase (Rogers et al. 2002). Different types of consumer returns are consumer returns, such as reimbursement guarantees, warranty returns, service returns, EOU, and EOL returns. Reimbursement guarantees occur when a customer gets the opportunity to change their mind about the purchase. A warranty return occurs when a product is not meeting the quality standards that are perceived. The customer receives a new product or gets their money back. Service returns are product returns that customer does not have the right to get a substitute a product, a repair or maintenance service. EOU returns occurs in situations where the user of the product has an opportunity of a return in a particular life stage of the product. EOL returns are the products that are at the end of a life cycle, even in an economic or a physical perspective (de Brito and Dekker 2002).

The consumer return category is the return type with the highest return rate. One of the reasons why this is the largest category of returns are the lenient return policies companies offers the customers (Rogers et al. 2002).

Disposition strategy for consumer returns

When a firm receives returned products, it needs to determine which disposition strategy to use. The decision is highly dependent on the quality of the product, and there are several options for consumer returns. The products can be sold as a new product if the packaging of the returned product is sealed. Products with a broken seal go through testing and refurbishing before it is resold as a refurbished product. Another option is to sell the product through a specialized resell outlet store. The last option of customer return is EOL. If the product is damaged and not meet the required qualifications, it goes to an EOL facility for recovery of components and materials (Gupta 2013).

Product recalls

Product recalls are when a product does not follow the quality set by the producer or does not fulfill the legislation given by the government. This type of recall is hard to manage and require proper planning to conduct an effective recall. For product recalls, suitable tracking system and communication is crucial to maintaining them effectively, to inform the customers and handle the return (Rogers et al. 2002).

Environmental returns

According to Rogers et al. (2002) *"Environmental returns include the disposal of hazardous materials or abiding by environmental regulations."* Environmental returns are different from the other types of returns, because it needs to follow strict legislations given by the government. Legislations narrows down the options for how companies can transport, handle and dispose of a product.

Distribution returns

Wong et al. (2015) have defined distribution returns as "*Distribution based of reverse logistics is considered the returns of products due products are sold with a return option, wrong deliveries, or non-conformance to product specifications.*" de Brito and Dekker (2002) described distribution returns as product recalls, commercial returns, stock adjustment, and functional returns. Product recall occurs due to safety or health complications. If a product recall occurs, the manufacturers or the supplier usually is held responsible for the recall. Commercial returns are a type of product return where a buyer has a contractual clause to return the product to its origin – for example, wrong or damaged supplies. Stock adjustments occur when a part in a value chain re-distributes their stock. Functional returns are returns of products which has a function in both forward and reverse supply chain.

The most essential return type for e-commerce is consumer returns, which consist of customers returning defective products or regret purchases. Consumer returns are also the return type with the highest return rate due to lenient return policies (Rogers et al. 2002). For consumer returns, the disposition strategy is essential because it can determine the value companies can recover from the returned products.

2.10 Costs in reverse logistics activities

In logistical management, there are several costs, like procurement, warehousing, transportation, and information systems. An example of cost in logistical management is inventory management, where inventory handling resources and information systems are essential. Inventory handling resources includes the cost of operating a warehouse, like the cost of personnel and handling equipment. Information systems for handling products applies cost in terms of personnel cost and communication cost (Abdallah 2004). Guide Jr and Van Wassenhove (2001) describes that in management of product returns in reverse logistics, companies can control both the quality and quantity of product returns by setting a price the company is willing to pay for the products. Within reverse logistics, there are several indirect costs for returns. The different cost for returning a product could be the collection, transportation, storage, and sorting.

The costs in reverse logistics divide into operation- and capacity costs. Operation cost consists of direct costs related to the reverse logistics process and the support activities related to the process. Capacity costs involve costs activities of storage space, materials, transport equipment, and rental costs. In the stage of reprocessing, it consists of several indirect activities, like training and education, legal services, marketing analysis, administration, communication, and health, safety, and environmental activities. The reprocessing activities are not necessarily categorized as cost factor because it may not be billed. The activities are recorded as overhead costs (Kovács and Rikharosson 2006).

Table 3 Examples of costs associated with reverse logistics activities (Kovács and Rikharosson 2006)

Costs/Activities	**Collection**	**Inspection**	**Separation**	**Reprocessing**	**Disposal**	**Other/Support activities**
Personnel: Labour	Extra time needed to collect items	Time for registering items on arrival to facility Time for inspection of items Time for transportation of items from arrival facility to inspection facility	Time for separation of materials in item Time for registration of materials Time for transportation of items from inspection facility to separation facility	Time or reprocessing items and materials	Time for preparing items for disposal	Management and administrative costs including legal, accounting, personnel etc. management and administration Time needed to transport items and materials internally in the company between facilities
Personnel: Training	Special training of collection employees	Special training of inspectors	Special training of employees in separation	Special training of reprocessing employees	Special training for handling of disposal items	
Materials			Cost of materials needed for the separation processes	Cost of materials needed for the reprocessing processes	Cost of materials needed for the disposal processes	
Tools			Costs of tools needed for separation	Cost of tools needed for reprocessing	Cost of tools needed for disposal	
Consumables	Extra fuel due to weight of items or rerouted transport	Cost of transportation materials used such as palettes				
Capacity costs	Part of depreciation of trucks	Part of costs of storage capacity	Costs of separation facility or parts of facility costs if not separate from other facilities	Costs of reprocessing facility or parts of facility costs if not separate from other facilities	Costs of disposal facility or parts of facility costs if not separate from other facilities	Part of collective facility costs such as electricity, heating and lighting
Other	Take-back fees				Disposal fees	

The costs of a reverse logistics process are personnel labor, personnel training, materials, tools, consumables, capacity costs, and other. These costs affect the collection, inspection, separation, reprocessing, disposal and other/support processes (see table 3) (Kovács and Rikharosson 2006). These costs are related to the reverse logistics process described in section 2.6.

3.0 Introduction to case description and industry

In this section, we will describe the case more in detail, introduce the companies contributing to this thesis, and give a brief introduction to the industry.

3.1 Case description

We found, as mentioned in section 1.1 that the Norwegian e-commerce market is rapidly growing from year to year, with a 17 % increase from 2017 to 2018. It is estimated that the Norwegian e-commerce market will reach a turnover of around 144 billion NOK in 2018, according to DIBS (2018). In our research for existing literature, we found almost nothing concerning the actual economic impact returns have on reverse logistics in e-commerce. Reverse logistics in e-commerce is a little explored topic, and with the increasing growth in e-commerce in Norway we see this as an essential field to investigate. With this foundation, we have decided to develop a master thesis from 2018 further. Last year's master thesis was a case study on one company associated within e-commerce in Norway. They focused on the return management process where they investigated the company`s product return process and cost drivers in this process. They also developed a business process model and notation for the company`s return process, describing every step in the process (Hjelt and Ramella 2018).

To further develop last year`s thesis and take it a step further, we will investigate four companies involved in the Norwegian e-commerce market. We will analyze the economic impact reverse logistics has on the companies. An analysis of these companies could give a good indication of the costs the companies should have in mind in their work with reverse logistics improvements and cost savings.

3.2 The case companies

This section will give a brief introduction to the four companies involved in this thesis. They have provided us with valuable data and information regarding their reverse logistics process. To not disclose the company's names involved in this master thesis, we have decided to categorize the companies into company 1, 2, 3 and 4, and use C1, C2, C3 and C4 as an abbreviation.

3.2.1 Company 1

This company is in the segment of electrical articles. They operate within B2B and B2C, offering electrical items and installation materials for both professionals and the private market. The company is the largest supplier of electrical articles in the Norwegian e-commerce market, and they have both physical stores and an online store enabling the customer to choose the option that fits them the best. The returns from the online store account for the largest share of returns if we see the different storage departments as individual departments. C1 estimate that 57 % of their sales are B2C, while 43 % are B2C (Hjelt and Ramella 2018).

In recent years, they have experienced rapid growth. They face hard competition in the market, mostly from large wholesalers. C1 have a free return policy regarding returns within 60 days after purchase.

3.2.2 Company 2

C2 is in the beauty segment, and they are offering their customers a wide range of hair, make-up, skin care, and perfume products online. The company sells its products to the private market, as a B2C-company. In the market segment they compete in, they face direct competition from other companies, and the price is the most crucial competition factor. The company mention they face competition from online stores abroad. Their description fits with the results described in Postnord (2018). The company offers free freight on deliveries to its customers, while customers must carry the cost of returning a product. According to their return policy, ordered products which remain uncollected within 14 days, will be returned on the customers expenses. The customers have 14 days open return. C2 also has one physical store.

3.2.3 Company 3

C3 provides a wide range of products in the outdoor segment. The range of products they offer is outdoor, garden, garage and hobby articles. Earlier they were an online auction site, selling a wide range of products. They sell their products through an online store, as a pure e-commerce business. The company operates as a B2C-company. For the product range, they offer in their online store; they are the only company in the Norwegian e-commerce market offering this range of products. C3 describe that they, therefore, do not face direct competition in the Norwegian e-commerce market. The competition they face is mostly from companies providing substitutional products, both through online stores and physical stores.

The company offers free freight on smaller post items, while they offer a fixed low price on transportation for large products If customers want to return purchased products, their return policy state that the customers must carry the expenses for the return, it is a difference in the price of the return, depending on the size of the returned products. Postal goods have a small freight fee, while for large products; the customers must pay the freight fee equivalent to the freight fee for delivery. The return policy of C3 offers customers 14 days of open return.

3.2.4 Company 4

This company is involved in the clothing market, and they offer clothes and shoes for outdoor use through its online store. The company is a pure e-commerce company with no physical stores. The market the company is involved in is embossed by hard competition. It is hard to compete in this market segment, due to the large numbers of competitors offering the same kind of products, and it is hard to differentiate its products or compete on price. They offer its customers free freight on deliveries, while the customers carry the cost of returning products. According to C4s return policy, the customers have 14 days open return.

3.3 Industry

The four companies we are investigating are all well-known companies for customers in Norway, and they are all involved in the Norwegian e-commerce market. The companies are not competitors and does not operate within the same market segment. The market segments they are involved in are beauty, clothes, electronic articles, and outdoor equipment.

They all face competition from companies involved in the Norwegian market with both physical and online stores, and C1, C2, and C3 face competition from companies located abroad. In a report from PostNord regarding e-commerce and customer habits, they found that 39 % of Norwegian online shoppers bought products from companies abroad. Within the category clothes and shoes, which C4 is in, 26 % of the Norwegians online shoppers bought this from companies abroad. Clothes and shoes were the top commodity category of the products Norwegians buy online from companies located abroad. C2 is in the beauty and health category, and 13 % of Norwegian online shoppers bought beauty and health products abroad (Postnord 2018, 11). Even though C1 and C3 does not directly fall in under any of the categories in this report, it is difficult to ignore the fact that they do not face any competition from companies located abroad. Another report about the Norwegian e-commerce market in 2018 from DIBS (2018) shows that among those who shop online, 30 % shops' electronics online and preferable abroad. Norwegian online shoppers spend the most money on the category electronics. Consumers purchased electronics for 10 billion NOK online in 2017. C1 partly falls in under this category.

4.0 Quantitative research

This chapter will provide an insight into the method we will apply in the thesis. We will describe quantitative research, its strengths, and weaknesses since we will use this in the thesis.

According to Jacobsen (2005), the quantitative methodology is used when the researcher wants to find out the extent and frequency of a phenomenon, often with a large number of data to survey. After the data collection is conducted, the data will be analyzed, and the result would be presented in graphics and tables. Typical characteristics of quantitative research are that the research problem is possible to measure, not too broad and specific. The data is numerical, and the research should be conducted in a way that it is easy to replicate for other researchers. Quantitative research also follows a strict method for how the study should be performed (Creswell 2012, 13-16).

Johnson and Onwuegbuzie (2004) describes the quantitative approach and list their strengths and weaknesses. Some of the advantages they list are:

- *Useful for obtaining data that allow quantitative predictions to be made.*
- *The researcher may construct a situation that eliminates the confounding influence of many variables, allowing one to more credibly assess cause-and-effect relationship*.
- *Data collection using some quantitative methods is relatively quick.*
- *Data analysis is relatively less time-consuming.*
- *It is useful for studying large numbers.*

According to them, some of the weaknesses of the quantitative method are:

- *Knowledge produced may be too abstract and general for direct application to specific local situations, contexts, and individuals.*
- *The researchers' categories that are used may not reflect local constituencies 'understanding.*

We will use a quantitative research method since there are large numbers of data to survey from several companies. By using a quantitative research method, we can analyze the data, present it in tables, and show the cost of returns in reverse logistics. By presenting the analyzed data in tables, it also enables readers and us to see the economic impact our calculations have. Since the timeframe for writing the master thesis is relatively short, it is also beneficial that data collection and data analysis for the quantitative research method is relatively less time consuming than the qualitative method (Johnson and Onwuegbuzie 2004).

5.0 Research design

According to Kothari (2004) research design is defined as *"A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure"*. Research design is described as a corporation for collection, measurement, and analysis of data. Research design makes sure for maximal information efficiency with minimal effort in time and money use. The characteristics of a suitable research design are flexibility, efficiency and economically (Kothari 2004).

5.1 Case studies

A case study is referred to case history, and it is defined as a research strategy. It is an empirical analysis that aims to investigate a phenomenon in an actual context (Sachdeva 2009). A case study differentiates from other research designs, due to focus on a situation or a system, and an object with a commitment and function elements (Bryman and Bell 2015). The case study can be used in several contexts to add understanding of an individual, group, organizational, social, political, or a related phenomenon (Yin 2003). A case study can be divided into two groups, single, and multiple-case studies. These studies are based on a theoretical plan and are dependent on various sources (Sachdeva 2009).

One of the misconceptions related to case studies is that it is only applicable for qualitative research. Ellram (1996) states that *"While it is the norm, it is not absolute; therefore, it is not really a question of a survey being superior to a case study. Each serves a different purpose."* Based on this, we show evidence that we can combine quantitative research method with a case study research design. We will further elaborate what a multiple-case study is, since we will use this.

Multiple-case study design

Since this master thesis investigate the economic impact of reveres logistics in several companies, a multiple-case study design will be used. This design is an extension of a single case study, which involves only one case, where several cases are involved. A case study goes in-depth in a specific case, while a multiple-case study design goes in-depth in each case, but not in the same degree. One of the benefits of using a multiple-case study design is the possibility for researchers to compare the findings from each case with each other. A comparison of the findings will enable us to see what is unique with each case and what differs from the other cases (Bryman and Bell 2015, 71-72). Other advantages of multiple-case studies are how others perceive the research result. Since this type of study consists of an investigation of multiple cases, the research is viewed as more reliable and robust since it represents results from several cases (Herriott and Firestone 1983). Some of the disadvantages of multiple-case study are the number of resources and time required for conducting this type of research. Since this is time and resource consuming, it is not recommended to be only one researcher conducting a multiple-case study (Yin 2003).

5.2 Data collection

In this chapter, we will describe what secondary data is, and what we must be cautious of when collecting this data. Further, we will describe how we collected the data, the calculations, and the variables.

According to Kothari (2004), secondary data is previously published data, collected and processed by someone else. The data could be published or unpublished. Published data are available through many different sources. Examples on sources of secondary data are databases who publish journals, books, and articles, reports from universities and research scholars, and public records and statistics, and other open sources of published information. Unpublished data could be through sources, like letters, diaries, and biographies that are not published. Kothari (2004) states that *"Researchers must be very careful in using secondary data. He must make a minute scrutiny because it is just possible that the secondary data may be unsuitable or may be inadequate in the context of the problem the researcher wants to study."* It is essential to check the reliability of the data, ensure that the data can be used for our purpose, and finally that the data is not too broad or narrow for our purpose before we decide to use the data.

The secondary data in the theoretical framework is originating from previous literature. The previous research used is found through scientific papers, academic journals, books, and reports. We have tried to use scientific papers, articles, and reports with many citations, from well-established authors in the field of reverse logistics. The keywords we have used to find relevant literature are: Reverse logistics, E-commerce, Return logistics management, Return policy, Cost in reverse logistics, Economic impact

We have also collected secondary data for this thesis from the involved companies. The companies have generated reports from their enterprise resource planning (ERP) systems and shared the data with us. The data we received have varied a bit, but mainly the data we have received from them are return, sales, and uncollected products reports. The datasets from C1, C2, C3 and C4 contained data from 01.01.2018-31.12.2018.

5.3 Calculations and variables

When we received the datasets, we went through the datasets and searched for potential errors and noise that could contribute to incorrect results. Before we describe of the datasets, we must define the different types of returns the companies receive. We have categorized the different returns as “standard returns,” “complaint,” “uncollected,” and “other.” “Standard returns” are categorized as products were customers regretted the purchase or wanted to change the products. “Complaints” are products with faults. “Uncollected” are products customers have not collected within 14 days. The category “other” consists of products lost during transport, fraud, unknown, free products, and missing products.

The dataset for C1 contained 3 096 observations. The observations contained 1 514 orders with “standard returns,” 30 orders containing “complaints.” The dataset of “uncollected” products contained 303 observations. An order could contain one or more products. The total number of returns was 11 658, where standard return products were 11 108, complaints 247, and uncollected products 303. The dataset for C2 contained 154 observations and a total 22 942 products sorted in different categories, which we further categorized in “standard returns,” “complaints,” “uncollected,” and “other.” The dataset for C3 contained 291 observations, and a total of 5 263 products, sorted in the same categories as C2. The dataset for C4 contained 91 observations, and a total of 7 125 products sorted in the same categories as C2 and C3 (see table 4).

Table 4 Overview of total orders and returns

Overview of total returned orders and returns				
Orders	C1	C2	C3	C4
Orders containing returns	1 514			
Orders containing complaints	30			
Total orders	**1 544**			
Returns				
Standard returns	11 108	8 124	1 042	5 264
Complaints	247	3 716	2 283	678
Uncollected products	303	2 584	1 011	316
Other		8 518	1 287	867
Total returns	**11 658**	**22 942**	**5 623**	**7 125**

After cleaning the datasets from C1, C2, C3, and C4, we calculated the economic impact of these variables:

- Transportation cost
- Handling cost
- Redelivery cost
- Potential loss for standard returns

Through informal conversation with C1, we got an average handling cost per product. The average handling cost included both salary and operational cost. From C2, C3, and C4 we did not receive an average handling cost per product. Therefore, the average handling cost per product for C1 is used as in the calculations of the handling cost for C2, C3, and C4.

From further conversations with C1, we got the average transportation cost per packages. C1 have a free freight return policy. We have no information about how many items one package include on average. An order could contain several products, but it is unreasonable to assume that all of the products in an order goes back as a return. Therefore, we decided to calculate the transportation cost per product. Similar to C1, the calculations of transportation cost are per product. For C2, C3, and C4 the return policy states that the customers must pay the transportation cost of standard returns. The datasets show that the companies have actual cost for transportation of returns. Therefore, we have decided to use the actual cost, given in their datasets, to illustrate the transportation cost.

In the calculations, we started to illustrate the percentage returns of total products sold and the percentage of type of returns. We categorized the returns into the four categories, standard returns, complaint, uncollected and other. Further, we calculated the handling cost and transportation cost of the four return categories. Then we calculated the redelivery cost for complaints, and the total loss of profit for standard returns.

Percentage returns and types of returns

"Percentage returns" shows how many products each company have received in return, in percentage of total number of products sold in 2018. The "Types of returns" shows the share of different return types for each company in percentage of total returns.

Handling cost

For the calculations of "Handling cost," we have used an estimate given from C1 for the cost of handling a product, and it was used in the calculations for all the companies. The category "Other" was not included in the calculations because it does not generate a handling cost. The cost was calculated for the different return types, standard returns, complaint, and uncollected.

- Multiplied the total number of "standard returns," "complaint," "uncollected," and "other" with "Handling cost" per product.

Transportation cost

In the calculation of "Transportation cost" for C1, we have used estimated transportation cost of C1. The transportation cost was calculated per product. The datasets from C2, C3, and C4 gave the transportation costs, but we had to categorize them into the different return categories standard returns, complaints, and uncollected. "Other" was not calculated because it does not generate a transportation cost. The transportation cost was calculated as:

- Multiplied the "Transportation cost" per product with the number of products returned as "standard returns," "complaints," "uncollected," and "other."

Redelivery cost for complaints

In the calculations of redelivery cost for complaints, we have assumed that each complaint was replaced with a new product. Further, for C2, C3, and C4, the cost price was not given in the data sets. To estimate the cost price for complaint products for C2, C3, and C4, we found the percentage median C1 had between cost price and retail price for its products and then calculated the cost price for complaint products for C2, C3, and C4s. We used median instead of average since the average percent between cost price, and the retail price was unreasonably high. In the calculations, the “Transportation cost” in and out, “Handling cost” in and out, and the “Cost of replacing complaint products” was included.

- Total “Transportation cost” in/out + number of complaints multiplied with “Handling cost” in/out + “Cost of replacing complaint products” (cost price multiplied with complaints).

Total loss of profit for standard returns

C1 estimated that 80 percent of the standard returns can be sold as new again for retail price and that the remaining 20 percent are sold as second-hand products. C1 describes that the discount for second-hand products can vary from 50-70 percent of the retail price. We have calculated that 80 percent of “standard returns” are sold to the retail price, 10 percent are sold to 50 percent of the retail price, and 10 percent are sold to 30 percent of the retail price. C2, C3, and C4 estimated that 95 percent of the standard returns can be sold as new again for retail price, while the remaining 5 percent are given to charity. Therefore, we have calculated that 95 percent of “standard returns” are sold to retail price, while the remaining 5 percent is calculated to be a direct loss. We have also included “Transportation cost,” and “Handling cost” in the calculations.

Total loss of profit for standard returns for C1

- **Cost of products:** Total cost price of “standard returns.”
  - **Total cost price of products sold as new (80%)**: Total cost price of standard returns multiplied with 0,80.
  - **Total cost price of products sold as second-hand (10%):** Total cost price of standard returns multiplied with 0,10.
  - **Cost price of products sold as second-hand (10%):** Total cost price of standard returns multiplied with 0,10.
- **New sales price:** Total retail price of standard returned products.
  - **New sales price of products sold as new (80%):** Total retail price of standard returns multiplied with 0,8.
  - **New sales price of products sold as second-hand (10%):** (Total retail price of standard returns multiplied with 0,8) multiplied with 50%.

    - **New sales price of products sold as second-hand (10%):** (Total retail price of standard returns multiplied with 0,8) multiplied with 30%.
- **Transport cost:** Total transport cost of standard returned products.
    - **Total transport cost of standard returns products sold as new (80%):** Total transport cost of standard returns multiplied with 0,8.
    - **Total transport cost of standard returns products sold as second-hand (10%):** Total transport cost of standard returns multiplied with 0,1.
- **Handling cost:** Total handling cost of standard returned products.
    - **Total handling cost of standard returns products sold as new (80%):** Total handling cost of standard returns multiplied with 0,8.
    - **Total handling cost of standard returns products sold as second-hand (10%):** Total handling cost of standard returns multiplied with 0,1.
- **Loss of profit:** New sales price – ("Cost of products" + "Transport cost" + "Handling cost").

Total loss of profit for standard returns for C2, C3, and C4

- **Cost of products:** Total cost price of "standard returns."
    - **Total cost price of products sold as new (95%):** Total cost price of standard returns multiplied with 0,95.
    - **Total cost price of products given to charity (5%):** Total cost price of for standard returns multiplied with 0,05.
- **New sales price:** Total retail price of standard returned products.
    - **New sales price of products sold as new (95%):** Total retail price of standard returns multiplied with 0,95.
    - **New sales price of products given to charity:** - (Total retail price of standard returns multiplied with 0,05).
- **Transport cost:** Total transport cost of standard returned products.

    - **Total transport cost of standard returns products sold as new (95%):** Total transport cost of standard returns multiplied with 0,95.
    - **Total transport cost of standard returns products given to charity:** Total transport cost of standard returns multiplied with 0,05.
- **Handling cost:** Total handling cost of standard returned products.
    - **Total handling cost of standard returns products sold as new (95%):** Total handling cost of standard returns multiplied with 0,95.
    - **Total handling cost of standard returns products given to charity (5%):** Total handling cost of standard returns multiplied with 0,05.
- **Loss of profit:** New sales price – "cost of products" – "Transport cost" – "Handling cost".

6.0 Summary

Due to the arising e-commerce market and rapidly growing online sales, the industry saw the need for information regarding the economic impact for reverse logistics in e-commerce. There is also little previous research in reverse logistics, due to resistance from companies to share valuable data concerning their reverse logistics processes (Tonanont 2009). The research question in this thesis is to *investigate the economic impact for reverse logistics in e-commerce and how return policy affects the number of returns for four companies in the Norwegian e-commerce market*. This research has used concepts from theory within reverse logistics and in e-commerce, like concepts of reverse logistics, return management, and costs in reverse logistics to answer the research question of this thesis.

The companies contributed to this thesis are all involved in e-commerce, and are in the market segments of electrical articles, beauty, outdoor articles, and clothing. A quantitative approach was used as large numbers of data, possible to measure, have been surveyed. Further, the results have been presented in tables. Multiple-case study design was used since several cases are involved, and the findings are compared with each other, enabled us to see similarities and differences with the cases (Bryman and Bell 2015). Secondary data from 01.01.2018 to 31.12.2018 concerning return, sales, and uncollected product reports have been gathered from the involved companies, and this data was the basis for further calculations. In the investigation of the economic impact of reverse logistics for the four companies, the following variables were calculated: Handling cost, redelivery cost, and potential loss for standard returns.

6.1 Managerial implications

The theory presented in this thesis is essential for managers in companies involved in e-commerce because it can improve their insight in return logistical management, reverse logistics, its drivers and barriers, processes, and costs in reverse logistics activities. Further, the theory can give managers an indication of which actions they could take to improve their return activities. Especially the section describing the costs drivers in reverse logistical activities can provide valuable knowledge about the activities contributing to costs.

From the findings in the research paper the implications for management are that companies with lenient return policies and high return rates need to consider if they should head towards a more restrictive return policy. Our findings show that there are substantial differences in the economic impact of returns based on the company's return policy, especially for standard returns. To limit the economic impact of returns, a well-functioning return logistics management is needed, where the focus should be on return policy, return avoidance, gatekeeping, and disposition.

6.2 Limitations of the study

This research only studied four Norwegian companies, operating within Norway. Further, the study only concerned returns from e-commerce. The main limitation is the lack of possibility to compare our findings with previous research. Since we have no foundation to compare our results, we cannot say that our findings are transferrable to other e-commerce businesses. It is also difficult to compare the different results with each other, since the companies are in different market segments and have different characteristics. Another limitation is the differences in the datasets we received from the companies. We see that our calculations could include other costs that apply for returned products, like warehousing cost. From the datasets we were in the position of, we could not calculate this.

6.3 Further research

Future research could investigate the economic impact of reverse logistics for a more significant number of companies within e-commerce. Furthermore, future research could investigate the economic impact of reverse logistics for several companies in the same market segment, for example in fashion e-commerce. In the emerging e-commerce market, it would also be interesting to see research investigating if the economic impact of reverse logistics for e-commerce companies could be reduced by letting a third-party logistics company handle returns.

7.0 Research paper

Reverse logistics in e-commerce: A multiple-case study of four e-commerce companies

7.1 Abstract

Background: E-commerce is rapidly growing, and the focus on forward and reverse logistics is trending. A trend in Norwegian merchandise is that traditional retailers are moving into several channels. However, there is a lack of awareness about the actual cost of returns in e-commerce, and the industry has initiated a project to gain more knowledge on the economic impact of handling returns. This paper investigated the economic impact of reverse logistics in e-commerce of four Norwegian e-commerce companies.

Methods: Calculation of cost data from return- and sales reports by four Norwegian companies involved in e-commerce.

Results: The companies percentage returns vary from 0,71 and 3,22 percent, and there is a significant difference between them for which type of returns they receive. The total loss of profit for standard returns show substantial differences, varying from a positive profit of 3 880 NOK to a negative loss of 866 902 NOK per year.

Conclusion: Returned products have an economic impact on companies involved in e-commerce. The return policy and legislation affect the number of returns back to the companies. To recover value and reduce cost from standard returns, complaints, and uncollected products, well-established management for returns is necessary to keep the cost down. These results could give the companies an indication of the economic impact of returns and help the companies to manage and lower their costs of returns.

Keywords: Reverse logistics, E-commerce, Return logistics management, Return policy, Cost in reverse logistics, Economic impact

7.2 Introduction

Due to the growth of e-commerce, the focus on reverse logistics is increasing. The consumers have got their eyes up for the many advantages of e-commerce. Some of the advantages are lower price, availability, and a broader specter of products (DIBS 2018). A trend of today´s society is that people want to use less time on shopping and therefore chooses online sales channels. From a retailer perspective, a trend in Norwegian merchandise is that traditional retailers are moving into several channels (Virke 2018). In Norway, e-commerce has increased by 17 % from 2017 to 2018, and e-commerce sales contributed to a turnover of 144 billion NOK (DIBS 2018). A report from a Norwegian transporter Bring (2017) states that in the timeframe from 2012 to 2017, the number of consumers' that uses e-commerce multiple times each month has doubled. The trend is the same in the other Scandinavian countries for all age segments. The competition in the Nordic market is hard and drives the companies to make it easier for the consumer to buy online. That includes offering a free return policy. If the cost of returning products is too high for the customer, it can result in loss of sales for e-businesses (Bring 2017).

The relationship between reverse logistics and e-commerce is arising due to competition and advantages of reverse logistics. The advantages of reverse logistics in e-commerce could potentially gain economic profit, customer satisfaction, and the opportunity to recapture value (Kokkinaki et al. 2002). Yanyan (2010) describe that reverse logistics might be affected by uncertainty, complexity, and increased costs. This may indicate that e-commerce, requires a more proper reverse logistics system to manage the physical flow of return products. A challenge of e-commerce is that the customer can only view the products visually, which could lead to increased risk of return (Biswas and Biswas 2004).

This paper focus on the costs which occur for the companies in the reverse logistics process. The economic aspect is in an e-commerce industry perspective. The cost aspect of reverse logistics has not been focused much in the literature among researchers. However, in the literature authors have discussed reverse logistics and its attributes (Rogers and Tibben-Lembke 2001, de Brito and Dekker 2002, 2003, de Brito, Dekker, and Flapper 2005, Rogers, Lembke, and Benardino 2013, Ravi and Shankar 2005, Thierry et al. 1995). The researchers are touching the management, barriers, drivers, and activities of reverse logistics. It has been a need for more specific data on the topics of reverse logistic (Stock and Mulki 2009). One reason for little previous research in reverse logistics is due to resistance from companies to share valuable data concerning their reverse logistics processes (Tonanont 2009).

The purpose of this paper is to investigate the economic impact for reverse logistics in e-commerce and how return policy affects the number of returns for four companies in the Norwegian e-commerce market.

The paper proceeds as follows. The first section, a literature review, focusing on reverse logistics, e-commerce, and return policies. Next, a description of data collection, method, and calculations. Finally, a presentation of results and discussion.

7.3 Literature review

This section presents and discuss the literature regarding the difference between return and reverse logistics, reverse logistics, e-commerce and reverse logistics, and the return policy.

Reverse logistics

In the literature, The Supply Chain Council have distinguished the terms of return and reverse logistics. Returns are described as the process of returning goods, for different reasons (Council 2005). Rogers et al. (2002) comment that return considers the physical flow of products, and not include management activities. The difference between return and reverse logistics process, is that reverse logistics involve a process of planning, implementation, and controlling of the physical flow of goods (Revlog 1998, Rogers et al. 1999).

Previously studies have addressed the positive impact of reverse logistics and its importance due to product returns (de Brito and Dekker 2002). Reverse logistics has developed as a competitive necessity through more liberal return policies, shorter product lifecycles, and an increase in demand from customers (Daugherty, Autry, and Ellinger 2001). As reverse logistics is becoming a necessity among businesses, it has several positive impacts. According to Kokkinaki et al. (2002), the positive impacts of reverse logistics are environmental, increased competitive advantages, and the opportunity to recapture value. With competitive advantage, the researchers describe that efficient handling of returns can contribute to cost reduction, increasing profit, and superior customer satisfaction. The main drivers of reverse logistics are the economic aspect, legislation, and corporate citizenship. These drivers contribute to organizations willingness to accept returns and recover products. Organizations have more and more realized that the understanding of reverse logistics could give a competitive advantage (de Brito and Dekker 2002).

However, reverse logistics face different challenges and it is presented in the literature. Stuart et al. (2005) have characterized reverse logistics operations challenges with high backlogs, inefficiency, and additional material handling. Guide, Harrison, and Van Wassenhove (2003) presents global competition, short life cycles, environmental legislation, and lenient return policies as the main reasons for increasing returns. Further, the researchers intend that companies need a life cycle approach to integrate product returns into their business model (Guide, Harrison, and Van Wassenhove 2003). Other challenges of reverse logistics are lack of information and technological systems, company policies, financial resources, training and education, awareness about reverse logistics, strategic planning, integration of actors in the supply chain, and product quality (Ravi and Shankar 2005, Rogers et al. 1999). The lack of focus on the critical factors of reverse logistics by organizations affects both profit and customer service (Stock and Mulki (2009).

E-commerce and reverse logistics

In the literature, the relationship between reverse logistics and e-commerce are an interesting topic among researchers. E-commerce are characterized with high interactivity, 24/7 availability, and dependence of logistical practices and differentiates from traditional offline commerce (Schöder, Ding, and Campos 2016). Yanyan (2010) states that reverse logistics is a growing area in the e-commerce industry, and can contribute to economic profit, and customer satisfaction. However, they also state that reverse logistics in e-commerce meet challenges regarding that the consumers only can view the products visually. It is also confirmed by Biswas and Biswas (2004) that customers are incapable of examining the product and concerns about the risk of the purchase and time of delivery. Grewal, Iyer, and Levy (2004) mention the limitation of e-commerce growth and state that poor logistics is one of the primary limitations. The researchers further point out that the e-commerce actors pay more attention to forward product flow and that e-commerce businesses are not used to handle a large portion of returns. However, Yanyan (2010) discuss that both reverse logistics and e-commerce are dependent on each other for value creation and development. A research conducted in Germany investigated the high number of returns, and found that among consumers shopping online, 77% of the consumers had made a return. The high return rate was a consequence of offering free freight on returns (Morganti et al. 2014).

Return policy

The return policy is one of the most significant factors in return management and e-commerce. Mukhopadhyay and Setoputro (2004) state that the return policy practices vary in e-commerce. They further characterize the return policy as a tradeoff for e-businesses and a tool to increase revenue, and customer satisfaction. However, because of the limited view of the physical product, the role of return policy is a crucial factor in e-commerce and purchase behavior (Pei, Paswan, and Yan 2014). The return policy in e-commerce faces a higher risk of uncertainty due limited view. Therefore, the purchase behavior of consumers' is not only dependent on the retail price. Offering a generous return policy, decreases the consumer risk of purchase (Li and Jiang 2019).

The aspect of free delivery and return is a distinguishing factor in reverse logistics. According to Rogers et al. (1999), the primary aim of offering generous return conditions is to generate a marketing incentive to develop customer loyalty, increase sale, and repurchase. The findings by Lantz and Hjort (2013), discovered the opposite effect of the return policy. When offering a free return policy, it discovered a reduced average value of the order, increased the possibility of a return, and increased order frequency. The findings of Bower and Maxham III (2012) shows that a restrictive return policy could be profitable in a short-term, but it will decrease the possibility of repurchase. According to Davis, Hagerty, and Gerstner (1998), the return policy is advantageous to consumers that are unsure if the product is suitable for their needs. The researchers further describe the retailer advantage of free return policy as an opportunity to recapture value and increased sale.

7.4 Case presentation

This case consists of four companies involved in the Norwegian e-commerce market. Company 1 (C1) is in the segment of electrical articles, supplies both B2B and B2C market, and is the largest supplier of electrical articles in the Norwegian e-commerce market. They have both physical stores and an online store. They have a lenient return policy with 60 days of open return. Company 2 (C2) is a large company in the segment of beauty where they focus on the B2C market, mainly within e-commerce and through one physical store.

Company 3 (C3) is selling products in the outdoor segment, with a wide range of products from outdoor, garden, garage- and hobby articles. They are a pure e-commerce company. Company 4 (C4) is a pure e-commerce company that competes in a highly competitive market where they sell clothes and shoes for outdoor use. C2, C3, and C4 have a more restrictive return policy with 14 days open return.

7.5 Data

The companies have generated and shared reports from their ERP systems, containing data from 01.01.2018-31.12.2018. C1 shared its return, sales, and uncollected products reports, while from C2, C3, and C4 contributed with sales, and return reports.

The dataset for C1 contained 3 096 observations. The observations contained 1 514 orders with standard "returns," 30 orders containing "complaints." The dataset of "uncollected" products contained 303 observations. One order could contain one or more products. The total number of returns was 11 658, where standard return products were 11 108, complaints 247, and uncollected products 303. One observation could contain one or more products. The dataset for C2 contained 154 observations. The 154 observations contained in total 22 942 products sorted in different categories, which we further categorized in "standard returns," "complaints," "uncollected," and "other". The dataset for C3 contained 291 observations, and a total of 5 263 products, sorted in the same categories as C2. The dataset for C4 contained 91 observations, and a total of 7 125 products sorted in the same categories as C2 and C3. The number of products in each category are listed in Table 5.

Table 5 Overview of total orders and returns

Overview of total returned orders and returns				
Orders	C1	C2	C3	C4
Orders containing returns	1 514			
Orders containing complaints	30			
Total orders	**1 544**			
Returns				
Standard returns	11 108	8 124	1 042	5 264
Complaints	247	3 716	2 283	678
Uncollected products	303	2 584	1 011	316
Other		8 518	1 287	867
Total returns	**11 658**	**22 942**	**5 623**	**7 125**

7.6 Methods

From the datasets, it was possible to investigate the economic impact of handling, transport, redeliveries, and loss of profit for standard returned products. The analyses started with finding an overview of the percentage returns for each company, and further how many percent of each return type they had. The different returns are categorized as "standard returns," "complaint," "uncollected," and "other." "Standard returns" are categorized as products were customers regretted the purchase or wanted to change the products. "Complaints" are products with faults. "Uncollected" are products customers have not collected within 14 days. The category "other" consists of products lost during transport, fraud, unknown, free products, and missing products. The two steps of finding the percentage returns and the percent of each return type were done to have a basis for comparison between the companies. Further, we calculated transportation, handling-, and redelivery costs, and finally, the potential loss for standard returned products. For transportation cost the average transportation cost was per packages. An order could contain several products, but it is unreasonable to assume that all of the products in an order goes back as a return. Therefore, we decided to calculate the transportation cost per product.

Percentage returns and types of returns

"Percentage returns" shows how many products each company have received in return, in percentage of total number of products sold in 2018. The "Types of returns" shows the share of different return types for each company in percentage of total returns.

Handling cost

For the calculations of “Handling cost,” we have used an estimate given from C1 for the cost of handling a product, and it was used in the calculations for all the companies. “Other” was not calculated because it does not generate a handling cost. The cost was calculated for the different return types, standard returns, complaint, and uncollected:

- Multiplied the total number of “standard returns,” “complaint,” “uncollected,” and “other” with “Handling cost” per product.

Transportation cost

In the calculation of “Transportation cost” for C1, we have used estimated transportation cost of C1. The transportation cost was calculated per product. The datasets from C2, C3, and C4 gave the transportation costs, but we had to categorize them into the different return categories standard returns, complaints, and uncollected. “Other” was not calculated because it does not generate a transportation cost. The transportation cost was calculated as:

- Multiplied the “Transportation cost” per product with the number of products returned as “standard returns,” “complaints,” “uncollected,” and “other.”

Redelivery cost for complaints

In the calculations of redelivery cost for complaints, we have assumed that each complaint was replaced with a new product. Further, for C2, C3, and C4, the cost price was not given in the data sets. To estimate the cost price for complaint products for C2, C3, and C4, we found the percentage median C1 had between cost price and retail price for its products and then calculated the cost price for complaint products for C2, C3, and C4s. We used median instead of average since the average percent between cost price, and the retail price was unreasonably high. In the calculations, the “Transportation cost” in and out, “Handling cost” in and out, and the “Cost of replacing complaint products” was included.

- Total “Transportation cost” in/out + number of complaints multiplied with “Handling cost” in/out + “Cost of replacing complaint products” (cost price multiplied with complaints).

Total loss of profit for standard returns

C1 estimated that 80 percent of the standard returns can be sold as new again for retail price and that the remaining 20 percent are sold as second-hand products. C1 describes that the discount for second-hand products can vary from 50-70 percent of the retail price. We have calculated that 80 percent of "standard returns" are sold to the retail price, 10 percent are sold to 50 percent of the retail price, and 10 percent are sold to 30 percent of the retail price. C2, C3, and C4 estimated that 95 percent of the standard returns can be sold as new again for retail price, while the remaining 5 percent are given to charity. Therefore, we have calculated that 95 percent of "standard returns" are sold to retail price, while the remaining 5 percent is calculated to be a direct loss. We have also included "Transportation cost," and "Handling cost" in the calculations.

Total loss of profit for standard returns for C1

- **Cost of products:** Total cost price of "standard returns."
    - **Total cost price of products sold as new (80%)**: Total cost price of standard returns multiplied with 0,80.
    - **Total cost price of products sold as second-hand (10%):** Total cost price of standard returns multiplied with 0,10.
    - **Cost price of products sold as second-hand (10%):** Total cost price of standard returns multiplied with 0,10.
- **New sales price:** Total retail price of standard returned products.
    - **New sales price of products sold as new (80%):** Total retail price of standard returns multiplied with 0,8.
    - **New sales price of products sold as second-hand (10%):** (Total retail price of standard returns multiplied with 0,8) multiplied with 50%.
    - **New sales price of products sold as second-hand (10%):** (Total retail price of standard returns multiplied with 0,8) multiplied with 30%.
- **Transport cost:** Total transport cost of standard returned products.
    - **Total transport cost of standard returns products sold as new (80%):** Total transport cost of standard returns multiplied with 0,8.
    - **Total transport cost of standard returns products sold as second-hand (10%):** Total transport cost of standard returns multiplied with 0,1.
- **Handling cost:** Total handling cost of standard returned products.

        - **Total handling cost of standard returns products sold as new (80%):** Total handling cost of standard returns multiplied with 0,8.
        - **Total handling cost of standard returns products sold as second-hand (10%):** Total handling cost of standard returns multiplied with 0,1.
- **Loss of profit:** New sales price – (“Cost of products” + “Transport cost” + “Handling cost”).

Total loss of profit for standard returns for C2, C3, and C4

- **Cost of products:** Total cost price of “standard returns.”
    - **Total cost price of products sold as new (95%):** Total cost price of standard returns multiplied with 0,95.
    - **Total cost price of products given to charity (5%):** Total cost price of for standard returns multiplied with 0,05.
- **New sales price:** Total retail price of standard returned products.
    - **New sales price of products sold as new (95%):** Total retail price of standard returns multiplied with 0,95.
    - **New sales price of products given to charity:** - (Total retail price of standard returns multiplied with 0,05).
- **Transport cost:** Total transport cost of standard returned products.
    - **Total transport cost of standard returns products sold as new (95%):** Total transport cost of standard returns multiplied with 0,95.
    - **Total transport cost of standard returns products given to charity:** Total transport cost of standard returns multiplied with 0,05.
- **Handling cost:** Total handling cost of standard returned products.
    - **Total handling cost of standard returns products sold as new (95%):** Total handling cost of standard returns multiplied with 0,95.

- **Total handling cost of standard returns products given to charity (5%):** Total handling cost of standard returns multiplied with 0,05.
- **Loss of profit:** New sales price – “cost of products” – “Transport cost” – “Handling cost”.

7.7 Results

The total percentage returns the companies have from e-commerce in 2018 are given in table 9. C1 faces a return degree of 2,67 % (of total sold products) C2 have return a degree of 0,71 % (of total products sold), C3 have a return degree of 0,97 % (of total products sold) while C4 have 3,22 % (of total products sold). C1 and C4 have more returns than the other companies (see Table 6).

Table 6 Percentage returns

Percentage returns			
Company 1	Company 2	Company 3	Company 4
2,67 %	0,71 %	0,97 %	3,22 %

For C1 and C4, the percentage degree of “standard returns” was 95,28% and 73,88% (of total returns), while C2 and C3 had only 35,41% and 18,53%. For C3, the percentage degree of “complaints” (of total returns) was 40,60%, whereas for C1, C2, and C4 it only counted 2,12%, 16,20%, and 9,52%. For C2 and C3, the percentage degree of “uncollected” (of total returns) was 11,26% and 17,98%, while C1 and C4 were only 2,60% and 4,44%. For C2, C3, and C4 the percentage degree of “other” (of total returns) were 37,13%, 22,89%, and 12,17%, while C1 does not have “other” returns (see Table 7).

Table 7 Types of returns

Types of returns								
Company 1					Company 2			
Standard returns	Complaint	Uncollected	Other		Standard returns	Complaint	Uncollected	Other
95,28 %	2,12 %	2,60 %	0 %		35,41 %	16,20 %	11,26 %	37,13 %
Company 3					Company 4			
Standard returns	Complaint	Uncollected	Other		Standard returns	Complaint	Uncollected	Other
18,53 %	40,60 %	17,98 %	22,89 %		73,88 %	9,52 %	4,44 %	12,17 %

Total handling cost

"Total handling cost" for C1, C2, C3, and C4 were respectively 209 844 NOK, 259 632 NOK, 78 048 NOK, and 112 644 NOK. Total percentage handling cost of "standard returns" (of total handling cost) for C1, C2, and C4 were 95,28%, 56,32%, and 84,12%, whereas it only was 24,03% for C3. Total percentage handling cost of "complaint" (of total handling cost) for C2 and C3 were 25,76% and 52,65%. For C1 and C4 it was only 2,12% and 10,83%. Total percentage handling cost of "uncollected" (of total handling cost) for C2 and C3 were 17,91% and 23,32%. For C1 and C4, it was only 2,60% and 5,05% (see Table 8).

Table 8 Total handling cost

Handling cost								
Company 1					Company 2			
Standard returns	Complaint	Uncollected	Total		Standard returns	Complaint	Uncollected	Total
kr 199 944	kr 4 446	kr 5 454	**kr 209 844**		kr 146 232	kr 66 888	kr 46 512	**kr 259 632**
95,28 %	2,12 %	2,60 %	**100 %**		56,32 %	25,76 %	17,91 %	**100 %**
Company 3					Company 4			
Standard returns	Complaint	Uncollected	Total		Standard returns	Complaint	Uncollected	Total
kr 18 756	kr 41 094	kr 18 198	**kr 78 048**		kr 94 752	kr 12 204	kr 5 688	**kr 112 644**
24,03 %	52,65 %	23,32 %	**100 %**		84,12 %	10,83 %	5,05 %	**100 %**

Total transportation cost

"Total transportation cost" for C1, C2, C3, and C4 were respectively 666 480 NOK, 229 211 NOK, 288 212 NOK, and 190 905 NO. Total percentage transportation cost of "standard returns" (of total transportation cost) for C1, C2, and C4 were, 95,28%, 51,35%, and 82,95%, whereas it only was 20,97% for C3. Total percentage transportation cost of "complaints" (of total transportation cost) for C3 was 74,53%. For C2 and C4 was 38,38% and 13,99%, while it was only 2,12% for C1. Total percentage transportation cost of "uncollected" (of total transportation cost) for C1, C2, and C3 were 2,60%, 10,27%, and 4,50%, while it was only 3,06% for C4 (see Table 9).

Table 9 Total transportation cost

Total transportation cost								
Company 1					Company 2			
Standard returns	Complaint	Uncollected	Total		Standard returns	Complaint	Uncollected	Total
kr 666 480	kr 14 820	kr 18 180	**kr 699 480**		kr 117 701	kr 87 972	kr 23 538	**kr 229 211**
95,28 %	2,12 %	2,60 %	**100 %**		51,35 %	38,38 %	10,27 %	**100 %**
Company 3					Company 4			
Standard returns	Complaint	Uncollected	Total		Standard returns	Complaint	Uncollected	Total
kr 60 442	kr 214 791	kr 12 979	**kr 288 212**		kr 158 347	kr 26 716	kr 5 842	**kr 190 905**
20,97 %	74,53 %	4,50 %	**100 %**		82,95 %	13,99 %	3,06 %	**100 %**

Redelivery cost for complaints

Total redelivery cost for C1, C2, and C4 were 75 848 NOK, 379 808 NOK, and 116 196, while it was 1 091 601 NOK for C3. Total percentage "transportation cost in/out" (of total redelivery cost) for C1, C2, C3 and C4 were respectively 39,08%, 46,32%, 39,35%, and 45,98%. Total percentage "handling cost in/out" (of total redelivery cost) for C2 and C4 were 35,22% and 21,01%, while it was only 11,72% and 7,53% for C1 and C3. The total percentage "cost of replacing complaint products" (of total redelivery cost) for C1, C3 and C4 were 49,20%, 53,12%, and 33,01% while it was only 18,45% for C2 (see Table 10).

Table 10 Redelivery cost for complaints

Redelivery cost for complaints								
Company 1					**Company 2**			
Transportation cost in/out	kr	29 640	39,08 %		Transportation cost in/out	kr	175 943	46,32 %
Handling cost in/out	kr	8 892	11,72 %		Handling cost in/out	kr	133 776	35,22 %
Cost of replacing complaint products	kr	37 316	49,20 %		Cost of replacing complaint products	kr	70 089	18,45 %
Total	**kr**	**75 848**	**100 %**		**Total**	**kr**	**379 808**	**100 %**
Company 3					**Company 4**			
Transportation cost in/out	kr	429 581	39,35 %		Transportation cost in/out	kr	53 432	45,98 %
Handling cost in/out	kr	82 188	7,53 %		Handling cost in/out	kr	24 408	21,01 %
Cost of replacing complaint products	kr	579 832	53,12 %		Cost of replacing complaint products	kr	38 356	33,01 %
Total	**kr**	**1 091 601**	**100 %**		**Total**	**kr**	**116 196**	**100 %**

Total loss of profit for standard returns

"Total loss" for C1, C2, and C4 were 866 902 NOK, 136 198 NOK, 131 064 NOK, whereas C3 had a positive profit of 3 880 NOK. The "total loss of profit, 80% of products sold as new" for C1 was 451 521 NOK. Total loss of profit, "10% of the products sold as second-hand to a discount of 50% of sales price" for C1 was 182 482 NOK, and Total loss of profit, "10% of the products sold as second-hand to a discount of 70% of sales price" for C1 was 232 899 NOK. Total loss "95% of products sold as new" for C2 and C4 was 22 216 NOK and 19 117 NOK, whereas it was positive value for C3 of 75 436 NOK. Total loss of profit, "5% of products are given to charity" for C2, C3, and C4 were 113 982 NOK, 71 555 NOK, and 111 947 NOK (see Table 11).

Table 11 Total loss for standard returned products

Total loss of profit for standard returns

Company 1

Cost of products		New sales price 100 %	New sales price 50 %	New sales price 30 %	Transport cost	Handling cost	Loss of profit
80 % of products sold as new	kr 1 775 058	kr 2 016 677			kr 533 184	kr 159 955	-kr 451 521
10 % of products sold as second-hand	kr 221 882		kr 126 042		kr 66 648	kr 19 994	-kr 182 482
10 % of products sold as second-hand	kr 221 882			kr 75 625	kr 66 648	kr 19 994	-kr 232 899
						Total loss	**-kr 866 902**

Company 2

Cost of products		New sales price 100 %	New sales price 0 %	Transport cost	Handling cost	Loss of profit
95 % of products sold as new	kr 843 201	kr 1 071 722		kr 111 816	kr 138 920	-kr 22 216
5 % of products are given to charity	kr 44 379		-kr 56 406	kr 5 885	kr 7 312	-kr 113 982
					Total loss	**-kr 136 198**

Company 3

Cost of products		New sales price 100 %	New sales price 0 %	Transport cost	Handling cost	Loss of profit
95 % of products sold as new	kr 566 821	kr 717 494		kr 57 420	kr 17 818	kr 75 436
5 % of products are given to charity	kr 29 833		-kr 37 763	kr 3 022	kr 938	-kr 71 555
					Total loss	**kr 3 880**

Company 4

Cost of products		New sales price 100 %	New sales price 0 %	Transport cost	Handling cost	Loss of profit
95 % of products sold as new	kr 832 614	kr 1 053 942		kr 150 430	kr 90 014	-kr 19 117
5 % of products are given to charity	kr 43 822		-kr 55 471	kr 7 917	kr 4 738	-kr 111 947
					Total loss	**-kr 131 064**

7.8 Discussion

The results showed small differences in the percentage returns between the companies; however, C1 and C4 faced higher percentage returns than C2 and C3. Percentage returns ranged from 0,71% to 3,22%. This is low compared to the findings by Bernon, Cullen, and Gorst (2016), where clothing had an average return degree of 20%, electrical/technical had 8,0%, and home 8,5% for e-commerce. C4 is in the clothing segment, and they face the highest percentage returns. The percentage returns for C4 at 3,22% is lower than the findings of Cullinane et al. (2019) and Bernon, Cullen, and Gorst (2016), where the average returns for clothing were 25% and 20% in e-commerce.

High percentage returns could be explained by lack of information and could increase the probability of returns in e-commerce (Xu and Jiang 2009). However, our companies provide detailed product information and show product reviews from previous customers. Therefore, this could be a factor explaining the low percentage return for C1, C2, C3, and C4. Another reason for the low percentage returns could be the companies return policies. C1 have a more lenient return policy than C2, C3, and C4, which have a more restrictive return policy. According to the findings, C1 have a higher percentage of “standard returns” with 95,28%, compared to C2, C3, and C4 with respectively 35,41%, 18,53%, and 78,88%. This corresponds with the research by Davis, Hagerty, and Gerstner (1998), where they found that companies with restrictive return policies have fewer returns. However, C2, C3, and C4 have higher percentage “complaint” than C1. With respectively 2,12% “complaint” for C1, 16,20% for C2, 40,60% for C3, and 9,52% for C4. C3 have a higher degree of “complaints” and differ from the other companies. This may be explained by the high-value products they are selling, and it is reasonable that customers will complain on faulty products with high value. The percentage types of return show that the results for “uncollected” varies between 2,60% to 17,98%. Through informal conversations with C1, it was described that reasons for “uncollected” could be customers being on holiday, or that they forgot to pick up the products. The category “other” under percentage types of return show products that are not categorized as regular returns. C1 have 0 % of this type since they do not record this. C2 have 37,13%, C3 have 22,89%, and C4 have 12,17%. The reason for the high percentage of “other,” are likely to be caused by reasons beyond the companies’ control.

There were substantial differences in the handling cost, with C1 and C2 deviating from C3 and C4. The total handling cost for C2 was 259 632 NOK, while it was 209 844 NOK for C1, 112 644 NOK for C4 and 78 048 NOK for C3. C1 had the highest percentage handling cost for “standard returns” at 95,28%, which is corresponding to their lenient return policy with 60 days of open return. C2, C3, and C4 only offer 14 days of open return with respectively percentage handling cost of “standard returns,” by 56,32%, 24,03%, and 84,12%. This might be the most important reason for why C1 has the highest handling cost for “standard returns.” The return policy also affects the “Total transportation cost,” where it accounted for a total of 699 480 NOK for C1. It is over twice as high as C2 at 229 210 NOK. C4 had the lowest “Total transportation cost” at 190 905 NOK. As from the results, “standard returns” is the main driver of the total transportation cost as it stands for 95,28% of total returns for C1. Compared with C2, C3, and C4 that had respectively 51,35%, 20,97%, and 82,95%, it was a significant difference. This is because C1 face more “standard returns “and that they offer a lenient return policy.

The “redelivery cost for complaints” shows that C3 have substantially higher costs than C1, C2, and C4, with 1 091 601 NOK. C1 have the lowest “redelivery cost for complaints” at only 75 848 NOK. C2 had a total of 379 808 NOK, and 116 196 NOK for C4. The substantially differences between C3 and the other companies could be the high value on the products C3 is selling, the product quality and the customers knowledge of the products. We have no foundation for stating that the products have a lack of quality, but still it could be a significant factor. The most likely reason for the high number of complaints and the following costs are that customers are more likely to complaint on high-value products.

The results showed significant differences in total loss of profit for resold “standard returns.” The calculations showed that C1 had a total loss of 866 902 NOK, while C2 and C3 had 136 198 NOK and 131 064 NOK. The substantial differences between C1 and the other companies may, for this cost as well, be explained by the different return policies. C1 has a more lenient return policy, contributing to a higher volume of standard returns, which again led to higher transportation and handling cost. A restrictive return policy could decrease the number of standard returns, which further will decrease the loss of profit for C1. Another reason for the substantial differences is that C1 sell 80% of “standard returns” to 100% of the retail price, 10% of total “standard returns” to a discount of 50% and remaining 10 % to a discount of 70 % of the retail price. While C2, C3, and C4 sell 95% of “standard returns” to 100% of the retail price and the remaining 5% is given to charity and become a direct loss. The percent of “standard returns” sold as a new product is decisive for the differences in loss of profit. The result for C3 shows that they had a positive profit, by reselling “standard returns.” The fact that they go almost in zero may be due to their low “standard return” rate and restrictive return policy. The potential loss for standard returned products would have been much higher if the companies did not have a recovery process. The primary purpose of the recovery process is to recapture the economic value of a product by minimizing the quantities of waste (Thierry et al. 1995). It shows the importance of reverse logistical management, and the economic impact returns have on the companies.

The results show the economic impact of allowing returns. In return management by Rogers et al. (2002), the return policy affects the economic impact on the companies, due to the transportation, handling-, and redelivery cost. The legislation aspect of reverse logistics is a primary driver of return (de Brito and Dekker 2003). This case is not an exception, where the companies are regulated by the cancelation act (Lovdata 2014). In general, both legislation and return policy contributes to returns and are primary drivers of the economic impact of reverse logistics in e-commerce.

7.9 Limitations

We experience some limitations concerning this study. This research only studied four Norwegian companies, operating within Norway. Further, the study only concerned returns from e-commerce. The main limitation is the lack of possibility to compare our findings with previous research. Since we have no foundation to compare our results, we cannot say that our findings are transferrable to other e-commerce businesses. It is also difficult to compare the different results with each other, since the companies are in different market segments and have different characteristics. Another limitation is the differences in the datasets we received from the companies. We see that our calculations could include other costs that apply for returned products, like warehousing cost. From the datasets we were in the position of, we could not calculate this.

7.10 Conclusion

In this paper, we have investigated the economic impact of reverse logistics in e-commerce. This study was initiated by the industry to gain more knowledge about the actual cost of returns in e-commerce, due to the rapid growth in e-commerce. After initial research we found little literature concerning this topic.

The companies involved in the paper is in the segments of clothing, electronic articles, beauty, and outdoor articles. Even though we only had four companies involved in this thesis, we have shown the different costs related to transportation, handling, redelivery, and the potential loss the companies face from standard returns. The output from the calculations also includes cost related to standard returns, complaints, and uncollected products. The results show that return policy, legislation, and the segment the companies belong to are all affecting the costs of returns.

We conclude that returned products have an economic impact on companies involved in e-commerce. Further, we also see that return policy and legislation affect the number of returns. Companies should be clear on the economic impact of returns. To recover value and reduce cost from standard returns, complaints, and uncollected products, well-established management for returns is necessary to keep the cost down.

The implications for management are that companies with lenient return policies and high return rates need to consider if they should head towards a more restrictive return policy. Our findings show that there are substantial differences in the economic impact of returns based on the company's return policy, especially for standard returns. To limit the economic impact of returns, a well-functioning return logistics management is needed, where the focus should be on return policy, return avoidance, gatekeeping, and disposition.

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